

TOWN OF PLYMOUTH
PROCUREMENT DIVISION
11 LINCOLN STREET
PLYMOUTH, MASSACHUSETTS 02360

BID 21601, WHARF REPLACEMENT PROJECT

Issued: January 7, 2016
Pre-Bid: January 15, 2016, at 2:00 p.m.
Due: January 22, 2016, at 11:00 a.m.



TABLE OF CONTENTS

<u>Title</u>	<u>Page</u>
A. Invitation To Bid	2
Contract Period	2
Rule for Award	2
Bid Deposit	2
Pre-Bid Conference	2
MA Highway Prequalification	3
Prevailing Wage Rates	3
Labor and Materials Bond	3
Performance Bond	3
B. General Information	4
C. Contract Award	7
D. Insurance Requirements	8
E. Withdrawal of Bids	9
F. Bid Status Information	10
G. Bid Questions	10
Special Conditions	11
Owner/Contractor Agreement	16
Contractual Liability Form	32
ATTACHMENT 1: Technical Specifications and Plans	34
01300 Submittals	36
01500 Temporary Facilities and Controls	39
01600 Products	43
01700 Project Closeout	45
02000 Site Preparation	47
02110 Demolition	54
02210 Earthwork	56
02317 Round Timber Piles	64
02500 Drainage System	71
03000 Reinforced Concrete	77
05500 Metal Fabrications	90
05600 Miscellaneous Metals	93
06130 Heavy Timber Construction	96
06310 Timber Treatment	99
16000 Electrical	101
APPENDIX A: REGULATORY PERMITS AND CONDITIONS	166
ATTACHMENT 2: Commonwealth of Massachusetts Prevailing Wage Rates	248
BID FORMS	



TOWN OF PLYMOUTH
11 Lincoln Street
Plymouth, Massachusetts 02360

January 7, 2016

INVITATION FOR BID 21601

A. INVITATION

Sealed bids are requested by the Town of Plymouth construction of new wharf in Plymouth Harbor.

Specifications and bid forms are available electronically online by registering at <http://www.plymouth-ma.gov/current-bids> and in the Procurement Office, 11 Lincoln St, Plymouth, MA, 02360, for a refundable deposit of \$100.00 and non-refundable mailing fee of \$50.00 or pre-paid shipping voucher. The office hours are M-F 7:30 a.m.-4:00 p.m. Call first for availability at 508-747-1620 x210.

Bids are to be submitted by 11:00 a.m., Friday, January 22, 2016, at which time they will be publicly opened and read. Postmarks will not be considered. All bids must be sealed and made upon forms furnished by the Procurement Division. Bids submitted on any other form will not be accepted as valid bids. Envelopes should be clearly marked "Bid 21601, Wharf Replacement".

All bids are subject to the provisions of M.G.L. Chapter 30, §39M, and these bid and contract documents.

Contract Period:

The agreement shall be for the period of contract execution through December 31, 2016. as specified in the agreement.

Rule for Award:

The contract will be awarded to the responsive, responsible and eligible bidder offering the lowest total bid price, including alternates, if any, selected by the Town.

Bid Deposit:

Bid deposit is required in the amount of five percent (5%) of the total amount of the bid, including any and all alternates. Such bid deposit shall be in the form of a Cashier's, Certified, or Bank Treasurer's check payable to the Town of Plymouth or a bid bond from a licensed surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Town. All bid deposits except for those of the three lowest responsible and eligible bidders shall be returned within seven days of contract award. The remaining bid deposits will be returned upon execution of a contract and presentment of all bonds by the successful low bidder.

Pre-Bid Conference:

Any person interested in submitting a bid is encouraged to inspect the premises. Arrangements have been made for such inspections on Friday, January 15, 2016, at 2:00 p.m. All potential bidders should meet at

the T-Wharf off Water Street. All inspections are to be completed during that time. Notwithstanding whether a bidder performs such an inspection, each bidder shall be deemed to have done so, and to be aware of any and all matters that are reasonably discernable from such an inspection.

MA Highway: N/A

Prevailing Wage Rates:

This bid is subject to Section 39M of Chapter 30 and Sections 26 to 27G and Section 29 of Chapter 149 of the Massachusetts General Laws as amended, including prevailing wage rates as determined by the Commissioner of Labor and Industries that must be paid on this contract.

A copy of said rates is contained herein. Each Contractor and/or subcontractor shall preserve its payroll records for a period of three (3) years from the date of completion of the contract, and shall furnish to the Commissioner within fifteen (15) days a statement of compliance, a copy of which is enclosed herein. In addition, each contractor and/or subcontract must submit a copy of their weekly payroll records to the Procurement Division on a weekly basis. A copy of the Weekly Payroll Report Form that is to be used in also included herein.

Prevailing wage rate sheets shall be updated annually. The contractor shall not be eligible for an adjustment to the contract price on account of any changes in the prevailing wage rates applicable to the project.

Labor and Materials Bond:

This bid is subject to Section 39M of Chapter 30 and Sections 26 to 27G and Section 29 of Chapter 149 of the Massachusetts General Laws as amended, including the requirement for a payment bond. The successful bidder must furnish a bond in an amount of One Hundred Percent (100%) of the total contract price for payment of labor performed or furnished and material used or employed therein, payable to the Town of Plymouth, issued by a responsible surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Town, the premiums of which are to be paid by the Contractor and included in the bid price.

Performance Bond:

The successful bidder must furnish a One Hundred Percent (100%) Construction performance Bond, payable to the Town of Plymouth, issued by a responsible surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Town, the premiums of which are to be paid by the Contractor and included in the bid price.

GENERAL INFORMATION

A. GENERAL CONDITIONS

1. All bids shall be based on the quantities set forth in the Invitation for Bid. These quantities shall be used as a basis for comparison of the bids. The quantities are based on estimates of the work to be performed during the term of this Contract; however, the Town does not expressly or by implication agree or warrant that the actual amount of work will correspond with such estimates and the Town reserves the right to increase or decrease the amount of any class or portion of the work as it may deem necessary, without change of price per unit, which unit prices shall be used for increases and decreases (credits) for adjustments in the quantity of work required.
2. The Town of Plymouth reserves the right to reject all bids, to waive informalities, to advertise for new bids and, if the Invitation for Bids states that more than one contract may be awarded, to split awards as may be deemed to be in the best interests of the Town. The contract or contracts will be awarded by the Town within thirty (30) business days after opening bids. The Town reserves the right to require samples of materials for inspection and testing.
3. All words, signatures and figures submitted on the bid shall be in ink. Bids which are conditional, obscure or which contain additions not called for, erasures, alterations or irregularities, or any prices which contain abnormally high or low prices for any item, may be rejected. More than one bid from the same bidder will not be considered.
4. Each bid is subject to Section 39M of Chapter 30 and Sections 26 to 27G and Section 29 of Chapter 149 of the Massachusetts General Laws as amended, including but not limited to the following:

a. Prevailing Wage Rates

Prevailing wage rates as determined by the Commissioner of Labor and Industries must be paid on this contract. A copy of said rates is contained herein. Each Contractor and subcontractor shall preserve its payroll records for a period of three (3) years from this date of completion of the contract, and shall furnish to the Owner within fifteen (15) days of completion of its portion of the work a statement of compliance, a copy of which is enclosed herein. In addition, each contractor and/or subcontractor must submit a copy of their weekly payroll records to the Town Manager's Office on a weekly basis. A copy of the Weekly Payroll Report Form that is to be used in also included herein.

Prevailing wage rates will be updated annually; however, the contractor shall not be entitled to any additional compensation on account of any adjustments in such rates.

b. Performance Bond

The successful bidder must furnish a Construction Performance Bond, payable to the Town of Plymouth, issued by a responsible

surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Town, the premiums of which are to be paid by the Contractor and included in the bid price.

c. Payment Bond

The successful bidder must furnish a bond for payment of labor performed or furnished and material used or employed therein, payable to the Town of Plymouth, issued by a responsible surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Town, the premiums of which are to be paid by the Contractor and included in the bid price.

5. Each bid shall be accompanied by a bid deposit in the amount of 5 percent of the total bid price, including any alternates. Such bid deposit shall be in the form of a cashier's check, certified check, or bank treasurer's check payable to the Town of Plymouth or a bid bond from a licensed surety company qualified to do business in Massachusetts and satisfactory to the Town. Failure to include this bid deposit will result in the rejection of the bid. Such deposits will be returned to all except the three lowest responsible and eligible bidders within seven (7) days of contract award. The remaining bid deposits will be returned after the Town and the successful bidder have executed the Contract, and such bidder has furnished all required bonds. In case of default, the bid deposit shall be forfeited to the Town.
6. The successful bidder shall comply with all applicable federal, state, and local laws and regulations.
7. The Town's policy on awarding bids to bidders with identical prices states: "When bids for goods and services are requested and received by the Town, the award is made to the lowest responsive and responsible bidder. If two or more bid prices are identical and all tied bidders are responsive and responsible, an award will be made according to the first of these three conditions to apply:
 1. Past service to the Town; if one of the tied bidders has provided this or similar service in a satisfactory manner in the past, it will be awarded to that bidder;
 2. A bidder based in Plymouth
 3. Random selection - flip of a coin or drawing of more than two are tied."

Each bidder, by submitting a bid, agrees to the above policy and its use in the event of a tie.

8. Purchases made by the Town are exempt from sales taxes and bid prices must exclude any such taxes. Tax exemption certificates will be furnished upon request.
9. Oral orders are not binding on the Town and deliveries made or work done without formal Purchase Order or Contract are at the risk of the Seller or Contractor and may result in an unenforceable claim.
10. "Equal" - An item "equal" to that named or described in the specifications of the contract may be furnished by the Contractor

and the naming of any commercial name, trademark, item or manufacturer not mentioned by name or as limiting competition, but shall establish a standard of equality only. An item shall be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the specifications. The name and identification of all materials other than the one specifically named shall be submitted to the Town for approval, prior to purchase, use or fabrication of such items. Subject to the provisions of Section 39J of Chapter 30 of the Massachusetts General Laws, approval shall be at the sole discretion of the Town, shall be in writing to be effective, and the decision of the Town shall be final. The Town may require tests of all materials so submitted to establish quality standards at the Contractor's expense. All directions, specifications and recommendations by manufacturers for the installation, handling, storing, adjustment and operation of their equipment shall be complied with; responsibility for proper performance shall continue to rest with the Contractor.

For the use of material other than the one specified, the Contractor shall assume the cost of and responsibility for satisfactorily accomplishing all changes in the work as shown or as necessary. If no manufacturer is named, the Contractor shall submit the product for intended use for approval of the Town.

Except as otherwise provided for by the provisions of Section 39J of Chapter 30 of the Massachusetts General Laws, the Contractor shall not have any right of appeal from the decision of the Town condemning any materials furnished if the Contractor fails to obtain the approval for substitution under this clause. If any substitution is more costly, the Contractor shall pay for such costs.

11. No charges will be allowed for packing, crating, freight, express, transportation, shipping or cartage. Delivery location shall be as specified in the Contract or on the Purchase Order.
12. In addition to any other rights, remedies, and warranties available to the Town: The Contractor warrants that its work shall be free of defects in materials and workmanship for a period of one year from the date of final completion/acceptance, and shall replace, repair or make good, without costs to the Town, defects or faults arising within such one (1) year period.
13. The Contractor shall not discriminate against any person on the grounds of race, color, marital status, physical disability, age, sex, sexual orientation, religion, ancestry, or national origin in any manner prohibited by the laws of the United States, the Commonwealth, or the Town of Plymouth.
14. If funds under G.L. c. 90 are used to pay for any of the Work, a Price Adjustment clause for Hot Mix Asphalt Mixtures shall apply to the contract. (If such funds are not used, this provision

shall not apply.) Municipalities are required to include price adjustment clauses for diesel fuel, gasoline, liquid asphalt, Portland cement concrete, structural steel and reinforcing steel in the bid documents of all construction contracts funded by the Massachusetts Chapter 90 Program.

This provision applies to all hot mix asphalt mixtures containing liquid asphalt.

The base price of liquid asphalt on the project will be a fixed price based on the date of bid opening per ton, which includes State Tax.

The price adjustment will be based on the variance in price for the liquid asphalt component only from the base price to the Period Price. It shall not include transportation or other charges.

The Period Price for Hot Mix Asphalt for a two month period (FOB Terminal) will be determined and published by the Massachusetts Highway Department (www.mhd.state.ma.us) by averaging the prices posted at the beginning, middle, and end of each two month period by two or more suppliers.

The contract price of the hot mix asphalt mixture will be paid under the respective item in the contract. The price adjustment, as herein provided, upward and downward, will be made as work is performed, using the most recent previous price adjustment Item until the applicable Period Price is established.

The asphalt content for hot mix asphalt mixtures shall be 5.5% (0.055) by weight regardless of percentages established by the Job Mix Formula as described in Material Section M3.11.03 of the Standard Specification.

The price adjustment will be a separate payment item. It will be determined by multiplying the number of tons of hot mix asphalt placed during each previous two month period by asphalt content percentage (0.055) times the variance in price between base price and Period Price of asphalt.

No price adjustment will be allowed beyond the completion date of the contract, unless there is an approved extension of time by the municipality.

B. CONTRACT AWARD

Award of this bid will be made to the bidder who offers the lowest price(s) and who is deemed responsive, responsible and eligible. Determination of responsiveness and responsibility and eligibility shall be based solely on the following criteria:

1. Bidders will be deemed responsive if they complete all required forms as included in the attached bid form package to the satisfaction of the Town.

2. A bidder will be deemed responsible and eligible if:
 - (1) its bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work;
 - (2) it shall certify, that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work;
 - (3) it shall also certify that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee;
 - (4) where the provisions of section 8B of chapter 81 apply, the bidder shall have been determined to be qualified thereunder; and
 - (5) if the bidder obtains within 10 days of the notification of contract award the security by bond required under section 29 of chapter 149;
 - (6) it can demonstrate it has 10 years' experience in construction of wharf and pier structures by providing a description of past projects with names and contact information of references.

C. INSURANCE REQUIRMENTS

1. The Contractor shall carry and continuously maintain until completion of the Contract, insurance as specified below and in such form as shall protect him performing work covered by this Contract, or the Town of Plymouth and its employees, agents and officials, from all claims an liability for damages for bodily injury, including accidental death, and for property damage, which may arise from operations under this Contract. The Contractor covenants and agrees to hold the Town and its employees, agents and officials harmless from loss or damage due to claims for personal injury and/or property damage arising from, or in connection with operations under this Contract.
2. Except as otherwise stated, the amounts of such insurance shall be for each policy, not less than:
 - 1) **General Liability** of at least \$1,000,000 Bodily Injury and Property Damage Liability, Combined Single Limit with a \$3,000,000 Annual Aggregate Limit. **The Town shall be named as an "Additional Insured".** Products and Completed Operations should be maintained for up to 3 years after the completion of the project.

- 2) Automobile Liability of at least \$1,000,000 Bodily Injury and Property Damage per accident. **The Town shall be named as an "Additional Insured".**
- 3) Workers' Compensation Insurance as required by law, including Employers Liability Part B.
- 4) Builders' Risk Property Coverage for the full insurable value (completed value) of the portion of the Wharf under construction to include the existing Wharf structure. It should include "All Risk" insurance for physical loss or damage including theft.
- 5) Property Coverage for materials and supplies being transported by the contractor, as the Town's Property Contract provides coverage for personal property within 1,000 feet of the premises.
- 6) Umbrella Liability of at least \$2,000,000/occurrence, \$2,000,000/aggregate. **The Town shall be named as an Additional Insured.**

3. All policies shall be so written that the Owner will be notified of cancellation or restrictive amendment at least fifteen (15) days prior to the effective date of such cancellation or amendment. A certificate from the Contractor's Insurance Carrier showing at least the coverage and limits of liability specified above and expiration date shall be filed with the Owner before operations are begun.

4. Such certificates shall not merely name the types of policy provided, but shall specifically refer to this Contract and shall state that such insurance is required by this Contract. The Contractor shall make no claims against the Town of Plymouth or its officers for any injury to any of his officers or employees or for damage to its trucks or equipment arising out of work contemplated by this Contract.

5. The Contractor shall, to the maximum extent permitted by law, indemnify and save harmless the Town of Plymouth, its officers, agents and employees from and against any and all damages, liabilities, actions, suits, proceedings, claims demands, losses, costs and expenses (including reasonable attorney's fees) that may arise out of or in connection with the work being performed or to be performed by the Contractor, his employees, agents, sub-contractors or materialmen. The existence of insurance shall in no way limit the scope of this indemnification. The Contractor further agrees to reimburse the Town of Plymouth for damage to its property caused by the Contractor, his employees, agents, sub-contractors or materialmen, including damages caused by his, its or their use of faulty, defective or unsuitable material or equipment, unless the damage is caused by the Town of Plymouth's gross negligence or willful misconduct.

D. WITHDRAWAL OF BIDS

Except as hereinafter expressed provided, once a bid is submitted and

received by the town, the bidder agrees that he may not and will not withdraw it within thirty (30) days (Saturdays, Sundays, and legal holidays excluded) after the actual date of the opening of proposals.

Upon proper written request and identification, bids may be withdrawn only as follows:

- a. at any time prior to the designated time for the opening of proposals;
- b. after the designated time for the opening of bids, a bid may be withdrawn only after a contract has been signed by the successful general bidder and Owner and such bidder has furnished all required bonds. Otherwise, a bidder withdrawing its bid after such designated time shall forfeit its bid deposit.

Unless a bid is withdrawn as provided above, the bidder agrees that its bid shall be deemed open for acceptance until a contract has been executed with the low bidder and such bidder has furnished all required bonds, or until the town notifies the bidder in writing that his bid is rejected or that the town does not intend to accept it, or returns his bid deposit. Notice of acceptance of a bid shall not constitute rejection of any other bid.

E. BID STATUS INFORMATION

Addenda: If you received bid documents directly from the Town, and provided the Town with an address for delivery of addenda, the Town intends to deliver a copy of each addendum to you at such address, but the Town shall not be responsible for any failure of a bidder to receive any addenda. Notwithstanding the foregoing, bidders are solely responsible to check for and confirm their receipt of any addenda in advance of the bid deadline.

Bid results will be made available over the Internet at
<http://www.plymouth-ma.gov/bid-results>. Bid results will not be provided over the phone.

Notification of award of contract will be mailed to all bidders.

F. BID QUESTIONS

Please contact Pamela D. Hagler, Procurement Officer, at 508-747-1620 ext. 107, if you have any questions on the bid process. Questions regarding the project or the specifications must be submitted in writing and faxed to 508-830-4133 or emailed to phagler@townhall.plymouth.ma.us five (5) days before bid opening.

At the discretion of the Town, questions will be answered by written addenda. Bidders may not rely upon oral responses to questions, and may rely solely upon written addenda, if any.

SPECIAL CONDITIONS

EQUIPMENT:

THE CONTRACTOR SHALL FURNISH EQUIPMENT WHICH WILL BE EFFECTIVE, APPROPRIATE AND LARGE ENOUGH TO SECURE A SATISFACTORY QUALITY OF WORK AND A RATE OF PROGRESS WHICH WILL ENSURE THE COMPLETION OF THE WORK WITHIN THE TIME STIPULATED IN THE BID FORM. IF AT ANY TIME SUCH EQUIPMENT APPEARS TO THE TOWN TO BE INEFFICIENT, INAPPROPRIATE OR INSUFFICIENT FOR SECURING THE QUALITY OF WORK REQUIRED OR FOR PRODUCING THE RATE OF PROGRESS AFORESAID, HE/SHE MAY ORDER THE CONTRACTOR TO INCREASE THE EFFICIENCY, CHANGE THE CHARACTER OR INCREASE THE EQUIPMENT, AND THE CONTRACTOR SHALL CONFORM TO SUCH ORDER. THE GIVING OR FAILURE TO GIVE SUCH ORDER BY THE TOWN SHALL IN NO WAY RELIEVE THE CONTRACTOR OF HIS/HER OBLIGATIONS TO SECURE THE QUALITY OF THE WORK AND RATE OF PROGRESS REQUIRED.

WORK HOURS:

NORMAL WORK HOURS WILL MEAN UP TO FIVE (5) 8-HOUR DAYS, MONDAY THROUGH FRIDAY. IN ORDER TO WORK HOURS NOT WITHIN THIS SPAN FOR THE CONTRACTOR'S BENEFIT, HE/SHE SHALL REQUEST A WRITTEN AUTHORIZATION TO BE APPROVED BY THE TOWN. FOR WORK OUTSIDE THE NORMAL DAY, WORK ON SATURDAYS, SUNDAYS, OR LEGAL HOLIDAYS, IF ANY WORK BEYOND THE NORMAL DAY IS TO BE PERFORMED, THE CONTRACTOR WILL RECEIVE NO EXTRA PAYMENT, AND COMPENSATION FOR SUCH WORK SHALL BE CONSIDERED AS HAVING BEEN INCLUDED IN THE PRICES AS STIPULATED FOR THE APPROPRIATE ITEMS OF WORK AS LISTED IN THE BID.

APPROVAL OF MATERIALS:

ONLY NEW MATERIALS AND EQUIPMENT SHALL BE INCORPORATED IN THE WORK. ALL MATERIALS AND EQUIPMENT FURNISHED BY THE CONTRACTOR SHALL BE SUBJECT TO THE INSPECTION AND APPROVAL OF THE TOWN, PROVIDED THAT ANY APPROVAL OR LACK OF APPROVAL SHALL NOT RELIEVE CONTRACTOR OF ITS OBLIGATIONS HEREUNDER. NO MATERIALS SHALL BE DELIVERED TO THE WORK SITE WITHOUT PRIOR APPROVAL OF THE TOWN.

THE CONTRACTOR SHALL SUBMIT DATA AND SAMPLES SUFFICIENTLY EARLY TO PERMIT CONSIDERATION AND APPROVAL BEFORE MATERIALS ARE NECESSARY FOR INCORPORATION IN THE WORK. ANY DELAY OF APPROVAL RESULTING FROM THE CONTRACTOR'S FAILURE TO SUBMIT SAMPLES OR DATA PROMPTLY SHALL NOT BE USED AS A BASIS OF A CLAIM AGAINST THE TOWN.

SUBSTITUTES OF APPROVED "OR-EQUAL" ITEMS:

WHENEVER MATERIALS OR EQUIPMENT ARE SPECIFIED OR DESCRIBED IN THE CONTRACT DOCUMENTS BY USING THE NAME OF A PROPRIETARY ITEM OR THE NAME OF A PARTICULAR SUPPLIER THE NAMING OF THE ITEM IS INTENDED TO ESTABLISH THE TYPE, FUNCTION AND QUALITY REQUIRED. MATERIALS OR EQUIPMENT OF OTHER SUPPLIERS MAY BE ACCEPTED BY THE TOWN IF SUFFICIENT INFORMATION, AS DETERMINED BY THE TOWN, IS SUBMITTED BY CONTRACTOR TO ALLOW TOWN TO DETERMINE THAT THE MATERIAL OR EQUIPMENT PROPOSED IS (1) AT LEAST EQUAL IN QUALITY, DURABILITY, APPEARANCE, STRENGTH AND DESIGN TO THE MATERIAL OR EQUIPMENT NAMED, (2) IT WILL PERFORM AT LEAST EQUALLY THE FUNCTION IMPOSED BY THE GENERAL DESIGN FOR THE WORK BEING CONTRACTED FOR OR THE EQUIPMENT OR MATERIAL BEING PURCHASED, AND (3)

IT CONFORMS SUBSTANTIALLY, EVEN WITH DEVIATIONS, TO THE DETAILED REQUIREMENTS FOR THE EQUIPMENT OR MATERIAL IN THE SPECIFICATIONS. THE PROCEDURE FOR REVIEW BY TOWN WILL INCLUDE THE FOLLOWING: REQUESTS FOR REVIEW OF SUBSTITUTE ITEMS OF MATERIAL AND EQUIPMENT WILL NOT BE ACCEPTED BY TOWN FROM ANYONE OTHER THAN CONTRACTOR. IF CONTRACTOR WISHES TO FURNISH OR USE A SUBSTITUTE ITEM OF MATERIAL OR REQUIREMENT, CONTRACTOR SHALL MAKE WRITTEN APPLICATION TO TOWN FOR ACCEPTANCE THEREOF CERTIFYING THAT THE PROPOSED SUBSTITUTE SATISFIES THE CRITERIA STATED ABOVE. THE APPLICATION WILL CERTIFY THAT THE EVALUATION AND ACCEPTANCE OF THE PROPOSED SUBSTITUTE WILL NOT DELAY CONTRACTOR'S ACHIEVEMENT OF SUBSTANTIAL COMPLETION WITHIN THE TIME STATED IN THE CONTRACT DOCUMENTS, AND MUST STATE WHETHER OR NOT ACCEPTANCE OF THE SUBSTITUTE FOR USE IN THE WORK WILL REQUIRE A CHANGE IN ANY OF THE CONTRACT DOCUMENTS, AND WHETHER OR NOT INCORPORATION OR USE OF THE SUBSTITUTE IN CONNECTION WITH THE WORK IS SUBJECT TO PAYMENT OF ANY LICENSE FEE OR ROYALTY. IF THE APPLICATION IS SILENT ON SUCH MATTERS, THE BIDDER, BY SUBMITTING AN APPLICATION, WILL BE DEEMED TO HAVE SO CERTIFIED, AND TO HAVE STATED THAT NO CHANGE IN THE CONTRACT DOCUMENTS IS NECESSARY AND NO LICENSE FEES OR ROYALTY PAYMENTS ARE REQUIRED.

ALL VARIATIONS OF THE PROPOSED SUBSTITUTE FROM THAT SPECIFIED MUST BE IDENTIFIED BY CONTRACTOR IN THE APPLICATION TOGETHER WITH AVAILABLE MAINTENANCE, REPAIR AND REPLACEMENT SERVICE FOR THE SUBSTITUTE ITEM. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COSTS OF ANY NECESSARY REDESIGN AND CLAIMS OF OTHER CONTRACTORS RESULTING FROM THE PROPOSED SUBSTITUTE. TOWN MAY REQUIRE CONTRACTOR TO FURNISH AT CONTRACTOR'S EXPENSE ADDITIONAL DATA ABOUT THE PROPOSED SUBSTITUTE.

IF A SPECIFIC MEANS, METHOD, TECHNIQUE, SEQUENCE OR PROCEDURE OF CONSTRUCTION IS EXPRESSLY REQUIRED BY THE CONTRACT DOCUMENTS, THE CONTRACTOR MAY FURNISH OR UTILIZE A SUBSTITUTE MEANS, METHOD, SEQUENCE, TECHNIQUE OR PROCEDURE OF CONSTRUCTION ACCEPTABLE TO TOWN, IF CONTRACTOR SUBMITS SUFFICIENT INFORMATION TO ALLOW TOWN TO DETERMINE THAT THE SUBSTITUTE PROPOSED IS EQUIVALENT TO THAT INDICATED OR REQUIRED BY THE CONTRACT DOCUMENTS. THE PROCEDURE FOR REVIEW BY TOWN WILL BE SIMILAR TO THAT STATED PREVIOUSLY. NOTWITHSTANDING ANY ACCEPTANCE OF THE TOWN AND UNLESS OTHERWISE EXPRESSLY AGREED IN WRITING BY THE TOWN, CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES, LOSSES, COSTS, EXPENSES, AND CLAIMS ARISING OUT OF THE SUBSTITUTE MEANS, METHOD, SEQUENCE, TECHNIQUE OR PROCEDURE.

TOWN WILL BE ALLOWED A REASONABLE TIME WITHIN WHICH TO EVALUATE EACH PROPOSED SUBSTITUTE. TOWN WILL BE THE SOLE JUDGE OF ACCEPTABILITY, AND NO SUBSTITUTE WILL BE ORDERED, INSTALLED OR UTILIZED WITHOUT TOWN'S PRIOR WRITTEN ACCEPTANCE, WHICH WILL BE EVIDENCED BY EITHER A CHANGE ORDER OR AN APPROVED SHOP DRAWING. TOWN MAY REQUIRE CONTRACTOR TO FURNISH AT CONTRACTOR'S EXPENSE A SPECIAL PERFORMANCE GUARANTEE OR OTHER SURETY WITH RESPECT TO ANY SUBSTITUTE. TOWN WILL RECORD TIME REQUIRED BY TOWN AND TOWN'S CONSULTANTS IN EVALUATING SUBSTITUTIONS PROPOSED BY CONTRACTOR AND IN MAKING CHANGES IN THE CONTRACT DOCUMENTS OCCASIONED THEREBY. WHETHER OR NOT TOWN ACCEPTS A PROPOSED SUBSTITUTE, THE CONTRACTOR SHALL REIMBURSE TOWN FOR THE CHARGES OF TOWN'S CONSULTANTS FOR EVALUATING EACH PROPOSED SUBSTITUTE, AND SHALL, UNLESS OTHERWISE EXPRESSLY AGREED IN WRITING BY THE TOWN, BE RESPONSIBLE FOR ALL DAMAGES, LOSSES, COSTS, EXPENSES, AND CLAIMS ARISING OUT OF THE USE OF THE PROPOSED SUBSTITUTE ITEM, EQUIPMENT, MATERIAL, MEANS, METHOD, SEQUENCE, TECHNIQUE OR PROCEDURE.

TEMPORARY UTILITIES:

THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR AND FURNISH AT HIS/HER EXPENSE ALL WATER, ELECTRIC, TELEPHONE OR OTHER UTILITY REQUIRED BY HIM/HER FOR CONSTRUCTION PURPOSES.

LOCATION OF ALL UTILITIES:

THE LOCATION OF THE EXISTING UTILITIES MUST BE ESTABLISHED AND VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL MAKE ARRANGEMENT WITH THE APPROPRIATE UTILITY COMPANIES TO HAVE ALL EXISTING UTILITIES MARKED ALONG THE COURSE OF THIS WORK BY SUCH MEANS AS NECESSARY. THE CONTRACTOR SHALL PRESERVE SUCH MARKED LOCATIONS UNTIL THE WORK HAS PROGRESSED TO THE POINT WHERE THE ENCOUNTERED UTILITY IS FULLY EXPOSED OR PROTECTED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE PROPER AUTHORITIES OR UTILITY BEFORE PROCEEDING WITH THE WORK POTENTIALLY AFFECTED THEREBY.

SAFETY CONTROL:

THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL REQUIRED SAFETY EQUIPMENT SUCH AS BARRICADES, DETOUR BARRIERS AND SIGNS, LIGHTS, WALKWAYS, FENCES, FIRE PREVENTION EQUIPMENT. IF AT ANY TIME BEFORE THE COMMENCEMENT OR DURING THE PROGRESS OF THE WORK, OR ANY PART OF IT, SUCH METHODS AND PROCEDURES AS USED APPEAR TO THE TOWN AS UNSAFE, INSUFFICIENT OR IMPROPER, THE TOWN SHALL HAVE THE RIGHT, BUT UNDER NO CIRCUMSTANCES THE OBLIGATION, TO ORDER THE CONTRACTOR TO INCREASE THEIR SAFETY OF EFFICIENCY OR TO IMPROVE THEIR CHARACTER, AND THE CONTRACTOR SHALL CONFORM TO SUCH ORDERS. THE GIVING OR FAILURE OF THE TOWN TO GIVE SUCH ORDER TO INCREASE OF SUCH SAFETY, EFFICIENCY, ADEQUACY OR ANY IMPROVEMENTS SHALL NOT RELEASE THE CONTRACTOR FROM HIS/HER OBLIGATION TO SECURE THE SAFE CONDUCT AND QUALITY OF WORK SPECIFIED AND FOR ALL DAMAGES, INJURIES, LOSSES, COSTS AND EXPENSES ARISING FROM ANY FAILURE OF CONTRACTOR TO COMPLY WITH THAT OBLIGATION.

OCCUPATIONAL SAFETY AND HEALTH ACT:

THE CONTRACTOR'S PARTICULAR ATTENTION IS CALLED TO THE RULES AND REGULATIONS INCLUDED IN PUBLIC LAW 91-596, KNOWN AS THE "OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970" (OSHA), AS SAME MAY BE AMENDED, SUPPLEMENTED OR SUPERSEDED.

MAINTENANCE OF TRAFFIC:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF TRAFFIC WITH THE MAXIMUM OF SAFETY AND PRACTICABLE CONVENIENCE TO SUCH TRAFFIC DURING THE LIFE OF THE CONTRACT WHETHER OR NOT WORK THEREON HAS BEEN SUSPENDED TEMPORARILY. THE WORK SHALL BE CARRIED ON IN SUCH A MANNER AS TO PROVIDE SAFE PASSAGE AT ALL TIMES FOR PUBLIC TRAVEL AND WITH LEAST OBSTRUCTION TO TRAFFIC.

THE CONVENIENCE OF THE GENERAL PUBLIC AND OF THE RESIDENTS ALONG AND ADJACENT TO THE WORK SHALL BE PROVIDED FOR IN AN ADEQUATE AND SATISFACTORY MANNER.

PORTABLE BARRIER FENCES WITH APPROPRIATE SIGNS SHALL BE USED FOR SAFETY CONTROL IN ESTABLISHING TRAFFIC PATTERNS (DETOURS, ETC.).

THESE PORTABLE BARRIER FENCES SHALL MEET THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS OR HIS/HER DESIGNEE.

ROADWAYS, DRIVEWAYS AND FOOT PATHS CLOSED TO TRAFFIC, SHALL BE PROTECTED BY SUITABLE BARRICADES AND WARNING SIGNS, AND THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE LIGHTS AND ILLUMINATION. THEREFORE, HE/SHE SHALL BE HELD RESPONSIBLE FOR ALL DAMAGE TO THE WORK DUE TO ANY FAILURE OF SIGNS AND BARRICADES TO PROTECT THE WORK PROPERLY FROM TRAFFIC, PEDESTRIANS, ANIMAL OR OTHER CAUSES.

POLICE DETAIL:

THE CONTRACTOR SHALL COORDINATE WITH THE PLYMOUTH POLICE DEPARTMENT THE NUMBER OF TRAFFIC POLICE REQUIRED IN EITHER THE APPROPRIATE TRAFFIC MANAGEMENT PLAN (TMP) TEMPLATE (SEE MASSDOT'S WEBSITE AT [HTTP://WWW.MHD.STATE.MA.US](http://www.mhd.state.ma.us)) OR DEEMED NECESSARY FOR THE DIRECTION AND CONTROL OF TRAFFIC WITHIN THE SITE.

THE CONTRACTOR SHALL SUBMIT THE REQUESTED AND SIGNED POLICE DETAIL SCHEDULE AS CALLED IN AND ARRANGED DIRECTLY WITH THE POLICE DEPARTMENT ON A WEEKLY BASIS. POLICE DETAILS WILL BE PAID DIRECTLY BY THE TOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING AND CANCELING POLICE DETAILS IF NOT NEEDED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CANCEL A DETAIL(S) AT A MINIMUM OF FOUR HOURS IN ADVANCE OF THE START OF THE SHIFT IF CONDITIONS SO WARRANT. POLICE DETAILS NOT CANCELLED IN TIME SHALL BE PAID FOR BY THE CONTRACTOR.

RESTORATION (WORK IN IMPROVED PROPERTY AREAS) :

THE CONTRACTOR, AT HIS/HER OWN EXPENSE, SHALL CARE FOR, REPLACE, AND RESTORE ANY PUBLIC AND PRIVATE PROPERTY (E.G., SHRUBS, HEDGES, TREES, PUBLIC OR PRIVATE WAYS, SEWER DRAIN, WATER OR OTHER PIPES, CATCH BASINS, WIRES, BUILDING, FENCES, POSTS, POLES, MAILBOXES, STONE WALLS OR OTHER STRUCTURES) DAMAGED BY HIS/HER WORK, EQUIPMENT, OR EMPLOYEES, TO A CONDITION AT LEAST EQUAL TO THAT EXISTING IMMEDIATELY PRIOR TO THE BEGINNING OF OPERATIONS OR, IF BETTER, TO GOOD CONDITION, AND TO THE SATISFACTION OF THE TOWN.

THE CONTRACTOR SHALL ALSO RESTORE, AT ITS COST, TO ORIGINAL CONDITION, AND TO THE SATISFACTION OF THE TOWN, ANY LAWN OR OTHER PLANTED AREA INTERFERED WITH, INCLUDING FERTILIZING, LOAMING, AND SEEDING AS REQUIRED.

SUITABLE MATERIALS, EQUIPMENT AND METHODS SHALL BE USED FOR SUCH RESTORATION.

BOUNDS AND PROPERTY MARKERS:

ALL BOUNDS AND PROPERTY MARKERS DISTURBED IN THE COURSE OF THE WORK SHALL BE REPLACED BY THE CONTRACTOR AT HIS/HER EXPENSE.

THE CONTRACTOR SHALL EMPLOY A REGISTERED LAND SURVEYOR TO RESET ALL BOUNDS AND PROPERTY MARKERS.

TELEPHONE NUMBERS:

THE TELEPHONE NUMBERS OF THE FOLLOWING DEPARTMENTS OF THE TOWN OF PLYMOUTH ARE:

POLICE	508-830-4220 (BUSINESS)
FIRE	508-830-4213 (BUSINESS)
HIGHWAY	508-830-4162, ext. 101
WATER	508-830-4162, ext. 138
ENGINEERING	508-747-1620, ext. 120
SEWER	508-830-4159
DIRECTOR OF PUBLIC WORKS	508-830-4162, ext. 105

TOWN OFFICE BUILDING HOURS: M - F 7:30 A.M. TO 4:00 P.M.

LEGAL REQUIREMENTS:

THE CONTRACTOR SHALL KEEP HIM/HERSELF FULLY INFORMED OF, AND COMPLY WITH, ALL LAWS, ORDINANCES AND REGULATIONS OF THE FEDERAL, STATE AND MUNICIPAL GOVERNMENTS, WHICH MAY BE IN FORCE DURING THE LIFE OF THE CONTRACT, AND IN ANY MANNER AFFECTING HIS/HER EMPLOYEES OR THE CONDUCT OF THE WORK OF MATERIALS USED ON SAID WORK.

PERSONAL SUPERVISION BY CONTRACTOR:

THE CONTRACTOR OR HIS/HER DULY AUTHORIZED AND APPROVED REPRESENTATIVE SHALL GIVE PERSONAL ATTENTION TO THE FULFILLMENT OF THE CONTRACT. THE CONTRACTOR SHALL HAVE ON THE WORK SITE, AT ALL TIMES, A COMPETENT FULL-TIME REPRESENTATIVE AUTHORIZED TO RECEIVE AND EXECUTE ANY ORDERS OF DIRECTION OF THE TOWN.

THE REPRESENTATIVE SHALL ALSO BE AUTHORIZED TO ACCEPT, ON BEHALF OF CONTRACTOR, ANY NOTICES GIVEN TO THE CONTRACTOR UNDER THE PROVISIONS OF THE CONTRACT.

CLEANUP:

DURING THE COURSE OF THE WORK, THE CONTRACTOR SHALL KEEP THE SITE OF HIS/HER OPERATIONS IN AS CLEAN AND NEAT A CONDITION AS IS POSSIBLE. HE/SHE SHALL DISPOSE OF ALL RESIDUE RESULTING FROM THE CONSTRUCTION WORK ON A DAILY BASIS AND, AT THE CONCLUSION OF THE WORK, HE/SHE SHALL REMOVE AND HAUL AWAY STRUCTURES, AND OTHER REFUSE REMAINING FROM THE CONSTRUCTION OPERATIONS, AND SHALL LEAVE THE ENTIRE SITE OF THE WORK IN A NEAT AND ORDERLY CONDITION.

OWNER/CONTRACTOR AGREEMENT

THIS AGREEMENT made this _____ day of _____, 2016, by and between the TOWN OF PLYMOUTH, with an office at 11 Lincoln Street, Plymouth, Plymouth County, Massachusetts, 02360, hereinafter called the "Owner", and **(name, street address and mailing address of contractor)** hereinafter called the "Contractor".

WITNESSETH, that the Owner and the Contractor, for the consideration hereafter named, agree as follows:

Article 1. SCOPE OF WORK: The Contractor shall perform all the Work required by the Contract Documents for Wharf Replacement as described in the Contract Documents.

Article 2. TIME OF COMPLETION: The Contractor shall commence work under this Contract on the date specified in the written "Notice to Proceed" from the Owner; and it shall bring the work to substantial completion on or before December 31, 2016.

Article 3. THE CONTRACT SUM: The Owner shall pay the Contractor in current funds for the performance of the Work, subject to additions and deductions by Change Order the Contract Sum of _____.

Article 4. THE CONTRACT DOCUMENTS (or "CONTRACT"): The following, together with this Agreement, form the Contract and all are as fully a part of the Contract as if attached to this Agreement or repeated herein: the Advertisement, Bidding Documents, General Information, Invitation for Bids, Contract Forms, Conditions of the Contract, and Specifications as enumerated in the Table of Contents; the Drawings as enumerated in the List of Contract Drawings; Addenda; and Modifications/Change Orders issued after execution of the Contract.

By signing this Contract, the Contractor certifies under the penalties of perjury that he/she has complied with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting of child support.

2. PRE-CONSTRUCTION CONFERENCE

Prior to the start of construction, the Contractor, all subcontractors, the project manager, and the owner shall attend a pre-construction conference. The conference will serve to acquaint the participants with the general plan of contract administration; and requirements under which the construction operation is to proceed, and will inform the Contractor, in detail, of the obligations imposed on him and his subcontractors by the Executive Orders concerning Equal Employment opportunity and Davis-Bacon Act requirements, provided that nothing said in or omitted from such pre-construction conference shall relieve Contractor of its obligations under the Contract Documents.

The date, time, and place of the conference will be furnished to the Contractor by the project manager.

GENERAL CONDITIONS

3. Funding Source

This project is funded through a Town of Plymouth appropriation and a Commonwealth of Massachusetts MassWorks Infrastructure Program grant.

4. Contract Plans and Specifications

All plans, specifications and addenda, hereinafter enumerated or referenced in this contract, shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein set fully forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretation of the provisions of which they refer. The plans and specifications are complimentary, and what is required by one shall be deemed as if required by all.

5. Additional Instructions and Detail Drawings

The Contractor may be furnished additional written instructions and detail drawings as necessary to carry out the work included in the contract. The Contractor shall carry out the work in accordance with the additional detail drawings and instructions. The Contractor and the Director of Public Works will prepare jointly: (a) a schedule, fixing the dates at which special detail drawings will be required, such drawings, if any, to be furnished by the Director of Public Works in accordance with said schedule, and (b) a schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies and equipments, and the completion of the various parts of the work; each such schedule to be subject to change from time to time in accordance with the progress of the work.

6. Shop or Setting Drawings

The Contractor shall submit promptly to the Director of Public Works two copies of each shop or setting drawing prepared in accordance with the schedule predetermined as aforesaid. After examination of such drawings by the Director of Public Works or his designee and the return thereof, the Contractor shall make such corrections to the drawings as have been indicated, if any, and shall furnish the Director of Public Works or his designee with two corrected copies. If requested by the Director of Public Works or his designee, the Contractor must furnish additional copies. Regardless of corrections made in or approval given to such drawings by the Director of Public Works, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the plans and specifications, unless he notifies the Director of Public Works in writing and conspicuously on the face of the shop drawing of any deviations at the time he furnishes such drawings, and the

Director has expressly and separately approved such deviation by noting its approval on the drawing.

7. Materials, Services and Facilities

- (a) It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.
- (b) Any work necessary to be performed after regular working hours, on Sunday or Legal Holidays, shall be performed without additional expense to the Owner.

8. Contractor's Title to Materials

No materials or supplies for the work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the work, free from all liens, claims or encumbrances.

9. Title to Work

The title to all work completed and in the course of construction, and of all material incorporated into the work, and all material not incorporated into the work but for which any payment has been made by Owner shall be in the Owner's name.

10. Inspection and Testing of Materials

- (a) All materials and equipment used in the construction of the project shall be subject to inspection and testing in accordance with accepted standards.
- (b) Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.

11. Express Warranty

The Contractor guarantees to Owner that all materials incorporated into the work will be new and of recent manufacture unless otherwise expressly specified or agreed in writing. Contractor also guarantees that all work will be done in a workmanlike manner, free from defects in material and workmanship, and in strict conformance with all requirements and specifications in the Contract.

12. Maintenance and Guarantee

The Contractor hereby guarantees that the entire work constructed by him under the contract will meet fully all requirements thereof as to quality of workmanship and of materials furnished by him. The Contractor hereby agrees, in addition to any other rights and remedies available to the Town, to make at his own expense any repairs or replacements made necessary by defects in materials or workmanship supplied to him that become evident within one (1) year after the date of the final payment, and to restore to full compliance with the requirements set forth herein for any part of the work constructed hereunder, which during said one (1) year period is found to be deficient with the respect to any provisions of the specifications. The Contractor also agrees to indemnify and hold harmless the Owner from claims of any kind arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written orders for same from the Owner. If the Contractor fails to make the repairs and replacements promptly, the Owner may do the work and the Contractor shall be liable to the owner for the cost thereof. The foregoing is not a limitation of, but is in addition to, any other rights and remedies available to the Owner, and nothing herein shall reduce or limit any applicable statutory limitations periods for suits by the Owner.

13. "Or Equal" Clause

Whenever a materials, article or piece of equipment is identified on the plans or in the specifications by reference to manufacturers' or vendors' trade names, catalogue numbers, etc., it is intended merely to establish a standard; and, any materials, article or equipment of other manufacturers and vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article or equipment so proposed is, in the opinion of the Director of Public Works, at least equal in quality, durability, appearance, strength and design, will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications. It shall not be purchased or installed by the Contractor without the Director's written approval.

14. Survey's Permits and Regulations

The Contractor shall be responsible for all additional surveys/layouts necessary for the execution of the work.

The Contractor shall procure and pay for all permits, licenses and approvals necessary for the execution of his contract.

The Contractor shall strictly comply with all laws, ordinances, rules, orders and regulations relating to performance of the work, the protection of adjacent property and the maintenance of passageways, guard fences or other protective facilities.

15. Contractor's Obligations

The Contractor shall and will, in a good and workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary and/or proper to perform and complete all the work required by and reasonably inferable from this Contract, within the time herein specified, in strict accordance with the provisions of this Contract and said specifications and in accordance with the plans and drawings covered by this Contract any and all supplemental plans and drawings, and in accordance with the directions of the Director of Public Works as given from time to time during the progress of the work. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required.

The Contractor shall observe, strictly comply with, and be subject to all terms, conditions, requirements and limitations of the Contract and specifications, and shall do, carry on and complete the entire work to the satisfaction of the Director of Public Works and the Owner.

16. Weather Conditions

In the event of temporary suspension of work, or during inclement weather, or whenever the Director of Public Works shall direct, the Contractor will, and will cause his Subcontractors to protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the Director of Public Works or his designee, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his Subcontractors so to protect his work, such materials shall be removed and replaced at the expense of the Contractor.

17. Protection of Work and Property-Emergency

The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with the Contract. He shall at all times safely guard and protect his own work, and that of adjacent property from damage. The Contractor shall replace or make good any such damage, loss or injury to the extent caused, in whole or in part, directly or indirectly, by Contractor, its employees, subcontractors or suppliers or any person for whom Contractor is responsible.

In case of an emergency which threatens loss or injury of property, and/or safety of life, the Contractor will be allowed to act, without previous instructions from the Director of Public Works, in a diligent manner to address such emergency. He shall notify the Director of Public Works immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be submitted for consideration to the Director of Public Works in writing within 21 days of the onset of the emergency.

18. Inspection

The authorized representatives and agents of the Owner shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials and other relevant data and records at any reasonable time with or without notice.

19. Reports, Records and Data

The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under the Contract.

20. Superintendence by Contractor

At the site of the work, the Contractor shall employ a construction superintendent or foreman who shall have full authority to act for the Contractor. It is understood that such representative shall be acceptable to the Director of Public Works, or designee, and shall be one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll, provided that any approval or lack of approval of the Director of any such representative shall not relieve Contractor of its obligations hereunder.

21. Changes in Work

No changes in the work covered by the approved Contract Documents shall be made without having prior written approval of the Owner. Charges or credits for the work covered by the approved change shall be determined by one or more or a combination of the following methods, at the sole election of Owner:

- (a) *Unit bid prices previously approved.*
- (b) *An agreed lump sum.*
- (c) *The actual cost of:*
 - (1) *Labor, including foremen.*
 - (2) *Materials entering permanently into the work.*
 - (3) *The ownership or rental cost of construction plant and equipment during the time of use on the extra work.*
 - (4) *Power and consumable supplies for the operation of power equipment.*
 - (5) *Insurance.*
 - (6) *Wages to be paid.*

To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) of the actual cost of work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses.

22. Time for Completion and Liquidated Damages

It is hereby understood and mutually agreed, by and between the

Contractor and the Owner, that the date of beginning and the time for substantial completion of the work to be done hereunder are ESSENTIAL CONDITIONS of the Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on the date specified in a "Notice to Proceed" to be issued by the Owner.

The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will ensure substantial completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for substantial completion of the work described herein is a reasonable time for the substantial completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

If the said Contractor shall neglect, fail or refuse to substantially complete the work within the time herein specified, or any property extension thereof granted by the Owner, then the Contractor does hereby agree, as a partial consideration for the awarding of this Contract, to pay to the Owner the amount specified below, not as a penalty, but as liquidated damages for each and every calendar day the Contractor shall be in default after the time stipulated in the Contract for substantially completing the work.

The said amount of liquidated damages is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would sustain in such event and said amount shall be retained from time to time by the Owner from current periodic estimates.

It is further agreed that time is of the essence of each and every portion of this Contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract as additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract.

Notwithstanding the foregoing, and notwithstanding anything to the contrary in the Contract Documents, the Owner may, at its sole election and in its sole discretion, recover its actual damages in lieu of liquidated damages for any delay caused in whole or in part, directly or indirectly, by Contractor, its employees, subcontractors, suppliers or any person for whom Contract is responsible.

In the event Contractor is delayed through no fault of its own, it may make claim for an extension of time (only) as follows: The Contractor shall within ten (10) days from the earlier of the date of the event giving rise to its claim, the date on which the delay commenced, or the date on which Contractor knew or should have known of its claim, notify the Owner in writing of the existence and causes of the delay, and request an extension of

time to complete the work and include therein the length of extension requested, and shall provide such other information as the Owner may reasonably request. Failure to comply strictly with the above notice procedure shall result in the waiver of any such claim. In addition, Contractor agrees that in the event it initiates any proceeding against Owner on account of any delays or the assessment of liquidated damages and Contractor is found to have failed to strictly comply with the aforesaid notice process, Contractor shall pay Owner's attorneys' and expert witness fees incurred in defending any such proceeding. Notwithstanding the foregoing, any decision of the Owner or its designee on any claim of Contractor for an extension of time to complete the work shall be final and binding on the Contractor under G.L. c. 30, § 39J.

The amount of liquidated damages for this project shall be Zero Dollars (\$0.00) per consecutive calendar day.

23. Correction of Work

All work, all materials, whether incorporated in the work or not, all processes of manufacture, and all methods of construction shall be at all times and places subject to the inspection of the Director of Public Works or his designee who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture and methods of construction for the purposes for which they are used. Should they fail to meet his approval they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor at his own expense. Rejected materials shall immediately be removed from the site. If, in the opinion of the Director of Public Works, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the Contract Documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as in the judgment of the Director shall be equitable.

24. Subsurface Conditions Found Different

Should the Contractor encounter subsurface and/or latent physical conditions at the site materially differing from those shown on the plans or indicated in the specifications for which an equitable adjustment is required under G.L. c. 30, § 39N, he shall immediately upon discovering such conditions and before disturbing same give written notice to the Director of Public Works of such conditions. The Director of Public Works will thereupon promptly investigate the conditions, and if he finds that they materially differ from those shown on the plans or indicated in the specifications and an equitable adjustment is required by G.L. c. 30, § 39N, an appropriate change order shall be prepared for such adjustment in accordance with Paragraph 21, above, including any credits to Owner and/or additional compensation to Contractor, as the case may be. Notwithstanding the foregoing, Contractor will be eligible for an equitable adjustment on account of said conditions if and only if such adjustment is required by G.L. c. 30, § 39N.

Failure to comply with the notice procedure stated above shall result in the waiver of Contractor's claim. Moreover, any decision of the Owner or its designee on any claim of the Contractor under this paragraph shall be final and binding on the Contractor under G.L. c. 30, § 39J. Contractor agrees that in the event it initiates any proceeding against Owner on account of any claim for equitable adjustment due to subsurface or latent physical conditions for which Contractor had failed to strictly comply with the aforesaid notice process, Contractor shall pay Owner's attorneys' and expert witness fees incurred in defending any such proceeding.

25. Right of the Owner to Terminate Contract

The Owner may terminate this Contract by providing the Contractor with ten (10) days written notice for the reasons stated below:

- (a) Violation of any of the provisions of this Contract by the Contractor or any of his/her subcontractors, or of any federal, state or local law or regulation applicable to the project work.
- (b) A determination by the Owner that the Contractor has engaged in fraud, waste, mismanagement, misuse of funds, or criminal activity with any funds provided by this Contract.
- (c) Failure of the Contractor, for any reason, to fulfill in a timely and proper manner its obligations under this Contract, including timely prosecution and completion of the work unless an extension of time to complete the work has been granted by the Owner via a signed Change Order.

The Owner shall not be required to give notice of termination to Contractor's surety, if any, provided that nothing herein shall preclude Owner from making claim on any performance bond issued by any surety.

If the Owner determines that a continuation of work on the project would endanger the life, health, or safety of those working or living at or near the project site, or that immediate action is necessary to protect public funds and/or property, the Owner may suspend work or terminate this agreement by providing notice to the Contractor in the form of telegram, mailgram, hand-carried letter, or other appropriate written means.

Owner may also terminate the Contractor for its convenience, including for no reason, upon 30 days' written notice. In the event of any such termination, Contractor shall be paid for all work satisfactorily performed to the date of termination. Contractor shall not be entitled to any lost profits or other damages.

26. Payments to Contractor

- (a) Provided an agreed upon form of application for payment is received by the fifth day of the month, not later than the twentieth (20th) day of each calendar month the Owner shall make a progress payment to the Contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract, less five percent (5%) of the amount of each estimate until final completion and acceptance of all work covered by this Contract, and the value of any claims of the Owner against Contractor.
- (b) In preparing estimates, the material delivered and properly stored on the site may be taken into consideration if and to the extent approved by Owner.
- (c) Notwithstanding any certification or lack of certification by the Owner or its agents or representatives, the Owner may withhold the value of its claims against the Contractor from amounts otherwise payable to Contractor.

27. Indemnification

The Contractor shall comply with the requirements of all applicable laws, rules and regulations in connection with the services of the Contractor, and shall exonerate, indemnify and hold harmless the Owner's officers, agents, and all employees from and against them, and local taxes or contributions imposed or required under the Social Security, Worker's Compensation, and Income Tax laws. Further, the Contractor shall exonerate, indemnify and hold harmless the Owner with respect to any damages, expenses or claims arising from or in connection with any of the work performed or to be performed under this Contract. This obligation of the Contractor is in addition to, and shall not be construed as a limitation of, the Contractor's liability under any other provision of the Contract or law and any other rights and remedies available to the Owner.

28. Acceptance of Final Payment Constitutes Release

The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor. No payment, however, final or otherwise, shall operate to release the Contractor or his Sureties from any obligations under the Contract or the performance and payment bond.

29. Insurance

The Contractor shall not commence work under this Contract until he has obtained all the insurance required in the Bidding Document and such insurance has been approved by the Owner, nor shall the Contractor allow any Subcontractor to commence work on this subcontract until the insurance required of the subcontractor has been so obtained and approved.

30. Assignments

The Contractor shall not assign or subcontract the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns, with Owner's consent, all or any part of any monies due or to become due under this Contract, the assignee shall be bound by the terms of the Contract Documents and its right, if any, in and to any monies due or to become due to the Contractor shall be subject to, among other things, prior claims of all the Owner, and of all persons, firms and corporations of services rendered or materials supplied for the performance of the work called for in this Contract.

31. Authority of the Director of Public Works

Where ever the Contract Documents there is a reference to the Director of Public Works, such reference shall be to the Director or his designee, which may be an independent third-party engineer retained by Owner. The Director of Public Works or his designee shall give all orders and directions contemplated under this Contract and specifications relative to the execution of the work. The Director or his designee shall determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under the Contract and shall decide all questions which may arise in relation to the interpretation of the Contract Documents, said work and the construction thereof. The Director's estimates and decisions shall be final and conclusive under G.L. c. 30, § 39J. In case any question shall arise between the parties hereto relative to said Contract and specifications, the determination or decision of the Director shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this Contract affected in any manner or to any extent by such question.

The Director or his designee shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found obscure or be in dispute, which decision shall be final and binding as aforesaid.

32. Notice and Service Thereof

Any notice to any Contractor from the Owner relative to any part of this Contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted, by certified or registered mail or by other method of delivery for which a delivery receipt is generated (including facsimile or e-mail, if a deliver receipt is generated), to the said Contractor at his last given address, or delivered in person to the said Contractor or his authorized representative on the work.

33. Subcontract

The Contractor will insert in any subcontracts provisions making the subcontractors responsible to the Contractor in the same manner as Contractor is responsible to the Owner under the Contract Documents.

34. Suspension of or Delays to the Work: No Damages for Delay

Notwithstanding anything to the contrary in the Contract Documents, if the Contractor or the work is delayed through no fault of Contractor for any reason, including, but not limited to, acts of the Owner, Contractor's sole remedy, if any, shall be an extension of time to complete the work, provided Contractor makes a claim for such an extension in strict accordance with the process set forth in paragraph 22, above. Under no circumstances shall the Contractor be entitled to make or assert or recover for any claim for damages by reason of any such delay, whether such a claim is characterized as one for delay, having to perform out-of-sequence work, or loss of production, or otherwise.

35. Access to Records

The Contractor shall maintain accounts and records, including personnel, property and financial records, adequate to identify and account for all costs pertaining to the Contract and such other records as may be deemed necessary by the Town to assure proper accounting for all project funds. These records will be made available for audit purposes and/or inspection to the Owner or its designee or any authorized representative, and will be retained by Contractor for three years after final completion of all work.

36. Non-Discrimination

The Contractor shall not discriminate in violation of any applicable federal, state and local law or regulation, including the following: Title VI of the Civil Rights Act of 1964 (Public Law 88-352), and the regulations issued pursuant thereto by HUD (24 CFR Part 1); Title VIII of the Civil Rights Act of 1968 (Public Law 90-284), as amended; Section 109 of the Housing and Community Development Act of 1974, and the HUD regulations issued pursuant thereto (24 CFR 570.601); Federal Executive Order 11063, as amended by Executive Order 12259 and the HUD regulations issued pursuant thereto (24 CFR 107); Executive Order 11246 and the rules, regulations and relevant orders of the U.S. Secretary of Labor, if applicable; The Age Discrimination Act of 1975 (42 U.S.C. 6101 et seq.); Section 402 of the Veterans of the Vietnam Era Act. Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794); Massachusetts General Laws Chapter 151B, section 1 et seq.; State Executive Order 74 as amended and revised by Executive Orders 116,143 and 227, and EOCD regulation, procedures or guidelines; Title II of the Uniform Relocation Assistance and Real Property, Acquisition Policies Act of 1979; and EOCD guidelines, procedures, or regulations.

The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, handicap, or national origin. Noncompliance by the Contractor with the non-discrimination clauses of this Contract shall constitute a material breach of the Contract.

37. Termination of Contract

In addition to any other rights of Owner to suspend or terminate the Contract: The Owner may suspend or terminate this Contract by providing the recipient with ten (10) days written notice for failure of the Contractor, for any reason, to fulfill in a timely and proper manner its obligations under this Contract including compliance with applicable federal, state or local laws or regulations.

38. Schedule of Salaries and Wages

The minimum wage rates and health and welfare fund contributions applicable to this Contract as determined by the Director, Division of Occupational Safety, Commonwealth of Massachusetts under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 and 27D, inclusive as amended are attached hereto and incorporated herein. The greater of Federal wage rates or State prevailing wage rates, when both are applicable, shall be paid under this contract and reported as required.

38. Labor Provisions

- (a) In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers by the Contractor and Subcontractors, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment, who are male veterans as defined in clause forty-third of G.L. c. 4, s. 7 and who are qualified to perform the work to which the employment relates; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, in accordance with G.L. c. 149, s. 26.
- (b) The minimum rates of wages to be paid mechanics and apprentices, chauffeurs, teamsters and laborers shall be set forth in the schedule of rates of wages determined by the Commissioner of Labor and Industry.
- (c) In accordance with G.L. c. 149, s 34A, the Contractor shall, before commencing performance of the contract, provide by insurance for the payment of compensation and the furnishing of other benefits under chapter one hundred and fifty-two to all persons to be employed under the contract, and the Contractor shall continue such insurance in full force and effect during the terms of the contract. Sufficient proof of compliance with this section must be furnished at the time of execution of this contract. Failure to provide and continue in force such insurance as aforesaid shall be deemed a materials breach of the contact and shall operate as an immediate termination thereof. The attention of the Contractor is directed to that portion of G.L. c. 149, s. 34A which provides that whoever violates any of its provisions shall be punished by a fine of not more than one hundred dollars or by imprisonment for six months,

or both; and, in addition, any Contractor who violates any provision of this section shall be prohibited from contracting, directly or indirectly, with the Commonwealth or any political subdivision thereof for the construction, alteration, demolition, maintenance or repair of, or addition to, any public works or public building for a period of two years from the date of conviction of said violation.

- (d) The Contractor shall pay to any reserve police officer employed by him prevailing rate of wage paid to regular police officers, as required by G.L. c. 149, s. 34B.

40. Environmental Requirements

The Contractor shall comply, where applicable, with: Federal Executive Order 1199218, Floodplain Management, May 24, 1977 (42 FR 26951 et. seq.) particularly section 2 (a); the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et. seq.), as amended, particularly section 307 (c) and (d) (16 U.S.C. 1456 (c) and (d)); the Safe Water Drinking Act of 1974 (42 U.S.C. 201, 300 (f) et seq., and 21 U.S.C. 349), as amended; the Endangered Species Act of 1973 (16 U.S.C. 1531 et. seq.) as amended, particularly section 7 (16 U.S.C. 1536; the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et. seq.) as amended, particularly section 7 (b) and (c) (16 U.S.C. 1278 (b) and (c)); the Clean Air Act (42 U.S.C. 7401 et seq.) as amended, particularly section 176 (c) and (d) (42 U.S.C. 7506 (c) and (d)); HUD Environmental Criteria and Standards (44 FR 40860-40866, July 12, 1979); "The American Standard Specification for Making Buildings and Facilities Accessible to and Usable by the Physically Handicapped," Number A-117.4-R 1971, subject to the exceptions contained in 41 CFR 101-19-604; and any corresponding provisions of State and local laws and regulations. The Contractor shall also comply, where applicable, with the National Environmental Policy Act of 1969, Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, Flood Disaster Protection Act of 1973, National Flood Insurance Act of 1968, and Protection of Wetlands Laws.

41. Historic Preservation

The Contractor shall, in the performance of any environmental assessments under the National Policy Act, and the Massachusetts Environmental Policy Act, comply with section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470), Federal Executive Order 11593, and the Preservation of Archaeological and Historic Data Act of 1966 (17 U.S.C. 469 a-1 et seq.), by (a) consulting with the State Historic Preservation Officer to identify properties listed in or eligible for inclusion in the National Register of Historic Places that are subject to adverse effect (see 36 CFR Part 800.8) by the proposed activity, and (b) complying with all requirements established by HUD to avoid or mitigate adverse effects upon such properties.

42. Interest of Contractor and Employees

The Contractor covenants that he presently has no interest and

shall not acquire interest, direct or indirect, that violates or will with the passage of time result in a violation of G.L. c. 268A. The Contractor further agrees that in the performance of this contract, no person having any such interest in violation of said law shall be employed.

43. Severability

If any provision of this Agreement is held invalid, the remainder of the Agreement shall not be affected thereby, and all other parts of this Agreement shall nevertheless be in full force and effect.

44. Claims for Additional Compensation

In the event the Contractor believes it is due additional compensation for extra work or otherwise, except for claims on account of subsurface and latent physical conditions, which claims shall be made as stated above, the Contractor shall, within ten (10) days from the earlier of the date of the event giving rise to its claim, the date on which the delay commenced, or the date on which Contractor knew or should have known of its claim, submit its claim in writing to the Owner, describing in reasonable detail the basis of the claim, the event giving rise to the claim, and an itemization of the additional compensation requested. Notwithstanding the foregoing, if such claim is for extra work, such claim must be submitted before the alleged extra work is performed.

Failure to comply strictly with the above notice procedure shall result in the waiver of any such claim. In addition, Contractor agrees that in the event it initiates any proceeding against Owner on account of any claims for additional compensation and Contractor is found to have failed to strictly comply with the aforesaid notice process, Contractor shall pay Owner's attorneys' and expert witness fees incurred in defending any such proceeding. Notwithstanding the foregoing, any decision of the Owner or its designee on any claim of Contractor for additional compensation shall be final and binding on the Contractor under G.L. c. 30, § 39J.

45. In the event of any conflict or inconsistency between and among the provisions of the Contract Documents, the provision resulting in the greatest quantity and better quality of goods and services or, if the foregoing does not resolve the conflict or inconsistency, the provision resulting in less cost or risk to the Owner, as reasonably determined by the Owner, shall control. Any decision of the Owner or its designee on such resolution shall be final and binding on the Contractor under G.L. c. 30, § 39J.

THE PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

CONTRACTUAL LIABILITY

To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify, and hold harmless OWNER and its consultants, agents and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of designers, architects, attorneys and other professionals and court and arbitration costs) arising out of or resulting from performance of the Work, provided that any such claim, damage, loss or expense(s) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by Law and Regulations regardless of the negligence of any such party.

In any and all claims against OWNER or any of its consultants, agents or employees by any employee of CONTRACTOR, and subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under the above paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefits acts.

Policies for General Liability, Automobile Liability, Workers' Compensation Insurance, and Umbrella Liability shall remain in effect during the one year correction period.

Such insurance as is herein certified applies to all operations of the insured in connection with, and necessary and incidental to, the work herein described at the locations stated.

It is hereby understood and agreed that the above policies will not be restrictively amended, materially changed nor canceled without 30 days advance notice by registered mail to OWNER.

Authorized Representative Signature
(Include Evidence of Authorization)

Address

THIS PAGE INTENTIONALLY LEFT BLANK.

ATTACHMENT 1

TECHNICAL SPECIFICATIONS

THIS PAGE INTENTIONALLY LEFT BLANK.

SECTION 01300

SUBMITTALS

1 GENERAL

1.1 SHOP DRAWINGS, MANUFACTURERS' SPECIFICATIONS AND INSTALLATION INSTRUCTIONS, SAMPLES, ETC.

- A. The Contractor shall review and approve all submittals prior to submittal to the Owner. Each submittal shall be numbered serially and marked with the approval of the Contractor.
1. The Contractor shall submit to the Owner for approval, **three copies** plus as many copies as required to be returned, all Shop Drawings as called for under the various headings of these specifications.
 2. Each submittal shall be numbered with the project name (abbreviated), specification section and submittal number in consecutive order (Ex NAME-02550-#). Where resubmission is required a letter shall be assigned to designate each resubmission (Ex NAME-02550-#A, NAME-2550-#B, etc.)
 3. The Contractor shall submit all Shop Drawings to the Owner in sufficient time for checking and processing. Shop Drawings shall be of sufficient clarity so that copies thereof will be legible.
 4. All Shop Drawings submitted by subcontractors for approval shall be sent directly to the Contractor for his approval. The Contractor shall be responsible for their submission to the Owner at the proper time so as to prevent delays in delivery of materials.
 5. All submissions shall be referenced properly to indicate clearly the location, service and function of each particular item and the specification paragraph under which it is being furnished.
 6. Submittals that are related to or affect each other shall be forwarded simultaneously as a package to facilitate coordinated review. Uncoordinated submittals will be rejected.
 7. The Owner reserves the right to require submittals in addition to those called for in individual sections.
 8. The term "Shop Drawings" includes drawings, diagrams, schematics, descriptive literature, illustrations, schedules, performance and test data, calculations and similar materials furnished by Contractor to explain in detail specific portions of the work required by the Contract.
 9. The Contractor shall stamp each sheet of each submission with a rubber stamp stating that he has examined and checked the submission as above, and shall date and sign each. Any submission, which, upon examination by the Owner, shows evidence of not having been thoroughly checked will be returned to the Contractor for completion of checking before it will be considered for review.

10. All calculations shall be performed and stamped by a Professionally Licensed Engineer who is authorized to perform engineering design in the location of the proposed work unless directed otherwise. Calculations shall be organized, legible and provide clear indications of the checks being performed, the codes being followed and all assumptions being made.
 11. All details on Shop Drawings submitted for approval shall show clearly the relation of the various parts of the work, and where correct fabrication of the work depends upon field measurements; such measurements shall be made and shall be noted on the Shop Drawings before being submitted for approval.
- B. Approval by the Owner shall not relieve Contractor from responsibility for any errors or omissions in such drawings, or from responsibility for complying with requirements of this Contract, except with respect to variations described and approved in accordance with Paragraph C below.
- C. If shop drawings show variations from Contract requirements, Contractor shall describe such variations in writing, separate from the drawings, at time of submission. All such variation must be approved by the Owner.
- D. The Contractor shall distribute approved submittals to job site and record documents files and to suppliers and subcontractors as required.
- E. Samples required by the specifications shall be submitted after the award of the Contract to the Owner. No material for which samples are required shall be fabricated or delivered to the site for use until representative samples of same have been approved in writing by the Owner. Such samples shall be furnished and delivered by the Contractor without charge.
1. All color samples shall be reviewed and approved by the Owner prior to inclusion into the work.
 2. Each sample shall be labeled to designate the material or product, the name of its producer, the name of the Contractor, and the name and number of the project; and each submission shall be accompanied by a certificate describing each sample submitted for approval, certifying that the material, equipment or accessory submitted complies with Contract requirements, and including the name and brand of product, the name and address of manufacturer, the name of the Contractor and the name of the project.
 3. Approved samples, unless incorporated in the work or otherwise specified, shall be kept on file (and accessible for inspection by the Owner until final acceptance of the project. If return on the samples is not requested within thirty (30) days after the acceptance of the project, they will be considered unclaimed material and disposed of by the Owner.
 4. Such samples as may be required for check tests shall be furnished by the Contractor without extra charge. Check tests will be made on materials delivered for use only as frequently as the Owner considers necessary to ensure compliance of materials used with Contract requirements. The cost of testing materials, or equipment, or accessories to check for compliance with specification requirements shall be borne by the Contractor.

1.3 PROJECT RECORD DOCUMENTS

- A. Keep on file at job site one complete set of up-to-date Contract Documents, including drawings and specifications, addenda, all shop drawings and manufacturer's data, testing data, change orders, field orders and other modifications. Documents shall be neatly and securely stored in files or on racks, clearly indexed by trade activity or specification section, and shall not be used for construction purposes.
- B. Legibly mark significant field changes such as the following, using colored pencils or felt-tipped pens:
 - 1. Drawings:
 - a. Locations of concealed utilities whether existing or new
 - b. All current horizontal and vertical survey control points
 - c. Field changes including dimension, location and detail,
 - d. Changes resulting from change order or field order,
 - e. Details not on original drawings.
 - 2. Specifications: manufacturer and model number of equipment actually installed.
 - 3. Shop Drawings and manufacturers' literature: changes made after the Owner's review.
- C. At completion of work, deliver completed record documents to the Owner. Final payment for project will not be made until the Owner reviews and approves these documents.

2 PRODUCTS (Not Applicable).

3 EXECUTION (Not Applicable).

4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

1 **GENERAL**

1.1 **GENERAL DESCRIPTION**

A. Work under this shall be the providing the temporary facilities and site controls throughout the construction phase and as required to perform the work specified within the contract documents including but not limited to:

1. Site Security
2. Material Storage
3. Site Safety
4. Erosion Control and conformance to regulatory approvals and conditions
5. Signage as required

1.2 **FACILITY REQUIREMENTS**

A. Provide Site Security

1. Provide secure temporary closures to prevent unauthorized entry to the site including:
 - a. Temporary 6 foot minimum chain link fence
 - b. Locked gate
 - c. Signage indicating 24 hour emergency contact visible from outside the work area.
2. Furnish, install and maintain a bulletin board, protected from the elements in a prominent location at the work site, accessible to all employees and workers at the site, on which data of concern to the employees will be posted.
3. Provide marked metal containers with tight-fitting covers for edible debris, enforce their use by employees. Provide on-site dump container for collection of waste material. Periodically remove and legally dispose of waste material off-site. Schedule cleaning operations so that dust and other contaminants resulting from cleaning will not fall on wet, newly-finished surfaces. Dispose of volatile wastes such as mineral spirits, oil or paint thinner in accordance with local and state regulations.

B. Provide for Material Storage

1. Temporary structures shall be constructed in a structurally-sound, weatherproof manner.
2. Confine storage of materials to within the Limit of Work and areas as may be designated.
3. Provide temporary sheds or other covered facilities for storage of materials subject to weather damage. Number and size of structures shall be subject to Owner's approval. Locate structures to avoid interference with work and relocate as required by progress of work.
4. Remove structures and surplus stored materials at completion of work.

C. Maintain site, temporary structures, storage areas, temporary fencing, etc., in a neat and orderly manner.

- D. Provide staging, hoists, temporary stairs, ladders, chutes, etc., as required, complying with applicable safety codes.
- E. The Contractor, including all subcontractors, will not be permitted to display any descriptive signs indicating their company names and names of equipment or materials installed in the work beyond the specific requirements established with the contract documents.

1.3 FIELD LAYOUT

- A. Contractor shall maintain a level, rod and total station on job, and shall employ competent personnel for use thereof. The Owner shall have reasonable use of these instruments at all times.
- B. Project survey information has been located on drawings for Contractor's use. Contractor shall establish bench marks in at least two widely separated locations, and shall establish and maintain grades, lines, levels, and other dimensional reference guides as required. Annotate project record documents (specified in SECTION 01300) to indicate all modifications of grades, utilities, etc.

1.4 EROSION CONTROL AND SITE DRAINAGE

- A. Prior to beginning work, Contractor shall review erosion and sedimentation control requirements as stipulated in the project regulatory approvals and shall coordinate activities to insure proper installation including meetings with regulatory agencies as may be stipulated within the regulatory approvals.
- B. Upon beginning site work, Contractor shall assume complete responsibility for Project Area site erosion and sedimentation control and drainage for duration of Contract, and shall maintain such erosion control measures in a manner which will cause no damage and/or erosion or sedimentation directly or indirectly into waterways or to adjacent areas.
- C. Maintain all erosion control barriers in good functional condition throughout the project. Erosion and sedimentation control measures shall be inspected weekly and after any major storm event.
- D. Take all necessary measures to prevent vehicles leaving site from depositing mud on public ways. Clean up after and repair damage caused by trucks. Comply with applicable ordinances regarding noise control.
- E. Keep excavations, pits, trenches, and other construction areas free of water at all times, including backing up of drains and sewers. Provide hydraulic equipment to control surface and ground water. Pumping equipment shall be adequate to remove all hydrostatic pressure from structures until sufficient strength has been developed by the structure to protect work from displacement or other damage.
- F. Maintain ground water level (non-tidal) sufficiently below excavation level at all times to maintain stable working platform. Ground water shall be controlled so as to avoid adverse effects on established ground water elevation of adjacent sites.

1.5 SAFETY AND PROTECTION

- A. Comply with applicable safety regulations, including ANSI Series A10, Safety requirements for Construction and Demolition, and OSHA Part 1926, Construction Safety and Health Regulations. Provide barricades, fences and other protection measures as required.
- B. Minimize storage of flammable materials and ensure that such material is properly handled and stored. Provide fire extinguishers per code requirements and near locations of flammable products. Install prominent signs giving locations of fire alarms. Do not permit use of open fires or salamanders.
- C. Take all necessary precautions to ensure that finished or partially-completed work is properly braced and secured against wind, rain, snow and other adverse weather conditions.
- D. Remove snow and ice from roads, walks, work area, etc., which impedes access or drainage, or presents danger to workmen, public, or property.

1.6 WORK WITHIN NAVIGABLE WATERWAY

- A. Contractor shall keep proper lights each night between sunset and sunrise upon all floating plant and equipment and any other obstructions connected with the work in accordance with CG-169, Rules of the Road, and Code of Federal Regulations, Title 33, Chapter 1, Subchapter C and Chapter 11, Part 207. Contractor shall be required to install and maintain for the duration of the Contract, standard obstruction lights upon all stakes, piles, dolphins, or upon any other obstruction connected with the work which are located in navigable waters. The obstruction light shall consist of a quick flashing white light which shows not less than sixty flashes per minute when viewed from any direction. The light shall have a luminous intensity of not less than a two-mile range.
- B. Contractor will be required to conduct the work in such a manner as to obstruct navigation as little as possible and in case Contractor's plant so obstructs vessels, it shall be promptly moved on the approach of any vessel, to such an extent as may be necessary to afford a safe practicable passage. Upon completion of the work, Contractor shall promptly remove his plant, buoys and other markers placed by him during execution of this Contract.
- C. Should the Contractor, during the progress of the work lose, dump, throw overboard, sink or misplace any materials, plant, machinery, or appliance which in the opinion of the Owner may be dangerous to berthing vessels or obstruct navigation, the Contractor shall recover and remove the same with the utmost dispatch. Should the Contractor refuse, neglect or delay compliance with the above, such obstructions may be removed by the Owner, and the cost of such removal shall be deducted from money due the Contractor.

1.7 TEMPORARY UTILITIES

- A. Maintain strict supervision to enforce conformance with applicable standards and safe practices and prevent abuse of services. Obtain necessary permits, temporary easements, etc.
- B. Light and Power:
 - 1. Provide temporary light and power for construction needs, safety and security throughout construction period. Suitably protect temporary system by fused or circuit breakers. Panelboards, safety switches and electrical outlets shall be enclosed and grounded. Provide

meters as required. Entire system shall comply with NEC requirements for temporary wiring.

2. Make necessary arrangements with power company to install temporary service, including temporary poles and transformer.

C. Heating and Ventilation:

1. Provide temporary heat and ventilation as required to protect against dampness, cold and condensation; provide heat and humidity suitable for curing and installation of materials; provide ventilation adequate for work safety and fire protection. Temporary heaters shall be smokeless portable unit heaters acceptable to Underwriter' Laboratories, local fire department and the Owner.

D. Water and Sanitary Facilities:

1. Provide temporary water for construction purposes, sanitation, drinking, first aid, fire protection and cleaning. Furnish and install all connections, pipes, fittings, meters, etc., necessary for temporary service, and maintain same in good condition. Take necessary precautions to prevent waste of water.

2 PRODUCTS (Not Applicable).

3 EXECUTION (Not Applicable).

4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 01600

PRODUCTS

1. GENERAL

1.1 GENERAL DESCRIPTION

- A. Standards (ANSI, ASTM, Federal Specifications, etc.) referenced in specifications are latest edition as of date Contract Documents are issued for bidding. To the extent that more than one standard is referenced, the more stringent (in judgment of the Owner) shall govern. Where compliance with a standard is required, Contractor shall provide affidavit from subcontractor or manufacturer certifying compliance, if requested by the Owner.

1.2 ABBREVIATIONS

- A. Organizations and standards referenced in abbreviated form include the following:

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	Associated General Contractors of America
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association
AWS	American Welding Society
CONNDOT	State of Connecticut Department of Transportation
MDOT	State of Maine Department of Transportation
MHD	Massachusetts Highway Department
NYSDOT	New York State Department of Transportation
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SS	Standard Specifications For Highways and Bridges
UL	Underwriters' Laboratories
WWPA	Western Wood Products Association

1.3 SUBSTITUTIONS

- A. Products of a particular manufacturer are generally specified either on an "or equal" basis or with a list of acceptable alternative manufacturers. Contractor shall submit proposals to substitute products other than those specified in ample time before product is to be incorporated in Work, in order to allow for full investigation of proposal. Proposal shall be thoroughly documented with manufacturers' literature, shop drawings, and samples, as appropriate.

- B. Contractor warrants as part of his request that proposed substitution is comparable in size, operation, material and finish, to product specified. He shall be responsible for coordination of accepted substitution into Work and waives all claims for additional costs related to substitution which subsequently become apparent.
- C. The Owner retains absolute right of approval of any proposed substitution, and may reject same on any ground including function, operation, and appearance.

1.4 DELIVERY, STORAGE AND INSTALLATION

- A. Products shall be properly enclosed in containers, boxes, packages, etc., to prevent damage during transportation and handling. Deliver in original unopened containers with labels indicating brand names, model numbers, quality designations, fire-resistance rates, etc.
- B. Store materials delivered to site under cover, in locations secure from vandalism and theft, in full conformance with manufacturer's recommendations. Carefully protect stored materials from mechanical damage, dampness, and extremes of temperature.
- C. Products shall be installed, finished and cleaned in strict accordance with manufacturers' instructions, unless otherwise specified, by skilled workmen under adequate supervision. Foremen of installation crews shall have minimum of five years' experience installing that product.
- D. Protect installed products until substantial completion by appropriate means including plastic or canvas sheeting, kraft paper, masking tape, or wood barricades. Remove name plates and other identifying markings from exposed surfaces of manufactured items installed in finished spaces, if requested by the Owner.
- E. Materials shall be stored within the areas designated by the Owner.

2. PRODUCTS (Not Applicable).

3. EXECUTION (Not Applicable).

4. MEASUREMENT AND PAYMENT

4.2 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for work in this Section. Measurement and Payment for this item shall be included within the work item with which it is associated.

*** END OF SECTION ***

SECTION 01700

PROJECT CLOSEOUT

1. **GENERAL**

1.1 **CLEANING**

- A. Use cleaning materials as recommended by product manufacturers and appropriate specification sections. Employ experienced workmen or professional cleaners.
- B. Before inspection for substantial completion, do all necessary cleaning, including the following:
 - 1. Sweep and rinse with clear water exterior paved surfaces, rake clean other site surfaces.
 - 2. Refer to specification sections for additional requirements for particular surfaces.

1.2 **SUBSTANTIAL COMPLETION AND FINAL INSPECTION**

- A. Submit written certification that project, or designated portion of project, is substantially complete, and request, in writing, a final inspection. The Owner will make an inspection within 10 days of receipt of request.
- B. Should the Owner determine that the work is substantially complete, he will prepare a punch list of deficiencies that need to be corrected before final acceptance and issue a notice of substantial completion with the deficiencies noted.
- C. Should the Owner determine that the work is not substantially complete, he will immediately notify Contractor, in writing, stating reasons. After Contractor completes work, he shall re-submit certification and request for final inspection.

1.3 **CLOSE-OUT SUBMITTALS**

- A. Refer to EXECUTION portion of each specification section for closeout requirements, including operating and maintenance manuals; instruction of Owner's personnel in maintenance and operation of systems; submission of certifications, test reports, etc.; provision of spare parts and maintenance materials, all of which shall be neatly wrapped or packaged in standard sizes and clearly labeled.
- B. Completed project record documents specified in SUBMITTALS, SECTION 01300.
- C. Certificate of insurance for products and completed operations.
- D. Typed list of major subcontractors and suppliers with addresses and telephone numbers.
- E. Submissions specified elsewhere in Contract Documents, including consent of surety to final payment; affidavit that all bills and indebtedness connected with the Work have been

paid; and certification of payment from subcontractors and suppliers, or bond satisfactory to the Owner indemnifying the Owner against liens or other claims.

1.4 ACCEPTANCE OF THE WORK

- A. After all deficiencies have been corrected, a Letter of Final Acceptance will be issued. If only designated portions of the project have been inspected, a Letter of Partial Acceptance will be issued for that portion of the Work.
- B. Acceptance may be given prior to correction of deficiencies that do not preclude operation and use of the facility; however, final payment will be withheld until all deficiencies are corrected.
- C. Until receipt of Letter of Final Acceptance, Contractor shall be responsible for the work of this Contract.

1.5 POST-CONSTRUCTION INSPECTION

- A. Prior to expiration of one year from date of final acceptance, the Owner will inspect the project to determine whether corrective work is required. Contractor will be notified in writing of all deficiencies. In accordance with terms of the General Conditions, corrective work must start on noted deficiencies within 10 days of receipt of notification to Contractor.

2. PRODUCTS (Not Applicable).

3. EXECUTION (Not Applicable).

4. MEASUREMENT AND PAYMENT

4.3 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 02000

SITE PREPARATION

I **GENERAL**

1.1 **DESCRIPTION**

- A. These site preparation requirements shall apply to all project work operations within this Contract.
- B. The latest addition of following Specifications, Standards and Codes shall be made a part of these specifications:
 - 1. Massachusetts Department of Public Works, Standard Specifications for Highways and Bridges, 1988 with all updates as utilized by the MassDOT.
- C. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to prepare the site, complete, as indicated on the Contract Documents, as specified, and as follows:
 - 1. Mobilization and demobilization of all equipment, labor, materials, supervision, survey and any incidentals required to satisfactorily complete this project in accordance with these Specifications, the Contract Drawings and as directed by the Owner.
 - 2. Comply fully with all requirements and conditions of all Project Permits including performance of any miscellaneous work required to ensure full compliance and not otherwise covered by individual items in the contract.
 - 3. Perform all other miscellaneous work obviously required to complete the project, but not covered by individual items in the contract.
 - 4. Perform site work operations and the removal of debris and waste materials to assure minimum interference with navigation, streets, walks, parking facilities, buildings and all other adjacent facilities.
 - 5. Obtain governing authorities written permission, when required, to close or obstruct street, walks and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways, when required by governing authorities.
 - 6. Obtainment of written permission from property owners to trespass and/or transgress their properties where an easement has not been granted.
 - 7. Control dust caused by the work. Dampen surfaces as required. Comply with pollution control regulations of governing authorities.

8. Provide debris booms and siltation curtains, as required, to meet regulatory agency conditions.
9. If the Contractor, in the course of excavation, uncovers or otherwise encounters any artifacts, whether historic or prehistoric, he shall bring them to the immediate attention of the Owner, and stop all work in that vicinity of said artifacts until directed by the Owner.
10. If the Contractor, in the course of excavation, uncovers or otherwise encounters any suspected hazardous or unidentified substances, he shall bring them to the immediate attention of the Owner, and stop all work in that vicinity of said substances until directed by the Owner.

1.2 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 1. Demolition under DEMOLITION, SECTION 02110
 2. Site Security & Erosion Control under TEMPORARY FACILITIES AND CONTROLS, SECTION 01500.

1.3 REFERENCES

- A. The following standards shall apply to the work of this Section.
 1. Commonwealth of Massachusetts Highway Department (MHD) Specifications - Standard Specifications for Highways and Bridges

1.4 REGULATORY APPROVALS

1. All work shall comply with all requirements of environmental permits as attached at Appendix A:
 - Order of Conditions
 - Chapter 91 License
 - Water Quality Certification
 - USACE Permit
 - MEPA Certificate

1.5 OSHA REQUIREMENTS

- A. Pursuant to M.G.L. c.30, §39S, any person signing a contract to work on a public building or public works project estimated to cost more than \$10,000, must certify under the pains and penalties of perjury that all employees employed on the worksite, or in work subject to the bid, have successfully completed at least ten hours of OSHA approved training. Proof of OSHA certification of all workers onsite will be required by the City prior to the start of work.

1.6 SUBMITTALS

- A. Location and phasing plan for proposed work areas and schedule for coordination of work with other Contractors shall be submitted for Owner's approval prior to mobilization and related work preparation operations.

1.7 PROTECTION

- A. The Contractor shall erect a security fence around the limit of work areas as defined in the staging and phasing plan.
- B. Protect existing structures and facilities that are adjacent to the work area from damage caused by the project operations. Repair all damage caused to the satisfaction of the Owner, at the sole expense of the Contractor.
- C. Do not interfere with use of adjacent buildings or facilities. Maintain free and safe passage to and from adjacent buildings and facilities or both and between them and the public way.
- D. Cease operations and notify Owner immediately if safety of adjacent structures, workers, or the general public appears to be endangered. Take precautions to properly support structures and protect workers and general public. Do not resume operations until safety is restored.

1.8 EXAMINATION OF EXISTING CONDITIONS

- A. The Contractor shall become thoroughly familiar with the existing conditions of the site, consult records and drawings of adjacent structures and of existing utilities and their connections, and note all conditions which may influence the work. The commencement of work signifies the Contractor's acceptance of existing conditions.
- B. Site information: Data on subsurface conditions is not intended as representations or warrants of continuity of such conditions between the locations of data. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn from them by the Contractor. Data is made available for the convenience of the Contractor.

1. Additional test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner, and as in compliance with permits and contaminated soils requirements.

1.9 EXISTING SERVICES

- A. Arrange and pay for disconnecting, removing, capping, and plugging utility services as indicated on the Contract Documents. Disconnect and stub off. Notify the affected utility company in advance and obtain approval before starting this work.
- B. Place markers to indicate location of disconnected services.

1.10 MAINTAINING TRAFFIC

- A. Do not close or obstruct roadways or other public access areas without authorization or permits.
- B. Conduct operations with minimum interference to public or private roadways. Coordinate with local and state officials, police, and emergency agencies regarding all operations on public roadways including requirements for Police Details.
- C. Maintain access to buildings and facilities as indicated on the Contract Drawings.

2 PRODUCTS

2.1 MATERIALS

- A. Materials shall be as selected by the Contractor and approved by the Owner, except as indicated on the Contract Drawings and/or in the Specifications.
- B. Construction Fence
 1. Unless otherwise specified on the Construction documents, Contractor shall provide chain link fencing around perimeter of work area and staging area to prevent public access and provide public safety. The Fence shall be a minimum of 6' high and constructed of galvanized steel chain link with posts at 8' on center. Fence shall be supported by concrete blocks to receive posts.
 2. Fence shall be installed around all areas dedicated for construction activities to prevent public access and provide for public safety.
 3. Fence shall be removed or relocated to minimize disruption to vehicle and pedestrian traffic.
- C. Floating Boom with Siltation Curtain

1. The Contractor shall place a floating boom with siltation curtain, approved by the Owner, to the degree required by regulatory approvals, around the work area.
 - a. Fabric shall be a minimum at 22 oz. - 500 lb./inch tensile strength vinyl coated fabric.
 - b. Floatation material shall be marine quality expanded polystyrene which provides 50 lb./ft. of buoyancy.
 - c. Ballast shall be provided by an enclosed galvanized chain weighing approximately 1.5 lb./ft. and having a break strength of 10,600 lbs.
 - d. Depth of curtain shall be based on anticipated water elevation with anticipated changes in elevation and actual bottom elevations at the barrier location
2. The boom shall be large enough to provide protection of the work area the Contractor is working in and shall be moved to new work areas as necessary as the Contractor moves. Limits and location are as shown on contract drawings.

3 EXECUTION

3.1 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. Notify "Dig Safe" and local utilities and services as applicable prior to conducting any work in order to have all known utilities and services marked out before work begins.
- B. Existing structures and utilities shall be suitably protected from damage, including but not limited to existing pavements and curbs, lighting, fencing, concrete vault, manholes, and utility lines.

3.2 PROTECTION OF CONSTRUCTION SITE

- A. It is the Contractor's responsibility to secure the construction site, both for the protection of the ongoing work and the protection of the public. The location of construction fencing used for this purpose shall be approved by the Owner.

3.3 INSPECTION

- A. The Owner will assign inspectors and/or resident engineers to this project on either a full time or part time basis, as required to cover the work under this Contract, as justified by the Owner. The inspector or resident engineer shall be the Owner's representative for this project.

- B. The Owner must be notified at least 48 hours in advance of all material shipments in order to make arrangements for shipments to be inspected as they arrive to the site.
- C. Unless otherwise agreed upon with the Owner, no work shall be done with materials that are partially or completely buried or hidden from view without the presence of the Owner's representative. The Owner reserves the right to have all materials uncovered for inspection if placed without direct supervision, at the sole expense of the Contractor. No materials shall be paid for under this Contract that have not been examined and passed by the Owner's representative, or for any reason are placed outside the prescribed limits of the work.
- D. The Owner shall be permitted at all times to check the lines, grades, elevations, reference marks, batter boards, etc. set by the Contractor. Any errors or discrepancies in these items discovered by checks shall be corrected by the Contractor. Such checks shall not be construed as to be an approval of the Contractor's work and shall not relieve or diminish in any way the responsibilities of the Contractor for the accurate and satisfactory completion of the entire work. The Contractor shall be available to assist the Owner with these checks as needed.

3.4 DUST CONTROL

- A. During the construction period, the Contractor shall take special measures including, but not limited to, wetting down to control dust on site, in order to prevent annoyance/and or damage to adjacent property, whether public or private. Calcium chloride or any other chemical material may not be used on subgrades of areas to be seeded or planted.
- B. During the construction period, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of roads as necessary, so as to minimize the creation and dispersion of dust and to prevent annoyance/and or damage to adjacent property, whether public or private. If the Owner's Representative decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed, and without additional compensation. Calcium chloride or any other chemical material may not be used on subgrades of areas to be seeded or planted.
- C. The Contractor shall take all necessary measures to keep streets, over which equipment and service for project travel, clean and free from dirt, dust, mud and debris resulting from construction operations. The actions taken shall meet the requirements of all authorities having jurisdiction.

4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for MOBILIZATION shall be made by Unit Price Lump Sum.
- B. Measurement for SITE PREPARATION shall be made by Unit Price Lump Sum.

4.2 METHOD OF PAYMENT

- A. Payment for MOBILIZATION shall be by the Contract Price Lump Sum and shall include mobilization, demobilization and all items not otherwise called out for individual price breakdown. Payment under this item shall be made in two installments, 50% at time of project startup and 50% after substantial completion and removal of all Contractors equipment and personnel.
- B. Payment for SITE PREPARATION shall be by the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, testing, transportation and supervision for the satisfactory supply and installation of all items under this section and shall include all work materials; preparation of the site all erosion control activities including materials for barriers and siltation curtains; as specified in the Order of Conditions and/or other approvals; and all safety barriers, signage, security requirements for the project site and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
02000.1	Mobilization	Lump Sum
02000.2	Site Preparation	Lump Sum

*** END OF SECTION ***

SECTION 02110

DEMOLITION

1 **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section.
- B. Scope of work includes, but is not limited to the removal, relocation and/or disposal of the following:
1. Existing T Wharf Timber pier complete
 2. Partial removal of timber fendering, wave fence, concrete curb on Town Wharf
 3. Buildings as noted
 4. Floats and Gangways (by others)
 5. Utilities:
 - a. Electrical - conduit, wiring and lighting
 - b. Water & sewer
 6. Concrete and asphalt
 7. Unsuitable material found during excavation
 8. Excess granular and stone material not incorporated into the work.
 9. Miscellaneous hardware, steel angles, pieces of timber, concrete, rubble and other material which are encountered during the course of work which interferes with work specified to be done.
- C. Scope of work includes removal, storage and reinstallation of the following, which are to remain the property of the Owner:
1. sewer pump out – electrical connections in this contract, pump relocation by others

1.2 **SUBMITTALS**

- A. Contractor to provide certification that all materials disposed of has been done so in accordance with all municipal, state and federal regulations

2 **PRODUCTS**

2.1 **MATERIALS**

- A. No materials are to be supplied under this specification.

3 **EXECUTION**

- 3.1 Bidders shall examine the site and make their own estimates of the types and quantities of demolition, which will be required to fulfill the Contract requirements.
- 3.2 All materials removed during demolition designated for disposal shall become the property of the Contractor unless otherwise noted.
- 3.3 All materials removed during demolition, except that which is to be reused, shall be disposed of off the site in conformance with all municipal, state and federal regulations.

- 3.4 During demolition activities which are over or in water, the area of the demolition work will be enclosed with a floating boom approved by the Owner.
- 3.5 Contractor shall use extreme caution when demolishing structures. Damage caused to adjacent structures or a structure to remain which is caused by the Contractor shall be repaired by the Contractor as directed by the Owner at no additional cost to the Owner.

4. MEASUREMENT AND PAYMENT

4.4 METHOD OF MEASUREMENT

- A. Measurement for DEMOLITION shall be made by Contract Price LUMP SUM.
- B. Measurement for BUILDING A RELOCATION shall be made by Contract Price LUMP SUM.

4.5 METHOD OF PAYMENT

- A. Payment for DEMOLITION shall be by the Contract Price LUMP SUM for the removal storage, relocation and disposal of all items as identified on the Contract Documents. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, temporary support, testing, transportation, survey, site adjustment, and supervision for the satisfactory demolition, removal, and disposal of all items under this section including any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.
- B. Payment for BUILDING A RELOCATION shall be by the Contract Price LUMP SUM for the additional cost to salvage and relocate Building A as identified on the Contract Documents. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, temporary support, temporary framing or bracing, lifting supports, hoisting, testing, transportation, survey, site adjustment, placement at an agreed location and supervision for the satisfactory lifting, relocation and placement into store location and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

4.6 METHOD OF PAYMENT

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
02110-1	Demolition	Lump Sum
02110-2	Building A Relocation	Lump Sum

*** END OF SECTION ***

SECTION 02210

EARTHWORK

1 **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to the following:
 - 1. Excavation, filling, and compaction of granular materials
 - 2. Grading, compaction and subgrade preparation for surface areas.
 - 3. Preparation of granular base for all walls and footings.
 - 4. Installation and compaction of stone and granular material within the tidal area
 - 5. Back filling and compaction of specified fill material for walls and footings.
- C. Related work specified in other Sections:
 - 1. Site Preparation under SITE PREPARATION, SECTION 02000.
 - 2. Site Demolition under DEMOLITION, SECTION 02110.
 - 3. Concrete under CONCRETE, SECTION 03000.

1.2 **QUALITY ASSURANCE**

- A. Except as noted, work shall conform to the latest editions of the following codes, specifications, and standards:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. The Commonwealth of Massachusetts, Department of Public Works "Standard Specifications for Highways and Bridges" (latest edition). (MHD)
- B. Soil testing and inspection service:
 - 1. Provide independent soil testing and inspection service for quality control testing during earthwork operations. All testing shall be performed by an independent firm certified in soil testing and who is acceptable to the Owner.

1.3 **SUBMITTALS**

- A. Name and address of testing service for approval by Owner.
- B. Test reports on excavating, filling and grading:
 - 1. Submit copies of the following reports directly to the Owner from the testing services:
 - a. Test reports on borrow materials and crushed stone.
 - b. One optimum moisture-maximum density curve for each type of soil encountered.
 - c. Verification of wall and footing subgrades.
 - d. Field density test reports.

- C. Contractor experience and references of similar work including crew foreman experience.

1.4 TESTING

- A. Testing during construction: Testing service must inspect and approve subgrades and fill layers before further construction work is performed thereon.
 - 1. Maximum soil density shall be the density at optimum moisture as determined by ASTM Standard Methods of Test for Moisture-Density Relations of Soil Using 10-lb. hammer and 18-in. Drop, Designation D 1557, using Method A, B, C, or D whichever is applicable.
 - 2. The in-place soil density shall be determined in accordance with ASTM Standard Method of Test for Density of Soil in Place by the Sand-Cone Method, Designation D 1556 or ASTM Standard Method of Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (shallow depth), Designation D-2922.
 - 3. Gradation Analyses shall be performed in accordance with the applicable sections of ASTM D422 Particle-Size Analysis of Soils.
- B. If subgrade or material has been placed are below specified density, based on reports of testing service and inspection, the Contractor shall provide additional compaction and testing at no additional expense to the Owner.

1.5 JOB CONDITIONS

- A. Site information: Data on indicated subsurface conditions are not intended as representations or warrants of continuity of such conditions between soil boring. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Data is made available for the convenience of the Contractor.
 - 1. Boring logs are illustrated on the Drawings.
 - 2. Additional test borings and other exploratory operations may be made by the Contractor at no cost to the Owner.
- B. Existing utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Engineer immediately for directions as to procedure. Cooperate with utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 2. Do not interrupt existing serving facilities occupied and used by others.
- C. Use of explosives:
 - 1. Use of explosives is prohibited.
- D. Protection of persons and property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

1. Protect structures, utilities, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

2 PRODUCTS

2.1 MATERIALS

- A. Gravel Borrow: Gravel Borrow shall conform to M1.03.0 in the "Standard Specifications for Highways and Bridges" shall consist of inert material that is hard, durable stone and coarse sand, free of organic material, loam, trash, snow ice, frozen soil and other objectionable material and shall be well-graded within the following limits:

<u>Sieve</u>	<u>Percent Passing</u>
1/2 inch	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-8

Maximum size of stone shall meet M1.03.0 Type b with 3 inches largest dimension

- B. Crushed Stone: Crushed stone shall conform to M2.01.0 in the "Standard Specifications for Highways and Bridges" shall consist of one or the other of the following material:

1. Durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat, elongated, or other objectionable pieces.*
2. Durable crushed gravel stone obtained by artificial crushing of gravel boulders or fieldstone with a minimum diameter before crushing of 8 inches.
3. The crushed stone shall be free from clay, loam or deleterious material and not more than 1.0% of satisfactory material passing a No. 200 sieve will be allowed to adhere to the crushed stone.
4. Crushed stone shall be uniformly blended according to the following grading:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
3"	100
2"	90-100
1-1/4"	25-50
3/4"	0-15
1/2"	0-5

- C. Underlayer Stone: Shall be Modified Rockfill conforming to conform to M2.02.4 in the "Standard Specifications for Highways and Bridges". Material shall be 6 to 8 inch stone and shall be whole or crushed clean tough durable fragments, free from an excess of flat, elongated, soft, or disintegrated pieces and conforming to the size requirements shown on the Drawings. The stone shall meet the following requirements:

<u>Test</u>	<u>Requirement</u>
Sodium Sulfate Soundness (5 cycles)	12% max.

Grading – Underlayer

<u>Size of Stone</u>	<u>Passing Percentage</u>
8 in	95-100

4 in	0-25
2 in	0-5

3 EXECUTION

3.1 EXCAVATION

- A. Excavation consists of removal and disposal of materials encountered when establishing required grade elevations.
- B. Perform all excavation of every description and of whatever substances encountered to the depths of extent indicated for the proper installation of the work.
- C. Excavate to the exact depth required for all foundations, structures, and utility systems.
- D. Earth excavation consists of removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions.
- E. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Owner.
 - 1. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Owner.
- F. Stability of excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated.
 - 1. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- G. Shoring and bracing: Provide adequate shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
 - 1. Trench shoring and bracing shall comply with local codes and authorities having jurisdiction.
 - 2. Maintain shoring and bracing in excavations, regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
- H. Dewatering (Above Tidal Fluctuations): Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- I. Excavation for structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from foundations to permit placing and removal of concrete formwork, other construction required, and for inspection.

1. In excavating for foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.
- J. Demolition: Remove any existing concrete foundations, abandoned utility piping, pilings, timber and other debris encountered in areas of construction.
- K. Excavated materials which meet specification requirements for ordinary fill may be used as ordinary fill. Separate and stockpile suitable excavated materials away from unsuitable materials.
- L. Cold weather protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.2 SUBGRADE PREPARATION

- A. Before placing the underlayer, the subgrade shall be shaped to a true surface conforming to the cross section shown. All depressions shall be filled with suitable material and high spots removed and such areas again compacted. A tolerance of 0.1 feet above or below the required finished subgrade line and grade will be allowed.

3.3 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.
Tests of subgrades and fill layers will be taken as follows:
 1. Paved areas and slab subgrade: Make at least one field density test of subgrade for every 2,000 sq. ft. of paved area or slab, but in no case less than 3 tests.
 2. Open areas: Make at least one field density test of subgrade for every 4,000 sq. ft. of area, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 4,000 sq. ft. of area, but in no case less than 3 tests.
 3. Backfill around foundations: Make one field density test at each increment of 200 feet for each 3 foot change of elevation.
- B. Percentage of maximum density requirements: Provide not less than following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material-in-place.
 1. Stairs: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum density.
 2. Pavements: Compact top 12" below the pavement base to 95%. Compact the remainder to 90%.
 3. Open areas: Compact to 90%.
 4. Subgrades: Compact to 90%.
- C. Moisture control: Where subgrade or layer of soil material must be moisture-conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, as needed to obtain optimum moisture content.

1. Granular material placed within the tidal zone shall be done during low tides and all material shall be leveled and compacted to the required specifications prior to the submergence of the next tide.
2. Remove and replace or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3.4 BACKFILL AND FILL

- A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification as shown on the contract drawings including but not limited to:
 1. Gravel Borrow in front of abutment and under concrete slab as delineated on the contract drawings.
 2. Crushed stone beneath concrete slab as delineated on the contract drawings.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 1. Acceptance by the Owner of construction below finish grade.
 2. Inspection, testing, approval, and recording locations of underground utilities.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Where temporary sheet piling is used cut off sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 5. Removal of trash and debris.
- C. Ground surface preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface (above Elevation 0.0 Mean Low Water) prior to placement of fills.

3.5 PLACEMENT AND COMPACTION

- A. General: All compacted fill shall be placed in layers unless otherwise specified. Each layer shall be systematically compacted by a minimum of four coverages with the equipment described below, to the density specified herein before. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum four coverages.
 1. Compaction equipment in open areas shall consist of fully-loaded ten-wheel dump trucks, tractor dozers weighing at least 30,000 pounds and operated at top speed, or by vibratory rollers or by other compaction equipment approved by the Owner.
 2. Compaction equipment in confined areas (in trenches and adjacent to walls) shall be accomplished by hand-operated vibratory equipment or mechanical tampers as approved by the Owner.
 3. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of a day's operations. Prior to terminating operations for the day, the final

layer of fill, after compaction, shall be rolled with a smooth-wheeled roller to eliminate ridges of soil left by tractors, trucks and compaction equipment.

4. The Contractor shall not place a layer of compacted fill on snow, ice or soil that was permitted to freeze prior to compaction. Removal of these unsatisfactory materials will be required as directed by the Owner.
- B. Backfill around foundation: gravel fill shall be placed in layers having a maximum loose layer thickness of 8 inches. Gravel fill shall be placed to the extent shown on the drawings.

3.6 GRADING

- A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. Compaction:
1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.7 DUST CONTROL

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping a sprinkling of roads 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, the Contractor shall furnish and spread the material, as directed, and without additional compensation

3.8 MAINTENANCE

- A. Protection of graded areas: Protect newly-graded areas from erosion, and keep free of trash and debris.
1. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.
- B. Reconditioning compacted areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.9 EXAMINATION OF THE WORKS

- A. No material shall be placed to cover a previous layer until the Engineer has approved the sizes, lines, levels and slope of the previous layer. The Contractor shall provide all assistance necessary as required by the Engineer for checking the work. If subsequent layers are placed without first obtaining the approval of the Engineer, the Contractor shall remove all or part of the covering layer, as directed by the Engineer, to enable the Engineer to check revetment construction is in compliance with the Contract Documents at no additional cost to the Employer.

3.10 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove all waste materials, including unacceptable and/or excess excavated material, trash and debris, from the Owner's property and legally dispose of it.

4 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for work in this Section. Measurement and Payment for this item shall be included within the work item with which it is associated.

*** END OF SECTION ***

SECTION 02317

ROUND TIMBER PILES

1 **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Bearing Piles
 - 2. Batter Piles
 - 3. Fender Piles
- C. Related work specified elsewhere includes:
 - 1. Demolition of Town Wharf curb under DEMOLITION, SECTION 02110.
 - 2. Concrete Pile Caps under REINFORCED CONCRETE, SECTION 03000.
 - 3. Fasteners, anchor bolts, bolts, and lag bolts under MISCELLANEOUS METALS, SECTION 05600.
 - 4. Timber construction under HEAVY TIMBER CONSTRUCTION, SECTION 06130
 - 5. Pile treatment under TIMBER TREATMENT (CCA), SECTION 06310.

1.2 **QUALITY ASSURANCE**

- A. Except as noted, work shall conform to the latest editions of the following codes, specifications and standards.
 - 1. American Society for Testing and Materials (ASTM), Specifications: D25 Round Timber Piles.
 - 2. American Institute of Timber Construction (AITC).

1.3 **SUBMITTALS**

- A. Submit for approval by Owner proposals for following items:
 - 1. Driving plan and schedule for installation of piles.
 - 2. Method of installation of piles including size and type of pile hammer.
 - 3. Templates and falsework to be used for support and layout of piles during driving.
 - 4. Pile point and method of attachment if required.
- B. AWWPA quality stamp on each new treated pile.
- C. Certification of timber pile species.

1.4 PRODUCT HANDLING

- A. Piles shall be handled with care to prevent damage. Damaged piles will be rejected and replaced at no additional cost to the Owner. Piles shall be stored with a space beneath them and situated to prevent being exposed to standing water. Cant hooks or pike poles shall not be used.

2 PRODUCTS

2.1 MATERIALS

- A. South Pier bearing and batter piles:
1. Shall be tropical Greenheart, meeting ASTM D25 and below.
 2. Minimum circumference three (3) feet from the butt shall be 44" and minimum tip circumference shall be 30 inches.
- B. South Pier fender piles:
1. Shall be tropical Greenheart, meeting ASTM D25.
 2. Minimum circumference three (3) feet from the butt shall be 44"
 3. Fender pile heads shall be cut at 15 degrees to the horizontal.
 4. Fender pile heads shall be capped with clear, (unless otherwise indicated), cast-in-place fiberglass, extending 4 inches down the sides of the pile. The sides of the cap shall be nailed to the pile with galvanized roofing nails prior to application of last layer of fiberglass. Pile covering shall be 4 layers of 1-1/2 oz. mat or approved equivalent.
- C. Boardwalk bearing piles:
1. Shall be Clean-peeled and treated Southern Yellow Pine or West coast Douglas Fir, meeting ASTM D25.
 2. Minimum circumference three (3) feet from the butt shall be 38" and minimum tip circumference shall be 22" for piles over 30' in length.
 3. Tops of piles shall be covered with tar paper. Tar paper shall extend over the pile as shown on contract drawings. Tar paper shall be 15 # and meet ASTM D4869.
- D. All piling shall be cut from sound and live trees, preferably during the winter season.
- E. Piles shall be free from any defects, which will impair their strength, or usefulness for the purpose intended or that will prevent proper driving.
- F. All Greenheart piles shall be supplied by a company that operates in the Guiana Shield countries in conformity with the International Conventions and National Forestry Regulations relating to the management of forestry concessions. Company shall enforce the protection of the endangered species listed by CITES (Convention on Trade in Endangered Species) and the bio-diversity of the ecosystems and shall respect the Intellectual Property Rights of the Indigenous Peoples.
- G. Greenheart piles shall be supplied by a company that stresses the need for low impact forestry operations, ensuring that its forestry extraction is state of the art while constantly monitoring the effect of its logistics systems on watershed management and its use of biodegradable wood preservatives.

- H. Greenheart piles shall be banded at 12" below final cutoff elevation unless noted otherwise on the Contract Drawings. Bands shall be 1¼" wide stainless steel 19 gauge. Each pile shall be double wrapped.
- I. Banding of greenheart piles shall occur prior to any cutting.
- J. Greenheart piles shall be untreated.
- K. Prior to ordering the greenheart piles, the Contractor shall drive a minimum of four test piles evenly spaced within the proposed pier footprint to confirm the required pile length(s). Locations to be approved by the Engineer.
 - 1. Test piles shall not be production piles unless approved otherwise by the Engineer.
 - 2. Test piles shall be installed using the same equipment intended to be used for production piles.
 - 3. Test piles may be shorter than anticipated production piles but shall have tip circumference as specified for production piles. Production piles are assumed to be up to 65 feet long installed length.
 - 4. All test piles shall be driven to required load capacity.
- L. Piles shall be installed to the criteria shown in the Contract Documents and Drawings.

3 EXECUTION

3.1 DRIVING EQUIPMENT

- A. Pile hammers: Vibratory, air, steam or diesel-powered, of a type approved by the Owner.
 - 1. Impact Hammers: The hammer furnished shall have a capacity at least equal to the hammer manufacturer's recommendation for the total weight of pile and character of subsurface material to be encountered. The minimum driving energy of the hammer shall be 6500 foot-pounds. For piles of any length, the maximum driving energy of the hammer shall be 15,000 foot-pounds. Diesel-powered hammers shall be operated at the rate recommended by the manufacturer throughout the entire driving period. Sufficient pressure shall be maintained at the hammer so that: (1) for double-acting hammer, the number of blows per minute during and at the completion of driving of a pile is equal approximately to that at which the hammer is rated; (2) for single-acting hammer, there is a full upward stroke of the ram; and (3) for differential-type hammer, there is a slight rise of the hammer base during each upward stroke.
 - 2. Vibratory Hammers: Vibratory hammers will be allowed when bearing capacity determination by blow count or driving energy is not required.
- B. Driving helmets and cushion blocks:
 - 1. Use a driving helmet or cap including a cushion block or cap block of a design approved by the Owner between the top of the pile and the ram to prevent impact damage to the pile.
 - 2. The driving helmet or cap and cushion block combination shall be capable of protecting the head of the pile, minimizing energy absorption, and transmitting hammer energy uniformly and consistently during the entire driving period.

3. The driving helmet or cap shall fit snugly on the top of the pile so that the energy transmitted to the pile is uniformly distributed over the entire surface of the pile head.
4. Demonstrate to the Owner that the equipment to be used on the project performs the above functions.
5. The cushion block may be a solid or laminated softwood block with the grain parallel to the pile axis and enclosed in a close-fitting steel housing. The thickness of block shall be suitable for the length of pile to be driven and the character of subsurface material to be encountered. Generally, thicker blocks are required for longer piles and softer subsurface material.
6. Replace cushion block if it has been damaged, split, highly compressed, charred or burned or has become spongy or deteriorated in any manner.
7. Under no circumstances will the use of small wood blocks, wood chips, rope or other material permitting excessive loss of hammer energy be permitted.

3.2 HANDLING

- A. Inspect piles in the leads, and where the protective shell of treated wood is impaired, between cutoff and a point which will be not less than 10 feet below the ground, the piles shall be repaired as specified under Timber Treatment unless the pile is damaged to such an extent that it is rejected. Rejected piles will be replaced at no additional cost to the Owner.
- B. Support pile laterally during driving, but not unduly restrained from rotation in the leads. Where pile orientation is essential, take special care to maintain the orientation during driving. Take special care in supporting battered piles to prevent excess bending stresses in the pile.
- C. When necessary, place collars around the pile head to prevent brooming. Cant hooks shall not be used in handling treated piles. Cut piles by sawing or other means approved by the Owner. Holes for rebar shall be of a size that will ensure a driving fit.

3.3 DRIVING PILES:

- A. Bearing piles: Drive without interruption to the specified capacity.
 1. Capacity specification: South Pier Piles Driven to **24** ton capacity.
Boardwalk Piles Driven to **10** ton capacity
 2. End Bearing Piles: In lieu of a pile load test for pile design loads of 35 tons or less, the allowable pile load shall be computed by means of the following pile driving formula:

$$R = 2E / (S + C)$$

where:

- R = Allowable pile load in pounds
E = Energy per blow in foot-pounds
S = Penetration of last blow or average penetration of last few blows experienced in inches

C = Constant equal to 1.0 for drop hammer and 0.1 for steam or air hammer

- a. The value of "S" must be determined with the hammer operated at one hundred (100) percent of the rated number of blows per minute for which the hammer is designed.
 - b. Any driving resistance developed in strata overlying the bearing material shall be discounted.
 - c. If the driving of the pile has been interrupted for more than one (1) hour, the value of "S" shall not be determined until the pile is driven at least an additional twelve (12) inches, except when it encounters refusal.
- B. Fender piles: Drive piles to minimum elevations as shown on the drawings unless refusal encountered and then shall be reported to the owner.
- C. Tolerances in Driving: Butts shall be within 4 inches of the location indicated. Manipulation of piles to force them into position will not be permitted. Check all piles for heave. Re-drive heaved piles to the required elevation. Piles damaged, mislocated, or driven out of alignment shall be replaced or additional piles driven as directed at no additional cost to the Owner.

3.4 INSTALLATION

- A. All piles shall be marked at a given distance from the pile tip and every foot interval to the pile butt end. Markings should indicate length from the pile tip and should be visible above the waterline or ground level after driving.
- B. If obstructions are encountered, contractor shall make reasonable effort to remove obstruction. Reasonable efforts shall include excavation if obstruction is shallow or probing with steel pile to remove or bypass the obstruction. This work shall be considered as part of the work associated with pile installation
- C. Pile Cut-Offs: After completion of driving, tops of piles shall be cut off to remove damage caused by driving hammer. All cut offs shall be the property of the contractor for removal and disposal from the project site.
- D. Piles that split under driving or prove otherwise unsatisfactory shall be removed and replaced from the site at the sole expense of the Contractor and to the satisfaction of the Engineer.
- E. The driving of piles with followers shall not be permitted.
- F. Spudding, jetting, auguring or pre-drilling of piles to achieve the required penetration will not be permitted unless approved in writing by the design engineer.
- G. Any pile, which may be driven in the wrong position, shall be removed and driven in the correct position. Contractor will not be paid for the pile driven in a wrong position.
- H. Any pile which may prove too short after driving, or which has been split, broomed, upset, or otherwise damaged during driving, shall be rejected and another satisfactory pile shall be substituted and properly driven. The Contractor shall not be paid for pile work associated with the replacement of piles in the above category.

- I. Tops of piles shall be trimmed and shaped as required to connect to other work as shown on the Contract Drawings.

3.5 INSPECTIONS

- A. All piles will be subject to inspection before or after shipment to the site, or both, at the option of the Engineer. Any pile that does not conform to all requirements will be rejected.
- B. A line drawn from the center of the butt to the center of the tip must lie wholly within the body of the pile. Any pile that does not meet this requirement shall be rejected.
- C. Inspection of pile driving operations will be provided by the Engineer. No piles shall be driven except in the presence of an authorized inspector.
- D. Approval given by the Engineer or by his agent shall not relieve the Contractor of his responsibility for performing the work in accordance with the plans and specifications.
- E. Contractor shall not cut off top of pile until verification by the Owner.

3.6 RECORDS

- A. A complete and accurate record of each pile shall be furnished by the Contractor. The record shall indicate the pile location, diameter, length, hammer (make and model), number of blows per 6" for the final 36 inches of penetration, all other pertinent information. Where a vibratory hammer is used for fender piles, the time of driving shall be recorded per 6 inches for the final 36 inches of penetration.

5 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement of ROUND GREENHEART PILES shall be measured per Linear Foot as the actual length in-place below design cut-off elevations measured along the axis of the pile.
- B. Measurement of ROUND TIMBER PILES shall be measured per Linear Foot as the actual length in-place below design cut-off elevations measured along the axis of the pile.

4.2 METHOD OF PAYMENT

- A. Payment shall be made for ROUND GREENHEART PILES at the Contract Unit Price Per Linear Foot. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, survey, and supervision for the satisfactory supply and installation of timber piles including cutting to final elevation, trimming, shaping, banding, disposal of excess material, fasteners and connection to other work as required, test piles and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents. No separate payment will be made for test piles.
- B. Payment shall be made for ROUND TIMBER PILES at the Contract Unit Price Per Linear Foot. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, survey, and supervision for the satisfactory supply and installation of timber piles including removal and replacement of riprap, cutting to final elevation, shaping, trimming, disposal of excess material, fasteners and connection to other work as required and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.

- C. No payment will be made for timber piles cut-offs.
- D. Test piles will not be measured separately. Payment for all test piles shall be included under Item 02000-1 Mobilization.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
02317- 1	Round Greenheart Piles –South Pier	LF
02317- 2	Round Timber Piles – Boardwalk	LF

END OF SECTION

SECTION 02500

DRAINAGE SYSTEM

1 **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section and shown on Contract Drawings.
- B. This Section specifies requirements for the site storm drainage system.
- C. The work includes:
 - 1. Drain system for Pier and connection to storm drainage system
 - 2. Drainage structures: manholes, Stormceptor, oil/water separator, piping, check valves, gate valves.

1.2 **RELATED SECTIONS**

- A. Sections which directly relate to the work of this Section include:
 - 1. EARTHWORK - SECTION 02210
 - 2. REINFORCED CONCRETE - SECTION 03000

1.3 **SUBMITTALS**

- A. Shop Drawings
 - 1. Materials list of items proposed for the work.
 - 2. Shop drawings or descriptive literature, or both, showing dimensions, joint and other details of all materials proposed for the work. Shop drawings shall be submitted to the Engineer for approval prior to ordering material.
- B. As-Built Drawings
 - 1. Submit electronic copies in CAD and PDF format and 4 bond copies of As-Built Drawings upon completion and acceptance of work.
 - 2. As-Built Drawings shall be complete and shall indicate the true measurement and location, horizontal and vertical, of all new drainage system construction. As-Built Drawings shall include a minimum of three ties showing the distance to each catch basin and manhole from fixed permanent objects. As-Built Drawings shall also contain any additional information required by the municipality, and shall be stamped with the seal of a Licensed Land Surveyor and/or Licensed Professional Engineer.
- C. Contractor will be required to obtain all Plymouth Engineering Department permits and inspections prior to construction and submit proof of obtainment.

2 **PRODUCTS**

2.1 **GENERAL**

- A. All materials for storm drainage system shall be new and unused.

2.2 PIPE

- A. Polyvinyl Chloride (PVC) Pipe: Pipe and fittings shall comply with the requirements of ASTM D3034, rated SDR 21, unless otherwise shown on the Drawings. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D3034 classification and be manufactured in accordance with ASTM D-1784 with rubber gaskets conforming to ASTM-3212 and F477.

Pipe joints shall be integrally molded bell ends in accordance with the requirements of ASTM D3034, Table 2, with factory supplied elastomeric gaskets and lubricant.

- B. Hangers shall be 316 stainless steel clevis clamps with $\frac{3}{4}$ " stainless steel rods to be fastened as shown on the Drawings.
- C. Reinforced Concrete Pipe: Pipe shall comply with the requirements of ASTM C76. All pipe 18 inches and smaller shall be Class V. All other pipe shall be Class III unless indicated otherwise on the Drawings.

Joints for the reinforced concrete pipe shall be the tongue and groove or bell and spigot type with rubber gasket conforming to ASTM C443.

2.3 PIER DRAIN SCUPPERS

- A. Drain scuppers to be provided on the pier shall be BridgeDrain – Scupper as manufactured by ACO Polymer Products, or approved equal, with a minimum length of 54 inches. The nominal clear opening shall be 8 inches width with overall width not exceeding 11 inches. Units shall be manufactured with a sloped invert with an 8 inch diameter outlet pipe. Units shall be polyester fiberglass with a galvanized steel frame and incorporate levelling feet for adjustment.

Grate shall be Class E Load ADA compliant ductile iron longitudinal grate secured with minimum 2 stainless steel hex bolts per 18 inch length.

Scuppers and grates shall be installed in accordance with the manufacturer's recommendations at the locations shown and as detailed on the Drawings.

2.4 STORM DRAIN MANHOLES

- A. Precast Units

1. Structure: 48-inch minimum inside diameter, precast concrete units (4,000 psi minimum compressive strength) with eccentric cone section tapering to 24-inch diameter and monolithic base section meeting the requirements of ASTM C478. All structures shall be designed for HS-20 loading and shall be provided with a bituminous damp proofing coating. Flat top sections to be substituted for conical sections shall be noted on the shop drawings.
2. Precast Unit Joint Seals: Flexible butyl rubber O-ring type seals meeting the requirements of ASTM C990.

B. MASONRY UNITS

1. Brick shall conform to Sewer Brick (Made from Clay or Shale), ASTM designation C32, Grade MS or Building Brick (Solid Masonry Units Made from Clay or Shale), ASTM C62, Grade SW.
2. Mortar shall be in conformance with ASTM C270, Type

C. Steps for manholes shall be Steel Reinforced Copolymer Polypropylene plastic step with at least a 16-inch wide stepping surface conforming to ASTM C478 and A615.

D. Manhole frames and covers shall be cast iron conforming to the requirements of ASTM A48, Class 30, and shall be of noiseless, non-rocking design with pick holes. Manhole covers shall have a diamond pattern, pickholes and include the word "Drainage" cast in 3 inch letters.

E. Manhole frames and covers shall have a minimum total weight of 530 pounds with a clear opening of 24 inches, unless otherwise indicated on the Drawings. Manhole frames and covers shall be LeBaron Model LB 268 or approved Town of Plymouth standards for frame and cover.

F. Inlet and outlet penetrations shall be provided with a flexible neoprene boot with stainless steel clamps and stainless steel expansion ring as manufactured by Kor-n-Seal or approved equal.

2.5 STORM DRAIN MANHOLES CONNECTIONS

A. Inlet and outlet penetrations shall be provided with a flexible neoprene boot with stainless steel clamps and stainless steel expansion ring as manufactured by Kor-n-Seal or approved equal.

2.6 STORMCEPTOR

A. The stormwater oil and sediment separators shall be as indicated on the Drawings as manufactured by Stormceptor or approved equal. The separator shall be circular and constructed from pre-cast concrete circular riser and slab components. The internal fiberglass insert shall be bolted and sealed watertight inside the reinforced concrete component. The separator shall be capable to be used as a bend or junction structure within the stormwater drainage system.

B. The treatment device shall be capable of removing 80 percent of the average annual total suspended solids (TSS) load without scouring previously captured pollutants. Design methodologies shall provide calculations substantiating removal efficiencies and correlation to field monitoring results using both particle size and TSS removal efficiency. The separator must be capable of removing 95 percent of the floatable free oil. The separator must be capable of trapping fine sand, silt, clay and organic particles in addition to larger sand, gravel particles and small floatables.

- C. Stormceptor structure shall meet the requirements of Article 2.4, Storm Drain Manholes of this Section.
- D. An on-site demonstration of the maintenance required for the Stormceptor shall be given to approved Plymouth Water and Sewer personnel. This demonstration/first cleaning shall take place after sufficient time has elapsed to allow the device to function (typically after one winter) and must be attended by the manufacturer's representative.
- E. The precast structure shall be designed for hydrostatic head based on 100 year flood elevation +17.43 feet Mean Low Water Datum. Contractor shall be responsible for providing precast tank manufacturer with groundwater information. Precast concrete manufacturer shall submit buoyancy calculations, with a minimum factor of safety of 1.5, as part of the shop drawing review and design anti-floatation collars for all tanks requiring counterbalance.

2.7 OIL/WATER SEPARATOR

- A. The oil/water separator shall meet the requirements of ASTM C478 and shall be fabricated of 5,000 psi concrete and fabricated as indicated on the Drawings. All structures shall be designed for HS-20 loading and shall be provided with a bituminous damp proofing coating. Steel reinforcement shall meet ASTM A-615, Grade 60 with 1" minimum cover. Joint sealant shall be flexible butyl rubber O-ring type seals meeting the requirements of ASTM C990.
- B. The precast structure shall be designed for hydrostatic head based on 100 year flood elevation +17.43 feet Mean Low Water Datum. Contractor shall be responsible for providing precast tank manufacturer with groundwater information. Precast concrete manufacturer shall submit buoyancy calculations, with a minimum factor of safety of 1.5, as part of the shop drawing review and design anti-floatation collars for all tanks requiring counterbalance.

2.8 TIDEFLEX VALVE

- A. All tideflex valves shall be of the Series TF-1 as manufactured by Tideflex Technologies, Inc. of Pittsburgh, PA or approved equal. Check Valves are to be all rubber of the flow operated check type with a slip-on connection. The Check Valve is designed to slip over the specified pipe outside diameter and attached by means of vendor furnished stainless steel clamps. The port area shall contour down to a duckbill, which shall allow passage of flow in one direction while preventing reverse flow. The valve shall be one piece rubber construction with nylon reinforcement. In sizes 20" and larger, the bill portion shall be thinner and more flexible than the valve body, and formed into a curve of 180°.
- B. Valves shall be installed in accordance with manufacturer's written installation and operation manual and approved submittals.
- C. Maximum external back pressure shall be equivalent to 7 feet head of sea water.

3 EXECUTION

3.1 GENERAL

- A. All work shall be done in accordance with the latest Plymouth Engineering Department's rules and regulations.

3.2 MANHOLES, STORMCEPTOR & OIL/WATER SEPARATOR

- A. Manholes, Oil/Water Separator and Stormceptor shall be constructed at the locations and to the lines, grades, dimensions and design shown on Drawings or as required by the Engineer.
- B. Precast concrete units shall be installed in a manner that ensures watertight construction and all leaks in precast concrete structures shall be sealed. If required, precast concrete structures shall be repaired or replaced to obtain watertight construction.
- C. Manhole Inverts shall conform accurately to the size of the adjoining pipes.
- D. Manhole inverts shall be constructed of 4,000 psi concrete as shown the Drawings.
- E. Precast sections shall be level and plumb with approved joint seals. Water shall not be permitted to rise over newly made joints until after inspection and acceptance. All joints shall be watertight.
- F. Openings which have to be cut in the sections in the field shall be carefully made to prevent damage to the riser. Damaged risers will be rejected and shall be replaced at no additional cost to the Owner.

3.3 CASTINGS

- A. Cast-iron frames for covers shall be well bedded in cement mortar and accurately set to the proposed grades.

3.4 PIPE INSTALLATION

- A. Contractor to verify the location, size invert and type of existing pipes at all points of connection prior to ordering new utility materials.
- B. As soon as the trench is excavated to the normal grade of the bottom of the trench, the Contractor shall immediately place the bedding material in the trench. The pipe shall be firmly bedded in the compacted bedding material accurately to the lines and grades shown on the Drawings.
- C. All piping shall be laid in the dry with the spigot ends pointing in the direction of flow. Installation shall proceed from the downstream to upstream in all cases.

3.5 CLEANING

- A. At the completion of the work, clean all pipes, structures, and open drainage courses through and to which water from the site is discharged.

3.6 LEAKAGE TESTING

- A. All new drainage services, shall be subjected to a hydrostatic leakage test, which would be accomplished by visual inspection and recording water loss.
- B. Any exposed pipe, fittings, valves and joints shall be carefully examined during the test. Any damaged or defective pipe, fittings, or valves discovered following, or as a result of the hydrostatic test shall be repaired or replaced with sound material. If faulty materials are removed and replaced, the hydrostatic test(s) shall be repeated until satisfactory to the Engineer at no additional cost to the Owner.

C. Hydrostatic Test

1. Test Standards
 - a. Duration of 2 hours
 - b. Zero leakage will be allowed.

D. Acceptance

1. Acceptance shall be determined on the basis of zero allowable leakage. If any test of pipe discloses leakage, the Contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.
 - a. All visible leaks are to be repaired regardless of the amount of leakage.

4 MEASUREMENT AND PAYMENT

4.4 METHOD OF MEASUREMENT

- A. Measurement for STORM DRAINAGE SYSTEM AND WATER DISTRIBUTION shall be made by the Contract Unit Price LUMP SUM, complete in-place.

4.5 BASIS OF PAYMENT

- A. Payment for STORM DRAINAGE SYSTEM AND WATER DISTRIBUTION shall be for the Contract Unit Price LUMP SUM. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, design, testing, transportation, survey, and supervision for the satisfactory supply and installation of the Storm Drainage System and Water Distribution, complete in place, including all piping and laterals, pipe hangers or supports, all connections, valves, and structures, scuppers, grates, frames, castings, dewatering, excavation, backfilling and compaction; material separation requirements, all associated erosion control activities including materials for barriers and siltation curtains and all safety barriers, signage, police details, security requirements, disposal of excess material and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.

4.6 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
02500-1	Storm Drainage System And Water Distribution	Lump Sum

*** END OF SECTION ***

SECTION 03000

REINFORCED CONCRETE

1. **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Reinforced Concrete
 - a. Pile Caps
 - b. Pier Deck (Precast panels and Cast in Place Topping)
 - c. As otherwise shown on contract documents or needed to complete the work
 - 2. Forms and falsework for forms
 - 3. Reinforcing steel including epoxy coated and associated accessories (Ties, Chairs, etc.) as required
 - 4. Grout for bedding and setting of anchor pins or dowels
 - 5. Epoxy adhesive for setting of anchor pins and/or dowels
 - 6. Cutting and patching
 - 7. Expansion and/or Control Joints

1.2 **RELATED WORK UNDER OTHER SECTIONS**

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 02210, EARTHWORK
 - 2. Section 02317, ROUND TIMBER PILES
 - 3. Section 02500, DRAINAGE SYSTEM
 - 4. Section 05500, METAL FABRICATIONS
 - 5. Section 06130, HEAVY TIMBER CONSTRUCTION

1.3 **QUALITY ASSURANCE**

- A. Except as noted, work shall conform to the latest edition of the following code specifications and standards:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. American Concrete Institute (ACI):
 - a. "Building Code Requirements for Reinforced Concrete", ACI 318.
 - b. "Specifications for Structural Concrete for Buildings", ACI 301.
 - c. "Recommended Practice for Measuring, Mixing, and Placing Concrete", ACI 304.
 - d. "Recommended Practice for Cold (Hot) Weather Concreting", ACI 305 and ACI 306.
 - e. "Guide to Formwork for Concrete ", ACI 347.

3. Concrete Reinforcing Steel Institute (CRSI):
 - a. Design of Reinforced Concrete Structures - "A Manual of Standard Practice".
 - b. "Placing Reinforcing Bars".
 - c. "Field Handling Techniques for Epoxy-Coated Reinforcing Bar"

1.3 SUBMITTALS

A. Shop Drawings

1. Reinforcing steel shop drawings
 - a. Shall be of such detail and completeness that all fabrication and placement at the site can be accomplished without the use of Contract Drawings for reference.
 - b. Shall include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
 - c. Shall show joint layout and design
2. Contractor shall check structural, and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete, and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.

B. Concrete mix designs.

C. Grout / manufacturer/design mix

D. Name and address of Independent Testing Laboratory for approval by Owner.

1.4 TESTING OF CONCRETE

A. Quality Control

1. Test Specimens: The Contractor will be required to make, cure and have tested, a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM Designations C172, C31 and C39. One cylinder shall be broken after seven days and three cylinders after twenty-eight day.
2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM Designation C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.
3. Air Content: The Contractor shall make an air content test from each day's pour of concrete by the pressure method in accordance with ASTM Designation C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. Testing: All personnel and laboratories testing concrete shall be licensed by the Commonwealth of Massachusetts.
5. Test Failures: In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Owner may require test cores of the hardened

structure to be taken by the Testing Laboratory in accordance with ASTM C-42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to the Owner. Any other work damaged as a result of this concrete removal shall be replaced with new materials to the satisfaction of the Owner at no additional cost to the Owner. The cost of coring will be deducted from the Contract amount. Where core cylinders have been taken by the Testing Laboratory and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Owner at no additional cost to the Owner.

- B. The Contractor shall coordinate the date and location of tests with the Owner before any concrete work is started.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Reinforcing steel shall be transported to the site, stored, and covered in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete or chip protective epoxy coating. A sufficient supply of approved reinforcing steel shall be stored on the site at all times to ensure that there will be no delay of the work. Identification of steel shall be maintained after bundles are broken.

2. PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, Type II of U.S. manufacture. Only one brand of cement shall be used on the project.
- B. Aggregates:
 - 1. Fine aggregate. ASTM C 33, clean and graded from 1/4 inch to fines.
 - 2. Coarse aggregate. ASTM C 33, clean and graded from 1/4 inch to maximum sizes hereinafter specified.
- C. Air Entraining Agent: Conforming to ASTM C 260 for Air-Entraining Admixtures for Concrete.
- D. Water Reducing Agent: Conforming to ASTM C 494 Type A for Chemical Admixtures for Concrete.
- E. Shrinkage-Reducing Agent: Conforming to ASTM C 494 requirements for Type S, Specific Performance, Admixtures. Admixture shall be able to reduce shrinking by a minimum of 75% by 28 days. Shrinkage reducing agent shall be used in all concrete mixes which will be susceptible to one dimensional drying or placed over impermeable surfaces.
- F. Microsilica Admixture: Packaged in easily dispersing form.
- G. Water: Clean and potable free of impurities detrimental to concrete.
- H. Reinforcing Bars: New, deformed billet steel bars, conforming to ASTM A 615, Grade 60, with Epoxy-Coating conforming to ASTM A775/A775M.
- I. Concrete Sealant: Must be on the MassDOT Qualified Construction Material
- J. Accessories: Reinforcement accessories, consisting of spacers, chairs, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement

in place. All accessories shall be dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of the CRSI Standards herein before specified.

- K. Tie wire for reinforcement shall be 16 gauge or heavier dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of ASTM A-82.
- L. Form Ties and Spreaders: Standard metal form clamp assemble and plastic cone, of type acting as spreaders and leaving no metal with 1 inch of concrete face. Inner tie rod shall be left in concrete when forms are removed. No wire ties or wood spreaders will be permitted. Use 1/2" x 1" C.T. plastic cones for sinkages.
- M. Form Coatings: Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface, "Nox-Crete Form Coating" as manufactured by Nox-Crete Company, or approved equal. Coating containing mineral oils or the nondrying ingredients will not be permitted.
- N. Grout: A high-strength, non-shrink grout with saltwater resistance, such as Five Star Special Grout 120 or equivalent.
- O. Lifting eyes for lifting, handling means and methods shall be submitted to Engineer for approval. Lifting eyes shall be stainless steel or dielectric coated.

2.2 CONCRETE STRENGTHS AND PROPORTIONS

- A. All reinforced concrete shall have the following minimum compressive strength at 28 days and shall be proportioned within the following limits:

	Minimum Strength at 28 days	Maximum Size of Aggregate	B. Water Cement ratio	Minimum Cement Content	Maximum Cement Replacement
A	5000 psi	3/4"	0.40	660 lbs/CY	Max fly ash 15% Max slag 25%

- B. Air-Entrainment: The air content in all concrete shall be maintained at 6 to 8 percent.
- C. The exact proportions for the mix, including amounts admixture (if any), and water, shall be determined by the concrete supplier.
- D. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface.

C. 3. EXECUTION

3.1 CAST-IN-PLACE CONCRETE

A. Falsework for Forms

1. The Contractor shall build and maintain necessary falsework for the forms.

B. Construction of Forms

1. Wood forms shall be constructed of sound material, shall be of the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position.
2. Embedded Items
 - a. Provisions shall be made for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features. No wood other than necessary nailing blocks shall be embedded in concrete. Complete cooperation shall be extended to suppliers of embedded items in their installation. Secure information for embedded items from other trades as required. All embedded items shall be securely anchored in correct location and alignment prior to placing concrete.
3. Openings for Items Passing Through Concrete
 - a. Contractor shall establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections. Contractor shall be held responsible for proper coordination of all work of this nature in order that there will be no unnecessary cutting and patching of concrete. Any cutting and repairing to concrete required as a result of failure to provide for such openings shall be paid for by the Contractor at no additional expense to the Owner.

C. Removing Forms and Falsework

1. Wood forms shall not be removed for at least 48 hours after concrete has been placed.
2. Forms shall not be removed until the concrete has attained sufficient strength to insure stability.

D. Reinforcing Steel

1. Reinforcing steel shall be placed in accordance with the drawings and approved shop drawings and the applicable requirements of the "Codes and Standards" herein before specified. Install reinforcement accurately and secured against movement, particularly under the weight of workmen and the placement of concrete.
2. Reinforcing Steel Supports: Bars shall be supported on approved plastic or dielectric-coated metal chairs or spacers, accurately placed and securely fastened to forms or steel reinforcement in place. Additional bars shall be supplied, whether specifically shown on the drawings or not, where necessary to securely fasten reinforcement in place. Support legs of accessories in forms without embedding in form surface. Spacing of chairs and accessories shall conform with CRSI's "Recommended Practice for Placing Bar Support". Hooping and stirrups shall be

accurately spaced and wired to the reinforcement. No wood will be permitted inside forms. Lifting of welded wire fabric into proper position while concrete is being poured rather than supporting fabric on chairs will not be permitted.

3. Placing and Tying: All reinforcement shall be set in place, spaced, and rigidly and securely tied or wired with tie wire at all splices and at all crossing points and intersections in the positions shown, or as directed. Rebending of bars on the job to accommodate existing conditions will not be permitted without the written approval of the Owner. Point ends of wire ties away from forms.
4. Spacing: Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings, or, where not shown, the clear spacing shall be 2 times the bar diameter but in no case less than 1-1/2 inches or less than 1-1/2 times the maximum size aggregate.
5. Splices shall be in accordance with the following:
 - a. Maximum 50% of steel spliced occurring within lap length.
 - b. Top bars shall be 1.4 times values given in 3.D.5.c.
 - c. Splice lengths

#6 bars and smaller	30 bar diameter
#7	36 bar diameter
#8	40 bar diameter
6. Protective Concrete covering
 - a. Except where shown otherwise on drawings, the minimum concrete coverage for steel reinforcement shall conform with the applicable revisions of the "Codes and Standards" herein before specified.

E. Mixing of Concrete

1. All concrete shall be ready-mixed concrete, and shall be mixed and delivered in accordance with the "Specification for Ready-Mixed Concrete", ASTM C-94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.
2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.
3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.
4. No admixtures, except those mentioned in paragraph 2.1 shall be used. Calcium chloride will not be permitted.
5. Truck delivery slips of all concrete delivered to the job shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. Delivery slips shall be forwarded to the Owner at the end of each week.

F. Cold Weather Requirements:

1. Concrete shall not be mixed or placed when the temperature is below 40 degrees F., or when conditions indicate that the temperature will fall below 40 degrees F. within 72 hours unless precautions are taken to protect the concrete.

2. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.
3. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.
4. Calcium chloride shall not be used.
5. Placement of concrete on Frozen ground will not be permitted
6. Heating of concrete shall be performed in such a way to not dry out the poured concrete in any way.

G. Hot Weather Requirements:

1. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by appropriate methods if approved by the Engineer.
2. No concrete shall be deposited when the air temperature is greater than 90 degrees F.
3. Contractor shall take all appropriate precautions to protect the concrete from drying. Contractor shall use fog spray and or plastic covers until burlap can be placed.
4. Burlap shall be submerged in water for at least 8 hours prior to placement of concrete. Burlap shall be drained of excess water prior to placement. Burlap shall be kept wet and protected from displacement for the entire curing period.
5. Contractor shall include slow curing additives to the concrete mix to reduce shrinkage cracking and concrete setting quickly due to temperatures.

H. Conveying and Placing Concrete

1. Notification: Contractor shall notify Owner's Representative at least 48 hours in advance of any placement of concrete.
2. Form Preparation: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.
3. Excess Water: Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Owner. Any flow of water into an excavation shall be diverted through proper side drains into a sump, or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.
4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).
5. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.

6. Handling and Depositing of Concrete

- a. Before any concrete is placed, the Contractor shall notify all whose work is in any way connected with or influenced by the concrete work, and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.
- b. Immediately before concrete is placed, the Contractor shall inspect all forms to be sure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials, and that all reinforcement is in proper position.
- c. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.
- d. Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods, which prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid rehandling or flowing.
- e. Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
- f. Concrete that has partially hardened shall not be deposited in the work.

7. Pumping

- a. Concrete may be placed by pumping if first approved in writing by the Owner for the location proposed.
- b. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.
- c. The concrete mix shall be designed to the same requirements as herein before specified, and may be richer in lubricating components in order to allow proper pumping.
- d. Concrete shall not be pumped through aluminum pipes.
- f. All pumping operations must have full-time inspection by a recognized testing laboratory approved by the Owner and paid for by the Contractor. The cost of this full-time inspection shall be included in the Contractor's bid proposal if the option of pumping is elected.

8. Vibrating and Compacting

- a. All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under experienced supervision, and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.
- b. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than seven thousand (7,000) impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be

- kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.
- c. Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Care shall be taken not disturb concrete which has its initial set.
 - d. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least on inch.
 - e. The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.
- I. Construction Joints: Construction joints shall be located a maximum of 40 feet apart. If, for any reason, the Contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Owner for approval. Where a joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a coat of grout immediately before the placing of new concrete. Approved keys shall be used at all joints, unless detailed otherwise. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.
- J. Expansion Joints: Expansion joints shall be located at a maximum spacing of 40' or as otherwise shown on Contract Drawings. The joint shall include a joint filler, a bond breaker and joint sealant and installed as indicated on Contract Drawings.
- K. Patching: Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Owner's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solids with matching concrete to produce firm bond and surface.
1. The Contractor shall do the entire cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted, nor shall any structural members or reinforcement be cut.
 2. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 mix.
- L. Protection and Curing
1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
 2. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least (7) days.
 3. Carefully protect exposed concrete corners from damage.

4. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be curing with Burlene or fog spray or an approved curing compound. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.

M. Concrete Finishes

1. Unexposed Surfaces

- a. All unexposed surfaces shall have any form finish, at the Contractor's option.

2. Wearing Surface Finish

- a. The wear surface shall receive a monolithic steel trowel finish. Surfaces shall be finished with a screed, float, or steel trowel. Trowel shall be vigorously used at an angle under pressure by the finisher until troweling gives evidence of shine or gloss as required to make a smooth, hard, dense, impervious surface, free of defects. Finishers shall work from kneeboards laid flat upon the surface. Mechanical troweling machines may be used if the desired finish and level tolerances can be obtained by their use, but finishing shall be by hand troweling.
- b. For sidewalks and where directed, finish surfaces by scoring in parallel lines with a fine hair stable broom, perpendicular to the direction of traffic or as indicated on the drawings.
- c. All curbs shall have a sweeping trowel finish similar to the existing pier curb.
- d. All wearing surfaces shall be coated with a MassDOT approved Concrete Sealant sufficient to seal any and all cracking within all concrete wear surfaces. Sealant shall be able to withstand a marine environment.

3. Exposed Surfaces

- a. Surfaces exposed to view shall be finished. Within 48 hours after the forms have been removed and form ties cut back from the face of the concrete, all voids and cavities shall be filled with a stiff mortar of the same composition and air-entrainment as the mortar in the original concrete mix. The same brand and color of cement, and the same kind and color of aggregate as was used in the original concrete mix shall be used in this mortar. The mortar for filling shall have been mixed and let set for 30 minutes and then remixed before placing in the work. The surface film of all such pointed surfaces shall be carefully removed before setting of the mortar occurs.
- b. If the Owner determines these surfaces as prepared do not present a uniformly smooth, clean surface of even texture and appearance, the surface shall be treated and rubbed to obtain a satisfactory finish. The Owner shall be the sole judge of the amount of rubbing which will be required.
- c. If rubbing is required, the rubbing will start within 48 hours of notification that the rubbing is required, the surface should be wetted with clean water and rubbed with a No. 16 carborundum brick or other abrasive

of equal quality until even and smooth and of uniform appearance, without applying any cement or other coating. If additional finishing is necessary it shall be obtained by a thorough rubbing with a No. 10 carborundum brick or other abrasive of equal quality. Subject to approval by the Owner, rubbing may be performed by use of satisfactory power equipment and tools, providing that the operational procedures shall be the same as those outlined above for hand rubbing.

- d. Rubbing will be kept to a minimum found necessary to produce smooth, even surfaces of uniform appearance. Rubbing will not be required to fill very small surface air bubble holes.
 - e. Patches required for form ties, if carefully and properly done, may not necessitate rubbing. If however, the work is done in such a way that the patches are conspicuous; the entire exposed face on which they occur shall be rubbed.
 - f. After the final rubbing is completed, and the mortar has set up, the surface shall be thoroughly drenched and kept wet with clean water for a period of five days, unless otherwise directed.
 - g. No rubbing will be permitted when the air temperature is below 40 °F.
 - h. Pile Caps and any formed surfaces not exposed to view, including the underside of concrete decking, shall be finished. Immediately after forms have been removed and form ties cut back from the face of the concrete, all voids and cavities shall be fixed with a stiff mortar of the same composition and air-entrainment as the mortar in the original concrete mix. The mortar for filling shall have been mixed and let set for 30 minutes and then remixed before placing in the work. In case the operation of filling is delayed, the surface of the concrete shall be thoroughly cleaned and washed with water, if necessary, before the mortar is applied.
4. Concrete Sealant shall be applied as required per the manufacturers recommendations. Concrete sealant shall be applied to all deck surfaces, and exposed concrete.
5. Addition of Material
- a. The addition of cement, sand, water, or mortar to any surface while finishing concrete is strictly prohibited.

N. Defective Work

- 1. The following concrete work shall be considered defective and may be ordered by the Owner to be removed and replaced at Contractor's expense:
 - a. Incorrectly formed.
 - b. Not plumb or level.
 - c. Not specified strength.
 - d. Containing rock pockets, voids, honeycomb, or cold joints.
 - e. Containing wood or foreign matter.
 - f. Otherwise not in accordance with the intent of the Drawings and Specifications.

3.2 PRECAST CONCRETE

- a. Precast Concrete shall comply with the requirements of 3.1 CAST IN PLACE CONCRETE and the following:
- b. Use of Precast Concrete slabs as shown on the Contract Drawings is at the Contractors option. Precast Concrete may be used as an alternative for other items. All dimensions and reinforcing details shall remain the same as the Cast-In-Place Concrete Option, as shown on Contract Drawings. If the Contractor chooses to use Precast concrete instead of the Cast in Place Concrete shown on the Contract Drawings, it shall be at no additional cost to the Owner. Contractor shall be responsible for design of all additional details and connections required for precast alternative(s).
- c. Contractor shall supply detailed shop drawings for all precast components.
- d. Contractor shall submit proposed lifting and handling means and methods to Engineer for approval prior to commencing work.
- e. If precast concrete is to be lifted or moved prior to 7 day cylinder strength test, additional cylinders shall be taken to prove required strength of concrete. Minimum strength shall be twice calculated stress on concrete or 1500psi, whichever is the greater.
- f. Contractor shall provide suitable temporary supports for the precast concrete adequately designed to take all dead and live construction loads.
- g. Contractor shall submit details of falsework supports for precast concrete to Engineer for approval prior to placing any panels on site.
- h. All precast panels shall be placed to correct line and level as shown on the drawings. Joints between panels shall be sealed by approved method to prevent loss of grout from subsequent cast in place concrete.

4. MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- C. Measurement for CONCRETE PIER DECK shall be made by Contract Price Lump Sum.

4.2 METHOD OF PAYMENT

- D. Payment for CONCRETE PIER DECK shall be by the Contract Price Lump Sum, complete in place. This price and payment shall constitute full compensation for all supervision, survey, transportation, testing, labor, materials and equipment for the satisfactory installation of the complete concrete pier deck including concrete topping, curbs, precast panels and concrete pile caps, connection to the piles, compaction, falsework, temporary supports, lifting, forming, finishing, dowels, reinforcing steel, mortars, grouts, bearing pads, epoxy adhesives, inserts, anchors, steel plates, bollards, cleats, ladders, surface preparation, curing, attachments, disposal and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

4.3 PAYMENT ITEM

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
03000-1	Concrete Pier Deck	LS

END OF SECTION

SECTION 05500

METAL FABRICATIONS

1. **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, manufacturing or shop-fabricating metal elements including ladders.

1.2 **QUALITY ASSURANCE**

- A. Except as noted, work shall conform to the following codes and standards:
 - 1. American Society for Testing and Materials (ASTM), latest edition.
 - 2. American Institute of Steel Construction (AISC) Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, latest editions.
 - 3. American Welding Society (AWS).

1.3 **SUBMITTALS**

- A. Shop drawings
 - 1. Submit for approval prior to fabrication all information necessary for the fabrication of the component parts. Indicate size and weight of members, type and location of shop and field connections, the type, size and extent of all welds, and welding sequences. Use American Welding Society welding symbols. Approval of shop drawings will be for size and arrangement of principal and auxiliary members and strength of connections. Any errors in dimensions shown on shop drawing shall be the responsibility of the Contractor.
- B. The Contractor shall use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Each welder shall be certified for the particular work, prior to commencing the work, which must be accomplished.
- C. Upon completion of this portion of the work, and as a condition of its acceptance, the Contractor shall deliver to the Engineer a letter signed by an official of the miscellaneous metal fabricating firm or firms certifying that all fabricated metal has been fabricated in complete accordance with this Section of these specifications.

1.4 **PRODUCT HANDLING**

- A. All materials shall be delivered, stored and handled with care to prevent damage to any material or material coating. Material damaged or with damaged coating will be rejected and replaced at no additional cost to the Owner.

2. **MATERIALS**

2.1 **STRUCTURAL STEEL AND MISCELLANEOUS ITEMS**

- A. Structural steel, including rolled shapes, angles and plates, shall conform to ASTM A36,

unless otherwise noted.

- B. Hollow structural sections shall conform to ASTM A 500 Grade C, unless otherwise noted.
- C. All steel items under this section shall be galvanized. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

2.2 WELD ELECTRODES

- A. Weld rod shall conform to AWS E70XX grade.

3. EXECUTION

3.1 FABRICATION

- A. Fabricate products in a fully-equipped facility capable of producing high grade of metal fabrication work. All work shall be straight and true, free from warpage and other defects. Joints, covers, copes and miters shall be accurately and neatly cut, machined, filed and fitted.
- B. Carry out bolting and welding in accordance with latest approved methods, with due consideration for strength and appearance of finished product. All welding shall be done by certified welders.
- C. All steel will be free from imperfections, dirt, loose scale, paint, oil or other foreign substances.
- D. All welds shall be made watertight.
- E. All material shall be fabricated to within + or - 1/8 inch of their theoretical dimensions as shown on the drawings.
- F. Holes for bolts shall be located as shown on the drawings and shall be drilled or burnt 1/8" in diameter larger than the galvanized bolt.

3.2 INSTALLATION

- A. Store materials on skids, not on ground, in such a fashion as to prevent bending, twisting or similar damage. Do not dump steel off truck.
- B. Clean installed work from weld spatter, dirt and other foreign materials. Protect installed work as required from damage by subsequent building operations.

3.3 DEFECTIVE WORK

- A. Any parts damaged or improperly fabricated shall be removed and replaced or corrected as directed by the Engineer and at no additional cost to the Owner.

4 METHOD OF MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT and PAYMENT

- A. No separate measurement or payment shall be made for work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 05600

MISCELLANEOUS METALS

1 **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section.
- B. Scope of work includes:
 - 1. Machine bolts and washers
 - 2. Anchor and expansion bolts
 - 3. S.S. pins
 - 4. Eye bolts
 - 5. Chain and shackles
 - 6. Mooring hardware (cleats and bollards)
 - 7. Fabricated steel elements
 - 8. All other hardware not specified elsewhere
- C. Related work specified elsewhere:
 - 1. Concrete under REINFORCED CONCRETE, SECTION 03000.
 - 2. METAL FABRICATIONS, SECTION 05500.
 - 3. Timber Piles under ROUND TIMBER PILES, SECTION 02317
 - 4. Timber under HEAVY TIMBER CONSTRUCTION, SECTION 06130

1.2 **QUALITY ASSURANCE**

- A. Except as noted elsewhere, work shall conform to the following codes and standards:
 - 1. American Society for Testing and Materials (ASTM).
 - 2. American Welding Society (AWS).
 - 3. American Institute of Steel Construction (AISC).

1.3 **SUBMITTALS**

- A. Shop drawings for all shop fabricated items shall be submitted to the Engineer for approval before beginning fabrication.
- B. Certificate of compliance with applicable ASTM specifications for all galvanized items shall be submitted to the Engineer with all materials delivered to the fabricator or site.
- C. Manufacturer's literature and specifications for all fasteners, wire rope, chains, shackles, expansion bolts, and other connection items identified within the contract drawings.
- D. List of all other hardware with quantities and material specifications.

1.4 **PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. All materials shall be delivered, stored and handled with care to prevent damage to any material or material coating. Material damaged or with damaged coating will be rejected and replaced at no additional cost to the Owner.

2 PRODUCTS

2.1 MATERIALS

- A. All Structural shapes & plates shall conform to ASTM Specification A36.
- B. All fasteners including but not limited to: Bolts, Lag Screws, Drift Pins, Expansion Anchors & Machine and eye bolts shall conform to ASTM A307, Gr. A for Mild Steel Bolts unless otherwise noted on drawings.
- C. All A325 bolts and nuts shall be Type 3 with manufacturer markings that indicate such.
- D. All chains, cable, shackles and connecting links shall be the size and capacity shown on the drawings.
- E. All steel items under this section shall be galvanized. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.
- F. Welding rods shall conform to AWS E70XX grade. Sizes shall be as indicated on the drawings.

3 EXECUTION

3.1 FABRICATION

- A. Fabrication shall conform to AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- B. Workmanship shall be equal to standard commercial practice.
- C. All materials shall be clean and straight. Each assembly shall be accurately fabricated to the lines and dimensions called for and shall be free from undue twists, bends, warping, distortion and other irregularities.
- D. Assemblies shall be fabricated to within + or - 1/8" of their theoretical dimensions.

3.2 INSTALLATION

- A. Installation shall conform to AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- B. Parts covered by this specification shall be installed in the work as shown on the drawings.
- C. No cutting or burning of steel shall be done to install fasteners without approval of the Engineer.

3.3 DEFECTIVE WORK

- A. The following shall be grounds for rejection and replaced at no additional cost to the Owner:
 - 1. Any damaged parts.
 - 2. Any parts improperly installed in the work.

3. Any items found not to have the proper coating.
4. Otherwise not according to Contract Documents.

4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 06130

HEAVY TIMBER CONSTRUCTION

1 **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section.
- B. Scope of work includes, but is not limited to the following:
 - 1. Supply and installation of new timber members including but not necessarily limited to the following:
 - Base Bid:
 - a. Bracing for pier
 - b. Boardwalk: bracing, pile caps, stringers, decking & railing
 - c. Fender system – wale, chock and blocks
 - Add Alternate 1:
 - d. Wave fence
- C. Related work specified elsewhere:
 - 1. Fasteners, anchor bolts, and bolts under MISCELLANEOUS METALS, SECTION 05600.
 - 2. Treatments as specified under TIMBER TREATMENT, SECTION 06310.

1.2 **QUALITY ASSURANCE**

- A. Except as noted all work shall conform to the latest editions of the following codes, specifications and standards:
 - 1. Southern Pine Inspection Bureau (SPIB)
 - 2. West Coast Lumber Inspection Bureau (WCLIB)
 - 3. Western Wood Products Association (WWPA)
 - 4. National Forest Products Association (NFPA)
 - 5. American Society for Testing and Materials (ASTM)
 - 6. Commonwealth of Massachusetts State Building Code (CMSBC)
 - 7. American Institute of Timber Construction (AITC)

1.3 **SUBMITTALS**

- A. AWPA quality certification on all treated timber.
- B. Certification of timber species.

1.4 **PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. All timber shall be stored in stacks such that there is an air space beneath the material and situated to prevent the timber from being exposed to standing water.
- B. The material shall be stored on site in an area which will be designated by the Owner.
- C. Timber shall be handled in an approved manner such that the material will not be damaged.

2 PRODUCTS

2.1 MATERIALS

- A. Unless otherwise specified on the Contract Drawings, all timber to be used shall be No. 2 Southern Pine as graded by SPIB and with design values per NFPA National Design Specification or the equivalent for Douglas Fir as graded by WCLIB and WWPA.
- B. All timber shall be new and supplied with nominal dimensions S4S unless otherwise noted.

3 EXECUTION

3.1 PREPARATION

- A. Prior to installation all demolition affecting the new work shall be completed.

3.2 INSTALLATION

- A. Coat ends of field cut members as specified under TIMBER TREATMENT, SECTION 06310.
- B. Joints are to be square, tight and well-fastened with all members assembled in accordance with the Contract Drawings.
- C. Holes for bolts shall be drilled the same size as the bolt before galvanizing. Holes shall be swabbed with 2 coats of sealing compound as specified herein before installing the bolts.
- D. Bolts shall be tightened to provide a solid connection. No more than 1 washer shall be installed under the bolt head or nut. Bolt threads shall project no more than one bolt diameter beyond the nut.
- E. All timber shall be cut and fit in such a manner as to have full bearing over the entire contact surface.

4. MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement of TIMBER for PIER shall be Contract Price Lump Sum for all heavy timber except the wave fence.
- B. Measurement of TIMBER BOARDWALK shall be by Contract Price Lump Sum.
- C. Measurement of WAVE FENCE shall be by the Contract Price Lump Sum.

4.2 METHOD OF PAYMENT

- A. Payment for TIMBER for PIER shall be at the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, demolition, removal, preparation, submittals, transportation, survey, disposal of surplus materials, and supervision for the satisfactory supply and installation of all timber components for the pier including but not necessarily limited to, bracing, blocking, fender system wale and chock, connections, fasteners, all hardware required, and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

- B. Payment for BOARDWALK shall be at the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, demolition, removal, preparation, submittals, transportation, survey, disposal of surplus materials, and supervision for the satisfactory supply and installation of timber boardwalk and components for the boardwalk including but not necessarily limited to, pile caps, bracing, stringers, decking, railing, connections, tar paper, fasteners, all hardware required, and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

- C. Payment for WAVE FENCE shall be at the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, demolition, removal, preparation, submittals, transportation, survey, disposal of surplus materials, and supervision for the satisfactory supply and installation of the wave fence including but not necessarily limited to, wales, wave fence panels, cover boards, connections, fasteners, all hardware required, and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

4.7 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
06130-1	Timber for Pier	LS
06130-2	Boardwalk	LS
06130-3	Wave Fence	LS

**** END OF SECTION ****

SECTION 06310

TIMBER TREATMENT

1 **GENERAL**

1.1 **DESCRIPTION**

- A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section.
- B. Scope of work includes:
 - 1. The treatment of timber members with a wood preservative.
 - 2. The field application of all timber subject to field cutting.
- C. Related work specified elsewhere:
 - 1. Timber under HEAVY TIMBER CONSTRUCTION, SECTION 06130.
 - 2. Timber piles under ROUND TIMBER PILES, SECTION 02317

1.2 **QUALITY ASSURANCE**

- A. Except as noted all work shall conform to the latest editions of the following codes, specifications and standards.
 - 1. American Society for Testing and Materials (ASTM) D-25.
 - 2. American Wood Preservatives Association (AWPA).

2 **PRODUCTS**

2.1 **MATERIALS**

- A. All new Southern Yellow Pine timber members to which the public may be exposed (decking, handrails, benches, similar) shall be treated with alkaline copper quaternary (ACQ) in accordance with AWPA Standards for material subject to salt water use and shall obtain a green tint due to the treatment.
- B. All new Southern Yellow Pine timber members to which the public shall not be exposed (berthing fenders, similar) shall be treated with chromated copper arsenate (CCA) in accordance with AWPA Standard P5 and U1 – UC5A for material subject to salt water use and shall obtain a green tint due to the treatment.

3 **EXECUTION**

- 3.1 Prior to treatment all dimension lumber shall be kiln-dried. Conditioning by heating is not permitted.
- 3.2 All timber to be treated with alkaline copper quaternary (ACQ) shall be treated to a retention of 0.6 pounds per cubic foot.

3.3 All timber to be treated with chromated copper arsenate (CCA) shall be treated to a retention of 2.5 pounds per cubic foot.

3.4 Sealing compound for treatment of field cuts and drilled holes shall be two (2) coats of copper naphthenate meeting AWPA standard P8.

4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

TABLE OF CONTENTS
SECTION 16000
ELECTRICAL

PART 1 - GENERAL	103
1.00 GENERAL PROVISIONS	103
1.01 SCOPE OF WORK	103
1.02 RELATED WORK	104
1.03 PRODUCTS FURNISHED, BUT NOT INSTALLED UNDER THIS SECTION	105
1.04 Definitions	105
1.05 CODES, REFERENCES AND PERMITS	106
1.06 GENERAL REQUIREMENTS	107
1.07 MATERIAL AND EQUIPMENT STANDARDS	107
1.08 SUBMITTALS	108
1.09 OPERATION AND MAINTENANCE DATA	112
1.10 RECORD DRAWINGS	114
1.11 WARRANTIES	115
1.12 COORDINATION	115
1.13 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS	116
1.14 INSPECTION OF SITE CONDITIONS	117
1.15 SURVEY AND MEASUREMENTS	117
1.16 DELIVERY, STORAGE AND HANDLING	117
1.17 PROTECTION OF WORK AND PROPERTY	117
1.18 SUPERVISION	118
1.19 SAFETY PRECAUTIONS	118
1.20 SCHEDULE	118
1.21 HOISTING, SCAFFOLDING AND PLANKING	118
1.22 CUTTING AND PATCHING	118
1.23 SLEEVES, INSERTS AND ANCHOR BOLTS	119
1.24 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS	120
1.25 HAZARDOUS MATERIALS	120
1.26 ACCESSIBILITY	121
1.27 SEISMIC RESTRAINT REQUIREMENTS	121
1.28 PROJECT CLOSEOUT	121
PART 2 - PRODUCTS	125
2.00 not used	125
2.01 IDENTIFICATION	125
2.02 RACEWAYS AND CONDUIT	125
2.03 WIRE AND CABLE (600V)	127
2.04 WIRING DEVICES AND PLATES	129
2.05 OUTLET BOXES	132
2.06 JUNCTION AND PULL BOXES	133
2.07 SAFETY DISCONNECT SWITCHES	134
2.08 PANELBOARDS	137
2.09 LIGHTING FIXTURES	137
2.10 UNDERGROUND DUCT, MANHOLES, AND HANDHOLES	137
2.11 LOAD CENTERS	141
2.12 METER CENTERS	142
2.13 MARINA POWER PEDESTAL	144
2.14 FREE STANDING ELECTRICAL ENCLOSURE	145
2.15 GROUND FAULT PROTECTION (GFP)	146

PART 3 - EXECUTION	146
3.00 DEMOLITION	146
3.01 IDENTIFICATION	148
3.02 RACEWAYS AND CONDUIT	149
3.03 WIRE AND CABLE (600V)	153
3.04 WIRING DEVICES AND PLATES	155
3.05 OUTLET BOXES	155
3.06 JUNCTION AND PULL BOXES	156
3.07 SAFETY DISCONNECT SWITCHES	156
3.08 PANELBOARDS	157
3.09 LIGHTING FIXTURES	158
3.10 UNDERGROUND DUCT, MANHOLES, AND HANDHOLES	158
3.11 LOAD CENTERS	161
3.12 METER CENTERS	162
3.13 MARINA POWER PEDESTAL	163
3.14 GROUND FAULT PROTECTION (GFP)	163
PART 4 - COMPENSATION	164
4.00 Method of Measurement	164
4.01 Payment	164

SECTION 16000

ELECTRICAL

PART 1 - GENERAL

1.00 GENERAL PROVISIONS

- A. The GENERAL REQUIREMENTS, DIVISION 1, and BIDDING AND CONTRACT REQUIREMENTS, DIVISION 0, are hereby made a part of this Specification Section.
- B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 SCOPE OF WORK

- A. This project is Phase 1 of the Plymouth Town Wharf, and includes, but is not limited to: the installation of a new 208Y/120V, three-phase 4-wire electric service for the wharf; the replacement of the existing 120/240 volt meters with a new meter center; new site lighting, new marine power pedestals, re-feeding existing site loads and the relocation of existing telecommunications and electric services to underground.
- B. The electrical contractor is responsible for all utility coordination required to complete the scope of work and provide functioning electric and telecommunications services, per the drawings and specifications. The electrical contractor shall pay all associated utility back charges to complete the scope of work.
- C. This project is an active marina and as such, all installations shall comply with all applicable codes and standards, specifically Article 555 of the National Electrical Code.
- D. The work under this Section shall include the furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems, in general, to include the following items:
 - 1. Identification
 - 2. Raceways and Conduit
 - 3. Wire and Cable (600V)
 - 4. Wiring Devices and Plates
 - 5. Outlet Boxes
 - 6. Junction Boxes, Pull Boxes and Wireways

7. Safety Disconnect Switches
 8. Panelboards
 9. Fuses
 10. Light Fixtures
 11. Wire and Cable (above 600V)
 12. Underground Ductbank / Precast Manholes /Precast Handholes
 13. Lighting Contactors and Time Switches
 14. Marine Power Pedestals
 15. Ground Fault Protection
 16. TVSS
 17. Free Standing Enclosure
 18. Relocation of existing electrical components that interfere with new construction and removal and disposal of obsolete components.
 19. Operating and maintenance instructions and manuals
 20. Record (as-built) drawings
- E. Work of this Section is generally shown on the Electrical Drawings.

1.02 RELATED WORK

- A. Principal classes of Work related to the Work of this Section are listed in the Specification Table of Contents, and are specified to be performed under the indicated Sections of the Specifications. Refer to the indicated Sections for description of the extent and nature of the indicated Work, and for coordination with related trades. This listing may not include all related Work items. It is the responsibility of the Contractor to coordinate and schedule the Work of this Section with that of all other trades.
- B. The following work is not included in this section and will be provided under other sections:
 1. Structural supports necessary to distribute loading from equipment to roof or floor except as specified.
 2. Temporary light, power, water, heat, gas and sanitary facilities for use during construction and testing. Refer to Division 1, General Conditions.
 3. Excavation and backfill.

4. Concrete work including concrete housekeeping pads and blocks for vibrating and rotating equipment, and ductbank envelopes.
5. Flashing of roof and wall penetrations.
6. Painting, except as specified herein.

1.03 PRODUCTS FURNISHED, BUT NOT INSTALLED UNDER THIS SECTION

A. Furnish the following items for installation under other sections and provide wiring and connections as required:

1. Anchor bolts for poured-in-place light standard bases (furnish templates for placement) for installation under Division 3.
2. Pre-cast manholes and handholes for installation under Division 2.

1.04 Definitions

A. As used in this Section, the following items are understood to have the following meaning:

1. "Contractor or Subcontractor", unless otherwise qualified, shall mean the installer of the work specified under this Section.
2. "Furnish" shall mean purchase and deliver to the project site, complete with every necessary appurtenance.
3. "Install" shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting and proper operation at the proper location in the project.
4. "Provide" shall mean "Furnish" and "Install".
5. "Work" shall mean all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.
6. "Concealed" shall mean hidden from sight in chases, furred-in spaces, shafts, hung ceilings, embedded in construction or in a crawl space. Areas to be concealed as part of tenant alterations to the building shall also be considered in this definition.
7. "Exposed" shall mean not installed underground or concealed as defined above.
8. "Furnished by Others" shall mean materials or equipment purchased under other sections of the general contract and installed by this section of the specifications by this trade Contractor.

9. "Owners Representative" shall be the party responsible to make decisions regarding all contractual obligations in reference to the Scope of Work for the Owner.
10. "Date of Substantial Completion" shall indicate the date where the work has been formally accepted as evidenced by completed final punch list or where the work has reached the stage that the Owner obtains beneficial use and commences utilization of the installed systems for business or occupancy purposes. The GENERAL REQUIREMENTS, DIVISION 1, shall supersede this definition where specifically defined.

1.05 CODES, REFERENCES AND PERMITS

- A. Materials, installation of systems and equipment provided under this section shall be done in strict accordance with the Department of Public Safety, Department of Environmental Protection, State Building Code and any other Codes and Regulations having jurisdiction including but not limited to:
 1. All Applicable NFPA Standards
 2. National Electrical Code (NEC).
 3. Occupational Safety and Health Administration (OSHA)
 4. State and Local Building Codes
 5. Underwriters' Laboratories, Inc (UL)
- B. Unless otherwise specified or indicated, materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, except when more rigid requirements are specified or are required by applicable codes but not limited to:
 1. American National Standards Institute (ANSI)
 2. American Society of Mechanical Engineers (ASME).
 3. American Society of Testing and Materials (ASTM)
 4. Certified Ballast Manufacturers (CME)
 5. Illuminating Engineering Society (IES)
 6. Institute of Electrical and Electronics Engineers (IEEE)
 7. Insulated Cable Engineers Association (ICEA)
 8. National Electrical Contractors Association (NECA)
 9. National Electric Manufacturers Association (NEMA)

10. Thermal Insulation Manufacturers Association (TIMA)

- C. Codes, laws and standards provide a basis for the minimum installation criteria acceptable. The drawings and specifications illustrate the scope required for this project, which may exceed minimum codes, laws and standards.
- D. Give all notices, file all plans, obtain all permits and licenses, and obtain all necessary approvals from authorities having jurisdiction. Deliver all certificates of inspection to the authorities having jurisdiction. No work shall be covered before examination and approval by the Owner's Representative, inspectors, and authorities having jurisdiction. Replace imperfect or condemned work to conform to requirements, satisfactory to Owner's Representative, and without extra cost to the Owner. If work is covered before inspection and approval, this Contractor shall pay costs of uncovering and reinstalling the covering, whether it meets contract requirements or not.

1.06 GENERAL REQUIREMENTS

A. Nameplates

- 1. Each major component of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the equipment.

B. Equipment Guards

- 1. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts so located that any person may come in close proximity thereto shall be completely enclosed or guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be guarded or covered with insulation of type specified for service.

1.07 MATERIAL AND EQUIPMENT STANDARDS

- A. Where equipment or materials are specified with the name of a manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Owner's Representative.
- B. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified. The request for each substitution must be accompanied by complete specifications together with drawings or samples to properly appraise the materials, equipment or process. The Contractor shall highlight and list all applicable specification requirements which the substituted material deviates from.

- C. If a substitution of materials or equipment in whole or in part is made, this Contractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.
- D. All materials, equipment and accessories provided under this section shall be new and unused products of recognized manufacturers as approved.

1.08 SUBMITTALS

- A. Conform to the requirements of Division 1, General Conditions, for schedule and form of all submittals unless specifically noted otherwise in this section. Coordinate this submittal with submittals for all other finishes. Shop drawings and design layouts shall be prepared by licensed installing Contractor s and shall note the name(s), license number(s) and license expiration date(s) of the Contractor (s) installing electrical systems.
- B. Definitions:
 - 1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than indicated in the Contract Documents.
 - 2. Acceptable Manufacturers: The mechanical design for each product is based on the single manufacturer listed in the schedule or shown on the drawings. In Part 2 of the specifications, certain Alternate Manufacturers are listed as being acceptable. In addition, the MATERIAL AND EQUIPMENT STANDARDS paragraph potentially allows for substitutions as being acceptable. These are acceptable only if, as a minimum, they:
 - a. Meet all performance criteria listed in the schedules and outlined in the specifications. For example, to be acceptable, an emergency generator must deliver equal kW / kVA at equal or greater efficiency using equal or less fuel as the emergency generator listed in the schedules.
 - b. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either the space or the product. Clearances to walls, ceilings, and other equipment will be at least equal to those shown on the design drawings. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Engineer has determined that the manufacturer's products will fit within the available space – this determination is solely the responsibility of the Contractor.
 - c. For rooftop mounted equipment and equipment mounted in areas where structural matters are a concern, the products must have a

weight no greater than the product listed in the schedules or specifications.

- d. Products must adhere to all architectural considerations including, but not limited to; being of the same color as the product scheduled or specified, fitting within the architectural enclosures and details, and for lighting – being the same size and of the same physical appearance as scheduled or specified products.

C. Submittal Procedures, Format and Requirements

1. Review submittal packages for compliance with Contract Documents and then submit to Owner's Representative for review. Submit enough sets of shop drawings such that, after review, two sets will be kept by the reviewer, with only the remaining sets returned with reviewer's marks and comments.
2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:
 - a. Title
 - b. Equipment number
 - c. Name and location of project
 - d. Names of Owner, Engineer and Seller
 - e. Names of manufacturers, suppliers, vendors, etc.
 - f. Date of submittal
 - g. Whether original submittal or resubmitted
3. Shop Drawings showing manufacturer's product data shall contain detailed dimensional drawings (minimum ¼" – 1' scale) including plans and sections (where physical clearance could be an issue). Provide larger scale details as necessary.
4. Submit accurate and complete description of materials of construction, manufacturer's published performance characteristics, sizes, weights, capacity ratings (performance data, alone, is not acceptable), electrical requirements, starting characteristics, wiring diagrams, and acoustical performance for complete assemblies. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.
5. Provide Shop Drawings showing details of piping connections to all equipment. If connection details are not submitted and connections are

found to be installed incorrectly, this Contractor shall reinstall them within the original contract price.

6. Provide complete data for all auxiliary services and utilities required by submitted equipment. This shall include fuel, cooling and exhaust requirements and points of connections.
 7. Provide a complete description of all controls and instrumentation required including electrical power connection drawing for all components and interconnection wiring to starters, detailed information on starters, control diagrams, termination diagrams, and all control interfaces with a central control system.
 8. Provide installation and erection information including; lifting requirements, and any special rigging or installation requirements for all equipment.
 9. The Owner's Representative shall approve all materials before commitment for materials is made.
- D. Product Data: Submit complete manufacturer's product description and technical information including:
1. Identification
 2. Raceways and Conduit
 3. Wire and Cable (600V)
 4. Wiring Devices and Plates
 5. Outlet Boxes
 6. Junction Boxes, Pull Boxes and Wireways
 7. Safety Disconnect Switches
 8. Panelboards
 9. Light Fixtures and associated Utility Rebate Forms
 10. Manholes and handholes
 11. Lighting Contactors, Relays and Time Switches
 12. Marine Power Pedestals
 13. Ground Fault Protection
 14. TVSS
 15. Free Standing Electrical Enclosure

- E. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.
1. Access panel shop drawings shall be submitted to the Construction Supervisor for approval.
 2. Do not submit multiple product information in a single bound manual.
 3. Three-ring binders shall not be accepted.
- F. Deviations:
1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the deviation to the attention of the Owner's Representative.
 2. Without letters flagging the deviation to the Owner's Representative, it is possible that the Engineer may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Owner's Representative, the Seller shall hold the Engineers, his consultants and the Owner harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Engineer has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.
 3. Approval of proposed deviations, if any, will be made at discretion of Engineer.
- G. Schedule: Incorporate shop drawing review period into construction schedule so that Work is not delayed. This Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule. Allow at least 10 working days, exclusive of transmittal time, for review each time shop drawing is submitted or resubmitted with the exception that 20 working days, exclusive of transmittal time are required if more than five shop drawings of a single trade are received in one calendar week.
- H. Responsibility
1. Intent of Submittal review is to check for capacity, rating, and certain construction features. The Contractor shall ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with approved submittals to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities,

installation, wiring, supports and access for service, nor the shop drawing errors or deviations from requirements of Contract Documents. The Engineer's noting of some errors while overlooking others will not excuse the Contractor from proceeding in error. Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. Inform Contractor, manufacturers, suppliers, etc. of scope and limited nature of review process and enforce compliance with contract documents.
- I. In the event that the Contractor fails to provide Shop Drawings for any of the products specified herein:
1. The Contractor shall furnish and install all materials and equipment herein specified in complete accordance with these Specifications.
 2. If the Contractor furnishes and installs material and/or equipment that is not in complete accordance with these Specifications, he shall be responsible for the removal of this material and/or equipment. He shall also be responsible for the replacement of this material and/or equipment with material and/or equipment that is in complete accordance with these Specifications, at the direction of the Owner's Representative.
 3. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall be done at no extra cost to the Owner.
 4. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall not be allowed as a basis for a claim of delay of completion of the Work.
- J. Mark dimensions and values in units to match those specified.

1.09 OPERATION AND MAINTENANCE DATA

- A. Commence preparation of the Operating and Maintenance (O&M) manuals immediately upon receipt of "Approved" or "Approved as Noted" shop drawings and submit each section within one month. The final submission shall be no later than two months prior to the projected date of Substantial Completion of the Project.
- B. Submit O&M table of contents in the submittal phase. O&M manuals shall be built as submittals are accepted and shall include the individual equipment manufacturer's data retrieval sheet, as per Attachment A in Part IV for input into the Owner's Maintenance Management System. Form shall be provided and completed electronically.
- C. Each O&M document shall include the manufacturer's web address for equipment specific O&M information for Internet access by the Owner.

- D. The manual shall consist of three (3) sets of manuals and include three (3) sets of CDs, which shall contain the scanned content of the entire manual. The manual shall highlight the actual equipment used and not be a master catalog of all similar products of the manufacturer. The manual shall be submitted for review prior to creation of the CDs.
- E. The Manual shall contain the following:
1. Operations Manual
 - a. Systems description including all relevant information needed for day-to-day operations and management including start-up and shut-down instructions.
 - b. Wiring diagrams, schematics, logic diagrams and sequence of operations that accurately depict the controls system.
 - c. Depiction of each interface screen where programmable logic and visual displays are provided. Descriptors shall be provided to define displayed data, alarms, etc.
 - d. A single sheet (for ease of removal) of all access codes and passwords necessary to access all levels of control and programming.
 - e. Trouble shooting guide defining common alarms/problems with possible cause and effect.
 2. Maintenance Manual
 - a. Define all maintenance activities required to ensure system operation within manufacturers specified parameters. Provide table of all required activities plotted vs. interval with adequate fill-in-space for "activity completion date" and "comments". Where multiple instrument readings are required, provide data sheet formatted to accommodate activity.
 - b. Define recommended spare parts inventory with part numbers and source defined for ordering by the Owner. Identify lead time on all parts, source location and cost.
 - c. Provide copy of all warranty information with associated date of substantial completion (commencement of warranty) and end date of coverage. Define all components/subsystems specifically included and excluded.
 - d. Provide all information as listed on the Facility Support Services data sheet as per Attachment A in Part IV for input into the Owner's Maintenance Management System. Form shall be provided and completed electronically.

F. Provide O&M manuals for each of the following:

1. Timeclock
2. Ground Fault Protection
3. Marine Power Pedestals
4. Light Fixtures

1.10 RECORD DRAWINGS

- A. Refer to DIVISION 1, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.
- B. Record Drawings (red-line drawings) will be updated by this Contractor daily for review with the monthly requisition. The record drawing shall be an accurate depiction of the systems as completed, including dimensions (vertical/horizontal) of concealed components off fixed building elements.
- C. The Electrical Foreman shall maintain complete and separate set of prints of Contract Drawings at job site at all times and shall record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design.
- D. At completion of work the Electrical Contractor shall prepare a complete set of record drawings on AutoCAD showing all systems as actually installed. The Architectural background AutoCAD files will be made available for the Contractor's copying, at his expense, to serve as backgrounds for the drawings. The Electrical Contractor shall transfer changes from field drawings onto AutoCAD drawings and submit copy of files and three sets of prints to Owner's Representative for comments as to compliance with this section. CADD layering as established by the A&E design team shall be maintained with any and all changes done by the Contractor.
- E. The Architect and Engineer are not granting to the Contractor any ownership or property interest in the CADD Drawings by the delivery of the CADD Disks to the Contractor. The Contractor's rights to use the CADD disks and the CADD Drawings are limited to use for the sole purpose of assisting in the Contractor's performance of its contractual obligations under its contract with respect to the Project. The Architect and Engineer are granting no further rights. Any reuse or other use by the Contractor will be at the Contractor's sole risk and without liability to the Architect and Engineer. The Contractor hereby waives and releases any losses, claims, damages, liabilities of any nature whatsoever, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor. The Contractor, to the maximum extent permitted by law, hereby agrees to indemnify, defend and hold the Architect and Engineer harmless from all loses, claims, damages, liabilities, and costs (including attorney fees) arising out of, resulting from, or

otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor.

- F. Record Drawings, shall show "as-built" condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and model numbers of final equipment installation.
- G. The Electrical Contractor shall submit the record set for approval by the engineer a minimum of four weeks prior to seeking the permanent certificate of occupancy.

1.11 WARRANTIES

- A. Submit manufacturer's standard replacement warranties for material and equipment furnished under this Section. Such warranties shall be in addition to and not in lieu of all liabilities which the manufacturer and the Electrical Contractor may have by law or by provisions of the Contract Documents.
- B. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a minimum period of one-year (1) commencing with the Date of Substantial Completion. Where individual equipment sections specify longer warranties, provide the longer warranty. Any failure due to defective material, equipment or workmanship which may develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.
- C. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Drawings.
- D. Upon receipt of notice from the Owner of the failure of any part of the systems during the warranty period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.12 COORDINATION

- A. Refer to Division 1, General Conditions, for coordination requirements applicable to this section, unless specifically noted otherwise in this section.
- B. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as required.
- C. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Owner's Representative for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Owner's Representative's satisfaction at no expense to the Owner.

- D. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section may interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8" scale or larger working drawings and sections, clearly showing how the work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.
- E. Keep fully informed as to the shape, size and position of all openings required for all apparatus, conduit, cable, sleeves, etc., and give information in advance to allow construction of required openings. Furnish all sleeves, pockets, supports and incidentals, and coordinate with the General Contractor for the proper setting of same.
- F. All distribution systems which require pitch or slope such as condensate drains and water piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.
- G. Make reasonable modifications in the work as required by structural interferences, or by interference with work of other trades, or for proper execution of the work without extra charge.

1.13 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

- A. It is the intention of the Specifications and Drawings to call for complete, finished work, tested and ready for continuous operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications or vice-versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided by this Contractor without additional expense to the Owner.
- B. The Drawings are generally diagrammatic. The locations of all items that are not definitely fixed by dimensions are approximate only. The exact locations must be determined at the project and shall have the approval of the Owner's Representative before being installed. This Contractor shall follow Drawings, including his shop drawings, in laying out work and shall check the Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions. Where space conditions appear inadequate, notify the Owner's Representative before proceeding with the installation. This Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- C. Any requests for information (RFI) for resolving an apparent conflict or unclarity, or a request for additional detail, shall include a sketch or equivalent description of Contractor's proposed solution.

- D. Size of conduits, cable trays, raceways and methods of running them are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered. To carry out the true intent and purpose of the Drawings, all necessary parts to make complete approved working systems ready for use, shall be furnished without extra charge. All work shall be installed in an approved workmanlike manner.

1.14 INSPECTION OF SITE CONDITIONS

- A. Prior to submission of bid, visit the site and review the related construction documents to determine the conditions under which the Work has to be performed and send a report, in writing, to the Owner's Representative, noting any conditions which might adversely affect the Work of this Section of the Specifications.

1.15 SURVEY AND MEASUREMENTS

- A. Base all required measurements, horizontal and vertical, from referenced points established WITH the Owner's Representative. The Electrical Contractor shall be responsible for correctly laying out the Work required under this Section of the Specifications.
- B. In the event of discrepancy between actual measurements and those indicated, notify the Owner's Representative in writing and do not proceed with the related work until instructions have been issued.

1.16 DELIVERY, STORAGE AND HANDLING

- A. No materials shall be delivered or stored on site until corresponding Shop Drawings have been approved.
- B. All manufactured materials shall be delivered to the site in original packages or containers bearing the manufacturer's labels and product identification.
- C. Protect materials against dampness. Store off floors, under cover and adequately protected from damage.
- D. Inspect all equipment and materials, upon receipt at the job site, for damage and conformance to approved shop drawings.

1.17 PROTECTION OF WORK AND PROPERTY

- A. This Contractor shall be responsible for the care and protection of all work included under this Section until the completion and final acceptance of this Contract.
- B. Protect all equipment and materials from damage from all causes including, but not limited to, fire, vandalism and theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment at no additional cost to the Owner.

- C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this Section and make good damage thus caused.
- D. Damaged materials are to be removed from the site; no site storage of damaged materials will be allowed.

1.18 SUPERVISION

- A. Supply the service of a competent Supervisor with a minimum of 5 years experience in Electrical construction supervision who shall be in charge of the Electrical work at the site.

1.19 SAFETY PRECAUTIONS

- A. Life safety and accident prevention shall be a primary consideration. Comply with all of the safety requirements of the Owner and OSHA throughout the entire construction period of the project.
- B. Furnish, place and maintain proper guards and any other necessary construction required to secure safety of life and/or property.

1.20 SCHEDULE

- A. Construct work in sequence under provisions of Division 1 and as coordinated with the Owner's Representative.

1.21 HOISTING, SCAFFOLDING AND PLANKING

- A. The work to be done under this Section of the Specifications shall include the furnishing, set-up and maintenance of all derricks, hoisting machinery, cranes, helicopters, scaffolds, staging and planking as required for the work.

1.22 CUTTING AND PATCHING

- A. Include all coring, cutting, patching, and fireproofing necessary for the execution of the work of this Section. Structural elements shall not be cut without written approval of the Architect. This Contractor shall be responsible for taking all precautions required to identify hidden piping, conduits, etc. before any core drilling and/or cutting of slabs commences, including X-raying the affected slabs. Provide fire stopping to maintain the fire rating of the fire resistance-rated assembly. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details and be listed by UL or FM.
- B. All work shall be fully coordinated with all phases of construction, in order to minimize the requirements for cutting and patching.

- C. Form all chases or openings for the installation of the work of this Section of the specifications, or cut the same in existing work and see that all sleeves or forms are in the work and properly set in ample time to prevent delays. Be responsible that all such chases, openings, and sleeves are located accurately and are of the proper size and shape and consult with the Owner's Representative and all other trades concerned in reference to this work. Confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the approval of the Owner's Representative.
- D. Fit around, close up, repair, patch, and point around the work specified herein to match the existing adjacent surfaces and to the satisfaction of the Owner's Representative.
- E. Fill and patch all openings or holes left in the existing structures by the removal of existing equipment which is part of this Section of the Specifications.
- F. All of this work shall be carefully done by workmen qualified to do such work and with the proper and smallest tools applicable.
- G. Any cost caused by defective or ill-timed work required by this Section of the specifications shall be borne by this Contractor.
- H. When, in order to accommodate the work required under this Section of the specifications, finished materials of other trades must be cut or fitted, furnish the necessary drawings and information to the trades whose materials must be cut or fitted.

1.23 SLEEVES, INSERTS AND ANCHOR BOLTS

- A. Coordinate with other trades the location of and maintaining in proper positions, sleeves, inserts and anchor bolts to be supplied and/or set in place under this section of the specifications. In the event of incorrectly located preset sleeves, inserts and anchor bolts, etc., all required cutting and patching of finished work shall be done under this section of the specifications.
- B. All pipes passing through floors, walls, ceilings or partitions shall be provided with fire stopping to maintain the fire rating of the structure. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details. Provide sleeves for all penetrations where required by the listed detail, for the penetration of all mechanical room floors and where specifically required on the drawings.
- C. Field drilling (core drilling), when required, shall be performed under this section of the specifications, after receipt of approval by the Owner's Representative.
 - 1. When coring cannot be avoided, provide ¼ inch pilot hole prior to coring. When coring through floor or slab, verify location of core on floor below

and protect and piping, ductwork, wiring, furniture, personnel, etc., below the location of the core.

1.24 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

- A. Provide all supplementary steel, factory fabricated channels and supports required for the proper installation, mounting and support of all Electrical equipment, piping, etc., required by the Specifications.
- B. Supplementary steel and factory fabricated channels shall be firmly connected to building construction in a manner approved by the Owner's Representative as shown on the drawings or herein specified.
- C. The type and size of the supporting channels and supplementary steel shall be determined by the Contractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All supplementary steel and factory fabricated channels shall be installed in a neat and workmanlike manner parallel to the walls, floors and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.
- E. All supplementary steel including factory fabricated channels, supports and fittings shall be galvanized steel, aluminum or stainless steel where exposed or subject to rust producing atmosphere. Factory fabricated channels shall be manufactured by Unistrut, H-strut, Powerstrut or approved equal.

1.25 HAZARDOUS MATERIALS

- A. Removed batteries shall be recycled by a facility approved by the Owner's Representative. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment.
- B. Removed fluorescent and HID lamps shall be recycled by a facility approved by the Owner's Representative. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment.
- C. All ballasts in lighting fixtures to be disposed shall be verified to be PCB free. All ballasts manufactured prior to 1979 and not labeled as PCB free shall be considered to contain PCB's. Provide written verification to the Owner's Representative that confirms PCB free waste. Where PCB free waste cannot be verified, ballasts shall be recycled by a facility approved by the Owner's Representative, with PCB components eliminated by a high temperature incineration. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final

payment. All handling shall conform to EPA requirements. Provide breakout cost for this scope.

- D. Where it has been identified that asbestos-containing material exists within the scope limits, refer to the Asbestos Abatement specification section for requirements.

1.26 ACCESSIBILITY

- A. All work provided under this Section of the Specification shall be installed so that parts requiring periodic inspection, maintenance and repair are accessible. Work of this trade shall not infringe upon clearances required by equipment of other trades, especially code required clearances to electrical gear. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the Owner's Representative.

1.27 SEISMIC RESTRAINT REQUIREMENTS

- A. Submit working plans and calculations reviewed, signed and stamped by a professional engineer who is registered in the State where the project is located and has specific experience in seismic calculations, certifying that the plans meet all seismic requirements established by authorities having jurisdiction over the project.
- B. For each seismic restraint, provide certified calculations to verify adequacy to meet the following design requirements:
 - 1. Ability to accommodate relative seismic displacements of supported item between points of support.
 - 2. Ability to accommodate the required seismic forces.
- C. For each respective set of anchor bolts provide calculations to verify adequacy to meet combined seismic-induced shear and tension forces.
- D. For each weldment between structure and item subject to seismic force, provide calculations to verify adequacy.
- E. Restraints shall maintain the restrained item in a captive position without short circuiting the vibration isolation.

1.28 PROJECT CLOSEOUT

- A. Construction Observations By The Engineer
 - 1. The engineer shall make progress site visits during construction and one substantial completion (punch list) site visit for determining substantial completion.

2. The Trade Contractors and the General Contractor are required to inspect their own work and make any corrections to the work to comply with the specifications and the contract documents. It is not the responsibility of the engineer to develop lists of incomplete work items.
3. Progress Site Visits
 - a. The purpose of the progress site visit by the engineer is to observe if the work is proceeding in accordance with the contract documents.
 - b. The engineer will prepare a field report which will note in general the work completed since the last observation visit, work found not to be in accordance with the contract documents and work not corrected since the previous observation visit.

B. Substantial Completion

1. When the Contractor considers the Work under this Section is substantially complete, the Contractor shall submit written notice, through the General Contractor, with a detailed list of items remaining to be completed or corrected and a schedule of when each remaining work item will be completed. Should the engineer determine the list of remaining work does not constitute substantial completion the engineer will notify the Architect and/or Owner and he will not make a substantial completion site visit.
2. The following items shall be completed prior to the written request for substantial completion site visit:
 - a. Certification of successful operation of all systems.
 - b. Record Drawings in accordance with the contract specifications.
 - c. Operation and Maintenance manuals.
 - d. Emergency contact list for reporting of malfunctioning equipment during the warranty period.
 - e. Contractors Project Completion certificate.
3. Should the Engineer, during the substantial completion visit, observe that the Work is substantially complete, s/he will provide a written listing of the observed deficiencies referred herein as the Punch List. The Punch List will provide for a place for the Contractor and general Contractor to sign off and date each item individually indicating that the observed deficiency item has been corrected.
4. Should the Engineer, during the substantial completion site visit, observe that the Work is not substantially complete, s/he will provide, a written list

of the major deficiencies and a reason for the work not being considered substantially complete.

5. If the work is found not to be substantially complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any further observations by the engineer.
6. The Contractor shall remedy all deficiencies listed in the punch list within the time frame required by the contract.

C. Engineers Construction Completion Certification

1. Where required by the applicable code, the Engineers Construction Completion Certification will be issued by RDK Engineers when all life safety and health related issues are complete, all required functional tests are complete and all reports are complete.
2. There shall be NO outstanding items identified on the punch list for scope within any of these categories.

D. Final Completion

1. The following items shall be submitted prior to the written request for Final completion:
 - a. Revised Substantial Completion items to be resubmitted in accordance with the review process comments.
 - b. Warranties commencing the date of Substantial completion
 - c. Individual Signed and dated Punch List acknowledging completion of all punch list items
2. When the Contractor considers all of the punch list work items complete, the Contractor shall submit written notice through the General Contractor that all Punch List items are complete and resolved and the work is ready for final observation site visit. The signature lines for completion of each punch list item shall be signed by the Contractor indicating the work is complete and signed by the General Contractor indicating s/he has inspected the work and found it to be complete. Should the Engineer find the work to be finally complete and all Punch List items are complete the Engineer will make a recommendation to the Architect or Owner. If the Engineer has found the punch list work to be incomplete during final inspection a written listing of the observed deficiencies will be prepared by the Engineer.
3. If the work is not fully complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the

Contractor through the contractual agreement for any reobservations by the engineer.

E. Re-observation Fees

1. The re-observation fee shall be \$1200.00 per visit.

F. Contractor's Project Completion Certificate

1. Upon completion of work and prior to request for Certificate of Occupancy, each Trade Contractor and the General Contractor shall issue a certificate stating that work has been installed generally consistent with construction documents and all applicable codes. RDK Engineers can furnish a blank Contractor's certificate form upon request. The certificate shall certify:
 - a. Execution of all work has been in accordance with the approved construction documents.
 - b. Execution and control of all methods of construction was in a safe and satisfactory manner in accordance with all applicable local, state and federal statutes and regulations.
2. The certificate shall include the following information:
 - a. Project.
 - b. Permit Number.
 - c. Location.
 - d. Construction Documents.
 - e. Date on Plans and Specifications submitted for approval and issuance of the Building Permit.
 - f. Addendum(a) and Revision Dates.
3. The certificate shall be signed by the Contractor and include the following:
 - a. Signature.
 - b. Date.
 - c. Company.
 - d. License Number.
 - e. License Expiration Date.

PART 2 - PRODUCTS

2.00 not used

2.01 IDENTIFICATION

A. Nameplates

1. Nameplates shall be laminated black Bakelite with minimum 1/4" high white recessed letters.
2. Nameplates shall be securely attached to the equipment. Utilize mechanical fasteners such as galvanized steel or brass screws for exterior applications. High strength adhesives or cements may be used for interior applications.

2.02 RACEWAYS AND CONDUIT

A. Rigid Galvanized Steel (RGS) Conduit

1. RGS shall be zinc-coated steel that conforms to ANSI C80.1, UL Specification No. 6 and Federal Specification WW-C-581e by Allied Tube and Conduit, Republic Steel, Wheatland Tube or approved equal.
2. RGS fittings shall be threaded. Split couplings or non-threaded fittings shall not be used.
3. Nipples and Close Nipples shall be RGS, length as noted or as required to conform to field conditions.

B. Intermediate Metal Conduit (IMC)

1. IMC shall be zinc-coated steel that conforms to ANSI C80.6, UL Standard No. 1242 and Federal Specification WW-C-581e by Allied Tube and Conduit, Wheatland Tube or approved equal.
2. IMC fittings shall be threaded.

C. Electrical Metallic Tubing (EMT)

1. EMT shall be zinc-coated steel that conforms to ANSI C80.3, UL Standard No. 797 and Federal Specification WW-C-563 a by Republic Steel, Allied Tube and Conduit or approved equal.
2. EMT fittings shall be
 - a. zinc plated pressed steel gland and ring compression

zinc plated pressed steel gland and ring compression up to 2" and
zinc plated pressed steel double set screw from 2" and up

zinc plated pressed steel set screw type that shall form a positive
ground path.

D. Polyvinyl Chloride (PVC) Non-metallic Conduit

1. PVC conduit and fittings shall be Schedule 40 or Schedule 80, 90°C. UL Listed equal to Carlon Plus 40 or Plus 80. PVC shall meet NEMA Specification TC-2, TC-3 and UL-651.
2. PVC, fittings and solvent cement shall be by single approved manufacturer.
3. PVC shall be sunlight resistant and listed for exposed or outdoor usage.

E. Electrical Non-Metallic Tubing (ENT)

1. ENT raceway and fittings shall be UL listed and meet the requirements of UL 1653 and N15MA TC-13.
2. Fittings shall be concrete-tight without need to tape over joints.

F. Fiberglass Reinforced Epoxy (FRE) Conduit Schedule 40 or Schedule 80 UL Listed equal to FRE Composites Inc. Type ID, SW and HW for below ground and above ground applications. FRE shall comply with UL 1684.

G. Miscellaneous Conduit Fittings

1. Elbows shall be standard radius unless noted otherwise. Where Large Radius elbows are specified, provide 48" radius unless noted otherwise.
2. Bushings shall be threaded pressed steel hot dipped galvanized with conduit end stop and integrally molded noncombustible phenolic insulated surface rated for 150°C.
3. Bonding bushings shall be threaded pressed steel hot dipped galvanized with conduit end stop and integrally molded noncombustible phenolic insulated surface rated for 150°C with a lay-in tin plated copper grounding lug.
4. Exposed conduit expansion fittings shall be hot-dipped galvanized malleable iron with external bonding jumper equal to O.Z./Gedney Type EX for RGS or Type TX for EMT (4" maximum expansion).
5. Provide water-tight gland sealing assemblies with pressure bushings equal to OZ/Gedney Type WSK for new cast-in-place installations or Type CSCM for retrofit (core drilling of existing walls) as required for below grade wall and floor penetrations.

H. Flexible Metallic Conduit shall not be used.

- I. Wireways shall be minimum 16-gauge steel with all straight runs having hinged spring-latched covers. Finish shall be painted over a corrosion resistant phosphate pretreatment to protect against corrosion. Interior parts shall be smooth and free of sharp edges and burrs. Provide wireway as identified on the drawings for NEMA 1, 3R or 12 service. Wireways shall be equal to Square D and UL Listed.

2.03 WIRE AND CABLE (600V)

- A. Provide single-conductor, annealed copper wire and cable with insulation rated for 600 V, of sizes specified and scheduled on Drawings, by General Electric, Southwire, Okonite or approved equal, for secondary service, feeders, branch and system wiring. Wire sizes shown and specified are American Wire Gauge for copper conductors.
- B. The use of aluminum conductors is not allowed.
- C. Wire #10 and larger shall be stranded; #12 and smaller shall be solid. Wire and cable shall have THWN-THHN or XHHW insulation for branch circuit and feeder conductors. Type RHWUSE shall be used for all conductors installed in below grade raceways for generator applications only.
- D. Wire for use on hospital isolation power systems shall be type XLP low leakage wire #FR-XLI by Rome Cable brand, catalog number VW-1 XHHW-2 Spec 2110 or approved equal. Wire shall have a dielectric constant of 3.5 or less and shall meet recommendations of NEC and NFPA 99. Wire pulling compound shall not be allowed in conduits for isolated power systems.
- E. Conductor Color-coding
 1. Service entrance, branch circuit and feeder conductors shall be color-coded. Conductors #12 and #10 shall be colored with a factory applied solid or striped compound coating (black, red, blue, brown, orange or yellow). Neutrals and equipment grounds shall have solid compound or solid color coating (white, gray and green), except that neutrals with colored stripe shall be used where required by code. Phase conductors #8 and larger with stripes, bands or hash marks shall have background color other than white, green and gray.
 2. Alternative field-applied color coding methods may be used for wire #8 or larger, with color code as specified in other sections of this specification. Coloring shall be applied by the use of flame-retardant vinyl tape, equal to 3M Scotch 35.
- F. Cable
 1. Flexible Metal Clad (MC) cable shall be UL Listed with THHN insulated conductors with an insulated grounding conductor within galvanized steel

or aluminum interlocked armor. Connectors shall be provided with lock nut connection to the termination point enclosure.

2. Flexible Metal Clad (MC) cable utilized for Fire Alarm service shall be identified with a factory applied tracer along the entire length.
3. Flexible Armored (AC) cable shall be UL Listed with THHN insulated conductors with an insulated grounding conductor within galvanized steel or aluminum interlocked armor with bare bond wire. Connectors shall be self-grommetted with lock nut connection to the termination point enclosure.
4. Type G or Type W cable may be used where installed on the underside of the pier, dock or floats. Cable shall be extra-hard usage, rated not less than 75°C, 600 volts; listed for both wet locations and sunlight resistance; and have an outer jacket rated to be resistant to temperature extremes, oil, gasoline, ozone, abrasion, acids, and chemicals.

G. Splices and Terminations

1. Ampacity and temperature rating of splices and connectors shall be equal to or greater than those of associated wires and cables.
2. Make splices in branch circuit or feeder wiring from #12 to #10 with UL-listed, solderless screw on connectors rated 600 V.
3. Make splices in branch circuit or feeder wiring above #10 with UL-listed 90°C, 600V, compression butt splice barrel equal to Burndy YS-L HYLINK.
4. Conductor terminations shall be standard bolt-on lugs with hex screws listed for attachment of copper wire and cable to panelboards, switchboards, disconnect switches and other electrical equipment.
5. Make terminations for stranded conductors on screw terminals with UL Listed 105°C, 600V PVC insulated barrel compression locking fork tongue terminal equal to Burndy TP-LF VINYLUG.
6. Make bus terminations for conductors #6 and larger with UL-listed 90°C, 600V, compression standard barrel length lugs equal to Burndy YA-L for conductor sizes to #4/0. Connectors for cable 250 KCMil and larger shall be with UL-listed 90°C, 600V, compression long barrel length two hole lugs equal to Burndy YA-2N. Lugs shall be high conductivity seamless copper electro-tin plated for corrosion protection.

H. Wire management shall be provided by self-extinguishing self-locking nylon ties with -65 to 350°F. range for bundling conductors.

I. Arc-proofing

1. Provide flexible, flame-retardant, organic-composition-coated elastomer arc-proofing tape equal to 3M Scotch 77 on power cable in manholes and handholes, suitable to withstand 200 A arc for 30 seconds. Tape shall be self-extinguishing and shall not support combustion. Cover with glass cloth tape equal to 3M Scotch 69 as a binder.
 2. Tape shall have been tested with 186-hour distilled water exposure and 3% salt water and shall be ultra-violet and weather resistant.
- J. Cable pulling compounds shall be UL Listed and be suitable for use with the specified cable insulation system. The compound shall reduce the coefficient of friction, while not adding any long term issues to the installation such as premature aging of the insulation system, added flammability or drying in such a manner as to stick the cable in place in the raceway.

2.04 WIRING DEVICES AND PLATES

- A. Provide wiring devices by single manufacturer. Catalog designations of Cooper are specified, unless noted otherwise, to establish standards of quality for materials and performance. Colors of devices as specified below are White for standard applications. Refer to the drawings for color requirements that vary from White. Equal products by Leviton, Pass & Seymour or Hubbell will be accepted. Provide published manufacturers cross-reference sheet highlighted with the device specified and that being submitted with all device product data for approval.
- B. Wall switches shall be of the totally enclosed tumbler type. Wiring terminals shall be spring loaded terminal screws for back or side wiring. Switches shall be rated 20-ampere 277 volt for use on alternating current only. The yoke shall have a grounding terminal with a green hex head screw. Pilot lights indicated shall consist of red lighted handle, illuminated when the switch is on.
- C. Toggle Switches shall be heavy duty, UL listed, specification grade as follows:
1. Single-pole shall be No. 2221W
 2. Double-pole shall be No. 2222W
 3. Three-way shall be No. 2223W
 4. Four-way shall be No. 2224W
 5. Single-pole locking shall be No. 2221L
 6. Double-pole locking shall be No. 2222L
 7. Three-way locking shall be No. 2223L
 8. Four-way locking shall be No. 2224L
 9. Single-pole pilot shall be No. 2221PL

10. Double-pole pilot shall be No. 2222PL

D. Miscellaneous Switches:

1. Decorator switches with rocker frames shall be provided only where specifically noted on the drawings. Devices shall be Commercial Specification Grade rated 20-ampere 277 volt for use on alternating current only.

a. Single-pole shall be No. DECB120W

b. Three-way shall be No. DECB320W

c. Four-way shall be No. DECB420W

2. Dimmer switches shall be slide type equal to Lutron Nova with single gang capacity up to 2000 watts. The dimmer shall be selected and sized based upon the attached load and the mounting configuration. All incandescent dimmers shall incorporate an integral torodial choke to eliminate lamp filament buzz and minimize RFI and EMF.

a. Incandescent 600 watt shall be N-600

b. Incandescent 1000 watt shall be N-1000

c. Incandescent 1500 watt shall be N-1500

d. Incandescent 2000 watt shall be N-2000

e. Low voltage and fluorescent Nova dimmers shall be selected based upon the fixture type (electronic or magnetic). Submittal shall include lamp fixture data to ensure compatibility.

3. Occupancy Sensors

a. For dual-switching applications, wall mounted passive infrared occupancy sensors shall be equal to Leviton ODSOD-ID-W suitable for use in areas up to 900 SF with adjustable time delays from 30 seconds to 30 minutes, dual circuit relay ambient light override, self adjusting delayed off time, walk-through and manual on features.

b. Provide occupancy sensors equal to Leviton ODS10-ID-W for single switching applications.

c. Multi-technology ceiling mounted occupancy sensors with 1000 SF coverage shall be equal to Leviton OSC10-MOW. Provide with corresponding Leviton OSP Series Power Packs.

d. Occupancy sensors shall be as manufactured by Leviton, Sensorswitch, Hubbell, or approved equal.

4. Provide filled out utility rebate forms with all occupancy sensor submissions for separate application by the Owner.
5. Wall mounted time switches shall be solid state with integral LCD backlit display. Unit shall be white, have user selectable time interval and audio/visual warning at the end of the timing period. Switch shall be equal to Tork SSA100.

E. Receptacles:

1. Receptacles shall be nylon faced with rigid, glass reinforced nylon bodies. Wiring terminals shall be spring loaded terminal screws for back or side wiring. Receptacles shall be rated 20-ampere 125 volt. The yoke shall have a grounding terminal with a green hex head screw.
2. Duplex receptacles shall be UL Federal Specification WC-596 Specification Grade Extra Hard Duty 125V, 20A, 2 pole, 3 wire as follows:
 - a. General Use shall be No. 5362W (White)
 - b. GFCI Interior shall be No. GF20W (White)
 - c. GFCI Exterior shall be GF20BK (Black) UL listed Weather Resistant
3. Duplex receptacles for residential dwelling units shall be 15A, 125V residential grade, tamper resistant as follows:
 - a. General use shall be No. TR270W.
 - b. GFCI No. TRVGF15.
 - c. Where 20A device required for dedicated circuit applications such as washer (laundry outlet) utilize 20A commercial grade device.
4. Decorator duplex receptacles shall be provided only where specifically noted on the drawings. Devices shall be Specification Grade rated 20-ampere 125 volt equal to No. 6450W.
5. Special purpose outlets shall be provided as indicated on the drawings at the ratings listed on the schedules and notes.

F. Wiring Device Plates:

1. Provide 0.032" nominal brushed Type 430 stainless steel device plates by the manufacturer of the wiring device for all flush mounted switches and receptacles installed in dry locations and where not subjected to physical abuse. Ganged plates shall be of one-piece construction to accommodate

the required number of installed devices. Oversized plates to cover wall finish blemishes adjacent to the device box shall not be used.

Provide smooth thermoplastic device plates by the manufacturer of the wiring device for all flush mounted switches and receptacles installed in dry locations and where not subjected to physical abuse. Fastening screws shall be color matched to the plate, plate color to the device. Ganged plates shall be of one-piece construction to accommodate the required number of installed devices. Oversized plates to cover wall finish blemishes adjacent to the device box shall not be used.

Provide high-impact smooth nylon device plates by the manufacturer of the wiring device for all flush mounted switches and receptacles installed in dry locations and where not subjected to physical abuse. Fastening screws shall be color matched to the plate, plate color and to the device. Ganged plates shall be of one piece construction to accommodate the required number of installed devices. Oversized plates to cover wall finish blemishes adjacent to the device box shall not be used.

2. Provide heavy-duty cast aluminum horizontally mounted weatherproof covers for GFCI receptacles where weatherproof devices are specified equal to Hubbell No. WP26MH. Cover shall be attached to FS box with 4 screws and spring back to the closed position upon removal of the cord set. Fasteners chrome-plated brass.
3. Receptacle device plates for other than 20 amp, 120 V, 2-wire, circuits shall be provided with typed clear plastic label (equal to P-Touch) mounted to the device plate indicating voltage characteristics, panelboard and circuit number of outlet

Receptacle device plates for other than 20 amp, 120 V, 2-wire, circuits shall be identified by engravings or laser etching on the plate indicating voltage characteristics, panelboard and circuit number of outlet.

4. Provide all device plates for receptacles and switches with engraving. Engraving shall indicate associated panelboard name and circuit number.

2.05 OUTLET BOXES

- A. Outlet and switch boxes on concealed work shall be at least 4" square, galvanized pressed steel conforming to UL 514A. Where installed in plaster, boxes shall be fitted with galvanized steel plaster covers of required depth to finish flush with finished wall or ceiling. Outlet boxes shall be by Steel City Electric Company, Appleton Electric Company, or approved equal.
- B. Outlet boxes installed in masonry walls or in concrete decking shall be UL Listed for the application.

- C. Outlet boxes for interior surface mounted locations where RGS is specified where exposed to moisture, at kitchen and cafeteria equipment, adjacent to water or steam connections, and where indicated as weatherproof on Drawings shall be cast malleable iron with an aluminum polymer enamel coating equal to Appleton Type FD. Conduit entries shall be threaded cast hubs. Device covers shall be coated malleable iron with moisture sealing gasket and stainless steel fasteners.
- D. Outlet boxes for exterior surface mounting shall be cast aluminum alloy with an aluminum polymer enamel coating equal to Appleton Type FD. Conduit entries shall be threaded cast hubs. Device covers shall be cast aluminum alloy with moisture sealing gasket and stainless steel fasteners.
- E. All boxes shall have at least one tapped and threaded grounding hole for connection of a 10-32 grounding screw.
- F. Box depth shall accommodate code required volume for the specified installation. Through wall boxes shall not be used.
- G. Outlet boxes for various systems including but not limited to fire alarm, paging and master clocks shall be sized as required by the manufacturer. Boxes shall be cast where exposed to physical damage or installed in an exposed exterior location.
- H. Floor outlets shall be heavy-wall cast iron bodies with edge frames and floor plates of polished bronze. Boxes shall be watertight and be fully adjustable before and after pouring. Provide insert floor plates with hinged covers for duplex receptacles or for telephone connection as shown on the drawings. Multi-gang boxes shall be provided with internal removable barriers for separation of different voltages. Provide carpet plates where required. Boxes shall be equal to Steel City 840 SC Series.

2.06 JUNCTION AND PULL BOXES

- A. Provide galvanized steel junction and pull boxes where indicated and as necessary to facilitate installation. Steel shall be minimum 16 gauge. Junction and pull boxes shall be of code required dimensions. Cover shall be of the same type and thickness material as the box construction.
- B. Junction and pull boxes intended for dry interior locations shall be NEMA 1 enclosures with accessible, removable screw-on covers. Covers shall be secured with corrosion-resistant screws with keyhole slots to accommodate easy removal.
- C. Junction and pull boxes intended for wet or exterior locations shall be NEMA 3R enclosures with hinged gasketed covers. Interior and exterior shall be finished with a gray enamel powder coat over the galvanized metal. Hinge shall be galvanized steel with stainless steel pin. Covers shall be secured with corrosion-resistant zinc plated lockable pull catches.

- D. Custom fabricated medium to large junction and pull boxes shall have internal structural steel bracing welded to form a rigid assembly adequate to maintain alignment and shape in shipment and installation.

2.07 SAFETY DISCONNECT SWITCHES

- A. Switches shall be three-pole heavy-duty type rated for 600V in NEMA 1 (interior dry applications) and NEMA 3R (exterior applications) enclosures unless noted otherwise on the drawings. All switches shall be horsepower rated and suitable for service entrance use. Provide with solid neutral where four wire circuits are indicated and with 200% solid neutral where neutrals are sized for 200% full load ampacity.
 - 1. Operating mechanisms shall be quick-make/quick-break. Current-carrying parts shall be high-conductivity copper. Contacts shall be silver-tungsten or plated. Provide positive pressure fuse clips and switch operating mechanism suitable for continuous use at rated capacity without auxiliary springs in current path. Switches shall withstand available fault current or let-through current before operating, without damage or rating change.
 - 2. Terminations shall be suitable for copper or aluminum conductors 60o/75o C rated. Clear shielding shall prevent accidental contact with energized line terminals.
 - 3. The cover shall be mechanically interlocked to prevent access unless the disconnect is in the OFF position. A defeater shall be provided to bypass this interlock. With the door open, an interlock shall be provided to prevent inadvertent closing of the disconnect. Padlocking facilities shall be provided to positively lock the disconnect in the OFF position with from one to three padlocks with the door open or closed.
 - 4. The enclosure shall be given a phosphatizing pretreatment. The paint finish shall be manufacturer's standard color and shall pass 600 hours of corrosion resistance testing per ASTM B 117.
- B. Fused switches shall have short circuit ratings no less than 100,000 amperes RMS, with capabilities to 200,000 amperes when used with Class J, L or R fuses at 480V from 400A to 1200A.
- C. Manual Motor Starters shall have quick make, quick break toggle mechanisms with allowance for up to 10% field adjustment in nominal overload heater values. Manual Motor Starters shall be NEMA 1 (interior dry applications) and NEMA 3R (exterior applications) enclosed unless noted otherwise on the drawings. Provide Cutler Hammer type MS manual starters for applications up to 1 HP at 240V single phase and type B100 for up to 1 HP at 277V single phase.

2.08 PANELBOARDS

- A. General

1. Panelboards shall be equipped with 100mA ground fault protection on the main circuit breaker, per NEC article 555.
2. Provide dead-front lighting and power panelboards where shown on drawings and as scheduled.
3. Panelboards shall meet or exceed requirements of NEMA Standard Publication PB-1, and UL-50 and 67. Panelboards shall be UL-listed.
4. Where panelboards are used as service entrance equipment, they shall comply with all NEC and UL requirements for service. The panelboard shall include a UL service entrance label, incoming line isolation barriers and a removable neutral bond to ground for solidly grounded wye systems.
5. Enclosures shall be at least 20 inches wide made of galvanized steel. Gutter space shall be in accordance with NEC requirements for the specified combination of devices and accessories. Fronts shall be reinforced steel with concealed hinges and concealed trim adjusting screws. Trim clamps are unacceptable. Where two section panels are required, bolt boxes together to form one unit. Trim shall be two-piece construction with doors of equal size over each section. Trims shall be cleaned, primed and painted gray ANSI 61.
6. For panelboards up to 400 amps, provide cabinets with flush hinges and combination catch and lock to cover circuit breaker handles. Provide a directory card with a clear plastic cover mounted inside the door. Power and lighting panels shall have heavy-duty, continuous, section vertical-hinged to box section for access to wiring gutters in addition to trim door. All locks shall be keyed alike. Panelboards greater than 400 amps shall be provided with a four-piece front to cover wiring gutter and wiring access areas.
7. Nameplates shall be in accordance with other sections of this specification.
8. The manufacturer shall warrant equipment to be free from defects in materials and workmanship for 1 year from date of installation or 18 months from date of purchase, whichever occurs first.
9. Panels shall be GE A- Series for 400 A and below unless more than (1) 125 amp or larger branch breaker and/or space is specified. Spectra Power panelboards shall be provided for all applications greater than 400 amps and to accommodate multiple branch breakers greater than 125 amps. Approved equal panelboards by Cutler-Hammer, Siemens or Square D will be considered.

B. Bussing

1. Main bus bars of panels shall be copper, rated to carry at least full rating of the panel as identified on the schedules.

2. Split solid neutral bus, with rated capacity equal to the phase bus, shall be plated and located in main compartment for all incoming neutral cables to be same length. Neutral bus shall be 200% rated where double sized neutrals are indicated and/or where the panel is supplied via a K-rated transformer.
3. Provide separate equipment ground bus for each panelboard. Where an isolated ground is specified, provide an additional isolated ground bus, which shall be insulated from the panel enclosure and equipment ground.
4. Panelboards shall have a short circuit current rating equal to or greater than circuit breaker AIC ratings schedule on the Drawings. Where series ratings are allowed, as per the schedule on the Drawings, a label shall be affixed to the panel stating the conditions of the UL Series rating including:
 - a. Size and type of upstream device
 - b. Branch devices that are acceptable
 - c. UL Series short-circuit rating
5. All lugs shall be UL listed tin-plated aluminum suitable for copper or aluminum cable for sizes indicated on the drawings. Provide oversized lugs to accommodate designed cable sizes or increase gutter space to allow use of solid stud compression lugs where necessary. All terminations shall be suitable for 75 degree C cable.
6. Provide bus connections for future overcurrent devices with suitable insulation and bracing to maintain proper short circuit rating and voltage clearances. All required hardware shall be installed and be in place for ready insertion of future breaker without the need to relocate adjacent units. Future spaces shall accommodate frame sizes up to 50% of the main bus ampacity.

C. Overcurrent Devices

1. Molded case circuit breakers shall be bolt-on devices with thermal and magnetic trip elements in each pole. Multi-pole breakers shall have internal common trip crossbars for simultaneous tripping of each pole. Trip units shall be thermal magnetic unless solid state sensing specifically indicated on the drawings.
2. All breakers shall have handle trip indication and a trip indicator in window of circuit breaker housing.
3. Three pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs.

4. Internal accessories shall be UL Listed for field installation without removing the circuit breaker cover. Internal accessories shall be common to all frame sizes. Shunt trips, undervoltage releases, auxiliary switches, and bell alarms shall be available for all breakers and shall install from the front of the circuit breaker or molded-case switch.

D. Submittals

1. The manufacturer shall provide copies of the following documents for review and evaluation in accordance with general requirements of Division 1 and Division 16:
 - a. Product Data on specified product
 - b. Shop Drawings on specified product
 - c. Certified trip curves for each specified product
 - d. Nameplate list
 - e. Short circuit and coordination study shall be submitted with the equipment shop drawings to ensure rating conformity to study conclusions. Submittals made without the study shall be rejected.

2.09 LIGHTING FIXTURES

- A. Provide lighting fixtures, equipment and components where shown on Drawings, as listed in fixture schedules and as specified, wired and assembled. Provide approved aligned canopies, hangers and other appurtenances as required, for a complete and functional system.
- B. LED luminaires shall have a luminous efficacy of at least 90 lumens/watt, a color temperature of 3500 K (unless noted otherwise on the plans), a CRI of at least 80, an estimated life of at least 50,000 hours at 70% lumen maintenance, and shall include a minimum 5-year warranty on the entire luminaire including drivers. The luminaire and LEDs shall have been tested in accordance with LM-79 and LM-80
- C. Refer to the lighting fixture schedule for specific lamp type, CRI and color.
- D. Refer to fixture schedule for specific lamp and ballast requirements which may deviate from this specification.
- E. Verify ceiling constructions, and provide frames, rings and other accessories suitable for construction encountered.
- F. Provide polyester covers to protect fluorescent fixtures with parabolic louvers during construction.

2.10 UNDERGROUND DUCT, MANHOLES, AND HANDHOLES

- A. Underground Duct

1. Raceways shall comply with section 2.02 and 3.02 of this Specification unless specifically modified in this section of the Specification.
2. Spacers shall accommodate a minimum of two (2) inch conduit separation and three (3) inches from the top, bottom and side edges of the duct bank. Spacers shall accommodate the specified conduit sizes and interlock horizontally. Spacers shall be equal to Carlon or Underground Devices Incorporated.
3. PVC bell ends shall be utilized for all conduit transitions into manholes, handholes and building foundations where sealing fittings are not otherwise specified.
4. Bends in excess of 30 degrees over a 10 foot length shall be factory fabricated galvanized rigid steel conduit. Where required for pole risers and to turn up at pads, factory fabricated long radius 90° galvanized rigid steel sweeps shall be used.

B. Manholes

1. The complete manholes shall be rated for AASHTO HS20-20 wheel loading per AASHTO HB14. Covers shall fit frames without excessive play. Steel and iron shall be formed to shape and size with sharp lines and angles. Castings shall be free from warp and blow holes that may impair strength or appearance. Exposed metal shall have smooth finish and sharp lines and rises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. Floor surfaces shall have a steel trowel finish.
2. Precast units shall be the products of a manufacturer regularly engaged in the supply of precast concrete manholes and handholes, including products by American Precast, Rotondo or Chase.
3. Concrete shall have an ultimate 28-day compressive strength of not less than 4000 PSI. Structures may be precast to the design and details indicated for cast-in-place construction, precast monolithically and placed as a unit, or structures may be assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. Structures shall be identified with the manufacturer's name embedded in or otherwise permanently attached to an interior wall face.
4. Horizontal concrete surfaces of floors shall have a smooth finish. Cure concrete by applying two coats of white pigmented membrane forming-curing compound in strict accordance with the manufacturer's printed instructions, except that precast concrete may be steam cured. Curing compound shall conform to ASTM C 309.
5. Structure top, bottom, and wall shall be of a uniform thickness of not less than six (6) inches. Thin-walled knock-out panels designed for future duct

bank entrances shall not be permitted. Quantity, size, and location of duct bank entrance windows shall be as required per the drawings, and cast completely open. Size of windows shall exceed the nominal duct bank envelope dimensions by at least twelve (12) inches vertically and horizontally to preclude in-field window modifications made necessary by duct bank misalignment. The sides of windows shall be a minimum of six (6) inches from the inside surface of adjacent walls, floors, or ceilings. The perimeter of window openings shall be formed to have a keyed or inward flared surface to provide a positive interlock with the mating duct bank envelope. Provide welded wire fabric reinforcing through window openings for in-field cutting and flaring into duct bank envelopes. Provide additional reinforcing steel comprised of at least two No. 4 bars around window openings. The minimum concrete cover for reinforcing steel shall be two (2) inches. Provide drain sumps for structures a minimum of twelve (12) inches in diameter and four (4) inches deep.

6. Provide tongue-and-groove or shiplap joints on mating edges of precast components. Design joints to firmly interlock adjoining components and to provide waterproof junctions and adequate shear transfer. Seal joints watertight using preformed plastic strip conforming to AASHTO M198, Type B. Install sealing material in strict accordance with the sealant manufacturer's printed instructions. Provide waterproofing at conduit/duct entrances into structures. Where access frame meets the top slab, provide continuous grout seal.
7. Metal Frames and Covers
 - a. Frames and Covers shall be made of cast iron OR steel.
 - b. Cast-iron frames and covers shall meet FS RR-F-621. OR Steel covers shall be rolled steel floor plate having an approved antislip surface. Welding shall be performed by qualified welders in accordance with ASTM requirements.
 - c. Covers shall be rated AASHTO H20-44 wheel loading.
 - d. Brick for manhole collar shall be sewer and manhole brick conforming to ASTM C 32, Grade MS.
8. Pulling-In Irons
 - a. Provide bent steel bars or hooks, which project into the manhole approximately four (4) inches and shall be designed to withstand a minimum pulling-in load of 6000 pounds, cast in the walls or floors.
 - b. Iron shall be hot-dipped galvanized after fabrication.

- c. Pulling-In Irons shall be located within six (6) inches of the projected center of the duct bank pattern or precast window in the opposite wall. Irons shall not be located within six (6) inches of an adjacent interior surface, duct or precast window located within the same wall. Where a pulling-in iron cannot be located directly opposite the duct bank or precast window due to this clearance limitation, locate the iron directly above or below the projected center of the duct bank pattern or precast window the minimum distance required to preserve the six (6) inch clearance. Pulling-In Irons shall be located on the floor where clearances cannot be met for wall mounting. Floor mounted irons shall be a minimum of six (6) inches from the edge of the sump. Irons shall be placed directly below the projected center of the duct bank pattern entering the opposite wall, while maintaining a minimum clear distance of six (6) inches from any edge of the manhole.

9. Cable Racks

- a. Racks in power manholes shall be spaced not more than three (3) feet apart with a minimum of three levels of rack on each interior elevation.
- b. Racks in signal manholes shall be spaced no more than 16 ½ inches apart with the end rack being no further than 12 inches from the adjacent wall. A minimum of three levels of rack on each interior elevation.
- c. Racks and stanchion shall be non-metallic UL listed glass reinforced nylon. The stanchion shall incorporate multiple arm mounting holes on four (4) inch centers.
- d. The cable rack arms shall be a minimum of ten (10) inches long and rated for a minimum of 400 pounds. Load rating shall be based upon a concentrated load one (1) inch from the arm end.
- e. Drop in anchors shall be rated for a minimum of 8,500 pounds pulls out capacity and 6,500 pounds sheer. Hardware shall be 303 stainless steel with 316 stainless steel bolts and washers. Anchors shall be provided above each rack arm and at the top and bottom of each stanchion.
- f. Cable racks shall be equal to Underground Devices Incorporated.

C. Handholes

1. Handholes and associated covers shall be constructed of polymer concrete consisting of aggregate matrix bound together with a polymer resin. Internal reinforcement may be provided by means of steel and/or fiberglass.

2. Material shall have the following properties:
 - a. Compressive strength: 9000 psi
 - b. Flexural strength: 6000 psi
 - c. Tensile strength: 800 psi
3. The installed enclosure shall be rated for a minimum test load of 8000 pounds distributed over a 10" x 10" area, and intended for non-deliberate vehicular traffic only unless specifically noted otherwise on the drawings.
4. The boxes and covers shall be gray. Covers shall be provided with stainless steel bolts at each corner. The logo shall specifically identify the service inside, "Electrical", "Communications", "Lighting", etc. The logo shall be permanently recessed in the cover. Non-metallic covers shall be provided with electronic markers encased in the polymer concrete for ease in locating buried handholes.
5. Precast handholes shall be equal to Quazite composolite. Equal construction in precast or cast in place concrete will be accepted

2.11 LOAD CENTERS

A. General

1. Provide dead-front load centers where shown on drawings and as scheduled. Load centers shall comply with all applicable NEMA and UL requirements and meet Federal Specification W-C 375.
2. Nameplates shall be in accordance with other sections of this specification.
3. Terminals for conductors to mains and branch shall be UL listed as suitable for the type conductor specified.
4. The load center bus assembly shall be enclosed in a steel cabinet. The size of the wiring gutters and gauge steel shall be in accordance with UL Standards No. 67 and No. 50. Fronts shall be provided with a directory for circuit identification. Load center boxes and fronts shall have corrosion resisting phosphate treatment and a gray baked enamel finish.
5. The manufacturer shall warrant equipment to be free from defects in materials and workmanship for 5 years from date of installation.
6. Load centers shall be Cutler Hammer Type CH or approved equal from GE, Siemens or Square D.

B. Bussing

1. Main and cross bus bars of panels shall be plated copper, rated to carry at least full rating of the panel as identified on the schedules.

2. Neutral bus, capacity equal to the phase bus, shall be plated and suitable for neutral terminations equal to the quantity of pole spaces within the panel.
3. Provide separate equipment ground bus for each load center.
4. Load centers shall have a short circuit current rating equal to or greater than circuit breaker AIC ratings schedule on the Drawings, and not lower than 10,000 AIC.
5. All lugs shall be UL listed tin-plated aluminum suitable for copper or aluminum cable for sizes indicated on the drawings. Provide oversized lugs to accommodate designed cable sizes or increase gutter space to allow use of solid stud compression lugs where necessary. All terminations shall be suitable for 75 degree C cable.

C. Overcurrent Devices

1. Molded case circuit breakers shall be plug on devices with thermal and magnetic trip elements in each pole. Multi-pole breakers shall have internal common trip crossbars for simultaneous tripping of each pole. Mini-breakers with two circuit capacity combined within a single pole frame shall not be used.
2. All breakers shall have handle trip indication to clearly show between "on" and "off" when the beaker is tripped.
3. All breakers including Ground Fault and Arc Fault circuit breakers shall be provided as indicated on the schedules.

D. Submittals

1. The manufacturer shall provide copies of the following documents for review and evaluation in accordance with general requirements of Division 1 and Division 16:
 - a. Product Data on specified product
 - b. Shop Drawings on specified product
 - c. Nameplate list

2.12 METER CENTERS

A. General

1. All components shall have been tested and UL listed for use as an integral part of the multi-metering system. Installation shall be made as herein specified and shown on the associated electrical drawings.

2. Enclosures shall be constructed of formed and welded code gauge steel and shall be NEMA 1 OR 3R rated. No device disassembly shall be required to accommodate mounting. All devices shall be bonded together with bolted connections.
3. The bus system shall be an integral part of each meter socket module. No separate busways are acceptable. Meter units shall be provided with individual, removable covers for each meter position. All compartments containing unmetred circuits shall be provided with a sealing means. The wireway cover shall be separate, allowing access to the overcurrent protective devices without disturbing the meters.
4. Meter centers shall be by Siemens, Cuttler Hammer, GE, Square D or approved equal.

B. Bussing

1. All components shall be factory assembled and all current carrying parts shall be tin-plated aluminum OR copper bus bars. A single-bolt-joint assembly shall connect the main bus on adjacent modules. The single-bolt joints shall be accessible for tightening without removal of barriers, whether the bus is energized or deenergized.
2. Vertical bus shall be welded to the main horizontal bus and tied to the meter socket jaws by means of bus connection straps. Bolts joining the straps to the bus shall be accessible outside the socket base with the meter removed.
3. Bus connections shall be provided between socket load jaws and individual branch breakers. Line side meter jaws shall have meter guides. All meter guides shall be spring reinforced.
4. The unmetred horizontal bus in each meter module shall be completely barriered to prevent unauthorized access. Adjoining sections shall be slip together with front accessible captive bolts.
5. Components must be of such design to allow top or bottom wiring in the same assembly. Equipment shall be so arranged as to permit the installation of units with different branch ratings in the same meter center.

C. Overcurrent Devices

1. All protective devices shall be bolt-on molded case circuit breakers with inverse time and instantaneous tripping characteristics.
2. The meter center and associated molded case circuit breakers shall be UL listed with a short circuit current rating equal to or greater than the available current at the meter center as indicated on the drawings.

3. All series rating applications shall be permanently labeled in accordance with NEC requirements.

D. Metering

1. Meter sockets shall be in conformance to the applicable standards of the servicing utility.
2. Meter sockets shall be ring OR ringless type, rated in accordance with the drawings. Bypass shall not be required OR shall be slider OR horn OR lever OR disconnect block type.
3. Provide listed sealing covers for each meter position for removal by the utility prior to meter socket insertion.

E. Submittals

1. The manufacturer shall provide copies of the following documents for review and evaluation in accordance with general requirements of Division 1 and Division 16:
 - a. Product Data on specified products.
 - b. Shop Drawings on specified assembly.
 - c. Nameplate list.

2.13 MARINA POWER PEDESTAL

A. The Marina Power Pedestal shall be as follows:

1. 360° photocell controlled 13 watt fluorescent light with clear lens.
2. Powder coated stainless steel weather proof doors that protect receptacles and circuit breakers.
3. Lockable doors
4. Hose and cable brackets.
5. Powder coated stainless steel housing with limited lifetime warranty.
6. Large removable access panel for easy maintenance and installation.
7. Copper bus bars with 250A minimum rating.
8. One (1) ¾' hose bib with stainless steel handles.
9. Back lit device faceplate.
10. Bussing
 - a. Provide 3 phase 350 kcmil mechanical lug bus.

11. Devices

- a. Provide 30A, 125V, NEMA L5-30 single phase receptacle on Side #1.
- b. Provide 30A, 125V, NEMA L5-30 single phase receptacle on Side #2.
- c. Provide 20A GFI duplex on Side #1. Receptacle shall be labeled "DANGER: NOT TO BE USED FOR BOAT POWER"
- d. Provide 20A GFI duplex on Side #2. Receptacle shall be labeled "DANGER: NOT TO BE USED FOR BOAT POWER"

12. Electric Meters

- a. Provide digital electronic meter to meter both Side #1 and Side #2.
- b. Provide wireless remote metering for all digital electronic meters. Provide Gateway, Software, etc. for a complete and operational system which can meter electrical usage from within the Harbormaster's building. Provide start-up and testing services.

13. Marina power pedestal shall be Lighthouse Stainless Steel Series manufactured by Eaton Corporation.

2.14 FREE STANDING ELECTRICAL ENCLOSURE

- A. Electrical enclosure shall be 1418 series, 2 door, 304 stainless steel NEMA 4X freestanding enclosure, sized to accommodate all specified equipment and comply with NEC Working Space requirements. Manufacture shall be Hammond Manufacturing or approved equal.
- B. Standards: Panel enclosure shall be UL 508 Type 4X. Enclosure shall also comply with NEMA Type 4X, IEC 529, and IP66.
- C. Construction: Panel enclosure shall be constructed of formed 12 gauge 304 corrosion resistant stainless steel. Smooth, continuously welded seams without knockouts, cutouts, or holes. Lifting eyebolts made of heavy duty nickel plate/chrome are provided for easy enclosure handling. Doors are supported with heavy gauge continuous hinges. Doors secured with heavy duty mounting channels welded on the inside of the enclosure for mounting of panelboards and other electrical equipment. A grounding stud shall be provided in the enclosure and a bonding stud is provided at the door. All exterior hardware on Type 304 enclosures shall match the enclosure material.
- D. Finish: Panel enclosure and cover shall be natural stainless steel with a smooth brushed finish.

- E. Accessories: Stainless steel floor stand kit, breather kits, door stop kits, drip shield kits, light kit and panel rails.
- F. Panelboard(s) shall be mounted within enclosure to provide working clearances in accordance with NEC requirements. Access to the panelboard shall not require stepping into the enclosure.

2.15 GROUND FAULT PROTECTION (GFP)

- A. Provide ground fault protection not to exceed 100mA for all branch circuits serving equipment on all fixed or floating piers, wharves, docks, floats, etc., per NEC article 555.
- B. GFP device shall be Eaton Marina Ground Fault Monitor, or approved equal. Specifications as follows:
 - 1. Adjustable trip level 10 milliamps to 10 Amps
 - 2. Visual Alarm
 - 3. Controllable of minimum 10 circuits
 - 4. Minimum NEMA-3R enclosure
 - 5. Minimum circuit ratings of 100 Amps

PART 3 - EXECUTION

3.00 DEMOLITION

- A. General
 - 1. The Electrical Contractor shall visit the site before submitting his bid to familiarize himself with the existing conditions and the extent of the work. No extra compensation will be allowed for work required to be performed or to overcome existing conditions, by failure to visit the site.
 - 2. The Electrical demolition work shall be performed by the Electrical Contractor in cooperation with the other trades and as scheduled and approved by the Owner's Representative.
 - 3. The locations of existing equipment to remain including piping, ductwork, conduits, etc., are shown in an approximate way only. The Contractor shall determine the exact location of all existing equipment before commencing work.
 - 4. Power outages caused by demolition that affect other areas shall be held to a minimum. Shutdowns shall be coordinated with the users and the Owner. Night, weekend and/or Holiday time required to perform electrical

demolition work or new electrical work shall be carried as part of the Contract Cost.

B. Scope

1. The architectural drawings illustrate the full extent of the scope of demolition. Disconnect and make safe all electrical equipment identified for removal on the Electrical, HVAC, Plumbing and Fire Protection plans. The electrical scope may extend beyond the area defined by the architectural demolition limits to fully comply with various requirements of these specifications.
2. The electrical demolition plans and details indicate the general scope and are not intended to show all items to be removed or retained. Devices and equipment located on walls and/or ceilings to be removed shall be disconnected and made safe. The Electrical Contractor shall notify the Owner's Representative of any unanticipated hidden conditions encountered during demolition.
3. The Electrical Contractor shall circuit trace and label all existing branch circuits and feeders within the area of demolition scope prior to de-energizing and disconnection. All circuits within panelboards identified for removal shall be traced and labeled to ensure that no area outside the demolition scope limit is affected.
4. The Electrical Contractor shall identify all branch circuits, feeders and system components, which are to remain within the area of demolition scope. There shall be no interruption of service to any area outside the scope limits without approval from the Owner's Representative. Existing equipment to remain shall be left in a code compliant manner.
5. The Electrical Contractor shall de-energize and remove all conductors and raceways to their points of origin within the area of demolition scope. Items identified for demolition shall not be abandoned in place. Raceways that enter masonry walls and floors shall be cut flush at the surface for patching by others. All circuit breakers associated with the demolition scope shall be de-energized and labeled spare.
6. The Electrical Contractor shall be responsible for the repair of all systems or building components damaged during the execution of the work. Damage shall include but not be limited to destruction or disposal of items intended to remain or to be salvaged.
7. The Electrical Contractor shall temporarily support all items to remain that are affected by the demolition of building structural components (walls, ceilings, etc.). Temporarily supported items shall be permanently supported and installed when finalized structures are in place.

8. The existing fire alarm system shall remain fully functional during the entire demolition and construction period. Reuse of existing fire alarm system raceways shall not be allowed. All required system shutdowns shall be coordinated with and approved by the Owner's Representative and the Authority Having Jurisdiction. Demolition of the existing system shall not commence until the new system has been completely installed, tested and approved by the Authority Having Jurisdiction.
9. All demolition scope associated with low voltage systems including but not limited to telephone, data, security, paging, CCTV, etc. shall be included.

C. Disposal

1. All removed items shall be legally disposed of unless identified for reuse. Refer to Part 1 of this specification for requirements for Hazardous Material disposal.
2. The Owner's Representative shall inspect all retained items prior to placement in the identified storage location by the Electrical Contractor. Selected items will be disposed at no additional cost to the project.

3.01 IDENTIFICATION

A. Nameplates

1. Provide nameplates on all equipment listed in other sections of this specification including but not limited to switchboards, substations, panelboards, transformers, junction and pull boxes, disconnect switches, motor starters and motor control centers, contactors, time clocks, remote control stations, fire alarm panels, smoke detector remote test/alarm stations and fire alarm annunciators.
2. Nameplates shall designate equipment tag number as defined on the drawings, system voltage where applicable, circuit number, device controlled and system function. Refer to typical nameplate detail on the drawings for additional requirements.
3. Submit a complete list of proposed nameplates prior to order to ensure conformance to design criteria. Submittal shall include nomenclature, size and layout of each tag.
4. Samples of stickers together with color schedules shall be submitted during the submittal phase of this project.

B. Equipment Identification

1. Equipment identification designations shall be taken from equipment schedules and coordinated with the Owner's facility group to assure

designations match up with Owner's maintenance management system identification database.

3.02 RACEWAYS AND CONDUIT

A. General

1. Unless specified or shown on Drawings otherwise, install raceways and conduits concealed. Raceways and conduits may be run exposed on unfinished walls and basement ceilings with exposed structure, in mechanical rooms, electric rooms, attics and roof spaces.
2. Run concealed raceways and conduits in as direct lines as possible with minimum number of bends of longest possible radius. Install exposed raceways and conduits parallel to or at right angles to building lines.
3. Raceway and conduit runs shall be mechanically and electrically continuous from supply to outlet. Conduit shall enter and be secured to metallic enclosures with lock nut and bushing inside. Provide additional exterior lock nut for RGS connections. Bushings shall be the bonding type for conduit connections to metallic enclosures with concentric or eccentric knockouts. Lock nuts and bushings will not be required where conduits are screwed into threaded hubs.
4. Size raceways and conduits as required by NEC unless oversized raceways and conduits are shown on the Drawings. Raceways and conduits shall be 3/4" minimum.
5. Install conduit systems complete before installation of conductors. Blow through and swab after plaster is finished and dry, and before conductors are installed.
6. Raceways and conduits supports shall be rigidly attached to the building structure utilizing corrosion resistant components suitable for use with the selected raceway or conduit. Refer to the seismic restraint sections of this specification for any additional requirements.
7. Field bending, cutting and threading shall be executed with the proper tools, resulting in bends and shortened conduits and raceways that are equivalent to factory fabricated and purchased components.
8. Provide standoff clips for conduits on exterior and wet location walls.
9. Protect all vertical conduit runs from the entrance of foreign material before installation of conductors and the final closure of the raceway system. All spare conduits (vertical and horizontal runs) shall be sealed with a bushing and appropriate insert to prohibit entrance of debris or vermin. Affix a label that indicates "Spare Conduit to _____" at each

seal. Label shall be in accordance with the labeling section of this specification.

B. Rigid Galvanized Steel (RGS) Conduit

1. RGS may be used for all raceway applications outlined for EMT and PVC. RGS shall be used in locations where subject to accidental damage or abuse and for all above grade exterior applications unless other wiring methods are specified on the drawings. All circuit conductors in excess of 600 V shall be installed in RGS.
2. RGS shall not be used in corrosive environments.
3. All RGS fittings shall be threaded. Utilize Erickson couplings where joining two threaded conduits that cannot be rotated.

C. Intermediate Metal Conduit (IMC) may be used in any application, with same requirements, where RGS is allowed except for circuits operating at more than 600 V.

D. Electrical Metallic Tubing (EMT)

1. EMT may be used for lighting and receptacle branch circuits, telephone, fire alarm, communications, signal and instrumentation circuits and for control circuits. EMT may be used in masonry walls, above hung ceilings, in equipment rooms, in mechanical and electrical chases and closets, in exposed locations along ceilings or walls above normal traffic level and where not subject to accidental damage or abuse.
2. EMT shall not be used in exposed applications below 8 feet above finished floor or in exterior or damp/wet/corrosive locations. Electrical, telephone and communications closets are considered exempt from this restriction and EMT may be installed below 8' AFF in this application only. EMT shall not be installed underground, in slabs on grade, in exterior locations, in hazardous areas, or for circuits operating at more than 600 V.

E. Polyvinyl Chloride (PVC) Non-metallic Conduit

1. PVC may be used for installation in concrete or direct burial applications where not subject to damage. PVC may be used in corrosive environments where specifically allowed on the drawings.
2. PVC shall not be used for penetrations from concrete slabs. Transition to RGS shall be made a minimum of 2" below the slab finished surface, prior to penetration.
3. All connections shall utilize solvent and glue in accordance with the recommendations of the conduit manufacturer.

F. Electrical Non-Metallic Tubing (ENT)

1. ENT may be used in slab/embedded concrete applications only, in accordance with NEC criteria. ENT may extend out of the slab within fire rated walls to boxes mounted no greater than 24" AFF.
 2. ENT shall be tied (wire ties, wire, tape) every 2-3 feet to slab rebar to minimize miscellaneous bends and kinks.
 3. ENT shall not be used exposed.
- G. Fiberglass Reinforced Epoxy (FRE) Conduit shall be used in corrosive environments and where specified on the drawings, to replace PVC conduit.
- H. Miscellaneous Conduit Fittings
1. Expansion/Deflection Fittings: Raceways and conduit buried or secured rigidly on opposite sides of building expansion joints and long runs of exposed conduit subject to expansion and contraction due to variations in temperature shall have expansion fittings. Raceways and conduit shall cross building expansion joints at right angles. Provide separate external copper bonding jumper secured with grounding straps on each end of fitting. Fittings shall safely deflect and/or expand/contract to twice the distance of potential movement.
 2. Penetrations of all below grade exterior walls and flooring shall require approval by the Engineer and Architect. Submit proposed penetration points, size openings and penetration methods to Engineer and Architect. Penetrations shall utilize sealing fittings appropriately sized for the application. Duct bank penetrations are excluded from this requirement.
 3. Sealing Fittings shall be installed wherever conduits pass from warm to cold locations to minimize condensation within the conduit. Sealing fittings shall be installed with RGS penetration of the wall and terminate in a suitably sized junction box.
 4. Refer to other specification sections for requirements pertaining to sealing for hazardous atmospheres.
- I. Flexible Metallic Conduit
1. Provide flexible metallic conduits for connections to electrical equipment and to equipment furnished under other Divisions that are subject to movement, vibration or misalignment and/or where noise transmission must be eliminated or reduced.
 2. Flexible metallic conduit shall be liquid-tight under the following conditions:
 - a. Exterior locations
 - b. Moisture or humidity-laden atmospheres

- c. Environments where seepage or dripping of water, grease, oil or other fluids is possible. All mechanical equipment rooms and penthouses, kitchens and;
 - d. Corrosive atmospheres
- J. Wireways shall be provided where specifically shown on the drawings or where the group mounting of controllers, disconnects, enclosures, etc warrant the use for elimination of multiple short conduit runs. Wireways shall be provided complete with all required appurtenances necessary to have a totally enclosed system rated for the environment. Wireways shall not be installed in any location where subject to accidental damage or abuse.
- K. Raceway and Conduit Installation in Concrete Slabs
 - 1. Raceways and conduit may be installed in slabs where specifically allowed on the drawings. Maximum outside diameters of raceways in slabs shall not exceed 1/3 slab thickness. No more than two 3/4" raceways shall cross in floor slab at a single point. Lateral spacing of parallel raceways shall be at least 6" on centers. Submit raceway layout plan for approval to Architect and Engineer and obtain signoff from the structural engineer of the actual installation before pouring slabs. All in slab installations shall be photographed, with prints and negatives appropriately marked and turned over to the Owner at job completion.
 - 2. Raceways and conduit shall not be placed in slabs less than 3" thick.
- L. Cable Tray
 - 1. Cable Tray shall be installed to allow for accessibility. Allow a minimum of 12" clear space above and to each side for maintenance and cable installation.
 - 2. Cable tray supports shall consist of metal strut under the tray with threaded rods on each side of the tray to the structure above. Strut shall be rigidly fastened to the threaded rod with nuts at the top and bottom of the strut. Strut finish shall be equivalent to the specified finish of the tray. Supports shall be provided within 24" of each splice plate and shall not exceed 6'0" spacing. Support system shall be rated to carry the full rating of the tray specified when filled. Tray shall be rigidly fastened to the strut system.
 - 3. Cable tray shall not be center hung unless center spine mono-tray is specified on the drawings. Every other support shall provide lateral support for uneven loading.
 - 4. Cable tray shall be seismically braced in accordance with Part 1 requirements.

5. Splice plates shall be the four bolt type. Expansion plates and adjustable splices shall have code sized bonding jumpers on each side of the tray.
6. Hot dip galvanized tray shall be touched up in accordance with ASTM A780 at all cut and drill locations to restore the corrosion resistance of the finish.
7. Through wall penetrations shall utilize EMT sleeves, bonded to the tray at each end. Sleeves shall be fire stopped after installation of cables and conductors.

3.03 WIRE AND CABLE (600V)

- A. Homerun designations on the drawings are diagrammatic only. Install branch circuits and feeders from the power source to the attachment point as required for a complete system. Provide slack wire for connections to equipment installed by others. Refer to schedules and risers where specific conductor and associated raceway sizes are not indicated on the floor plans.
- B. Connect branch circuit homerun with two or three circuits and common neutral only where specifically shown on the drawings. Circuits with common neutrals shall not be connected to the same phase to ensure cancellation of the return current in the neutral conductor.
- C. Install wires and cable in raceways as specified. All conductor sizing is based upon no greater than three current carrying conductors in a conduit. Installation of up to six circuits (no greater than twelve current carrying conductors) in a single conduit will be allowed if the conductor sizing is increased to the required ampacity to accommodate de-rating factors required by the NEC and NFPA 70.
- D. The minimum wire size shall be #12 unless #14 specifically allowed on the drawings for wiring of controls. Branch circuits longer than 75' for 120 V and 175' for 277 V from panel to last outlet shall be increased a minimum of one size above that shown on the drawings to minimize voltage drop to less than 2%.
- E. Conductors shall be identified at all accessible locations in the following manner:
 1. Color code secondary service, feeders and branch circuit conductors as follows:

<u>208/120 Volts</u>	<u>Phase</u>
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground
 2. Provide nonferrous wire markers, embossed or printed to correspond with the Drawings. Labels shall be permanently marked so that the source of the branch circuit or feeder may be readily identified. Hand written labels

are not acceptable. Embossed tag equal to 3M Scotch Code STL-TAG or SCS-TM shall be applied with two miniature cable ties or slipped through both end holes. Heat bonded tag equal to 3M Scotch Code SCS-HB shall be permanently affixed with a heat gun.

F. Cable

1. Flexible Metal Clad (MC) cable * may be used in concealed locations for branch circuit wiring OR * shall not be used.
2. Flexible Armored (AC) cable * may be used in concealed locations for branch circuit wiring OR * may be used in concealed locations for branch circuit and systems wiring only OR * shall not be used.
3. Flexible Hospital Grade Armored Cable (AC) cable * may be used in concealed locations for branch circuits where redundant grounding is required OR * shall not be used.
4. Conductor color code shall comply with identification requirements as indicated in this Section.
5. Non Metallic (NM) cable may be used within dwelling units and shall not extend beyond the unit from which it originates. UL listed grommets shall be utilized in all metal studs, through which the NM cable passes and cover the entire opening.

G. Splices and Terminations

1. No more than twelve splices of current carrying conductors or six circuits, whichever is greater, shall be allowed in a single enclosure or junction box.
2. Splices and terminations shall be sized to the specified conductor. The insulation shall be cut back with the appropriate tools such that the conductors are not nicked or damaged.
3. The compression tool shall be appropriate for the installation of the provided lug or butt splice to ensure pressure necessary for a proper connection is applied.
4. Terminations shall not be stacked or bent unless specifically listed for the application.

H. Arc-proofing shall be applied to all feeders greater than 100 Amperes where multiple circuits are installed in common enclosures such as handholes, manholes and junction boxes. Apply tape in single, half-lapped layer as required by manufacturer's recommendations. Secure with strips of red plastic film tape on 208Y/120V conductors and yellow plastic film tape on 408Y/277V conductors.

I. Cable Pulling

1. Pull cables that share conduit at same time into completely installed raceway. Conductors shall not be pulled in raceways with existing wiring.
2. Submit cable pulling calculations for engineers' approval prior to all mechanically assisted pulls. Attach pull ropes to conductors with basket-weave grips on pulling eyes. Provide means to measure tension during entire pull. Utilize pulling compounds to lessen friction in accordance with the manufacturer's recommendations.
3. Mechanically assisted pulls shall utilize equipment specifically designed for the purpose such as ropes, electric wench, pulleys, etc. The use of a motorized vehicle to assist in a cable pull is prohibited.

3.04 WIRING DEVICES AND PLATES

- A. Branch circuitry shall be attached to all devices using the attachment screw or utilizing back wiring chambers that utilize screws for compressing the connection on the wire. Quick stab features that do not require a positive screw on attachment for the conductor are not acceptable.
- B. Receptacle devices for other than 20 amp, 120 volt, 2-wire, circuits shall be provided with tags indicating voltage characteristics and circuit number of outlet that match the nameplate or engraving required on the faceplate.
- C. Remove the interconnecting tab for receptacles identified for ½ switched applications such that the top is switch controlled and the bottom is constantly energized.
- D. The drawings specify all dimmer sizes based upon full capacity with no heat removal fins removed for ganged applications. Outlet boxes shall be sized to accommodate the specified dimmer at full rating.
- E. All switches/dimmers illustrated together on drawings shall be installed in ganged configuration with single faceplate unless specifically noted otherwise.
- F. Provide metal barriers to separate switches where voltage between adjacent switches exceeds 300 volts.
- G. Adjust all individual occupancy sensor time delays to 15 minutes and set to "manual on" operation. Sensor sensitivity shall be adjusted for 100% coverage of the associated space and to minimize the false sensing from adjoining areas with doors in their normal position.

3.05 OUTLET BOXES

- A. Outlet and switch boxes shall be securely fastened to metal studs with a minimum of two self-tapping screws. Boxes three gang and greater shall be securely fastened to studs on both sides of the box.
- B. Fasteners for mounting boxes in damp or wet locations shall be stainless steel.

- C. Pressed steel boxes shall not be used for exposed surface mounted locations below 8'0" AFF.
- D. Outlet and switch boxes shall not be installed back to back. Stagger box installation to adjacent stud spaces to maintain sound separation between rooms.
- E. Floor boxes shall not be used above grade level in concrete decking without the approval of the Structural Engineer and Architect. Floor slab installations shall not degrade the required structural or fire rating integrity of the floor deck.

3.06 JUNCTION AND PULL BOXES

- A. Junction box covers shall be accessible. Do not install junction boxes above suspended ceilings except where ceiling is removable or where an access panel is provided.
- B. Pull boxes connected to concealed conduits shall be mounted with covers flush with finished wall or ceiling.
- C. Pull boxes exposed to rain or in damp/wet locations shall be weatherproof NEMA 3R unless noted otherwise on the drawings.
- D. No pull box shall be within 2 feet of another.
- E. Provide clamps, grids, cable ties and other non-conductive or combustible appurtenances to secure cables. No cable shall be unsupported for more than 30". Cables shall not touch or be unsupported within 1" of the box cover.
- F. Each junction and pull box shall have a suitable laminated plastic nameplate with white cut letters identifying power source, voltage and driven load of the associated branch circuits or feeders.
- G. Submit box sizing calculations to confirm all box dimensions are in accordance with code requirements with product data prior to installation.

3.07 SAFETY DISCONNECT SWITCHES

- A. Provide safety disconnects as required and indicated on the drawings. Each motor shall be provided with a local disconnecting means in accordance with code requirements.
- B. Manual motor starters may be used for 120, 208, 240, or 277V, single-phase motors up to 1 HP. Switches shall disconnect all ungrounded conductors. Overload heating elements shall be properly sized and coordinated for the associated motor in accordance with code and manufactures recommendations.
- C. Disconnect switches for all applications with available fault current in excess of 10,000 amperes RMS symmetrical shall be fusible. Fuses shall be Class J, L or R

and rejection clips shall be installed in the fuse holders to prohibit the installation of non-current limiting fuses.

- D. Each disconnect switch shall have a suitable laminated plastic nameplate with white cut letters identifying power source, voltage and driven load.

3.08 PANELBOARDS

A. Storage

1. Contractor shall store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals. Contractor shall store in a clean, dry space. Cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. Heat enclosures to prevent condensation.
2. Low voltage panelboards shall be located in well-ventilated areas, free from excess humidity, dust and dirt and away from hazardous materials. Ambient temperature of area will be between -30 °C and +25 °C. Indoor locations shall be protected to prevent moisture from entering enclosure.

B. Installation

1. Provide 1/2" spacers for panelboards mounted at exterior walls below grade to establish 1/2" air space behind panel.
2. Inspect installed panelboard(s) for anchoring, alignment, grounding and physical damage. Clean interiors to remove construction debris, dirt and shipping materials.
3. Check tightness of all electrical connections with calibrated torque wrench. Minimum acceptable values are specified in manufacturer's instructions.
4. Adjust all circuit breakers and doors for free mechanical operation as described in manufacturer's instructions.
5. Adjust circuit breaker trip and time delay settings to values determined by the short circuit and coordination study.
6. Directories shall be typed to indicate loads served by each circuit and mounted in a holder behind a clear protective covering.

- C. Circuit breakers used as a motor disconnecting means, and not in sight of the motor and the driven machinery location, shall be capable of being locked in the open position.

- D. Circuit breakers supplying fire alarm equipment and any others loads noted on the schedules shall be capable of being locked in the ON position. The locking means

shall not inhibit the ability of the circuit breaker from performing its protective function.

3.09 LIGHTING FIXTURES

A. Fixtures

1. General

- a. Do not install fixtures until work of other trades that may damage fixtures is completed.
- b. Where seismic requirements are specified herein, fixtures shall be supported as shown or specified.
- c. Handling of reflectors shall be done only with cotton gloves to avoid imprinting fingerprints on reflective surfaces.

2. Accessories

- a. Installation and support of fixtures shall as a minimum be in accordance with the NFPA 70 and manufacturer's recommendations.
- b. Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.

3. Support

- a. Do not suspend or support lighting fixtures, threaded rod and safety chains from hung ceiling, conduit or duct. Support fixtures with threaded rod and safety chain from structural members only. Provide supplemental steel (factory fabricated channel equal to Unistrut) where required to span structural steel members.
- b. Supplemental steel shall be rigidly supported from structure. Where suspension is required, support supplemental steel with threaded rods to structure. Sizing of all supplemental support components is the responsibility of the Contractor.

3.10 UNDERGROUND DUCT, MANHOLES, AND HANDHOLES

A. Underground Duct

1. Where nonmetallic underground conduit transitions from concrete encasement and continues exposed to pull box, cabinet, or other electric apparatus, portion through floor or wall and where exposed shall be rigid galvanized steel. Provide adapter below floor or outside wall to transition from PVC and metal conduit.

2. Where underground conduit enters building through membrane-waterproofed wall or floor, provide malleable iron seal with gland assembly and adjustable pressure bushings secured to masonry construction with one or more integral flanges. Membrane waterproofing shall be secured to device in watertight manner.
3. Where underground conduit without concrete envelope enters building through non-waterproofed wall or floor, provide Schedule 40 galvanized pipe sleeve. Fill space between conduit and sleeve with suitable plastic expandable compound on each side of wall or floor.
4. Run conduits straight between manholes and upturned elbows. Unavoidable bends in nonmetallic conduits shall be made with assembling couplings at slight angle if resulting radius is at least 100 feet. For radii less than 100 feet, use 5° angle couplings or factory-made PVC coated galvanized rigid steel bend sections.
5. Space separators to prevent sagging of conduits and breaking of couplings and watertight seals, to maintain deformation of conduit at separators to 0.10" or less. Separators spacing shall not exceed 4' centers. Spacing between exterior surfaces of conduits shall be least 2" between telephone conduits, 2" between conduits containing cables operating at 600 V or less, 6" between telephone conduit and power conduit and 2" between conduits that contain cables operating at more than 600 V. Secure with cords where necessary. Do not use tie wires, reinforcing rods or metallic materials.
6. Stagger conduit couplings, so that couplings on adjacent conduits do not lie in same transverse plane.
7. Conduits shall terminate in end bells where lines enter manholes. Space end bells 9" center to center at manhole wall face for 4" conduits; space proportionately for other sizes. Flaring of duct bank to accommodate transition to end bell spacing shall start 10 feet from face of the manhole wall. Make new conduit entrances into existing manholes and building walls consistent with grading requirements and existing entrances; waterproof as required by Owner's Representative. .
8. After concrete envelopes have set, nonmetallic conduits shall be cleared with mandrel of same size as conduit.
9. Seal active and spare conduit and duct that enters building with non-metallic blank seals until conductors pulled.
10. Excavation
 - a. Excavation, shoring, bracing, backfiring and grading will be provided under Division 2. Trenches shall be evenly graded so that conduit slopes uniformly at least 3" per 100 feet, without horizontal or vertical waves. Unless specified otherwise, conduit

shall slope uniformly from one manhole to next or from high point between manholes. Avoid low points between manholes, or upturned elbows.

- b. Trenches shall not be back filled until concrete envelopes have set sufficiently

11. Concrete

- a. Conduit envelopes shall be 2500 psi under Division 3, CONCRETE and shall extend at least three inches beyond exterior surface of each conduit in bank. Coordinate work of this section with that of Division 3.
- b. Envelopes may be poured directly against sides of trenches, if trench wall is clean, even and free of loose material. Remove loose dirt and extraneous material. Concrete shall be spaded during pouring to eliminate voids under and between conduits and honeycombing of exterior surfaces. Power-driven tampers or agitators shall not be used.
- c. Envelope between manholes shall be poured in single operation. Where more than one pour is necessary, provide 3/4" reinforcing rod dowels extending 18" into concrete on each side of joint.
- d. Envelopes that cross conduits, pipelines, roads and driveways shall be reinforced. Provide reinforcement where envelopes connect to manhole and building walls. Reinforcement shall be 3/4" rods in single layer (2) inches above bottom and below top of envelope. Outside rods shall be two (2) inches from outside edges of envelope and intermediate rod shall be placed in center of each space between conduits. Reinforcement rods shall be tied with pairs of "C" shaped 3/4" rods on 18" centers.

B. Manholes

1. Do not construct or set manholes until final conduit grading has been determined, including field changes required by underground interferences. Set frames and covers to final grade.
2. Commercial precast assemblies shall be set on six (6) inches of level, 90 percent compacted granular fill, 3/4 inch to one (1) inch size, extending twelve (12) inches beyond the manhole on each side. Granular fill shall be compacted by a minimum of four passes with a plate type vibrator.
3. Provide a 2/0 AWG bare copper cable, surface mounted six (6) inches above finished floor around the perimeter of the manhole. The cables shall be exothermically welded to the two (2) 10' by 3/4" copper clad ground rods driven in opposing corners of the manhole. Connect all non-

current carrying metal parts in manholes, including the cover collar, with 6 AWG bare copper to the 1/0 AWG ground. Seal hole where ground rod penetrates the manhole floor with mastic.

4. Cast-iron frames and covers not buried in masonry shall be cleaned of mortar, rust, grease, dirt and other contaminants, and given a coat of bituminous paint. Steel frames not buried in masonry and steel covers shall be cleaned of mortar, dirt and grease by an approved blasting process. Surfaces that cannot be cleaned satisfactorily by blasting shall be cleaned to bare metal by wire brushing or other mechanical means. Surfaces contaminated with rust, dirt, oil, grease, or other contaminants shall be washed with solvents until thoroughly cleaned. Immediately after cleaning, surfaces shall be coated with a pretreatment coating or be given a crystalline phosphate coating. As soon as practicable after the pretreatment coating has dried, treated surfaces shall be primed with a coat of primer and one coat of synthetic exterior gloss enamel.

C. Handholes

1. Do not construct or set manholes until final conduit grading has been determined, including field changes required by underground interferences. Set frames and covers to final grade.
2. Commercial precast assemblies shall be set on six (6) inches of level, 90 percent compacted granular fill, $\frac{3}{4}$ inch to one (1) inch size, extending twelve (12) inches beyond the manhole on each side. Granular fill shall be compacted by a minimum of four passes with a plate type vibrator.
3. Cast-iron frames and covers not buried in masonry shall be cleaned of mortar, rust, grease, dirt and other contaminants, and given a coat of bituminous paint. Steel frames not buried in masonry and steel covers shall be cleaned of mortar, dirt and grease by an approved blasting process. Surfaces that cannot be cleaned satisfactorily by blasting shall be cleaned to bare metal by wire brushing or other mechanical means. Surfaces contaminated with rust, dirt, oil, grease, or other contaminants shall be washed with solvents until thoroughly cleaned. Immediately after cleaning, surfaces shall be coated with a pretreatment coating or be given a crystalline phosphate coating. As soon as practicable after the pretreatment coating has dried, treated surfaces shall be primed with a coat of primer and one coat of synthetic exterior gloss enamel.

3.11 LOAD CENTERS

A. Storage

1. Contractor shall store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals. Contractor shall store in a clean, dry space. Cover

with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. Heat enclosures to prevent condensation.

2. Load centers shall be located in well-ventilated areas, free from excess humidity, dust and dirt and away from hazardous materials. Ambient temperature of area will be between -30 °C and +25 °C. Indoor locations shall be protected to prevent moisture from entering enclosure.

B. Installation

1. Load Centers shall be used for Dwelling Units only. Load Centers shall not be utilized for any common area or commercial/industrial power distribution applications.
2. Provide 1/2" spacers for load centers mounted at exterior walls below grade to establish 1/2" air space behind panel.
3. Inspect installed load centers for anchoring, alignment, grounding and physical damage. Clean interiors to remove construction debris, dirt and shipping materials.
4. Check tightness of all electrical connections.
5. Adjust all circuit breakers and doors for free mechanical operation as described in manufacturer's instructions.
6. Directories shall be typed to indicate loads served by each circuit and mounted in a holder behind a clear protective covering.
7. Verify that the bonding jumper does not connect the grounded conductor (neutral) to the grounding conductor with the exception of service entrance applications.

- C. Circuit breakers used as a motor disconnecting means, and not in sight of the motor and the driven machinery location, shall be capable of being locked in the open position with a UL listed accessory.

3.12 METER CENTERS

A. Storage

1. Contractor shall store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals. Contractor shall store in a clean, dry space. Cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. Heat enclosures to prevent condensation.
2. Meter centers shall be located in well-ventilated areas, free from excess humidity, dust and dirt and away from hazardous materials. Ambient

temperature of area will be between -30 °C and +25 °C. Indoor locations shall be protected to prevent moisture from entering enclosure.

B. Installation

1. Provide 1/2" spacers for load centers mounted at exterior walls below grade to establish 1/2" air space behind panel.
2. Inspect installed meter centers for anchoring, alignment, grounding and physical damage. Clean interiors to remove construction debris, dirt and shipping materials.
3. Check tightness of all electrical connections with calibrated torque wrench. Minimum acceptable values are specified in manufacturer's instructions.
4. Adjust all circuit breakers and doors for free mechanical operation as described in manufacturer's instructions.
5. Nameplates shall be attached to indicate loads served by each circuit in accordance with other sections of this specification.

3.13 marina power pedestal

- A. All Marine Power Pedestals shall be supported to the deck in an approved manner utilizing stainless steel hardware in accordance with the manufactures recommendations. Electrical Contractor shall provide additional blocking as required. Coordinate with General Contractor.
1. Lugs sized appropriately to accept the branch circuits as specified on the drawings

3.14 Ground fault protection (gfp)

- A. GFP shall be installed per the manufacturer's recommendations.
- B. Install GFP inside electrical distribution enclosure.

PART 4 - COMPENSATION

4.00 Method of Measurement

1. Method of measurement is not applicable. The electrical contractor shall receive contract price payment at full completion of project.

4.01 Payment

1. Payment for the following bid items shall be under one (1) lump sum.

<u>Item Number</u>	<u>Description</u>
16000-1	Base Bid
16000-2	Utility Back Charges
16000-E1	Add-Alternate E-1

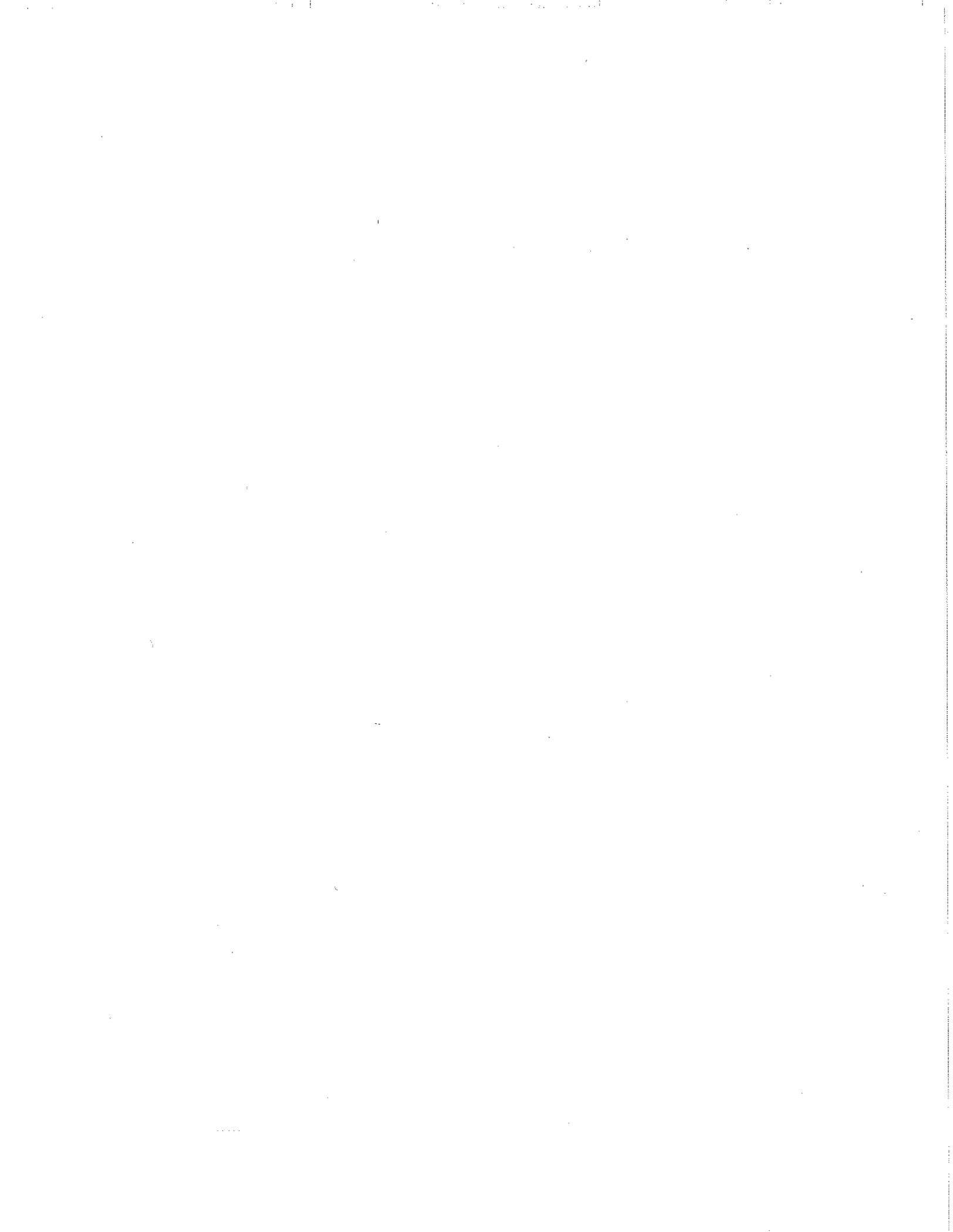
2. Base of Payment

- a. Payment for Item 16000-1, listed above, shall be LUMP SUM and shall include all work and materials for the installation of all electrical work to provide a fully functional system including all panelboards, enclosures, conduits, piping, pull lines, laterals, hand-holes, pull boxes, manholes and any other structures and equipment; excavation, backfilling, installation, concrete, compaction of fills; all associated erosion control activities including materials for barriers and siltation curtains; and all safety barriers, signage, security requirements for the project site as shown on and described within, but not limited to, the construction documents.
- b. Payment for Item 16000-2, Utility Back Charges, listed above shall be LUMP SUM and shall include all utility work and materials for the providing and installation of new 208Y/120V NSTAR Electric service; relocation and reconfiguration of existing 240/120V NSTAR Electric service; relocation of Verizon, Comcast, and Town Fiber utility lines and equipment. All associated work shall be by utility companies and paid for by this electrical contractor via utility company back charges.
- c. Payment for Item 16000-E1, Add-Alternate E1, listed above shall be LUMP SUM and shall include: all materials; labor; equipment and transportation; legal disposal of all materials; all incidentals

required to complete the installations and removals to the satisfaction of the Engineer; as shown on and described within, but not limited to, the construction documents.

ATTACHMENT 2

COMMONWEALTH OF MASSACHUSETTS PREVAILING WAGE RATES



The Massachusetts Prevailing Wage Law
M.G.L. ch. 149, §§ 26 - 27

NOTICE TO AWARDING AUTHORITIES

- The enclosed wage schedule applies only to the specific project listed at the top and will remain in effect for the duration of the project.
- You should request an updated wage schedule from the Division of Occupational Safety if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.
- Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.

NOTICE TO CONTRACTORS

- The enclosed wage schedule must be posted in a conspicuous place at the work site during the life of the project.
- The wages listed on the enclosed wage schedule must be paid to employees on public works projects regardless of whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- The enclosed wage schedule applies to all phases of the project including the final clean-up. Contractors whose only role is to perform final clean-up must pay their employees according to this wage schedule.
- All apprentices must be registered with the Massachusetts Division of Apprentice Training in order to be paid at the reduced apprentice rates. If a worker is not registered with the Division of Apprentice Training, they must be paid the "total rate" listed on the wage schedule regardless of experience or skill level. For further information, please call (617) 727-3486 or write to the Division of Apprentice Training, 399 Washington Street, 4th Floor, Boston, MA 02108

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

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

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

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

STATEMENT OF COMPLIANCE

_____, 20_____

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

do hereby state:

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

(Contractor, subcontractor or public body)

(Building or project)

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

Signature _____

Title _____

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM



Company's Name:		Address:		Phone No.:		Payroll No.:													
Employer's Signature:		Title:		Contract No.:		Work Week Ending:													
Awarding Authority's Name:		Public Works Project Name:		Public Works Project Location:		Min. Wage Rate Sheet Number													
General / Prime Contractor's Name:		Subcontractor's Name:		"Employer" Hourly Fringe Benefit Contributions															
Employee Name & Complete Address	Work Classification:	Employee is OSHA 10 certified (?)	Appr. Rate (%)	Hours Worked							Project Hours (A)	Hourly Base Wage (B)	Health & Welfare Insurance (C)	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	Project Gross Wages	Total Gross Wages	Check No. (H)
				Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.									

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

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

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

Date Received by Awarding Authority _____ / _____ / _____



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

RONALD L. WALKER, II
Secretary
WILLIAM D MCKENNEY
Director

CHARLES D. BAKER
Governor

KARYNE POLITO
Lt. Governor

Awarding Authority: Town of Plymouth
Contract Number: 21601 **City/Town:** PLYMOUTH
Description of Work: Demolition of T-Wharf and construction of new wharf in Plymouth Harbor
Job Location: Water Street

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 Division of Apprentice Standards (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. **If an apprentice rate is not listed on the prevailing wage schedule for the trade in which an apprentice is registered with the DAS, the apprentice 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 criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2015	\$31.65	\$10.41	\$10.08	\$0.00	\$52.14
	06/01/2016	\$32.15	\$10.41	\$10.08	\$0.00	\$52.64
	08/01/2016	\$32.15	\$10.91	\$10.08	\$0.00	\$53.14
	12/01/2016	\$32.15	\$10.91	\$10.89	\$0.00	\$53.95
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2015	\$31.72	\$10.41	\$10.08	\$0.00	\$52.21
	06/01/2016	\$32.22	\$10.41	\$10.08	\$0.00	\$52.71
	08/01/2016	\$32.22	\$10.91	\$10.08	\$0.00	\$53.21
	12/01/2016	\$32.22	\$10.91	\$10.89	\$0.00	\$54.02
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2015	\$31.84	\$10.41	\$10.08	\$0.00	\$52.33
	06/01/2016	\$32.34	\$10.41	\$10.08	\$0.00	\$52.83
	08/01/2016	\$32.34	\$10.91	\$10.08	\$0.00	\$53.33
	12/01/2016	\$32.34	\$10.91	\$10.89	\$0.00	\$54.14
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$88.29	\$9.80	\$19.23	\$0.00	\$117.32
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2015	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	06/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
	12/01/2016	\$33.15	\$7.45	\$12.65	\$0.00	\$53.25
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	12/01/2015	\$34.38	\$10.40	\$5.95	\$0.00	\$50.73
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.73	\$10.00	\$14.90	\$0.00	\$68.63
	06/01/2016	\$44.48	\$10.00	\$14.90	\$0.00	\$69.38
	12/01/2016	\$45.73	\$10.00	\$14.90	\$0.00	\$70.63
	06/01/2017	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	12/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.73	\$10.00	\$14.90	\$0.00	\$68.63
	06/01/2016	\$44.48	\$10.00	\$14.90	\$0.00	\$69.38
	12/01/2016	\$45.73	\$10.00	\$14.90	\$0.00	\$70.63
	06/01/2017	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	12/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	12/01/2015	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	06/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
	12/01/2016	\$33.15	\$7.45	\$12.65	\$0.00	\$53.25
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2016	\$41.62	\$6.97	\$16.21	\$0.00	\$64.80
	01/01/2017	\$42.92	\$6.97	\$16.21	\$0.00	\$66.10

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$27.05	\$6.97	\$10.54	\$0.00	\$44.56
2	65	\$27.05	\$6.97	\$10.54	\$0.00	\$44.56
3	70	\$29.13	\$6.97	\$11.35	\$0.00	\$47.45
4	75	\$31.22	\$6.97	\$12.16	\$0.00	\$50.35
5	80	\$33.30	\$6.97	\$12.97	\$0.00	\$53.24
6	85	\$35.38	\$6.97	\$13.78	\$0.00	\$56.13
7	90	\$37.46	\$6.97	\$14.59	\$0.00	\$59.02
8	95	\$39.54	\$6.97	\$15.40	\$0.00	\$61.91

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)	08/01/2015	\$49.86	\$10.18	\$18.57	\$0.00	\$78.61
BRICKLAYERS LOCAL 3 (QUINCY)	02/01/2016	\$49.86	\$10.18	\$19.14	\$0.00	\$79.18
	08/01/2016	\$50.76	\$10.18	\$19.22	\$0.00	\$80.16
	02/01/2017	\$51.33	\$10.18	\$19.22	\$0.00	\$80.73

Classification Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Quincy

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.93	\$10.18	\$18.57	\$0.00	\$53.68
2	60	\$29.92	\$10.18	\$18.57	\$0.00	\$58.67
3	70	\$34.90	\$10.18	\$18.57	\$0.00	\$63.65
4	80	\$39.89	\$10.18	\$18.57	\$0.00	\$68.64
5	90	\$44.87	\$10.18	\$18.57	\$0.00	\$73.62

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.93	\$10.18	\$19.14	\$0.00	\$54.25
2	60	\$29.92	\$10.18	\$19.14	\$0.00	\$59.24
3	70	\$34.90	\$10.18	\$19.14	\$0.00	\$64.22
4	80	\$39.89	\$10.18	\$19.14	\$0.00	\$69.21
5	90	\$44.87	\$10.18	\$19.14	\$0.00	\$74.19

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN LABORERS - FOUNDATION AND MARINE	12/01/2015	\$36.45	\$7.45	\$13.75	\$0.00	\$57.65
	06/01/2016	\$37.20	\$7.45	\$13.75	\$0.00	\$58.40
	12/01/2016	\$38.20	\$7.45	\$13.75	\$0.00	\$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER LABORERS - FOUNDATION AND MARINE	12/01/2015	\$35.30	\$7.45	\$13.75	\$0.00	\$56.50
	06/01/2016	\$36.05	\$7.45	\$13.75	\$0.00	\$57.25
	12/01/2016	\$37.05	\$7.45	\$13.75	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN LABORERS - FOUNDATION AND MARINE	12/01/2015	\$35.30	\$7.45	\$13.75	\$0.00	\$56.50
	06/01/2016	\$36.05	\$7.45	\$13.75	\$0.00	\$57.25
	12/01/2016	\$37.05	\$7.45	\$13.75	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR LABORERS - ZONE 2	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
CARPENTER CARPENTERS -ZONE 2 (Eastern Massachusetts)	03/01/2015	\$35.75	\$9.80	\$16.48	\$0.00	\$62.03

Classification Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.88	\$9.80	\$1.63	\$0.00	\$29.31
2	60	\$21.45	\$9.80	\$1.63	\$0.00	\$32.88
3	70	\$25.03	\$9.80	\$11.59	\$0.00	\$46.42
4	75	\$26.81	\$9.80	\$11.59	\$0.00	\$48.20
5	80	\$28.60	\$9.80	\$13.22	\$0.00	\$51.62
6	80	\$28.60	\$9.80	\$13.22	\$0.00	\$51.62
7	90	\$32.18	\$9.80	\$14.85	\$0.00	\$56.83
8	90	\$32.18	\$9.80	\$14.85	\$0.00	\$56.83

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING BRICKLAYERS LOCAL 3 (QUINCY)	01/01/2016	\$46.44	\$10.90	\$18.71	\$1.30	\$77.35
---	------------	---------	---------	---------	--------	---------

Apprentice - CEMENT MASONRY/PLASTERING - Eastern Mass (Quincy)

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.22	\$10.90	\$12.21	\$0.00	\$46.33
2	60	\$27.86	\$10.90	\$13.71	\$1.30	\$53.77
3	65	\$30.19	\$10.90	\$14.71	\$1.30	\$57.10
4	70	\$32.51	\$10.90	\$15.71	\$1.30	\$60.42
5	75	\$34.83	\$10.90	\$16.71	\$1.30	\$63.74
6	80	\$37.15	\$10.90	\$17.71	\$1.30	\$67.06
7	90	\$41.80	\$10.90	\$18.71	\$1.30	\$72.71

Notes:

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

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR LABORERS - ZONE 2	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75

For apprentice rates see "Apprentice-LABORER"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4	12/01/2015	\$44.73	\$10.00	\$14.90	\$0.00	\$69.63
	06/01/2016	\$45.48	\$10.00	\$14.90	\$0.00	\$70.38
	12/01/2016	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	06/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63
	12/01/2017	\$48.73	\$10.00	\$14.90	\$0.00	\$73.63

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR OPERATING ENGINEERS LOCAL 4	12/01/2015	\$30.13	\$10.00	\$14.90	\$0.00	\$55.03
	06/01/2016	\$30.65	\$10.00	\$14.90	\$0.00	\$55.55
	12/01/2016	\$31.52	\$10.00	\$14.90	\$0.00	\$56.42
	06/01/2017	\$32.21	\$10.00	\$14.90	\$0.00	\$57.11
	12/01/2017	\$32.90	\$10.00	\$14.90	\$0.00	\$57.80

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE) PAINTERS LOCAL 35 - ZONE 2	01/01/2016	\$49.51	\$7.85	\$16.10	\$0.00	\$73.46
	07/01/2016	\$50.46	\$7.85	\$16.10	\$0.00	\$74.41
	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.76	\$7.85	\$0.00	\$0.00	\$32.61
2	55	\$27.23	\$7.85	\$3.66	\$0.00	\$38.74
3	60	\$29.71	\$7.85	\$3.99	\$0.00	\$41.55
4	65	\$32.18	\$7.85	\$4.32	\$0.00	\$44.35
5	70	\$34.66	\$7.85	\$14.11	\$0.00	\$56.62
6	75	\$37.13	\$7.85	\$14.44	\$0.00	\$59.42
7	80	\$39.61	\$7.85	\$14.77	\$0.00	\$62.23
8	90	\$44.56	\$7.85	\$15.44	\$0.00	\$67.85

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.23	\$7.85	\$0.00	\$0.00	\$33.08
2	55	\$27.75	\$7.85	\$3.66	\$0.00	\$39.26
3	60	\$30.28	\$7.85	\$3.99	\$0.00	\$42.12
4	65	\$32.80	\$7.85	\$4.32	\$0.00	\$44.97
5	70	\$35.32	\$7.85	\$14.11	\$0.00	\$57.28
6	75	\$37.85	\$7.85	\$14.44	\$0.00	\$60.14
7	80	\$40.37	\$7.85	\$14.77	\$0.00	\$62.99
8	90	\$45.41	\$7.85	\$15.44	\$0.00	\$68.70

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN LABORERS - ZONE 2	12/01/2015	\$35.50	\$7.45	\$13.55	\$0.00	\$56.50
------------------------------------	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS - ZONE 2	12/01/2015	\$36.50	\$7.45	\$13.55	\$0.00	\$57.50
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS LABORERS - ZONE 2	12/01/2015	\$36.25	\$7.45	\$13.55	\$0.00	\$57.25
------------------------------------	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER LABORERS - ZONE 2	12/01/2015	\$36.50	\$7.45	\$13.55	\$0.00	\$57.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR LABORERS - ZONE 2	12/01/2015	\$36.25	\$7.45	\$13.55	\$0.00	\$57.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER LABORERS - ZONE 2	12/01/2015	\$35.50	\$7.45	\$13.55	\$0.00	\$56.50
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$58.86	\$9.80	\$19.23	\$0.00	\$87.89
DIVER TENDER PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$63.06	\$9.80	\$19.23	\$0.00	\$92.09
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$88.23	\$9.80	\$19.23	\$0.00	\$117.26
ELECTRICIAN ELECTRICIANS LOCAL 223	09/01/2015	\$38.31	\$8.40	\$11.28	\$0.00	\$57.99
	09/01/2016	\$39.21	\$8.90	\$11.51	\$0.00	\$59.62

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELECTRICIAN - Local 223

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$15.32	\$0.00	\$0.46	\$0.00	\$15.78
2	42	\$16.09	\$0.00	\$0.48	\$0.00	\$16.57
3	45	\$17.24	\$8.40	\$0.52	\$0.00	\$26.16
4	48	\$18.39	\$8.40	\$3.36	\$0.00	\$30.15
5	50	\$19.16	\$8.40	\$3.47	\$0.00	\$31.03
6	55	\$21.07	\$8.40	\$3.75	\$0.00	\$33.22
7	60	\$22.99	\$8.40	\$4.03	\$0.00	\$35.42
8	65	\$24.90	\$8.40	\$4.31	\$0.00	\$37.61
9	70	\$26.82	\$8.40	\$5.28	\$0.00	\$40.50
10	75	\$28.73	\$8.40	\$4.86	\$0.00	\$41.99

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$15.68	\$0.00	\$0.47	\$0.00	\$16.15
2	42	\$16.47	\$0.00	\$0.49	\$0.00	\$16.96
3	45	\$17.64	\$8.90	\$0.53	\$0.00	\$27.07
4	48	\$18.82	\$8.90	\$3.42	\$0.00	\$31.14
5	50	\$19.61	\$8.90	\$3.55	\$0.00	\$32.06
6	55	\$21.57	\$8.90	\$3.83	\$0.00	\$34.30
7	60	\$23.53	\$8.90	\$4.12	\$0.00	\$36.55
8	65	\$25.49	\$8.90	\$4.39	\$0.00	\$38.78
9	70	\$27.45	\$8.90	\$4.68	\$0.00	\$41.03
10	75	\$29.41	\$8.90	\$4.96	\$0.00	\$43.27

Notes:

Steps are 750 hours

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR	01/01/2016	\$54.53	\$14.43	\$14.96	\$0.00	\$83.92
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 - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.27	\$14.43	\$0.00	\$0.00	\$41.70
2	55	\$29.99	\$14.43	\$14.96	\$0.00	\$59.38
3	65	\$35.44	\$14.43	\$14.96	\$0.00	\$64.83
4	70	\$38.17	\$14.43	\$14.96	\$0.00	\$67.56
5	80	\$43.62	\$14.43	\$14.96	\$0.00	\$73.01

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>	01/01/2016	\$38.17	\$14.43	\$14.96	\$0.00	\$67.56
	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>	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2015	\$40.49	\$10.00	\$14.55	\$0.00	\$65.04
	05/01/2016	\$41.38	\$10.00	\$14.55	\$0.00	\$65.93
	11/01/2016	\$41.97	\$10.00	\$14.55	\$0.00	\$66.52
	05/01/2017	\$42.85	\$10.00	\$14.55	\$0.00	\$67.40
	11/01/2017	\$43.58	\$10.00	\$14.55	\$0.00	\$68.13
	05/01/2018	\$44.29	\$10.00	\$14.55	\$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>	11/01/2015	\$41.93	\$10.00	\$14.55	\$0.00	\$66.48
	05/01/2016	\$42.82	\$10.00	\$14.55	\$0.00	\$67.37
	11/01/2016	\$43.42	\$10.00	\$14.55	\$0.00	\$67.97
	05/01/2017	\$44.31	\$10.00	\$14.55	\$0.00	\$68.86
	11/01/2017	\$45.04	\$10.00	\$14.55	\$0.00	\$69.59
	05/01/2018	\$45.76	\$10.00	\$14.55	\$0.00	\$70.31
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2015	\$21.71	\$10.00	\$14.55	\$0.00	\$46.26
	05/01/2016	\$22.23	\$10.00	\$14.55	\$0.00	\$46.78
	11/01/2016	\$22.58	\$10.00	\$14.55	\$0.00	\$47.13
	05/01/2017	\$23.11	\$10.00	\$14.55	\$0.00	\$47.66
	11/01/2017	\$23.53	\$10.00	\$14.55	\$0.00	\$48.08
	05/01/2018	\$23.96	\$10.00	\$14.55	\$0.00	\$48.51
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 223</i>	09/01/2015	\$38.31	\$8.40	\$11.28	\$0.00	\$57.99
	09/01/2016	\$39.21	\$8.90	\$11.51	\$0.00	\$59.62
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE <i>LOCAL 223</i> / COMMISSIONINGELECTRICIANS	09/01/2015	\$32.56	\$8.40	\$9.59	\$0.00	\$50.55
	09/01/2016	\$33.33	\$8.90	\$9.78	\$0.00	\$52.01
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$36.34	\$10.00	\$14.90	\$0.00	\$61.24
	06/01/2016	\$36.96	\$10.00	\$14.90	\$0.00	\$61.86
	12/01/2016	\$38.00	\$10.00	\$14.90	\$0.00	\$62.90
	06/01/2017	\$38.84	\$10.00	\$14.90	\$0.00	\$63.74
	12/01/2017	\$39.67	\$10.00	\$14.90	\$0.00	\$64.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER <i>LABORERS - ZONE 2</i>	12/01/2015	\$20.50	\$7.45	\$12.65	\$0.00	\$40.60
	06/01/2016	\$20.50	\$7.45	\$12.65	\$0.00	\$40.60
	12/01/2016	\$20.50	\$7.45	\$12.65	\$0.00	\$40.60
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE 1</i>	09/01/2015	\$41.59	\$9.80	\$17.53	\$0.00	\$68.92

Apprentice - FLOORCOVERER - Local 2168 Zone 1

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.80	\$9.80	\$1.79	\$0.00	\$32.39
2	55	\$22.87	\$9.80	\$1.79	\$0.00	\$34.46
3	60	\$24.95	\$9.80	\$12.16	\$0.00	\$46.91
4	65	\$27.03	\$9.80	\$12.16	\$0.00	\$48.99
5	70	\$29.11	\$9.80	\$13.95	\$0.00	\$52.86
6	75	\$31.19	\$9.80	\$13.95	\$0.00	\$54.94
7	80	\$33.27	\$9.80	\$15.74	\$0.00	\$58.81
8	85	\$35.35	\$9.80	\$15.74	\$0.00	\$60.89

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.73	\$10.00	\$14.90	\$0.00	\$68.63
	06/01/2016	\$44.48	\$10.00	\$14.90	\$0.00	\$69.38
	12/01/2016	\$45.73	\$10.00	\$14.90	\$0.00	\$70.63
	06/01/2017	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	12/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$30.13	\$10.00	\$14.90	\$0.00	\$55.03
	06/01/2016	\$30.65	\$10.00	\$14.90	\$0.00	\$55.55
	12/01/2016	\$31.52	\$10.00	\$14.90	\$0.00	\$56.42
	06/01/2017	\$32.21	\$10.00	\$14.90	\$0.00	\$57.11
	12/01/2017	\$32.90	\$10.00	\$14.90	\$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>	01/01/2016	\$39.01	\$7.85	\$16.10	\$0.00	\$62.96
	07/01/2016	\$39.96	\$7.85	\$16.10	\$0.00	\$63.91
	01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86

Apprentice - GLAZIER - Local 35 Zone 2

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.51	\$7.85	\$0.00	\$0.00	\$27.36
2	55	\$21.46	\$7.85	\$3.66	\$0.00	\$32.97
3	60	\$23.41	\$7.85	\$3.99	\$0.00	\$35.25
4	65	\$25.36	\$7.85	\$4.32	\$0.00	\$37.53
5	70	\$27.31	\$7.85	\$14.11	\$0.00	\$49.27
6	75	\$29.26	\$7.85	\$14.44	\$0.00	\$51.55
7	80	\$31.21	\$7.85	\$14.77	\$0.00	\$53.83
8	90	\$35.11	\$7.85	\$15.44	\$0.00	\$58.40

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.98	\$7.85	\$0.00	\$0.00	\$27.83
2	55	\$21.98	\$7.85	\$3.66	\$0.00	\$33.49
3	60	\$23.98	\$7.85	\$3.99	\$0.00	\$35.82
4	65	\$25.97	\$7.85	\$4.32	\$0.00	\$38.14
5	70	\$27.97	\$7.85	\$14.11	\$0.00	\$49.93
6	75	\$29.97	\$7.85	\$14.44	\$0.00	\$52.26
7	80	\$31.97	\$7.85	\$14.77	\$0.00	\$54.59
8	90	\$35.96	\$7.85	\$15.44	\$0.00	\$59.25

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.73	\$10.00	\$14.90	\$0.00	\$68.63
	06/01/2016	\$44.48	\$10.00	\$14.90	\$0.00	\$69.38
	12/01/2016	\$45.73	\$10.00	\$14.90	\$0.00	\$70.63
	06/01/2017	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	12/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 12/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$24.05	\$10.00	\$0.00	\$0.00	\$34.05
2	60	\$26.24	\$10.00	\$14.90	\$0.00	\$51.14
3	65	\$28.42	\$10.00	\$14.90	\$0.00	\$53.32
4	70	\$30.61	\$10.00	\$14.90	\$0.00	\$55.51
5	75	\$32.80	\$10.00	\$14.90	\$0.00	\$57.70
6	80	\$34.98	\$10.00	\$14.90	\$0.00	\$59.88
7	85	\$37.17	\$10.00	\$14.90	\$0.00	\$62.07
8	90	\$39.36	\$10.00	\$14.90	\$0.00	\$64.26

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$24.46	\$10.00	\$0.00	\$0.00	\$34.46
2	60	\$26.69	\$10.00	\$14.90	\$0.00	\$51.59
3	65	\$28.91	\$10.00	\$14.90	\$0.00	\$53.81
4	70	\$31.14	\$10.00	\$14.90	\$0.00	\$56.04
5	75	\$33.36	\$10.00	\$14.90	\$0.00	\$58.26
6	80	\$35.58	\$10.00	\$14.90	\$0.00	\$60.48
7	85	\$37.81	\$10.00	\$14.90	\$0.00	\$62.71
8	90	\$40.03	\$10.00	\$14.90	\$0.00	\$64.93

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 - A	08/01/2015	\$43.31	\$10.20	\$21.48	\$2.25	\$77.24
	02/01/2016	\$44.31	\$10.20	\$21.48	\$2.25	\$78.24
	08/01/2016	\$45.46	\$10.20	\$21.48	\$2.25	\$79.39
	02/01/2017	\$46.56	\$10.20	\$21.48	\$2.25	\$80.49
	08/01/2017	\$47.66	\$10.20	\$21.48	\$2.25	\$81.59
	02/01/2018	\$48.81	\$10.20	\$21.48	\$2.25	\$82.74

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 223	09/01/2015	\$38.31	\$8.40	\$11.28	\$0.00	\$57.99
	09/01/2016	\$39.21	\$8.90	\$11.51	\$0.00	\$59.62

For apprentice rates see "Apprentice- ELECTRICIAN"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING - AIR) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	08/01/2015	\$43.31	\$10.20	\$21.48	\$2.25	\$77.24
	02/01/2016	\$44.31	\$10.20	\$21.48	\$2.25	\$78.24
	08/01/2016	\$45.46	\$10.20	\$21.48	\$2.25	\$79.39
	02/01/2017	\$46.56	\$10.20	\$21.48	\$2.25	\$80.49
	08/01/2017	\$47.66	\$10.20	\$21.48	\$2.25	\$81.59
	02/01/2018	\$48.81	\$10.20	\$21.48	\$2.25	\$82.74
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	09/01/2015	\$36.88	\$11.00	\$15.85	\$0.00	\$63.73
	03/01/2016	\$37.63	\$11.00	\$15.85	\$0.00	\$64.48
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	09/01/2015	\$36.88	\$11.00	\$15.85	\$0.00	\$63.73
	03/01/2016	\$37.63	\$11.00	\$15.85	\$0.00	\$64.48
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	12/01/2015	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	06/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
	12/01/2016	\$33.15	\$7.45	\$12.65	\$0.00	\$53.25
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	09/01/2015	\$43.81	\$11.50	\$13.80	\$0.00	\$69.11
	09/01/2016	\$45.81	\$11.50	\$13.80	\$0.00	\$71.11
	09/01/2017	\$47.81	\$11.50	\$13.80	\$0.00	\$73.11
	09/01/2018	\$50.06	\$11.50	\$13.80	\$0.00	\$75.36
	09/01/2019	\$52.56	\$11.50	\$13.80	\$0.00	\$77.86

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

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.91	\$11.50	\$10.05	\$0.00	\$43.46
2	60	\$26.29	\$11.50	\$10.80	\$0.00	\$48.59
3	70	\$30.67	\$11.50	\$11.55	\$0.00	\$53.72
4	80	\$35.05	\$11.50	\$12.30	\$0.00	\$58.85

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.91	\$11.50	\$10.05	\$0.00	\$44.46
2	60	\$27.49	\$11.50	\$10.80	\$0.00	\$49.79
3	70	\$32.07	\$11.50	\$11.55	\$0.00	\$55.12
4	80	\$36.65	\$11.50	\$12.30	\$0.00	\$60.45

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (BOSTON AREA)</i>	09/16/2015	\$42.40	\$7.80	\$20.85	\$0.00	\$71.05
	03/16/2016	\$43.40	\$7.80	\$20.85	\$0.00	\$72.05
	09/16/2016	\$44.05	\$7.80	\$20.85	\$0.00	\$72.70
	03/16/2017	\$44.65	\$7.80	\$20.85	\$0.00	\$73.30

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - IRONWORKER - Local 7 Boston

Effective Date - 09/16/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.44	\$7.80	\$20.85	\$0.00	\$54.09
2	70	\$29.68	\$7.80	\$20.85	\$0.00	\$58.33
3	75	\$31.80	\$7.80	\$20.85	\$0.00	\$60.45
4	80	\$33.92	\$7.80	\$20.85	\$0.00	\$62.57
5	85	\$36.04	\$7.80	\$20.85	\$0.00	\$64.69
6	90	\$38.16	\$7.80	\$20.85	\$0.00	\$66.81

Effective Date - 03/16/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.04	\$7.80	\$20.85	\$0.00	\$54.69
2	70	\$30.38	\$7.80	\$20.85	\$0.00	\$59.03
3	75	\$32.55	\$7.80	\$20.85	\$0.00	\$61.20
4	80	\$34.72	\$7.80	\$20.85	\$0.00	\$63.37
5	85	\$36.89	\$7.80	\$20.85	\$0.00	\$65.54
6	90	\$39.06	\$7.80	\$20.85	\$0.00	\$67.71

Notes:

** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 2	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
LABORER LABORERS - ZONE 2	12/01/2015	\$31.15	\$7.45	\$12.65	\$0.00	\$51.25
	06/01/2016	\$31.65	\$7.45	\$12.65	\$0.00	\$51.75
	12/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - LABORER - Zone 2

Effective Date - 12/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$18.69	\$7.45	\$12.65	\$0.00	\$38.79
2	70	\$21.81	\$7.45	\$12.65	\$0.00	\$41.91
3	80	\$24.92	\$7.45	\$12.65	\$0.00	\$45.02
4	90	\$28.04	\$7.45	\$12.65	\$0.00	\$48.14

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$18.99	\$7.45	\$12.65	\$0.00	\$39.09
2	70	\$22.16	\$7.45	\$12.65	\$0.00	\$42.26
3	80	\$25.32	\$7.45	\$12.65	\$0.00	\$45.42
4	90	\$28.49	\$7.45	\$12.65	\$0.00	\$48.59

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER LABORERS - ZONE 2	12/01/2015	\$31.15	\$7.45	\$12.65	\$0.00	\$51.25
	06/01/2016	\$31.65	\$7.45	\$12.65	\$0.00	\$51.75
	12/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER LABORERS - ZONE 2	12/01/2015	\$31.15	\$7.45	\$12.65	\$0.00	\$51.25
	06/01/2016	\$31.65	\$7.45	\$12.65	\$0.00	\$51.75
	12/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS - ZONE 2	12/01/2015	\$31.35	\$7.45	\$12.60	\$0.00	\$51.40
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER LABORERS - ZONE 2	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
LABORER: MULTI-TRADE TENDER LABORERS - ZONE 2	12/01/2015	\$31.15	\$7.45	\$12.65	\$0.00	\$51.25
	06/01/2016	\$31.65	\$7.45	\$12.65	\$0.00	\$51.75
	12/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER LABORERS - ZONE 2	12/01/2015	\$31.15	\$7.45	\$12.65	\$0.00	\$51.25
	06/01/2016	\$31.65	\$7.45	\$12.65	\$0.00	\$51.75
	12/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
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 LABORERS - ZONE 2	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE & TILE FINISHERS	08/01/2015	\$38.08	\$10.18	\$17.25	\$0.00	\$65.51
BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2016	\$38.08	\$10.18	\$17.70	\$0.00	\$65.96
	08/01/2016	\$38.78	\$10.18	\$17.78	\$0.00	\$66.74
	02/01/2017	\$39.24	\$10.18	\$17.78	\$0.00	\$67.20

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

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.04	\$10.18	\$17.25	\$0.00	\$46.47
2	60	\$22.85	\$10.18	\$17.25	\$0.00	\$50.28
3	70	\$26.66	\$10.18	\$17.25	\$0.00	\$54.09
4	80	\$30.46	\$10.18	\$17.25	\$0.00	\$57.89
5	90	\$34.27	\$10.18	\$17.25	\$0.00	\$61.70

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.04	\$10.18	\$17.70	\$0.00	\$46.92
2	60	\$22.85	\$10.18	\$17.70	\$0.00	\$50.73
3	70	\$26.66	\$10.18	\$17.70	\$0.00	\$54.54
4	80	\$30.46	\$10.18	\$17.70	\$0.00	\$58.34
5	90	\$34.27	\$10.18	\$17.70	\$0.00	\$62.15

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH	08/01/2015	\$49.90	\$10.18	\$18.57	\$0.00	\$78.65
BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2016	\$49.90	\$10.18	\$19.14	\$0.00	\$79.22
	08/01/2016	\$50.80	\$10.18	\$19.22	\$0.00	\$80.20
	02/01/2017	\$51.37	\$10.18	\$19.22	\$0.00	\$80.77

Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.95	\$10.18	\$18.57	\$0.00	\$53.70
2	60	\$29.94	\$10.18	\$18.57	\$0.00	\$58.69
3	70	\$34.93	\$10.18	\$18.57	\$0.00	\$63.68
4	80	\$39.92	\$10.18	\$18.57	\$0.00	\$68.67
5	90	\$44.91	\$10.18	\$18.57	\$0.00	\$73.66

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.95	\$10.18	\$19.14	\$0.00	\$54.27
2	60	\$29.94	\$10.18	\$19.14	\$0.00	\$59.26
3	70	\$34.93	\$10.18	\$19.14	\$0.00	\$64.25
4	80	\$39.92	\$10.18	\$19.14	\$0.00	\$69.24
5	90	\$44.91	\$10.18	\$19.14	\$0.00	\$74.23

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES)	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
<i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
<i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2)	04/01/2015	\$34.69	\$9.80	\$16.21	\$0.00	\$60.70
<i>MILLWRIGHTS LOCAL 1121 - Zone 2</i>						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
-----------------------	-----------------------	------------------	---------------	----------------	----------------------------------	-------------------

Apprentice - MILLWRIGHT - Local 1121 Zone 2

Effective Date - 04/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$19.08	\$9.80	\$4.48	\$0.00	\$33.36
2	65	\$22.55	\$9.80	\$13.36	\$0.00	\$45.71
3	75	\$26.02	\$9.80	\$14.18	\$0.00	\$50.00
4	85	\$29.49	\$9.80	\$14.99	\$0.00	\$54.28

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER LABORERS - ZONE 2	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4	12/01/2015	\$22.27	\$10.00	\$14.90	\$0.00	\$47.17
	06/01/2016	\$22.66	\$10.00	\$14.90	\$0.00	\$47.56
	12/01/2016	\$23.31	\$10.00	\$14.90	\$0.00	\$48.21
	06/01/2017	\$23.82	\$10.00	\$14.90	\$0.00	\$48.72
	12/01/2017	\$24.34	\$10.00	\$14.90	\$0.00	\$49.24

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4	12/01/2015	\$26.08	\$10.00	\$14.90	\$0.00	\$50.98
	06/01/2016	\$26.54	\$10.00	\$14.90	\$0.00	\$51.44
	12/01/2016	\$27.29	\$10.00	\$14.90	\$0.00	\$52.19
	06/01/2017	\$27.89	\$10.00	\$14.90	\$0.00	\$52.79
	12/01/2017	\$28.50	\$10.00	\$14.90	\$0.00	\$53.40

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 - ZONE 2	01/01/2016	\$49.51	\$7.85	\$16.10	\$0.00	\$73.46
	07/01/2016	\$50.46	\$7.85	\$16.10	\$0.00	\$74.41
	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.76	\$7.85	\$0.00	\$0.00	\$32.61
2	55	\$27.23	\$7.85	\$3.66	\$0.00	\$38.74
3	60	\$29.71	\$7.85	\$3.99	\$0.00	\$41.55
4	65	\$32.18	\$7.85	\$4.32	\$0.00	\$44.35
5	70	\$34.66	\$7.85	\$14.11	\$0.00	\$56.62
6	75	\$37.13	\$7.85	\$14.44	\$0.00	\$59.42
7	80	\$39.61	\$7.85	\$14.77	\$0.00	\$62.23
8	90	\$44.56	\$7.85	\$15.44	\$0.00	\$67.85

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.23	\$7.85	\$0.00	\$0.00	\$33.08
2	55	\$27.75	\$7.85	\$3.66	\$0.00	\$39.26
3	60	\$30.28	\$7.85	\$3.99	\$0.00	\$42.12
4	65	\$32.80	\$7.85	\$4.32	\$0.00	\$44.97
5	70	\$35.32	\$7.85	\$14.11	\$0.00	\$57.28
6	75	\$37.85	\$7.85	\$14.44	\$0.00	\$60.14
7	80	\$40.37	\$7.85	\$14.77	\$0.00	\$62.99
8	90	\$45.41	\$7.85	\$15.44	\$0.00	\$68.70

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2016	\$40.41	\$7.85	\$16.10	\$0.00	\$64.36
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2016	\$41.36	\$7.85	\$16.10	\$0.00	\$65.31
	01/01/2017	\$42.31	\$7.85	\$16.10	\$0.00	\$66.26

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.21	\$7.85	\$0.00	\$0.00	\$28.06
2	55	\$22.23	\$7.85	\$3.66	\$0.00	\$33.74
3	60	\$24.25	\$7.85	\$3.99	\$0.00	\$36.09
4	65	\$26.27	\$7.85	\$4.32	\$0.00	\$38.44
5	70	\$28.29	\$7.85	\$14.11	\$0.00	\$50.25
6	75	\$30.31	\$7.85	\$14.44	\$0.00	\$52.60
7	80	\$32.33	\$7.85	\$14.77	\$0.00	\$54.95
8	90	\$36.37	\$7.85	\$15.44	\$0.00	\$59.66

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.68	\$7.85	\$0.00	\$0.00	\$28.53
2	55	\$22.75	\$7.85	\$3.66	\$0.00	\$34.26
3	60	\$24.82	\$7.85	\$3.99	\$0.00	\$36.66
4	65	\$26.88	\$7.85	\$4.32	\$0.00	\$39.05
5	70	\$28.95	\$7.85	\$14.11	\$0.00	\$50.91
6	75	\$31.02	\$7.85	\$14.44	\$0.00	\$53.31
7	80	\$33.09	\$7.85	\$14.77	\$0.00	\$55.71
8	90	\$37.22	\$7.85	\$15.44	\$0.00	\$60.51

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2016	\$38.47	\$7.85	\$16.10	\$0.00	\$62.42
PAINTERS LOCAL 35 - ZONE 2	07/01/2016	\$39.42	\$7.85	\$16.10	\$0.00	\$63.37
	01/01/2017	\$40.37	\$7.85	\$16.10	\$0.00	\$64.32

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.24	\$7.85	\$0.00	\$0.00	\$27.09
2	55	\$21.16	\$7.85	\$3.66	\$0.00	\$32.67
3	60	\$23.08	\$7.85	\$3.99	\$0.00	\$34.92
4	65	\$25.01	\$7.85	\$4.32	\$0.00	\$37.18
5	70	\$26.93	\$7.85	\$14.11	\$0.00	\$48.89
6	75	\$28.85	\$7.85	\$14.44	\$0.00	\$51.14
7	80	\$30.78	\$7.85	\$14.77	\$0.00	\$53.40
8	90	\$34.62	\$7.85	\$15.44	\$0.00	\$57.91

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.71	\$7.85	\$0.00	\$0.00	\$27.56
2	55	\$21.68	\$7.85	\$3.66	\$0.00	\$33.19
3	60	\$23.65	\$7.85	\$3.99	\$0.00	\$35.49
4	65	\$25.62	\$7.85	\$4.32	\$0.00	\$37.79
5	70	\$27.59	\$7.85	\$14.11	\$0.00	\$49.55
6	75	\$29.57	\$7.85	\$14.44	\$0.00	\$51.86
7	80	\$31.54	\$7.85	\$14.77	\$0.00	\$54.16
8	90	\$35.48	\$7.85	\$15.44	\$0.00	\$58.77

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS)	12/01/2015	\$31.15	\$7.45	\$12.65	\$0.00	\$51.25
LABORERS - ZONE 2	06/01/2016	\$31.65	\$7.45	\$12.65	\$0.00	\$51.75
	12/01/2016	\$32.40	\$7.45	\$12.65	\$0.00	\$52.50
For Apprentice rates see "Apprentice- LABORER"						
PAINTER / TAPER (BRUSH, NEW) *	01/01/2016	\$39.01	\$7.85	\$16.10	\$0.00	\$62.96
* If 30% or more of surfaces to be painted are new construction,	07/01/2016	\$39.96	\$7.85	\$16.10	\$0.00	\$63.91
NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	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 - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.51	\$7.85	\$0.00	\$0.00	\$27.36
2	55	\$21.46	\$7.85	\$3.66	\$0.00	\$32.97
3	60	\$23.41	\$7.85	\$3.99	\$0.00	\$35.25
4	65	\$25.36	\$7.85	\$4.32	\$0.00	\$37.53
5	70	\$27.31	\$7.85	\$14.11	\$0.00	\$49.27
6	75	\$29.26	\$7.85	\$14.44	\$0.00	\$51.55
7	80	\$31.21	\$7.85	\$14.77	\$0.00	\$53.83
8	90	\$35.11	\$7.85	\$15.44	\$0.00	\$58.40

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.98	\$7.85	\$0.00	\$0.00	\$27.83
2	55	\$21.98	\$7.85	\$3.66	\$0.00	\$33.49
3	60	\$23.98	\$7.85	\$3.99	\$0.00	\$35.82
4	65	\$25.97	\$7.85	\$4.32	\$0.00	\$38.14
5	70	\$27.97	\$7.85	\$14.11	\$0.00	\$49.93
6	75	\$29.97	\$7.85	\$14.44	\$0.00	\$52.26
7	80	\$31.97	\$7.85	\$14.77	\$0.00	\$54.59
8	90	\$35.96	\$7.85	\$15.44	\$0.00	\$59.25

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2016	\$37.07	\$7.85	\$16.10	\$0.00	\$61.02
PAINTERS LOCAL 35 - ZONE 2	07/01/2016	\$38.02	\$7.85	\$16.10	\$0.00	\$61.97
	01/01/2017	\$38.97	\$7.85	\$16.10	\$0.00	\$62.92

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.54	\$7.85	\$0.00	\$0.00	\$26.39
2	55	\$20.39	\$7.85	\$3.66	\$0.00	\$31.90
3	60	\$22.24	\$7.85	\$3.99	\$0.00	\$34.08
4	65	\$24.10	\$7.85	\$4.32	\$0.00	\$36.27
5	70	\$25.95	\$7.85	\$14.11	\$0.00	\$47.91
6	75	\$27.80	\$7.85	\$14.44	\$0.00	\$50.09
7	80	\$29.66	\$7.85	\$14.77	\$0.00	\$52.28
8	90	\$33.36	\$7.85	\$15.44	\$0.00	\$56.65

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.01	\$7.85	\$0.00	\$0.00	\$26.86
2	55	\$20.91	\$7.85	\$3.66	\$0.00	\$32.42
3	60	\$22.81	\$7.85	\$3.99	\$0.00	\$34.65
4	65	\$24.71	\$7.85	\$4.32	\$0.00	\$36.88
5	70	\$26.61	\$7.85	\$14.11	\$0.00	\$48.57
6	75	\$28.52	\$7.85	\$14.44	\$0.00	\$50.81
7	80	\$30.42	\$7.85	\$14.77	\$0.00	\$53.04
8	90	\$34.22	\$7.85	\$15.44	\$0.00	\$57.51

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2012	\$30.28	\$9.07	\$8.00	\$0.00	\$47.35
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
PILE DRIVER PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07

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

PIPELAYER LABORERS - ZONE 2	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75

For apprentice rates see "Apprentice- LABORER"

PLUMBER & PIPEFITTER PLUMBERS & PIPEFITTERS LOCAL 51	09/01/2015	\$36.88	\$11.00	\$15.85	\$0.00	\$63.73
	03/01/2016	\$37.63	\$11.00	\$15.85	\$0.00	\$64.48

Apprentice - PLUMBER/PIPEFITTER - Local 51

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$14.75	\$11.00	\$1.50	\$0.00	\$27.25
2	50	\$18.44	\$11.00	\$1.50	\$0.00	\$30.94
3	60	\$22.13	\$11.00	\$7.85	\$0.00	\$40.98
4	70	\$25.82	\$11.00	\$11.66	\$0.00	\$48.48
5	80	\$29.50	\$11.00	\$14.20	\$0.00	\$54.70

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$15.05	\$11.00	\$1.50	\$0.00	\$27.55
2	50	\$18.82	\$11.00	\$1.50	\$0.00	\$31.32
3	60	\$22.58	\$11.00	\$7.85	\$0.00	\$41.43
4	70	\$26.34	\$11.00	\$11.66	\$0.00	\$49.00
5	80	\$30.10	\$11.00	\$14.20	\$0.00	\$55.30

Notes:

Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	09/01/2015	\$36.88	\$11.00	\$15.85	\$0.00	\$63.73
	03/01/2016	\$37.63	\$11.00	\$15.85	\$0.00	\$64.48
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	12/01/2015	\$32.15	\$7.45	\$12.65	\$0.00	\$52.25
	06/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
	12/01/2016	\$33.40	\$7.45	\$12.65	\$0.00	\$53.50
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.73	\$10.00	\$14.90	\$0.00	\$68.63
	06/01/2016	\$44.48	\$10.00	\$14.90	\$0.00	\$69.38
	12/01/2016	\$45.73	\$10.00	\$14.90	\$0.00	\$70.63
	06/01/2017	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	12/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.73	\$10.00	\$14.90	\$0.00	\$68.63
	06/01/2016	\$44.48	\$10.00	\$14.90	\$0.00	\$69.38
	12/01/2016	\$45.73	\$10.00	\$14.90	\$0.00	\$70.63
	06/01/2017	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	12/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$30.13	\$10.00	\$14.90	\$0.00	\$55.03
	06/01/2016	\$30.65	\$10.00	\$14.90	\$0.00	\$55.55
	12/01/2016	\$31.52	\$10.00	\$14.90	\$0.00	\$56.42
	06/01/2017	\$32.21	\$10.00	\$14.90	\$0.00	\$57.11
	12/01/2017	\$32.90	\$10.00	\$14.90	\$0.00	\$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS LOCAL 653</i>	08/01/2008	\$19.76	\$7.16	\$4.21	\$0.00	\$31.13
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RESIDENTIAL WOOD FRAME (All Other Work) <i>CARPENTERS -ZONE 2 (Residential Wood)</i>	04/01/2011	\$24.24	\$8.67	\$15.51	\$0.00	\$48.42
RESIDENTIAL WOOD FRAME CARPENTER **	05/01/2011	\$24.24	\$6.34	\$6.23	\$0.00	\$36.81

** 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. *CARPENTERS -ZONE 2 (Residential Wood)*

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 - 05/01/2011

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$14.54	\$6.34	\$0.00	\$0.00	\$20.88
2	60	\$14.54	\$6.34	\$6.23	\$0.00	\$27.11
3	65	\$15.76	\$6.34	\$6.23	\$0.00	\$28.33
4	70	\$16.97	\$6.34	\$6.23	\$0.00	\$29.54
5	75	\$18.18	\$6.34	\$6.23	\$0.00	\$30.75
6	80	\$19.39	\$6.34	\$6.23	\$0.00	\$31.96
7	85	\$20.60	\$6.34	\$6.23	\$0.00	\$33.17
8	90	\$21.82	\$6.34	\$6.23	\$0.00	\$34.39

Notes:

Apprentice to Journeyworker Ratio:1:5

RIDE-ON MOTORIZED BUGGY OPERATOR	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
<i>LABORERS - ZONE 2</i>	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
<i>For apprentice rates see "Apprentice- LABORER"</i>						
ROLLER/SPREADER/MULCHING MACHINE	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
<i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17
<i>For apprentice rates see "Apprentice- OPERATING ENGINEERS"</i>						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)	08/01/2015	\$40.11	\$11.00	\$12.00	\$0.00	\$63.11
<i>ROOFERS LOCAL 53</i>	02/01/2016	\$41.01	\$11.00	\$12.00	\$0.00	\$64.01

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ROOFER - Local 33

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.06	\$11.00	\$3.38	\$0.00	\$34.44
2	60	\$24.07	\$11.00	\$12.00	\$0.00	\$47.07
3	65	\$26.07	\$11.00	\$12.00	\$0.00	\$49.07
4	75	\$30.08	\$11.00	\$12.00	\$0.00	\$53.08
5	85	\$34.09	\$11.00	\$12.00	\$0.00	\$57.09

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.51	\$11.00	\$3.38	\$0.00	\$34.89
2	60	\$24.61	\$11.00	\$12.00	\$0.00	\$47.61
3	65	\$26.66	\$11.00	\$12.00	\$0.00	\$49.66
4	75	\$30.76	\$11.00	\$12.00	\$0.00	\$53.76
5	85	\$34.86	\$11.00	\$12.00	\$0.00	\$57.86

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.

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE ROOFERS LOCAL 33	08/01/2015	\$40.36	\$11.00	\$12.00	\$0.00	\$63.36
	02/01/2016	\$41.26	\$11.00	\$12.00	\$0.00	\$64.26
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 17 - A	08/01/2015	\$43.31	\$10.20	\$21.48	\$2.25	\$77.24
	02/01/2016	\$44.31	\$10.20	\$21.48	\$2.25	\$78.24
	08/01/2016	\$45.46	\$10.20	\$21.48	\$2.25	\$79.39
	02/01/2017	\$46.56	\$10.20	\$21.48	\$2.25	\$80.49
	08/01/2017	\$47.66	\$10.20	\$21.48	\$2.25	\$81.59
	02/01/2018	\$48.81	\$10.20	\$21.48	\$2.25	\$82.74

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 17-A

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.32	\$10.20	\$4.90	\$0.00	\$32.42
2	40	\$17.32	\$10.20	\$4.90	\$0.00	\$32.42
3	45	\$19.49	\$10.20	\$9.59	\$1.18	\$40.46
4	45	\$19.49	\$10.20	\$9.59	\$1.18	\$40.46
5	50	\$21.66	\$10.20	\$10.45	\$1.27	\$43.58
6	50	\$21.66	\$10.20	\$10.70	\$1.28	\$43.84
7	60	\$25.99	\$10.20	\$12.17	\$1.45	\$49.81
8	65	\$28.15	\$10.20	\$13.04	\$1.54	\$52.93
9	75	\$32.48	\$10.20	\$14.76	\$1.72	\$59.16
10	85	\$36.81	\$10.20	\$15.98	\$1.89	\$64.88

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.72	\$10.20	\$4.90	\$0.00	\$32.82
2	40	\$17.72	\$10.20	\$4.90	\$0.00	\$32.82
3	45	\$19.94	\$10.20	\$9.59	\$1.19	\$40.92
4	45	\$19.94	\$10.20	\$9.59	\$1.19	\$40.92
5	50	\$22.16	\$10.20	\$10.45	\$1.28	\$44.09
6	50	\$22.16	\$10.20	\$10.70	\$1.29	\$44.35
7	60	\$26.59	\$10.20	\$12.17	\$1.47	\$50.43
8	65	\$28.80	\$10.20	\$13.04	\$1.56	\$53.60
9	75	\$33.23	\$10.20	\$14.76	\$1.75	\$59.94
10	85	\$37.66	\$10.20	\$15.98	\$1.92	\$65.76

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SIGN ERECTOR	06/01/2013	\$25.81	\$7.07	\$7.05	\$0.00	\$39.93
PAINTERS LOCAL 35 - ZONE 2						

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$19.05	\$8.67	\$8.55	\$0.00	\$36.27
2	40	\$21.77	\$8.67	\$8.55	\$0.00	\$38.99
3	45	\$24.49	\$8.67	\$8.55	\$0.00	\$41.71
4	50	\$27.22	\$8.67	\$8.55	\$0.00	\$44.44
5	55	\$29.94	\$8.67	\$8.55	\$0.00	\$47.16
6	60	\$32.66	\$8.67	\$8.55	\$0.00	\$49.88
7	65	\$35.38	\$8.67	\$8.55	\$0.00	\$52.60
8	70	\$38.10	\$8.67	\$8.55	\$0.00	\$55.32
9	75	\$40.82	\$8.67	\$8.55	\$0.00	\$58.04
10	80	\$43.54	\$8.67	\$8.55	\$0.00	\$60.76

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$19.40	\$8.67	\$8.55	\$0.00	\$36.62
2	40	\$22.17	\$8.67	\$8.55	\$0.00	\$39.39
3	45	\$24.94	\$8.67	\$8.55	\$0.00	\$42.16
4	50	\$27.72	\$8.67	\$8.55	\$0.00	\$44.94
5	55	\$30.49	\$8.67	\$8.55	\$0.00	\$47.71
6	60	\$33.26	\$8.67	\$8.55	\$0.00	\$50.48
7	65	\$36.03	\$8.67	\$8.55	\$0.00	\$53.25
8	70	\$38.80	\$8.67	\$8.55	\$0.00	\$56.02
9	75	\$41.57	\$8.67	\$8.55	\$0.00	\$58.79
10	80	\$44.34	\$8.67	\$8.55	\$0.00	\$61.56

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 OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 223	09/01/2015	\$32.56	\$8.40	\$9.59	\$0.00	\$50.55
	09/01/2016	\$33.33	\$8.90	\$9.78	\$0.00	\$52.01

Classification Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 223

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes: See Electrician Apprentice Wages
Steps are 750hrs
Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages
Apprentice to Journeyworker Ratio:2:3

TERRAZZO FINISHERS	08/01/2015	\$48.80	\$10.18	\$18.57	\$0.00	\$77.55
BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2016	\$48.80	\$10.18	\$19.14	\$0.00	\$78.12
	08/01/2016	\$49.70	\$10.18	\$19.22	\$0.00	\$79.10
	02/01/2017	\$50.27	\$10.18	\$19.22	\$0.00	\$79.67

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.40	\$10.18	\$18.57	\$0.00	\$53.15
2	60	\$29.28	\$10.18	\$18.57	\$0.00	\$58.03
3	70	\$34.16	\$10.18	\$18.57	\$0.00	\$62.91
4	80	\$39.04	\$10.18	\$18.57	\$0.00	\$67.79
5	90	\$43.92	\$10.18	\$18.57	\$0.00	\$72.67

Effective Date - 02/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.40	\$10.18	\$19.14	\$0.00	\$53.72
2	60	\$29.28	\$10.18	\$19.14	\$0.00	\$58.60
3	70	\$34.16	\$10.18	\$19.14	\$0.00	\$63.48
4	80	\$39.04	\$10.18	\$19.14	\$0.00	\$68.36
5	90	\$43.92	\$10.18	\$19.14	\$0.00	\$73.24

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER	12/01/2015	\$36.70	\$7.45	\$13.75	\$0.00	\$57.90
LABORERS - FOUNDATION AND MARINE	06/01/2016	\$37.45	\$7.45	\$13.75	\$0.00	\$58.65
	12/01/2016	\$38.45	\$7.45	\$13.75	\$0.00	\$59.65

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER	12/01/2015	\$35.42	\$7.45	\$13.75	\$0.00	\$56.62
LABORERS - FOUNDATION AND MARINE	06/01/2016	\$36.17	\$7.45	\$13.75	\$0.00	\$57.37
	12/01/2016	\$37.17	\$7.45	\$13.75	\$0.00	\$58.37

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2015	\$35.30	\$7.45	\$13.75	\$0.00	\$56.50
	06/01/2016	\$36.05	\$7.45	\$13.75	\$0.00	\$57.25
	12/01/2016	\$37.05	\$7.45	\$13.75	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.31	\$10.00	\$14.90	\$0.00	\$68.21
	06/01/2016	\$44.06	\$10.00	\$14.90	\$0.00	\$68.96
	12/01/2016	\$45.29	\$10.00	\$14.90	\$0.00	\$70.19
	06/01/2017	\$46.28	\$10.00	\$14.90	\$0.00	\$71.18
	12/01/2017	\$47.27	\$10.00	\$14.90	\$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>	12/01/2015	\$32.52	\$10.41	\$10.08	\$0.00	\$53.01
	06/01/2016	\$33.02	\$10.41	\$10.08	\$0.00	\$53.51
	08/01/2016	\$33.02	\$10.91	\$10.08	\$0.00	\$54.01
	12/01/2016	\$33.02	\$10.91	\$10.89	\$0.00	\$54.82
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2015	\$47.58	\$7.45	\$14.15	\$0.00	\$69.18
	06/01/2016	\$48.33	\$7.45	\$14.15	\$0.00	\$69.93
	12/01/2016	\$49.33	\$7.45	\$14.15	\$0.00	\$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2015	\$49.58	\$7.45	\$14.15	\$0.00	\$71.18
	06/01/2016	\$50.33	\$7.45	\$14.15	\$0.00	\$71.93
	12/01/2016	\$51.33	\$7.45	\$14.15	\$0.00	\$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2015	\$39.65	\$7.45	\$14.15	\$0.00	\$61.25
	06/01/2016	\$40.40	\$7.45	\$14.15	\$0.00	\$62.00
	12/01/2016	\$41.40	\$7.45	\$14.15	\$0.00	\$63.00
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2015	\$41.65	\$7.45	\$14.15	\$0.00	\$63.25
	06/01/2016	\$42.40	\$7.45	\$14.15	\$0.00	\$64.00
	12/01/2016	\$43.40	\$7.45	\$14.15	\$0.00	\$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2015	\$31.94	\$10.41	\$10.08	\$0.00	\$52.43
	06/01/2016	\$32.44	\$10.41	\$10.08	\$0.00	\$52.93
	08/01/2016	\$32.44	\$10.91	\$10.08	\$0.00	\$53.43
	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2015	\$31.40	\$7.45	\$12.65	\$0.00	\$51.50
	06/01/2016	\$31.90	\$7.45	\$12.65	\$0.00	\$52.00
	12/01/2016	\$32.65	\$7.45	\$12.65	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2015	\$43.73	\$10.00	\$14.90	\$0.00	\$68.63
	06/01/2016	\$44.48	\$10.00	\$14.90	\$0.00	\$69.38
	12/01/2016	\$45.73	\$10.00	\$14.90	\$0.00	\$70.63
	06/01/2017	\$46.73	\$10.00	\$14.90	\$0.00	\$71.63
	12/01/2017	\$47.73	\$10.00	\$14.90	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	09/01/2015	\$36.88	\$11.00	\$15.85	\$0.00	\$63.73
	03/01/2016	\$37.63	\$11.00	\$15.85	\$0.00	\$64.48
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Marine Drilling						
BLASTER <i>MARINE DRILLING</i>	10/01/2005	\$27.83	\$3.40	\$4.50	\$0.00	\$35.73
BOAT CAPTAIN <i>MARINE DRILLING</i>	10/01/2005	\$22.97	\$3.40	\$3.90	\$0.00	\$30.27
BOAT MASTER <i>MARINE DRILLING</i>	10/01/2005	\$23.99	\$3.40	\$4.50	\$0.00	\$31.89
CORE DRILLER <i>MARINE DRILLING</i>	10/01/2005	\$21.93	\$3.40	\$3.30	\$0.00	\$28.63
CORE DRILLER HELPER <i>MARINE DRILLING</i>	10/01/2005	\$19.78	\$3.40	\$3.30	\$0.00	\$26.48
DRILLER <i>MARINE DRILLING</i>	10/01/2005	\$27.30	\$3.40	\$4.50	\$0.00	\$35.20
ENGINEER <i>MARINE DRILLING</i>	10/01/2005	\$27.29	\$3.40	\$4.50	\$0.00	\$35.19
HELPER <i>MARINE DRILLING</i>	10/01/2005	\$23.97	\$3.40	\$3.30	\$0.00	\$30.67
MACHINIST <i>MARINE DRILLING</i>	10/01/2005	\$27.03	\$3.40	\$3.90	\$0.00	\$34.33
OILER - MARINE DRILLING <i>MARINE DRILLING</i>	10/01/2005	\$23.97	\$3.40	\$3.30	\$0.00	\$30.67
TUG DECKHAND <i>MARINE DRILLING</i>	10/01/2005	\$19.14	\$3.40	\$3.30	\$0.00	\$25.84
WELDER <i>MARINE DRILLING</i>	10/01/2005	\$27.03	\$3.40	\$3.90	\$0.00	\$34.33
Op Eng Marine (Dredging Work)						
BOAT OPERATOR <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$25.29	\$5.20	\$2.95	\$0.00	\$33.44
CERTIFIED WELDER <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$26.84	\$5.20	\$3.25	\$0.00	\$35.29
CHIEF WELDER/ CHIEF MATE <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$28.49	\$5.20	\$3.25	\$0.00	\$36.94
DERRICK / SPIDER / SPILLBARGE OPERATOR <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$28.49	\$5.20	\$3.25	\$0.00	\$36.94
DRAG BARGE OPERATOR / WELDER / MATE <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$26.14	\$5.20	\$2.95	\$0.00	\$34.29
ENGINEER / ELECTRICIAN <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$28.49	\$5.20	\$3.25	\$0.00	\$36.94
LICENSED BOAT OPERATOR <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$28.49	\$5.20	\$3.25	\$0.00	\$36.94
LICENSED TUG OPERATOR OVER 1000HP <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$32.89	\$5.20	\$3.25	\$0.00	\$41.34
MAINTENANCE ENGINEER <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$28.49	\$5.20	\$3.25	\$0.00	\$36.94
OILER - MARINE DIVISION <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$21.09	\$5.20	\$2.65	\$0.00	\$28.94
OPERATOR / LEVERMAN <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$32.89	\$5.20	\$3.25	\$0.00	\$41.34
RODMAN / SCOWMAN <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$21.09	\$5.20	\$2.65	\$0.00	\$28.94

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHOREMAN / DECKHAND <i>OPERATING ENGINEERS - MARINE DIVISION</i>	10/01/2011	\$21.09	\$5.20	\$2.65	\$0.00	\$28.94
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2015	\$26.11	\$7.25	\$1.78	\$0.00	\$35.14
	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>	08/30/2015	\$36.98	\$7.25	\$8.12	\$0.00	\$52.35
	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>	08/30/2015	\$30.46	\$7.25	\$8.34	\$0.00	\$46.05
	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>	08/30/2015	\$23.93	\$7.25	\$1.72	\$0.00	\$32.90
	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>	08/30/2015	\$36.98	\$7.25	\$12.29	\$0.00	\$56.52
	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>	08/30/2015	\$32.63	\$7.25	\$9.05	\$0.00	\$48.93
	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>	08/30/2015	\$23.93	\$7.25	\$1.72	\$0.00	\$32.90
	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>	08/30/2015	\$19.58	\$7.25	\$1.59	\$0.00	\$28.42
	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>	08/30/2015	\$43.51	\$7.25	\$15.06	\$0.00	\$65.82
	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

Apprentice - LINEMAN (Outside Electrical) - East Local 104

Effective Date - 08/30/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.11	\$7.25	\$3.28	\$0.00	\$36.64
2	65	\$28.28	\$7.25	\$3.35	\$0.00	\$38.88
3	70	\$30.46	\$7.25	\$3.41	\$0.00	\$41.12
4	75	\$32.63	\$7.25	\$4.98	\$0.00	\$44.86
5	80	\$34.81	\$7.25	\$5.04	\$0.00	\$47.10
6	85	\$36.98	\$7.25	\$5.11	\$0.00	\$49.34
7	90	\$39.16	\$7.25	\$7.17	\$0.00	\$53.58

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

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>	02/01/2015	\$18.05	\$3.55	\$0.00	\$0.00	\$21.60
	01/31/2016	\$18.51	\$3.55	\$0.00	\$0.00	\$22.06
TREE TRIMMER GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/01/2015	\$15.92	\$3.55	\$0.00	\$0.00	\$19.47
	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 not on the ground.

This classification does not apply to wholesale tree removal.

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
----------------	----------------	-----------	--------	---------	---------------------------	------------

Additional Apprentices 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.

NAME OF BIDDER:

Bids must be submitted on this form and the following table. Bids submitted on any other form will not be considered valid. Please return this form and the attached forms to:

Town of Plymouth
ATTN: Procurement Div.
Town Office Building
11 Lincoln Street
Plymouth, MA 02360

Bids must be received by 11:00 a.m., Friday, January 22, 2016.

Postmarks will not be considered. All bids will be publicly opened and read at the above address, date and time. Prices are to include any delivery charges unless otherwise specified. All offers are subject to Specifications 21601. This bid may be extended for up to an additional thirty (30) calendar days (beyond the period set forth below) at the request of the Town of Plymouth.

In compliance with the above, the undersigned offers and agrees, if this offer is accepted within thirty (30) business days from date of receipt of offers specified above, to perform the herein described work for the prices offered opposite each item and that said prices will be good for the period of one year.

The undersigned bidder hereby certifies:

Bidder has carefully read and examined all the documents herein referred to and knows and understands the terms and provisions therein.

Bidder agrees that if this bid is accepted he/she will contract with the Owner, as provided for in the bid/contract documents, and that he/she will perform all the work and furnish all bonds, the material and equipment and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies, and all other things required by the documents in the manner and within the time therein prescribed and according to the requirements of the Town as therein set forth and that he/she will take in full payment therefor, the lump sum applicable to the project as offered below.

The bid is based upon the payment to laborers to be employed on the project of wages in an amount not less than the applicable prevailing wage rates established for the project by the Massachusetts Division of Occupational Safety. The undersigned bidder agrees, in addition to any other rights and remedies available to the Awarding Authority, to indemnify the Awarding

Authority for, from and against any loss, expense, damages, actions or claims, including any expense incurred in connection with any delay or stoppage of the project work, arising out of or as a result of (1) the failure of the said bid to be based upon the payment of applicable prevailing wage rates or (2) the failure of the bidder, if selected as the Contractor, to pay laborers employed on the project the said applicable prevailing wage rates.

No person in the employ of the Town of Plymouth has any pecuniary interest in this proposal or in the contract for the work, which is proposed.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards made subject to G.L. c.149, §44A.

THE UNDERSIGNED BIDDER HEREBY CERTIFIES UNDER THE PAINS AND PENALTIES OF PERJURY THE FOLLOWING:

This bid in all respects is bonafide, fair, and made without collusion or fraud with any other person. As used in this paragraph, the word PERSON shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

It has complied with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support in accordance with MGL Chapter 62C, Section 49A.

It is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

All structural works should be priced installed with appropriate finishing works. Shop drawings may be required for any additional design work.

The Bidder understands and agrees that the estimated quantities for unit price pay items are not guaranteed, are approximate only, and are included solely for the purpose of comparison of bids, and that it

shall be paid no more than its unit prices for all unit price work, even if such work greatly exceeds the estimated quantities. The Bidder also understands and agrees that the Owner does not expressly or by implication guaranty or warrant the nature and extent of the materials or conditions that may be encountered below the surface of the ground.

CONSTRUCTION OF A NEW WHARF, AS SPECIFIED. PRICES SHALL INCLUDE ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO COMPLETE THE PARTICULAR ITEM AS SPECIFIED AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.

Brief Description of Item	Est. Quant.	Unit	Rate	Total Amount in words	Total Amount in figures
1. Mobilization (Item 02000-1)	1	LS		_____ dollars and _____ cents	\$
2. Site Preparation (Item 02000-2)	1	LS		_____ dollars and _____ cents	\$
3. Demolition (Item 02110-1)	1	LS		_____ dollars and _____ cents	\$
4. Round Greenheart Piles -- South Pier (Item 02317-1)	10725	LF		_____ dollars and _____ cents	\$
5. Round Timber Piles -- Boardwalk (Item 02317-2)	1680	LF		_____ dollars and _____ cents	\$
6. Storm Drainage System and Water Distribution (Item 02500-1)	1	LS		_____ dollars and _____ cents	\$
7. Concrete Pier Deck (Item 03000-1)	1	LS		_____ dollars and _____ cents	\$
8. Timber for Pier (Item 06130-1)	1	LS		_____ dollars and _____ cents	\$
9. Boardwalk (Item 06130-2)	1	LS		_____ dollars and _____ cents	\$
10. Electrical (Item 16000-1)	1	LS		_____ dollars and _____ cents	\$
11. Utility Back Charges (Item 16000-2)	1	Allowance		_____ dollars and _____ cents	\$60,000.00

TOTAL BASE BID PRICE:		\$
------------------------------	--	----

TOTAL BASE BID PRICE WRITTEN IN WORDS:

_____ DOLLARS

_____ CENTS

ADD ALTERNATE ITEMS

1. ALTERNATIVE ITEM(S) BID

The Bidder agrees to perform the Work described in the Contract Documents for the following prices should the Owner choose to include this work within the Contract:

2. ALTERNATIVE ITEM BID SCHEDULE

ADD ALTERNATE ITEM 1 – WAVE FENCE

Brief Description of Item	Est. Quant.	Unit	Rate	Total Amount in words	Total Amount in figures
A1. Wave Fence (Item 06130-3)	1	LS		_____ dollars and _____ cents	\$
TOTAL ALTERNATE ITEM BID PRICE:					\$

TOTAL ADD ALTERNATE 1 BID PRICE WRITTEN IN WORDS:

_____ DOLLARS

_____ CENTS

ADD ALTERNATE ITEM 2 – BUILDING A RELOCATION

Brief Description of Item	Est. Quant.	Unit	Rate	Total Amount in words	Total Amount in figures
A2. Building A Relocation (Item 02110-2)	1	LS		_____ dollars and _____ cents	\$
TOTAL ALTERNATE ITEM BID PRICE:					\$

TOTAL ADD ALTERNATE 2 BID PRICE WRITTEN IN WORDS:

_____ DOLLARS
 _____ CENTS

ADD ALTERNATE 3 – ELECTRICAL ADD ALTERNATE

Brief Description of Item	Est. Quant.	Unit	Rate	Total Amount in words	Total Amount in figures
E1. Electrical Add Alternate (Item 16000-E1)	1	LS		_____ dollars and _____ cents	\$ _____
TOTAL ALTERNATE ITEM BID PRICE:					\$ _____

TOTAL ADD ALTERNATE 3 BID PRICE WRITTEN IN WORDS:

_____ DOLLARS
 _____ CENTS

BID PROPOSAL INCLUDES ADDENDA NUMBER(S) _____

1. Mobilization (Item 02000-1)

Payment for MOBILIZATION shall be by the Contract Price Lump Sum and shall include mobilization, demobilization and all items not otherwise called out for individual price breakdown. Payment under this item shall be made in two installments, 50% at time of project startup and 50% after substantial completion and removal of all Contractors equipment and personnel.

2. Site Preparation (Item 02000-2)

Payment for SITE PREPARATION shall be by the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, testing, transportation and supervision for the satisfactory supply and installation of all items under this section and shall include all work materials; preparation of the site all erosion control activities including materials for barriers and siltation curtains; as specified in the Order of Conditions and/or other approvals; and all safety barriers, signage, security requirements for the project site and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.

3. Demolition (Item 02110-1)

Payment for DEMOLITION shall be by the Contract Price LUMP SUM for the removal, storage, relocation and disposal of all items as identified on the Contract Documents. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, temporary support, testing, transportation, survey, site adjustment, and supervision for the satisfactory demolition, removal, and disposal of all items under this section including any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

4. Round Greenheart Piles (Item 02317-1)

Payment shall be made for ROUND GREENHEART PILES at the Contract Unit Price Per Linear Foot. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, survey, and supervision for the satisfactory supply and installation of timber piles including cutting to final elevation, trimming, shaping, banding, disposal of excess material, fasteners and connection to other work as required, test piles and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents. No separate payment will be made for test piles.

5. Round Timber Piles (Item 02317-2)

Payment shall be made for ROUND TIMBER PILES at the Contract Unit Price Per Linear Foot. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, survey, and supervision for the satisfactory supply and installation of timber piles including removal and replacement of riprap, cutting to final elevation, shaping, trimming, disposal of excess material, fasteners and connection to other work as required and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.

6. Storm Drainage System And Water Distribution (Item 02500-1)

Payment for STORM DRAINAGE SYSTEM AND WATER DISTRIBUTION shall be for the Contract Price LUMP SUM. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, design, testing, transportation, survey, and supervision for the satisfactory supply and installation of the Storm Drainage System and Water Distribution, complete in place, including all piping and laterals, pipe hangers or supports, all connections, valves, and structures, scuppers, grates, frames, castings, dewatering, excavation, backfilling and compaction; material separation requirements, all associated erosion control activities including materials for barriers and siltation curtains and all safety barriers, signage, police details, security requirements, disposal of excess material and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.

7. Concrete Pier Deck (Item 03000-1)

Payment for CONCRETE PIER DECK shall be by the Contract Price Lump Sum, complete in place. This price and payment shall constitute full compensation for all supervision, survey, transportation, testing, labor, materials and equipment for the satisfactory installation of the complete concrete pier deck including concrete topping, curbs, precast panels and concrete pile caps, connection to the piles, compaction, falsework, temporary supports, lifting, forming, finishing, dowels, reinforcing steel, mortars, grouts, bearing pads, epoxy adhesives, inserts, anchors, steel plates, bollards, cleats, ladders, surface preparation, curing, attachments, disposal and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

8. Timber for Pier (Item 06130-1)

Payment for TIMBER for PIER shall be at the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, demolition, removal, preparation, submittals, transportation, survey, disposal of surplus materials, and supervision for the satisfactory supply and installation of all timber components for the pier including but not necessarily limited to, bracing, blocking, fender system wale and chock, connections, fasteners, all hardware required, and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

9. Boardwalk (Item 06130-2)

Payment for BOARDWALK shall be at the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, demolition, removal, preparation,

submittals, transportation, survey, disposal of surplus materials, and supervision for the satisfactory supply and installation of timber boardwalk and components for the boardwalk including but not necessarily limited to, pile caps, bracing, stringers, decking, railing, connections, tar paper, fasteners, all hardware required, and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings. Timber piles for boardwalk shall be paid under Item 02317-2 Round Timber Piles.

10. Electrical (Item 16000-1)

Payment for ELECTRICAL shall be LUMP SUM and shall include all work and materials for the installation of all electrical work to provide a fully functional system including all panelboards, enclosures, conduits, conduit hangers or supports, piping, pull lines, laterals, hand-holes, pull boxes, manholes, traffic bollards and any other structures and equipment; excavation, backfilling, installation, concrete, compaction of fills; all associated erosion control activities including materials for barriers and siltation curtains; and all safety barriers, signage, security requirements for the project site as shown on and described within, but not limited to, the construction documents.

11. Utility Back Charges (Item 16000-2)

Payment for UTILITY BACK CHARGES shall be LUMP SUM and shall include all utility work and materials for the providing and installation of new 208Y/120V NSTAR Electric service; relocation and reconfiguration of existing 240/120V NSTAR Electric service; relocation of Verizon, Comcast, and Town Fiber utility lines and equipment. All work shall be by utility companies and paid for by this electrical contractor via utility company back charges as invoiced with no markup. This item only includes invoiced utility back charges, all other associated work and materials shall be included and paid under item 16000-1.

ADDITIVE ALTERNATE ITEMS

Contractor shall provide separate break-out pricing for each add alternative with submission of bid price. Acceptance of each add alternative shall be by the owner

Add Alternate 1 - Wave Fence (Item 06130-3)

Payment for WAVE FENCE shall be at the Contract Price Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, demolition, removal, preparation, submittals, transportation, survey, disposal of surplus materials, and supervision for the satisfactory supply and installation of the wave fence including but not necessarily limited to, wales, wave fence panels, cover boards, connections, fasteners, all hardware required, and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

Add Alternate 2 - Building A Relocation (Item 02110-2)

Payment for BUILDING A RELOCATION shall be by the Contract Price LUMP SUM for the additional cost to salvage and relocate Building A as identified on the Contract Documents. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, temporary support, temporary framing or bracing, lifting supports, hoisting, testing, transportation, survey, site adjustment, placement at an agreed location and supervision for the satisfactory lifting, relocation and placement into store location and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

Add Alternate 3 - Electrical Add Alternate (Item 16000-E1)

Payment for Item 16000-E1, ELECTRICAL ADD-ALTERNATE E1 shall be LUMP SUM and shall include: all materials; labor; equipment and transportation; legal disposal of all materials; all incidentals required to complete the installations and removals to the satisfaction of the Engineer; as shown on and

described within, but not limited to, the construction documents.

THE UNDERSIGNED ACKNOWLEDGES RECEIPT OF ADDENDA # _____ *

*To be filled in by bidder if addenda are issued.

PLEASE NOTE ANY EXCEPTIONS ON SEPARATE CONTRACTOR LETTERHEAD.

BIDDER _____

AUTHORIZED SIGNATURE

Printed Name and Title

COUNTY _____

STATE OF INCORPORATION _____

PHONE _____

Date Offered

FAX _____

E-MAIL _____

TAX I.D. NUMBER _____

TOWN OF PLYMOUTH
REFERENCES OF BIDDER

By signing this page, the bidder certifies that he/she has a minimum of ten (10) years experience in performing work of this nature.

Please also provide the names of at least THREE municipal clients for which the bidder has provided this type of work within the last three years, including names and telephone numbers of contact persons.

REFERENCES:

Signed:

Name of Person Authorized to Sign for the Bidder

Title

Date

DELEGATION OF AUTHORITY

At a meeting of the Board of Directors of the _____
(Name of Corporation)

_____ duly called and held on _____
(Date)

at which a quorum was present, and acting throughout, the following vote

was duly adopted: VOTED: That _____
(Name of Individual)

the _____ of the Corporation, hereby is authorized
(Title)

to affix the Corporate Seal, sign and deliver in the name and on behalf of the Corporation, bids, proposals, contracts, bills of sale, conditional sale agreements, chattel mortgages, leases, bonds, applications, affidavits, certificates, and any other similar documents required in connection with the sale of the Corporation's products to any purchaser, including assignments and satisfactions of any such documents.

Any and all applications, affidavits, statements, certificates, and similar documents required by law in connection with the licensing of the Corporation or its representatives for the sale, distribution, and servicing of its commercial products.

The authority is hereby delegated and shall be exercised by the aforesaid person in connection with the duties as

_____ of _____
(Title) (Name of Corporation)

and not otherwise.

ATTEST: _____ DATE: _____

NOTE: This form must be completed if the contractor is a corporation.