

**SEWER EXTENSIONS AND WATER MAIN RENEWAL  
ISLAND AVENUE AND WINDING WAY AREAS  
PEAKS ISLAND, PORTLAND, MAINE**

**BID SPECIFICATIONS**

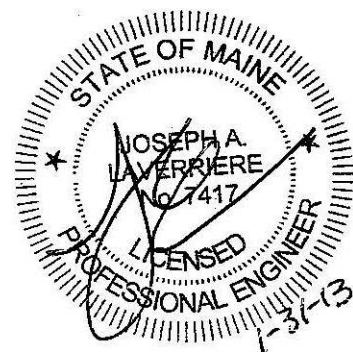
**PREPARED FOR:**

**PORTLAND WATER DISTRICT  
225 DOUGLASS STREET  
PORTLAND, MAINE 04102**

**PREPARED BY:**

**DeLUCA-HOFFMAN ASSOCIATES, INC.  
778 MAIN STREET, SUITE 8  
SOUTH PORTLAND, MAINE 04106  
(207) 775-1121**

**JANUARY 2013**



**PORTLAND WATER DISTRICT  
PEAKS ISLAND – PORTLAND, MAINE  
SEWERAGE EXTENSIONS AND WATER MAIN RENEWAL  
ISLAND AVENUE AND WINDING WAY AREAS**

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**SECTION 00200**  
**INSTRUCTION TO BIDDERS**

**ARTICLE 1 – DEFINED TERMS**

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered:

DeLuca-Hoffman Associates, Inc.  
778 Main Street, Suite 8  
South Portland, Maine 04106

**ARTICLE 2 – COPIES OF BIDDING DOCUMENTS**

2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the advertisement or invitation to bid may be obtained from the Issuing Office.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

**ARTICLE 3 – QUALIFICATIONS OF BIDDERS**

3.01 To be considered a responsive Bidder, the Contractor shall have obtained a copy of the Contract Documents from the Engineer (DeLuca-Hoffman Associates, Inc.). The Bid will not be awarded to a Bidder unless a record for the purchase of the Contract Documents exists in the office of the Engineer. To meet this requirement and to establish the record of purchase, a prospective Bidder must purchase the Contract Documents using the name of the Contractor that will appear in the Bid Form.

3.02 To demonstrate Bidder's qualifications to perform the Work, each Bidder must submit with his bid a completed Experience Statement contained within the Bid Form (Section 00410) and such other data as may be called for below (or in the Supplementary Conditions).

3.03 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

**ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE**

4.01 Bidder shall access the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

- 4.02 A. Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents
- B. Paragraph 6.13.C of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.
- 4.03 It is the responsibility of each Bidder before submitting a Bid to:
- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- E. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- F. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- G. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
- H. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.04 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

## **ARTICLE 5 – PRE-BID CONFERENCE**

- 5.01 A pre-Bid conference will be held at 1 p.m. local time on Wednesday, February 13, 2013 at Nixon Training Center at the Portland Water District. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged but not required to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

## **ARTICLE 6 – SITE AND OTHER AREAS**

- 6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

## **ARTICLE 7 – INTERPRETATIONS AND ADDENDA**

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.
- 7.03 Addenda will not be issued less than five (5) days prior to bid opening unless bid date is also extended.

## **ARTICLE 8 – BID SECURITY**

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's total amount of the Base Bid price and in the form of a certified check, bank money order, or a Bid bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions. Any bid submitted without the required Bid Security will be disqualified.
- 8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

## **ARTICLE 9 – CONTRACT TIMES**

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

## **ARTICLE 10 – LIQUIDATED DAMAGES**

- 10.01 Provisions for liquidated damages, are set forth in the Agreement.

## **ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS**

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

## **ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS**

- 12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.
- 12.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

## **ARTICLE 13 – PREPARATION OF BID**

- 13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from DeLuca-Hoffman Associates, Inc.
- 13.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each unit price listed therein. In the case of optional alternatives the words “No Bid,” “No Change,” or “Not Applicable” may be entered.

- 13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.06 A Bid by an individual shall show the Bidder's name and official address.
- 13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.08 All names shall be printed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.10 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

#### **ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS**

##### 14.01 Unit Price

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

##### 14.02 Allowances

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 11.02.B of the General Conditions. Treatment and disposal of material determined and be hazardous.

#### **ARTICLE 15 – SUBMITTAL OF BID**

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished an electronic copy of the Bid Form. The Bid Form is to be completed and submitted with the Bid security and the following documents:
- A. List of Subcontractors
- B. List of Project References



- 15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title, the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED."

A mailed Bid shall be addressed to:

Portland Water District  
225 Douglass Street  
P.O. Box 3553  
Portland, ME 04102  
Attn: Paul Cereste, Purchasing Agent

#### **ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID**

- 16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

#### **ARTICLE 17 – OPENING OF BIDS**

- 17.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

#### **ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

#### **ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT**

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.
- 19.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.

#### **ARTICLE 20 – CONTRACT SECURITY AND INSURANCE**

- 20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds and insurance.

#### **ARTICLE 21 – SIGNING OF AGREEMENT**

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

#### **ARTICLE 22 – SALES AND USE TAXES**

- 22.01 Owner is exempt from Maine state sales and use taxes on materials and equipment to be incorporated in the Work (Exemption No. E-45784). Said taxes shall not be included in the Bid. Refer to Paragraph 6.10 of the Supplementary Conditions for additional information.

#### **ARTICLE 23 – RETAINAGE**

- 23.01 Provisions concerning retainage are set forth in the Agreement.

**SECTION 00410  
BID FORM**

**ARTICLE 1 – BID RECIPIENT**

1.01 This Bid is submitted to:

**Portland Water District  
225 Douglass Street  
P.O. Box 3553  
Portland, ME 04102  
Attn: Paul Cereste, Purchasing Agent**

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS**

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

**ARTICLE 3 – BIDDER’S REPRESENTATIONS**

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder’s safety precautions and programs.

- E. Based on the information and observations referred to in Paragraph 3.01.D above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- F. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- G. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- H. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

#### **ARTICLE 4 – BIDDER’S CERTIFICATION**

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
  - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

#### **ARTICLE 5 – BASIS OF BID**

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
1	ENGINEER'S FIELD OFFICE	LS		100%		0 %		0 %		0%	
2	TRAFFIC CONTROL, MOBILIZATION AND DEMOBILIZATION	LS		100%		2.5%		2.5%		0%	
3	TESTPIT EXCAVATION	CY		220		10		10		0	
4	PROVIDE, INSTALL AND MAINTAIN SHEETING, SHORING, BRACING AND DEWATERING	LS		100%		2.5%		2.5%		0%	
5	ROCK EXCAVATION, INCLUDING DISPOSAL AND REPLACEMENT WITH SELECT BACKFILL	CY		4,900		370		180		250	
6	COMMON EXCAVATION ASSOCIATED WITH ROADWAY RESTORATION WORK	CY		2,155		40		135		0	
7	EXCAVATION BELOW GRADE	CY		220		0		0		0	
8	SELECT BACKFILL	CY		2,300		0		160		0	
9	SAWCUT PAVEMENT	LF		400		0		0		0	

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
10	MILL EXISTING BITUMINOUS PAVEMENT IN-PLACE (3" DEPTH TYPICAL)	SY		4,600		0		0		0	
11	REMOVE AND RESET SIGN OR MAIL BOX	EACH		20		0		0		0	
12	REMOVE EXISTING STRUCTURE	EACH		2		0		0		0	
13	ALTER EXISTING STRUCTURE	EACH		2		0		0		0	
14	ADJUST EXISTING STRUCTURE	EACH		1		0		0		0	
15	CALCIUM CHLORIDE	TON		5		0		0		0	
16	WATER FOR DUST CONTROL	1,000 GAL		60		0		0		0	
17	HOT BITUMINOUS CONCRETE SURFACE, SUPERPAVE 12.5 MM	TON		500		0		0		0	
18	HOT BITUMINOUS CONCRETE BINDER, SUPERPAVE 19 MM	TON		660		0		0		0	
19	BASE GRAVEL, MDOT TYPE B	CY		1,670		40		90		0	

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
20	PLACE, SPREAD, GRADE AND COMPACT PAVEMENT GRINDINGS ALONG DESIGNATED ROADWAY RESTORATION AREAS	SY		2,300		0		535		0	
21	1-1/4" DIAMETER HDPE SDR 11 (PRE-INSULATED) LOW PRESSURE FORCE MAIN LATERAL	LF		390		165		160		0	
22	1-1/2" DIAMETER HDPE SDR 11 (PRE-INSULATED) LOW PRESSURE FORCE MAIN	LF		590		0		350		0	
23	4" DIAMETER PVC SDR 21 SEWER FORCE MAIN, INCLUDING BENDS, FITTINGS AND THRUST RESTRAINT	LF		820		0		0		0	
24	4" DIAMETER PVC SDR 35 SEWER SERVICE LATERAL, INCLUDING BENDS AND CAPS	LF		1,790		30		15		0	
25	LOW PRESSURE FORCE MAIN SHUTOFF VALVE	EACH		14		2		8		0	
26	LOW PRESSURE FORCE MAIN TERMINUS CLEANOUT	EACH		3		1		1		0	
27	8" X 4" PVC SDR 35 TEE WYE FOR SEWER SERVICE LATERALS	EACH		60		1		0		0	
28	8" DIAMETER PVC SDR 35 SEWER MAIN IN SINGLE PIPE TRENCH < 12 FEET DEEP	LF		2,930		81		0		0	
29	8" DIAMETER PVC SDR 35 SEWER MAIN IN SINGLE PIPE TRENCH > 12 FEET DEEP	LF		830		0		19		0	

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
30	8" DIAMETER PVC SDR 35 SEWER MAIN IN MULTIPLE PIPE TRENCH < 12 FEET DEEP	LF		630		0		0		0	
31	6" DIAMETER PVC SDR 35 UNDERDRAIN WITH CAP	LF		75		0		0		0	
32	8" DIAMETER PVC SDR 35 STORM DRAIN PIPE	LF		20		0		0		0	
33	12" DIAMETER DUCTILE IRON STORM DRAIN OR CULVERT PIPE	LF		540		0		0		0	
34	18" DIAMETER RCP CLASS III CULVERT PIPE	LF		40		0		0		0	
35	4' DIAMETER SEWER MANHOLE	VF		235		18		10		0	
36	5' DIAMETER INTERNAL DROP SEWER MANHOLE	VF		65		0		0		0	
37	2' SQUARE CATCH BASIN	EACH		5		0		0		0	
38	REMEDIAL GRADING AND DRAINAGE WORK ALONG ISLAND AVENUE	LS		100%		0%		0%		0	
39	LOAM, SEED AND MULCH	UNIT		150		6		8		0	



ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
40	RIPRAP OUTLET AND CHANNEL LINING	SY		100		0		0		0	
41	VEGETATED SWALE EROSION CONTROL BLANKET	SY		400		0		0		0	
42	RIGID INSULATION OVER PIPES	LF		1,150		0		0		0	
43	CROSS COUNTRY SEWER SURFACE RESTORATION	ACRE		0.3		0		0		0	
44	GREAT POND ROAD PUMP STATION	LS		100%		0%		0%		0	
45	CONTAMINATED SOILS DISPOSAL	ALLOW	\$10,000.00	1	\$10,000.00	0	\$0.00	0	\$0.00	0	
46	CLAY TRENCH DAM	EACH		10		0		0		0	
47	12" DIAMETER D.I. WATER MAIN	LF		1,495		0		0		0	
48	8" DIAMETER D.I. WATER MAIN	LF		160		0		0		0	
49	4" DIAMETER D.I. WATER MAIN	LF		0		0		0		340	

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
50	2" COPPER WATER MAIN	LF		54		0		0		20	
51	2" CERTA-LOK YELLOWMINE PVC WATER MAIN	LF		260		0		0		0	
52	1-1/2" 200 PSI HDPE WATER MAIN (SHALLOW)	LF		200		0		0		0	
53	1-1/2" COPPER WATER MAIN	LF		20		0		0		0	
54	1" COPPER SERVICE ASSEMBLY – SHORT SIDE	EACH		15		0		0		3	
55	1" COPPER SERVICE ASSEMBLY – LONG SIDE	EACH		13		0		0		4	
56	1" SERVICE PIPE – RECONNECT ONLY	EACH		4		0		0		0	
57	12" RS GATE VALVE	EACH		1		0		0		0	
58	8" RS GATE VALVE	EACH		2		0		0		0	
59	1-1/2" COPPER SERVICE ASSEMBLY	EACH		1		0		0		0	

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
60	2" COPPER SERVICE ASSEMBLY	EACH		5		0		0		2	
61	12" DIAMETER D.I. SLEEVE COUPLING	EACH		2		0		0		0	
62	8" DIAMETER D.I. SLEEVE COUPLING	EACH		1		0		0		0	
63	12" DIAMETER D.I. 11-1/4 BEND MJ-MJ	EACH		2		0		0		0	
64	8" DIAMETER D.I. 22-1/2 BEND MJ-MJ	EACH		1		0		0		0	
65	4" DIAMETER D.I. 22-1/2 BEND MJ-MJ	EACH		0		0		0		1	
66	4" DIAMETER D.I. 11-1/4 BEND MJ-MJ	EACH		0		0		0		2	
67	D.I. REDUCER 12"x6"	EACH		1		0		0		0	
68	D.I. REDUCER 8"x4"	EACH		0		0		0		1	
69	D.I. SWIVEL TEE 8" x 8" x 8"	EACH		1		0		0		0	

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	BASE BID		DEDUCTIVE BID ALT. 1		DEDUCTIVE BID ALT. 2		ADDITIVE BID ALT. 3	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
70	FIRE HYDRANT ASSEMBLY	EACH		4		0		0		0	
71	1" AIR VALVE ASSEMBLY	EACH		5		0		0		1	
72	2" BLOW-OFF ASSEMBLY	EACH		1		0		0		0	
73	1" BLOW-OFF ASSEMBLY	EACH		2		0		0		0	

**TOTAL BASE BID AMOUNT:**

\_\_\_\_\_

**TOTAL DEDUCTIVE BID ALTERNATE 1 AMOUNT:  
(DIAMOND PASS UTILITY AND RESTORATION WORK)**

\_\_\_\_\_

**TOTAL DEDUCTIVE BID ALTERNATE 2 AMOUNT:  
(SUNSET ROAD UTILITY AND RESTORATION WORK)**

\_\_\_\_\_

**TOTAL ADDITIVE BID ALTERNATE 3 AMOUNT  
(WINDING WAY WATER MAIN EXTENSION)**

\_\_\_\_\_

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

**ARTICLE 6 – TIME OF COMPLETION**

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

**ARTICLE 7 – EXPERIENCE STATEMENT**

All questions must be answered with clear and comprehensive data; if necessary, add additional pages. This statement must be notarized.

- 1. Name of Bidder:

\_\_\_\_\_

- 2. Permanent Main Office Address:

\_\_\_\_\_

Telephone: \_\_\_\_\_ FAX #: \_\_\_\_\_

E-mail: \_\_\_\_\_

- 3. When organized:

\_\_\_\_\_

- 4. When incorporated:

\_\_\_\_\_

- 5. How many years have you been engaged in the contracting business under your present firm name? Also state names and dates of previous firms names, if any:

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

- 6. State work of a similar nature to that stated in the Bid Proposal, including references that will assist the Owner to judge experience, skill and business standing:

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

- 7. Contract(s) on hand. (Schedule these, showing gross amount of each contract and the approximate anticipated dates of completion):

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

8. General character of work performed by your company:

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

9. Have you ever failed to complete any work awarded to you? (Yes) (No)  
If so, where and why?

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

10. Have you ever defaulted on a contract? \_\_\_\_\_(Yes) \_\_\_\_\_(No). If so, where and why?

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

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

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

12. List your major equipment available for this contract.

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

13. List your key personnel such as Project Superintendent and foreman available for this contract.

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

14. Name and address of banking institutions with whom you do business:

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

Do you grant the Engineer permission to contact this (these) institutions? \_\_\_(Yes) \_\_\_(No)

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

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

By \_\_\_\_\_

State of \_\_\_\_\_ SS Title \_\_\_\_\_

County of \_\_\_\_\_

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

of \_\_\_\_\_ and that the answers to the foregoing questions and  
(Name of Organization)

all statements contained therein are true and correct.

Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

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

My commissions expires \_\_\_\_\_

**ARTICLE 8 – ATTACHMENTS TO THIS BID**

8.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. List of Proposed Subcontractors;
- C. List of Project References; and

**ARTICLE 9 – DEFINED TERMS**

9.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

**ARTICLE 10 – BID SUBMITTAL**

9.01 This Bid is submitted by:

If Bidder is:

An Individual

Name (typed or printed): \_\_\_\_\_

By: \_\_\_\_\_  
(Individual’s signature)

Doing business as: \_\_\_\_\_

A Partnership

Partnership Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

A Corporation

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_

By: \_\_\_\_\_  
(Signature -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_  
(CORPORATE SEAL)

Attest \_\_\_\_\_

Date of Qualification to do business in Maine is \_\_\_\_/\_\_\_\_/\_\_\_\_.

A Joint Venture

Name of Joint Venture: \_\_\_\_\_

First Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

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

Second Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

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

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)



**SECTION 00430  
BID BOND**

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER *(Name and Address)*:

SURETY *(Name and Address of Principal Place of Business)*:

OWNER *(Name and Address)*:

**BID**

Bid Due Date:

Description *(Project Name and Include Location)*:

**BOND**

Bond Number:

Date *(Not earlier than Bid due date)*:

Penal sum \_\_\_\_\_ \$ \_\_\_\_\_  
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

**BIDDER**

**SURETY**

\_\_\_\_\_  
Bidder's Name and Corporate Seal (Seal)

\_\_\_\_\_  
Surety's Name and Corporate Seal (Seal)

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

By: \_\_\_\_\_  
Signature (Attach Power of Attorney)

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

## PENAL SUM FORM

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2 All Bids are rejected by Owner, or
  - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

Bidder's Business Address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No. \_\_\_\_\_

E-mail \_\_\_\_\_

SUBMITTED on \_\_\_\_\_, 20\_\_\_\_.

**SECTION 00510  
NOTICE OF AWARD**

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

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:
Bidder:	
Bidder's Address: <i>[send Notice of Award Certified Mail, Return Receipt Requested]</i>	

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for \_\_\_\_\_

*[Indicate total Work, alternates, or sections of Work awarded.]*

The Contract Price of your Contract is \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

*[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]*

\_\_\_\_\_ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

\_\_\_\_\_ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [\_\_\_\_\_] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:  
\_\_\_\_\_

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

\_\_\_\_\_  
Owner  
By: \_\_\_\_\_  
Authorized Signature  
\_\_\_\_\_  
Title

Copy to Engineer

**SECTION 00520  
AGREEMENT  
BETWEEN OWNER AND CONTRACTOR  
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)**

THIS AGREEMENT is by and between \_\_\_\_\_ The Portland Water District \_\_\_\_\_ (“Owner”) and  
\_\_\_\_\_  
\_\_\_\_\_ (“Contractor”).

Owner and Contractor hereby agree as follows:

**ARTICLE 1 – WORK**

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

- A. Provide all labor, equipment material and incidental facilities required to construct gravity sewers and appurtenances, pressure sewers and appurtenances, a wastewater pumping station and force main; relocate, renew and extend water mains and appurtenances; and improve existing storm drainage in a certain area.

**ARTICLE 2 – THE PROJECT**

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

- A. Peaks Island – Portland, Maine: Sewerage Extensions and Water Main Renewal, Island Avenue and Winding Way Areas

**ARTICLE 3 – ENGINEER**

3.01 The Project has been designed by DeLuca-Hoffman Associates, Inc. (Engineer), which is to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

**ARTICLE 4 – CONTRACT TIMES**

4.01 *Time of the Essence*

- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Dates for Substantial Completion and Final Payment*

- A. The Work will be substantially completed on or before December 31, 2013, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before June 30, 2014.

4.02 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the

times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$1,000 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$1,000 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

## **ARTICLE 5 – CONTRACT PRICE**

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined below:
- A. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the actual quantity of that item. The Bid prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.07 of the General Conditions.
  - B. Unit prices shall be as stated in Contractor's Bid, attached hereto as an exhibit. The contract value stated in the Contractor's Bid exhibit is preliminary and subject to adjustment in accordance with 5.01A, above.

## **ARTICLE 6 – PAYMENT PROCEDURES**

### **6.01 *Submittal and Processing of Payments***

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

### **6.02 *Progress Payments; Retainage***

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the last day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.
  - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.

- a. Ninety (90) percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
  - b. Ninety (90) percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

#### 6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

### **ARTICLE 7 – INTEREST**

- 7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 0 percent per annum.

### **ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS**

- 8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
  - B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  - C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
  - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."
  - E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of

such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

- F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

## **ARTICLE 9 – CONTRACT DOCUMENTS**

### *9.01 Contents*

- A. The Contract Documents consist of the following:
  - 1. This Agreement (pages 1 to \_\_, inclusive).
  - 2. Performance bond (pages \_\_\_\_ to \_\_\_\_, inclusive).
  - 3. Payment bond (pages \_\_\_\_ to \_\_\_\_, inclusive).
  - 4. Other bonds (pages \_\_\_\_ to \_\_\_\_, inclusive).
    - a. \_\_\_\_ (pages \_\_\_\_ to \_\_\_\_, inclusive).
    - b. \_\_\_\_ (pages \_\_\_\_ to \_\_\_\_, inclusive).
    - c. \_\_\_\_ (pages \_\_\_\_ to \_\_\_\_, inclusive).
  - 5. General Conditions (pages \_\_\_\_ to \_\_\_\_, inclusive).
  - 6. Supplementary Conditions (pages \_\_\_\_ to \_\_\_\_, inclusive).
  - 7. Specifications as listed in the table of contents of the Project Manual.
  - 8. Drawings consisting of \_\_\_\_ sheets with each sheet bearing the following general title: \_\_\_\_ [or] the Drawings listed on attached sheet index.
  - 9. Addenda (numbers \_\_\_\_ to \_\_\_\_, inclusive).



10. Exhibits to this Agreement (enumerated as follows):
    - a. Contractor's Bid (pages \_\_\_\_ to \_\_\_\_, inclusive).
    - b. Documentation submitted by Contractor prior to Notice of Award (pages \_\_\_\_ to \_\_\_\_, inclusive).
  11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
    - a. Notice to Proceed (pages \_\_\_\_ to \_\_\_\_, inclusive).
    - b. Work Change Directives.
    - c. Change Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

## **ARTICLE 10 – MISCELLANEOUS**

### 10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

### 10.02 *Assignment of Contract*

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

### 10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

### 10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on \_\_\_\_\_ (which is the Effective Date of the Agreement).

OWNER:

CONTRACTOR

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

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

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

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

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

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

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

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

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

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

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

Address for giving notices:

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Address for giving notices:

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License No.: \_\_\_\_\_  
(Where applicable)

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

Agent for service of process:  
\_\_\_\_\_

**SECTION 00550  
NOTICE TO PROCEED**

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

Project: \_\_\_\_\_

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

Owner's Contract No.: \_\_\_\_\_

Contract: \_\_\_\_\_

Engineer's Project No.: \_\_\_\_\_

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

Contractor's Address: *[send Certified Mail, Return Receipt Requested]*  
\_\_\_\_\_  
\_\_\_\_\_

You are notified that the Contract Times under the above Contract will commence to run on \_\_\_\_\_. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is \_\_\_\_\_, and the date of readiness for final payment is \_\_\_\_\_ [(or) the number of days to achieve Substantial Completion is \_\_\_\_\_, and the number of days to achieve readiness for final payment is \_\_\_\_\_].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

\_\_\_\_\_ *[add other requirements]*.

\_\_\_\_\_

Owner

Given by:

\_\_\_\_\_

Authorized Signature

\_\_\_\_\_

Title

\_\_\_\_\_

Date

Copy to Engineer

**SECTION 00610  
PERFORMANCE BOND**

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

**CONSTRUCTION CONTRACT**

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

**BOND**

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form:     None     See Paragraph 16

---

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

**CONTRACTOR AS PRINCIPAL**

**SURETY**

\_\_\_\_\_ *(seal)*

Contractor's Name and Corporate Seal

\_\_\_\_\_ *(seal)*

Surety's Name and Corporate Seal

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

Signature

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

Signature *(attach power of attorney)*

\_\_\_\_\_

Print Name

\_\_\_\_\_

Print Name

\_\_\_\_\_

Title

\_\_\_\_\_

Title

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

Signature

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

Signature

\_\_\_\_\_

Title

\_\_\_\_\_

Title

**Notes:** (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:
  - 3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
  - 3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
  - 3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
  - 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
  - 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
  - 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
  - 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances;
  - 5.5 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
  - 5.6 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
  - 7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
  - 7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
  - 7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations. Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.
  - 14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
  - 14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
  - 14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
  - 14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.
12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
14. Definitions
  - 14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
  16. Modifications to this Bond are as follows:

**SECTION 00615  
PAYMENT BOND**

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

**CONSTRUCTION CONTRACT**

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

**BOND**

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form:  None  See Paragraph 18

---

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

**CONTRACTOR AS PRINCIPAL**

**SURETY**

\_\_\_\_\_  
Contractor's Name and Corporate Seal *(seal)*

\_\_\_\_\_  
Surety's Name and Corporate Seal *(seal)*

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

**By:** \_\_\_\_\_  
Signature *(attach power of attorney)*

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

**Notes:** (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.



1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
  - 5.1 Claimants who do not have a direct contract with the Contractor,
    - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
    - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
  - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall

promptly and at the Surety's expense take the following actions:

- 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
- 7.2 Pay or arrange for payment of any undisputed amounts.
- 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph

are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

## 16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and

engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

**SECTION 00700**  
**STANDARD GENERAL CONDITIONS OF THE**  
**CONSTRUCTION CONTRACT**

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
  7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
  9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
  12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.



42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 Terminology

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

*B. Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

*C. Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

*D. Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
  - a. does not conform to the Contract Documents; or
  - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
  - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

*E. Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

## **ARTICLE 2 – PRELIMINARY MATTERS**

### *2.01 Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

### *2.02 Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### *2.03 Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

### *2.04 Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

### *2.05 Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
  1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
  2. a preliminary Schedule of Submittals; and
  3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during

performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference, Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
  - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
  - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

**ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

### 3.02 *Reference Standards*

#### A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

#### B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

- a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
- b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

#### 3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  1. A Field Order;
  2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
  3. Engineer's written interpretation or clarification.

#### 3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
  1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
  2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

#### 3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving

party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

#### **ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

##### *4.01 Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, because of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

##### *4.02 Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
  - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
  - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
  - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or



- b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
  - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

- 1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
- 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
  - a. reviewing and checking all such information and data;
  - b. locating all Underground Facilities shown or indicated in the Contract Documents;
  - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
  - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

- 1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

#### 4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## **ARTICLE 5 – BONDS AND INSURANCE**

### **5.01 *Performance, Payment, and Other Bonds***

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### **5.02 *Licensed Sureties and Insurers***

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

### **5.03 *Certificates of Insurance***

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
    - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
    - b. by any other person for any other reason;
  - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
  - 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
  - a. Such insurance shall remain in effect for two years after final payment.
  - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

#### 5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

#### 5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
  1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
  2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations,

water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
  4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
  5. allow for partial utilization of the Work by Owner;
  6. include testing and startup; and
  7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

#### 5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or

causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
  - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

#### 5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.



5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

**ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES**

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

### 6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

### 6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
  - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
  - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

### 6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
  - 1. "*Or-Equal*" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
    - a. in the exercise of reasonable judgment Engineer determines that:

- 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
  - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
  - 3) it has a proven record of performance and availability of responsive service.
- b. Contractor certifies that, if approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
  - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
2. *Substitute Items:*
- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
  - b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
  - c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
  - d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
    - 1) shall certify that the proposed substitute item will:
      - a) perform adequately the functions and achieve the results called for by the general design,
      - b) be similar in substance to that specified, and
      - c) be suited to the same use as that specified;
    - 2) will state:
      - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
      - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

- c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
  - 3) will identify:
    - a) all variations of the proposed substitute item from that specified, and
    - b) available engineering, sales, maintenance, repair, and replacement services; and
  - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

#### 6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
  2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

#### 6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

#### 6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

#### 6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and

Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
  2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts



any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable

Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:
  - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
  - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
  - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  1. observations by Engineer;
  2. recommendation by Engineer or payment by Owner of any progress or final payment;
  3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
  4. use or occupancy of the Work or any part thereof by Owner;
  5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

#### 6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
  1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

#### 6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such

professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **ARTICLE 7 – OTHER WORK AT THE SITE**

### *7.01 Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
  - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
  - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and

proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
  - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
  - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

**ARTICLE 8 – OWNER'S RESPONSIBILITIES**

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

**ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION**

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

## 9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

## 9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

## 9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

## 9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.



9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

**ARTICLE 10 – CHANGES IN THE WORK; CLAIMS**

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

#### 10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

#### 10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  1. deny the Claim in whole or in part;
  2. approve the Claim; or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

## **ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### *11.01 Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
  2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
  3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any

subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
  - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
  - g. The cost of utilities, fuel, and sanitary facilities at the Site.
  - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

## 11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:
  - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
  - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
  2. there is no corresponding adjustment with respect to any other item of Work; and
  3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

**ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
  1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
  - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
  - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
  - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
  - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
  - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
  - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

## 12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.



### 12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

## **ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

### 13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

### 13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

### 13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
  - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
  - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

### 13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
1. repair such defective land or areas; or
  2. correct such defective Work; or
  3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of

engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

#### 13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

#### 13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## **ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION**

### **14.01 *Schedule of Values***

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

### **14.02 *Progress Payments***

#### **A. *Applications for Payments:***

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

#### **B. *Review of Applications:***

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
  - a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
  - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
  - a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
  - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

*D. Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - c. there are other items entitling Owner to a set-off against the amount recommended; or
  - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

#### 14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

#### 14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
  - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is



substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

##### A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and
  - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for

which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

*B. Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

*C. Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

## **ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

### *15.01 Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

### *15.02 Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
  1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
  2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  3. Contractor's repeated disregard of the authority of Engineer; or
  4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
  1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
  2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
  3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or

remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

#### 15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
  - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
  - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

## **ARTICLE 16 – DISPUTE RESOLUTION**

### *16.01 Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
  2. agrees with the other party to submit the Claim to another dispute resolution process; or
  3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

## **ARTICLE 17 – MISCELLANEOUS**

### *17.01 Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
  2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

## Supplementary Conditions

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## **SUPPLEMENTARY CONDITIONS**

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (No. C-700, 2007 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

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

### **SC-1.01.A.3 Application for Payment**

Add the following language to the end of Paragraph 1.01.A.3:

The Application for Payment form to be used on this project is EJCDC No. C-620.

### **SC-1.01.A.9 Change Order**

Add the following language to the end of Paragraph 1.01.A.9:

The Change Order form to be used on this project is EJCDC No. C-941.

### **SC-1.01.A.41 Site**

Add the following language after the first sentence of Paragraph 1.01.A.41:

The term “Site” may include locations within public streets wherein the OWNER’S utility plant is to be constructed and/or replaced.

### **SC-2.01.B Delivery of Bonds and Evidence of Insurance**

Delete Paragraph 2.01.B in its entirety and insert the following in its place:

B. Evidence of Insurance: Before any Work at the Site is started, Contractor shall deliver to the Owner, with copies for each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which any additional insured may reasonably request) which Contractor is required to purchase and maintain in accordance with Article 5.

### **SC-2.02 Copies of Documents**

Delete Paragraph 2.02.A in its entirety and insert the following in its place:

A. Owner shall furnish to Contractor One printed or hard copy of the Drawings and Project Manual and one set in electronic format. Additional copies will be furnished upon request at the cost of reproduction.

### **SC-2.03 Commencement of Contract Times; Notice to Proceed**

Delete the last sentence of Paragraph 2.03.A

### **SC-2.05.A.3 Preliminary Schedules**

Delete Paragraph 2.05.A.3 in its entirety and substitute the following:

3. A preliminary Schedule of Values is required for each lump sum item of the Work for which partial payment may be requested. Each required Schedule of Values shall include quantities and prices of items which when added together equal the Lump Sum Price for that item and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

### **SC-4.01 Availability of Lands**

Delete Paragraphs GC-4.01.C in its entirety and insert the following:

C. The CONTRACTOR shall provide at his own expense and without liability to the OWNER any land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials and equipment.

### **SC-4.02 Subsurface and Physical Conditions,**

Delete Paragraphs 4.02.A and 4.02.B in their entirety and insert the following:

- A. All available knowledge of subsurface conditions at or contiguous to the Site known to the Owner or Engineer has been shown on the Drawings.
- B. Not Used

### **SC-4.03.A Differing Subsurface or Physical Conditions**

Delete Paragraphs 4.03.A in its entirety and insert the following:



A. Notice: If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

**SC-4.03.C Possible Price and Times Adjustments**

Delete Paragraph 4.03 C.1 in its entirety and insert the following:

1. The Contract Price or the Contract Times or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for performance of the Work; provided, however, that with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

**SC-4.04 Underground Facilities**

SC-4.04.B.1: Amend the first sentence of Paragraph 4.04.B.1 to read as follows:

If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

SC-4.04.B.2: Amend the second sentence of Paragraph 4.04.B.2 to read as follows:

An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated

in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated.

**SC-4.05 Reference Points**

Delete the first sentence of paragraph A in its entirety. Modify the second sentence to read as follows: Contractor shall be responsible for laying out the Work, shall protect and preserve any established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner.

**SC-4.06 Hazardous Environmental Condition**

Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

A. No reports on drawings related to Hazardous Environmental Conditions are known to Owner or Engineer.

B. Not Used.

**SC-5.02 Licensed Sureties and Insurers**

Modify the first sentence of paragraph A by deleting the words: "Owner or".

**SC-5.03 Certificates of Insurance**

SC-5.03.A: Delete paragraph 5.03.A in its entirety and substitute the following:

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required by this contract to purchase and maintain.

SC-5.03.B: Delete paragraph 5.03.B in its entirety.

**SC-5.04 Contractor's Insurance**

SC-5.04.A: Modify the first sentence of Paragraph 5.04.A to read as follows:

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as required by the Supplemental Conditions, and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's

other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

SC-5.04.B.6: Amend the duration of coverage in this paragraph SC-5.04.B.6 to be at least three years.

SC-5.04.C: Add the following new paragraph immediately after Paragraph 5.04.B:

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions:

- a. State of Maine Statutory
- b. Applicable Federal: Statutory
- c. Employers Liability: \$2,000,000

2. Contractor's General Liability under Paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

- a. General Aggregate: \$2,000,000
- b. Products - Completed Operations Aggregate: 2,000,000
- c. Personal and Advertising Injury: \$2,000,000
- d. Each Occurrence (Bodily Injury and Property Damage): \$1,000,000
- e. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverages where applicable.
- f. Excess or Umbrella Liability
  - 1) General Aggregate \$1,000,000
  - 2) Each Occurrence \$1,000,000

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

- a. Bodily Injury:
  - Each person \$1,000,000
  - Each Accident \$1,000,000
- b. Property Damage:
  - Each Accident \$1,000,000
- c. Combined Single Limit of \$2,000,000

4. The Contractual Liability coverage required by Paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:

- a. Bodily Injury:
  - Each Accident \$1,000,000
  - Annual Aggregate \$2,000,000
- b. Property Damage:
  - Each Accident \$1,000,000
  - Annual Aggregate \$2,000,000

5. Additional insureds shall include: The Portland Water District.

### SC-5.05 Owner's Liability Insurance

Delete Paragraph 5.05 in its entirety.

### SC-5.06 Property Insurance

Property Insurance is not typically required for projects completely in the public right of way. It is to be provided for work on District Land where structures, existing or under construction, may be impacted.

SC-5.06.A. Delete Paragraph 5.06.A in its entirety and insert the following in its place:

A. Contractor shall purchase and maintain property insurance upon the Work at the Pump Station Site located at the corner of Great Pond Road and Third Street, in the amount of the full replacement cost thereof. Contractor shall be responsible for any deductible or self-insured retention. This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, Engineer, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by these Supplementary Conditions.

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
5. allow for partial utilization of the Work by Owner;
6. include testing and startup;
7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued; and
8. comply with the requirements of Paragraph 5.06.C of the General Conditions.

**SC-5.06.B. Equipment Breakdown Insurance**

Equipment Breakdown and Other Property insurance will not be required.

**SC-5.07 Waiver of Rights**

Delete paragraphs GC-5.07.B and GC-5.07.C in their entirety. (The terms of the District's insurance policies require that it transfer its rights of recovery against another party to the District's insurer.)

**SC-5.09 Acceptance of Bonds and Insurance; Option to Replace**

Delete paragraph GC-5.09 in its entirety.

**SC-6.02 Labor; Working Hours**

Insert the following Paragraph in their entirety directly after 6.02.B

C. If the Contractor must Work beyond the regular Work week at anytime, all expenses, including labor costs, of the Engineer and personnel required for inspection or observation shall be deducted monthly from any sums due or which shall become due to the Contractor. A regular work week is defined as 40 hours commencing 7:00 AM and ending at 4:00 PM, Monday through Friday.

**SC-6.03 Services Materials and Equipment**

Insert the following Paragraphs in their entirety directly after 6.02.C

D. Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection.

E. No Chattel Mortgages: Materials, supplies, or equipment to be incorporated into the Work shall not be purchased by the Contractor or the Subcontractor subject to a chattel mortgage or under a conditional sale Contract or other agreement by which an interest is retained by the seller.

**SC-6.06 Concerning Subcontractors, Suppliers, and Others**

SC-6.06.B: Delete paragraph 6.06.B in its entirety and substitute the following:

B. Within 5 days of the Bid opening and before the Notice of Award, the apparent Successful Bidder is required to identify all Subcontractors, Suppliers, or other individuals or entities that will supply a work value equal to or greater than 10% of the total contract value, for acceptance by Owner.

1. Owner's acceptance will be indicated by issuance of a Notice of Award to the Contractor. Owner's objections if any, to any listed Subcontractors, Suppliers, or other individuals or entities will be communicated in writing to the apparent Successful Bidder.

2. Owner's acceptance of any Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. In the event that the Owner rejects a Subcontractor, Supplier, or other individual or entity, either before the Notice of Award, or after execution of the Agreement, the Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

SC-6.06.H. Add a new paragraph immediately after Paragraph 6.06.G:

H. Owner or Engineer may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

SC-6.06.I. Add a new paragraph immediately after Paragraph 6.06.H:

I. The Contractor shall not award Work to Subcontractor(s) in excess of fifty (50) percent of the Contract Price without prior written approval of the Owner.

### SC-6.10 Taxes

Add a new paragraph immediately after Paragraph 6.10.A:

B. Owner is exempt from payment of sales and compensating use taxes of the State of Maine and of cities and counties thereof on all materials to be incorporated into the Work.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of equipment, supplies and materials to be physically incorporated into the Work such that they become a part of the real estate.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials consumed in, but not incorporated into, the Work.

### SC-6.13.C Safety and Protection

Add a new subparagraph to Paragraph 6.13.C:

1. Confined Space and Lock-out/Tag-out programs: The Contractor is advised that the Owner has clearly established on-going Confined Space and Lock-out/Tag-out programs. Where the Contractor's Work requires confined space entry into existing facilities and/or lock-out/tag-out of existing equipment and electrical controls, the Contractor shall strictly abide by the Owner's programs if they are more stringent than the Contractor's own procedures.

### SC-6.17 Shop Drawings and Samples

SC 6.17.B. Delete paragraph GC-6.17.B in its entirety and insert the following in its place:

B. Portions of the Work requiring a Shop Drawing or sample submission shall not begin until the

Shop Drawing or submission has been approved by the Engineer. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of all pertinent submittals will be at the sole risk, expense and responsibility of Contractor.

SC-6.17.C.4 Add the following paragraph after Paragraph 6.17.C.3:

4. Each submittal shall be cataloged and identified individually according to the specification section, paragraph, sub paragraph, etc. to which it pertains. Submittals from various specifications shall not be grouped into one submittal pertaining to a larger piece of the Work or the work of a single supplier. For example, submittals for pumps, pipe of various types and fittings that are specified in separate sections of the Contract Documents may not be cataloged and identified as a single submittal pertaining to a pump station or other facility, or as a submittal from a single supplier.

SC-6.17.F.: Add the following new paragraphs immediately after Paragraph 6.17.E:

F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.

G. In the event that Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time unless the need for such substitution is beyond the control of Contractor.

### SC-6.19 Contractor's General Warranty and Guarantee

Delete Paragraphs B, B.1 and B.2 in their entirety and substitute the following:

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons or entities for whom the Contractor is not responsible; or

2. normal wear and tear under normal usage that occurs after Substantial Completion.

### SC-8 Owner's Responsibilities

Delete Paragraphs 8.04, 8.05, 8.06, 8.07, 8.08 and 8.10 in their entirety and substitute the following:

8.04 Several of the Owner's responsibilities described in various Articles of the General Conditions have been modified by various Supplemental Conditions that will not be specifically enumerated here. Full review of the Supplemental Conditions is necessary to a full understanding of the Owner's Responsibilities under this contract.

### SC-9 Engineer's Status during Construction

#### SC-9.03 Project Representative

Delete Paragraph 9.03.A in its entirety and substitute the following:

A. Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work.

Add the following new paragraphs immediately following paragraph 9.03 A:

B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:

1. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.

2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.

3. *Liaison:*

a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the intent of the Contract Documents.

b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

4. *Interpretation of Contract Documents:* Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

5. *Shop Drawings and Samples:*

a. Record date of receipt of Samples and approved Shop Drawings.

b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.

6. *Modifications:* Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.

7. *Review of Work and Rejection of Defective Work:*

a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.

b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. *Inspections, Tests, and System Startups:*

a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

9. *Records:*

a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.

b. Maintain records for use in preparing Project documentation.

10. *Reports:*

a. Furnish to Engineer periodic reports as required of progress of the Work and of

Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.

b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.

11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. *Completion:*

a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.

b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.

c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents.

5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.

8. Authorize Owner to occupy the Project in whole or in part.

### **SC-11.03 Unit Price Work**

Delete Paragraph GC-11.03.D in its entirety and insert the following in its place:

D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. if the Bid price of a particular item of Unit Price Work amounts to 10 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

2. if there is no corresponding adjustment with respect to any other item of Work; and

3. if Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

### **SC-13.03 Tests and Inspections**

Add the following new paragraph after GC-13.03.F:

G. For the purpose of this section 13.03, the words 'timely notice' shall be construed as to mean not less than 48 hours prior to the event.

### **SC-13.04 Uncovering Work**

Add the following paragraph after GC-13.04.D:

E. Paragraphs B, C, and D, above shall apply only to the situation where work that has been covered by mutual agreement is subsequently determined to require uncovering for further observation.

**SC-14 Payment to Contractor and Completion**

SC-14.02.A.1: Modify the beginning of the first sentence of GC-14.02.A.1 to read as follows: “At least 10 days before the date established in the Agreement....”

SC-14.02.A.2: Delete Paragraph GC-14.A.2 in its entirety and substitute the following:

2. Beginning with the second Application for Payment, each Application shall include a lien release or other waiver acceptable to the Owner signed by the appropriate officer of each Subcontractor or Supplier that has provided labor, equipment or material to the Project during the period applicable to the previous Application for Payment.

SC-14.02.C.1 Modify the beginning of the first sentence of GC-14.02.C.1 to read as follows: “Twenty days after presentation of the Application for Payment....”

SC-14.07.A.3 Delete paragraph GC-14.07.A.3 in its entirety.

**SC-16 Dispute Resolution**

SC-16.01.C Delete GC-16.01.C in its entirety and insert the following in its place:

C. If the Claim is not resolved by mediation, Engineer’s action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. gives to the other party written notice of intent to submit the Claim to a court of competent jurisdiction, or
2. agrees with the other party to submit the Claim to another dispute resolution process.

SC-16.01.D Add the following new paragraph immediately after Paragraph SC-16.01.C.

D. Notwithstanding any applicable statute of limitations, a party giving notice under Paragraph SC-16.01.C.1 shall commence an action on the Claim within one year of giving such notice. Failure to do so shall result in the Claim being time-barred and Engineer’s action or denial shall become final and binding.

**SC-17.01 Giving Notice**

Delete GC-17.01.A.2 in its entirety and insert the following in its place:

2. delivered at or sent by registered or certified mail, postage prepaid, to the “Address for Giving Notices” listed in the Agreement.

**SC-17.07 Fill on Private Land**

Insert GC-17.07 after GC-17.06 as follows:

17.07 Fill on Private Land

A. The Contractor shall not deposit any matter on private land for the purpose of fill without written permission of the land owner.

**SC-17.08 Operation of Existing Facilities**

Insert GC-17.08 after GC-17.07 as follows:

17.08 Operation of Existing Facilities

A. No valve, hydrant or other facility of the Portland Water District may be operated by the CONTRACTOR or his agents. The OWNER will, upon reasonable request of the CONTRACTOR, furnish men and equipment for such activity at no additional cost to the CONTRACTOR.

**SC-17.09 Noise Control**

Insert GC-17.09 after GC-17.08 as follows:

17.09 Noise Control

A. The project area is residential in nature. The CONTRACTOR shall provide adequate exhaust silencers on all equipment and shall generally endeavor to minimize noise throughout the term of construction. This shall be in addition to any applicable ordinance or regulation pertaining to noise.

**SC-17.10 Vehicle Idling Policy**

Insert GC-17.10 after GC-17.09 as follows:

17.09 Vehicle Idling Policy

A. Purpose: Air pollution is a major public health concern in Portland Water District’s Service Area. Air pollution can cause or aggravate lung illnesses as well as impose significant economic costs and negative impacts on our quality of life. Exhaust from both on- and off-road vehicles is a source of carbon monoxide, particulate matter, toxic air contaminants, and greenhouse gases. The Portland Water District can play an important role in improving air quality by limiting the amount of time the District vehicles are allowed to idle. As an environmental leader in the water and wastewater fields the District has the responsibility to be a leader by the adoption of effective policies to improve air quality. Under this policy,

limitations and guidelines on engine idling are established by the District to reduce the idling of District and Contractor vehicles.

B. Definitions:

1. “Driver” means any person who drives, operates, or is in actual physical control of a vehicle.
2. “Emergency” means a sudden, urgent, usually unforeseen, occurrence.
3. “Equipment Operator” means any person who is in actual physical control of a piece of off-road equipment.
4. “Idling” means the engine is running while the vehicle is stationary or the piece of off-road equipment is not performing work.
5. “Traffic Control Device” means any sign, signal, marking or device placed or erected for the purpose of regulating, warning, or guiding traffic.
6. “Off-road Equipment” means all non-road equipment such as bulldozers, loaders, backhoes, compressors, etc.
7. “Vehicle” means any on-road, self-propelled vehicle that is required to be registered and have a license plate by the Department of Motor Vehicles.

C. Scope: This policy applies to all District and Contractor vehicles regardless of gross vehicle weight rating, all heavy-duty vehicles regardless of the fuel being used, all off-road diesel equipment regardless of horsepower rating, and all off-road equipment regardless of fuel being used, except as provided as specific exceptions stated in the policy.

D. Policy:

1. The driver of a vehicle shall turn off the engine upon stopping at a destination and shall not cause or allow an engine to idle at any location for:
  - a. More than ten consecutive minutes or
  - b. A period or periods totaling more than ten minutes in any one hour period.
2. An equipment operator of an off-road piece of equipment shall not cause or allow an engine to idle at any location for:
  - a. More than ten consecutive minutes or
  - b. A period or periods totaling more than ten minutes in any one hour period
3. This idling policy does not apply to a vehicle or a piece of equipment for the period or periods during which:
  - a. idling is necessary while stopped:
    - 1) and the vehicle is being used for a traffic control device (Using strobe lights, light-

bars, etc.) to protect employees while working in the street from traffic.

- 2) for traffic conditions over which the driver has no control, included but not limited to: stopped in a line of traffic, at a railroad crossing, etc.

- 3) at the direction of a law enforcement officer

- b. idling is necessary to determine that the vehicle and / or the off-road equipment is in safe operating condition and equipped as required by all provisions of the law, and that all equipment is in good working order, either as part of the daily vehicle inspection, or as otherwise needed.

- c. idling is necessary for the testing, servicing, repairing, and diagnostic purposes.

- d. idling is necessary, for a period of 3 minutes or as recommended by the manufacturer, to cool down a turbo- charged vehicle before turning off the vehicle.

- e. idling is necessary to accomplish work for which the vehicle / equipment was designed, other than transporting goods, for example: operating a lift, crane, pump, drill, hoist, or other auxiliary equipment other than a heater or air conditioner.

- f. idling is necessary to operate defrosters, heaters, air conditioners, or other equipment to prevent a safety hazard such as melting ice on the windshield, but not solely for the comfort of the driver or passengers for a period not to exceed twenty minutes.

- g. idling is necessary solely to recharge a battery or other energy storage unit of a hybrid electric vehicle / equipment.

- h. idling is permitted when vehicles are occupied by personnel and being actively used as a work station, i.e. TV truck, using computers, etc.

- i. idling is permitted to provide a habitable environment during breaks during extreme weather conditions, hot or cold (above 80 degrees F or below 32 degrees F.)



**SECTION 01000  
GENERAL REQUIREMENTS**

PART 1 – GENERAL

1.01 SUMMARY OF WORK

- A. General: The project includes a base bid, two (2) deductive bid alternates, and one (1) additive bid alternate. In addition, the progress of work will need to be scheduled and coordinated in accordance with the sequence of construction outlined in Paragraph 1.07 of this section. A summary of work associated with the base bid and bid alternates is provided below:

Base Bid: The base bid includes the installation of sanitary sewer extensions and water main renewals within the Island Avenue and Winding Way areas as further described below:

Island Avenue Area

- Installation of approximately 3,100 linear feet of 8” diameter gravity sewer main with 4” diameter sanitary sewer service laterals to abutting properties.
- Installation of approximately 590 linear feet of 1½” diameter low-pressure force main with service laterals to 11 abutting properties.
- Installation of approximately 1450 linear feet of 12” diameter water main, replacing a portion of existing 6” diameter water main, and installation of new service laterals. This work also includes installation of temporary water service.
- Installation of storm drain improvements and remedial drainage swale grading along the easterly side of Island Avenue.
- Roadway reconstruction and restoration of disturbed areas.

Winding Way Area

- Installation of approximately 1,300 linear feet of 8” diameter gravity sewer main with 4” diameter sanitary sewer service laterals to abutting properties.
- Installation of approximately 820 linear feet of 4” diameter force main with connection to existing gravity sewer system within Maple Street.
- Installation of approximately 200 linear feet of 8” diameter water main to replace and re-align portion of the existing water main to enable the installation of the gravity sewer main work.
- Installation of Great Pond Road Sewerage Pump Station with separate wet well/valve pit structures, duplex submersible pumps, and 13’x17’ control building housing electrical/telemetry equipment and standby generator.
- Roadway reconstruction and restoration of disturbed areas.

Bid Alternate No. 1 (Diamond Pass): Bid Alternate No. 1 is a deductive alternate associated with the installation of approximately 81 linear feet of 8” diameter gravity sewer main, two manholes, 4” sanitary sewer services to three properties, and 1½” diameter low pressure force main service lateral to a fourth property. The work associated with Bid Alternate No. 1 shall also include all trench excavation (including rock removal), backfill, and surface restoration work along Diamond Pass to complete the sewer installation work.

Bid Alternate No. 2 (Sunset Road): Bid Alternate No. 2 is a deductive and includes the installation of approximately 350 linear feet of 1½” diameter common low pressure force main with 1¼” diameter low pressure force main service laterals to seven (7) abutting properties. The work associated with Bid Alternate No. 2 shall also include all trench excavation (including rock removal), backfill, and surface restoration work along Sunset Street to complete the sewer installation work.

Bid Alternate No. 3 (Winding Way Water Main Extension): Bid Alternate No. 3 is an additive alternate associated with the installation of approximately 340 linear feet of 4" diameter water main with service laterals to abutting properties. The work associated with Bid Alternate No. 3 shall also include all trench excavation (including rock removal) and backfill of the water main extension work.

1.02 ENGINEER'S FIELD OFFICE

- A. The Contractor shall provide and maintain a Field Office for the exclusive use of the Engineer. The facilities shall be available for his use during the entire life of the project, and shall not be disturbed, moved, or interrupted without the Engineer's approval. The building shall be a separate structure, sealed from the weather, completed and ready for occupancy on the first day of work. The building shall be erected on a location approved by the Owner and the Engineer. The field office shall include: electricity, heat, air conditioning, water, and telephone and broadband service. A mobile field office trailer is acceptable if it contains the required facilities described herein:

Size:	Equivalent 10' x 24'
Windows:	2 arranged for cross ventilation with screens
Door:	With closer and secure lock
Lighting:	Adequate lights over all work areas, convenience outlets each wall
Heating and Air Conditioning System:	Adequate heating system, thermostat control
System:	Adequate cooling system, thermostat control
Plumbing:	Toilet or privy
Communication Systems:	A plain copy facsimile machine shall be provided w/ telephone service Broadband service connection shall be provided
Water:	Service connection or water cooler

The following office furniture and equipment shall be furnished:

- 1 – Flat top desk, 2-1/2 x 4-1/2 feet, with drawers at each end
- 2 – Plywood drawing tables, 3 feet x 6 feet top
- 2 – Straight chairs, 2 swivel chairs, 2 drafting stools
- 1 – 4-drawer steel filing cabinet with lock and key
- 2 – Large metal wastebaskets
- 1 – Rack from which to hang drawings, including related appurtenances
- 1 – Wall-mounted fire extinguisher
- 1 – Desk lamp
- 2 – Drafting table lamps
- 1 – Broom

Sufficient floor sweeping compound for the duration of the job, window cleaning materials, toilet paper and paper towels.

If a mobile office is utilized, the space between the floor and ground shall be skirted the entire perimeter for the protection of utility connections and to reduce heat loss during cold weather.

- B. The office site shall have parking space for three vehicles and the parking area shall have a gravel or stone surface, properly maintained.
- C. On completion of the project, the field office shall be removed from the site.

1.03 PROJECT COORDINATION

- A. Coordinate all work under this contract. In particular, this project requires coordination of work with the Portland Water District, City of Portland, Central Maine Power Company, Fairpoint Communications, and Time Warner Cable.

- B. Make arrangements for temporary storage of materials and supplies and for their timely delivery to the job site. Temporary storage locations shall be the responsibility of the Contractor.
- C. Assist the Engineer as required in the review of construction and any testing of materials.
- D. Cooperate and provide access to the Owner or his representatives for the purpose of measuring quantities, if necessary, and access to the project.
- E. Maintain up-to-date progress records and record drawings.
- F. Maintain the project site in a neat condition.
- G. Preparing and maintaining records of contractor's request for information.
- H. Providing access and personnel to accompany City officials and third party inspectors.
- I. Prompt notification to the Owner of any construction changes, which alter or affect the work of others.

#### 1.04 LAYOUT OF WORK

- A. The contract drawings depict locations of benchmarks and horizontal control points throughout the project site. For the purposes of this specification, this shall be the limit of Owner provided survey control to the contractor.
- B. The Contractor shall employ a land surveyor licensed in the State of Maine to lay out the work from the established reference points and benchmark, and coordinate system indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The licensed land surveyor shall certify in writing that the layout was performed under his/her direct supervision and is correct and meets the requirements of the contract documents. A copy of the certificate shall be furnished to the Owner.

The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Owner. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Owner until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Owner may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

- C. The layout shall establish the locations of silt fence and areas of trees to be protected for review and approval of the Owner prior to clearing.
- D. Establish and plainly mark construction base lines for the utility work and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each structure, utilities, or site improvement are in accordance with lines and elevations shown on the contract drawings.
- E. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work.
  1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the Owner before any work is placed.
  2. A detailed check of all coordinates, resultant pipe lengths, backslopes, and appurtenant locations shall be made by the registered land surveyor or civil engineer and provided to the Owner prior to starting utility lines.

- F. During progress of work the Contractor shall have line grades and plumbness of all major work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the Owner before any major items are placed. In addition, Contractor shall furnish to the Owner certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.
  - 1. Elevations of all pavement areas and building pads.
  - 2. Lines and elevations of sewers, and storm drains.
  - 3. Lines of elevations of all swales and drainage areas.
  - 4. Lines of elevations of parking area.
- G. The location of catch basins and manholes shall be accurately located by the layout data provided on the contract drawings.
- H. Whenever approved changes from contract drawings are made in line or grading, record such changes on a reproducible drawing and forward record of "as-built" conditions on record drawings to the Owner upon completion of work. Refer to Section 01700 – Project Closeout for additional requirements for record drawings.
- I. Changes in location, additions and appurtenant items such as, but not limited to, manholes, inlets, pipe lines and conduits shall be shown in same manner as on contract drawings (by coordinates or dimensions from buildings); however, if no such locations are shown on contract drawings, changes in locations of items shall be shown by a sufficient number of right-angled dimensions from the nearest building or structure.
- J. Contractor is responsible for all costs associated with layout of work, and any costs associated with correcting non-conforming work or with restoring the landscape to its original condition.

#### 1.05 PRECONSTRUCTION MEETING

- A. A preconstruction meeting will be held within 15 days after date of Notice to Proceed and prior to start of construction. This meeting shall be attended by the Portland Water District officials, Engineer, Contractor, Subcontractors, City officials, and franchise utility representatives.
- B. The following will be undertaken:
  - 1. Distribute and discuss:
    - a. List of major Subcontractors.
    - b. Tentative construction schedule.
  - 2. Critical work sequencing.
  - 3. Relation and coordination of Subcontractors.
  - 4. Designation of responsible personnel.
  - 5. Processing of field decision and Change Orders.
  - 6. Adequacy of distribution of Contract Documents.
  - 7. Submittal of Shop Drawings, project data, and samples.
  - 8. Procedures for maintaining Record Documents.
  - 9. Use of premises:
    - a. Office and storage areas.
    - b. Owner's requirements.
  - 10. Safety and first-aid procedures.
  - 11. Security procedures.
  - 12. Housekeeping procedures.
  - 13. Aggregate suppliers and submission of samples and test results.
  - 14. Review of the proposed independent testing laboratory to be retained by the Contractor.

#### 1.06 PROGRESS MEETINGS:

- A. Progress meetings will be scheduled on a mutually acceptable timetable.

B. Attendance:

1. Owner or designated representative.
2. Contractor.

C. Minimum agenda:

1. Review, approve minutes of previous meeting.
2. Review work progress since last meeting.
3. Note field observations, problems, and decisions.
4. Identify problems, which impede planned progress.
5. Review off-site fabrication problems.
6. Develop corrective measures and procedures to regain planned schedule.
7. Revise construction schedule as indicated.
8. Plan progress during next work period.
9. Review submittal schedules, expedite as required to maintain schedule.
10. Maintaining of quality and work standards.
11. Review changes proposed by Owner for:
  - a. Effect on construction schedule.
  - b. Effect on completion date.
12. Complete other current business.

1.07 CONSTRUCTION SCHEDULES:

A. General:

The Contractor shall provide construction schedules for the project at the preconstruction meeting, and revise as necessary prior to each pay requisition. The schedule shall be coordinated with material suppliers, subcontractors, etc.

B. Form of Schedule:

Prepare in form of horizontal bar chart as follows:

1. Provide separate horizontal bar column for each trade or operation.
2. Order: Chronological order of beginning of each item of work.
3. Identify each column:
  - a. By major specification number.
  - b. By distinct graphic delineation.
4. Horizontal time scale: Identify first work day of each week.

C. Content of Schedules:

Provide complete sequence of construction by activity.

1. Shop drawings, project data, and samples:
  - a. Submittal dates.
  - b. Dates reviewed copies will be required.
2. Completion dates for:
  - a. Island Avenue Sewer Extension Area:
    - Start of construction work
    - Completion of site preparation
    - Completion of utility infrastructure improvements
    - Completion of quality control testing
    - Completion of surface restoration

- b. Winding Way Sewer Extension Area:
- Start of construction work
  - Completion of site preparation
  - Completion of utility infrastructure improvements
  - Completion of quality control testing
  - Completion of surface restoration

- c. Great Pond Road Sewerage Pump Station:
- Start of construction work
  - Completion of site preparation
  - Completion of wet well and valve pit installation
  - Completion of control building foundation installation
  - Completion of control building structure
  - Completion of electrical/mechanical equipment
  - Completion of site work/surface restoration
  - Completion of testing/start-up

3. Product procurement and delivery dates.
4. Dates for beginning and completion of each element of construction, specifically items which impact equipment startup, etc.
5. Show projected percentage of completion for each item of work as of first day of each month.
6. Include estimate of the amount of each monthly requisition for the duration of the project.

D. Updating:

1. Show all changes occurring since previous submission of updated schedule.
2. Indicate progress of each activity; show completion dates.
3. Include:
  - a. Major changes in scope.
  - b. Activities modified since previous updating.
  - c. Revised projections due to changes.
  - d. Other identifiable changes.
4. Provide narrative report, including:
  - a. Discussion of problem areas, including current and anticipated delay factors, and their impact.
  - b. Corrective action taken, or proposed, and its effect.
  - c. Effect of change in schedules of other Prime Contractors.
  - d. Description of revisions:
    - Effect on schedule due to change of scope.
    - Revisions in duration of activities.
    - Other changes that may affect schedule.

E. Schedule Submittals:

1. Submit initial schedules within 10 days after date of Notice to Proceed.
  - a. Engineer will review schedules and return review copy within 10 days after receipt.
  - b. If required, resubmit within 7 days after return of review copy.
2. Submit periodically updated schedules accurately depicting progress to first day of each month.
3. Submit the number of copies required by the Contractor, plus 3 copies to be retained by the Engineer.

F. Schedule Distribution:

1. Distribute copies of reviewed schedules to:
  - a. Job site file.

- b. Other concerned parties.
  - 2. Instruct recipients to report any inability to comply, and provide detailed explanation, with suggested remedies.
- 1.08 APPLICABLE CODES
- A. Comply with current edition of all local, state, and national codes applicable to the proposed construction.
- 1.09 AS-BUILT INFORMATION
- A. Record Ties: The Contractor shall maintain a record of all locations of buried fittings, etc., throughout the project. The locations shall be recorded by 3 ties from fixed permanent points. **Record ties shall be provided as part of the monthly pay requisition process.** The records shall be clearly legible.
  - B. Record Drawings: Contractor shall furnish record drawings as specified in Section 01700 – Project Closeout. **The record drawings shall be kept up to date throughout the construction process and copies of the record drawing markups shall be provided as part of the monthly pay requisition process.**
  - C. Insufficient or incomplete as-built information submitted by the Contractor as part of the monthly pay requisition process may result in the Owner withholding or reducing the amount of payment requested by the Contractor.
- 1.10 REQUESTS FOR INFORMATION (RFIs)
- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
    - 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
    - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
  - B. RFI Forms: The use of either hard copy or software-generated forms will be acceptable.
    - 1. Hard-Copy RFIs: Form at end of this Section.
      - a. Identify each page of attachments with RFI number and sequential page number.
    - 2. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
      - a. Attachments shall be electronic files in Adobe Acrobat PDF format.
  - C. Engineer's Action: Engineer will review each RFI, determine action required, and return it. Allow seven working days for Engineer's response for each RFI. RFI's received after 1:00 p.m. will be considered as received the following working day.
    - 1. The following RFIs will be returned without action.
      - a. Request for approval of submittals.
      - b. Request for approval of substitutions.
      - c. Request for coordination information already indicated in the Contract Documents.
      - d. Request for adjustments in the Contract Time or the Contract Sum.
      - e. Request for interpretation of Engineer's actions on submittals.
      - f. Incomplete RFIs or RFIs with numerous errors.
    - 2. Engineer's action may include a request for additional information, in which case Engineer's time for response will start again.

3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit change Proposal according to the General Conditions of the Contract.
  - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of RFI response.
- D. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFI's organized by the RFI number. Submit log weekly. Include the following:
  1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Engineer.
  4. RFI number, including RFIs that were dropped and not submitted.
  5. RFI Description.
  6. Date the RFI was submitted.
  7. Date Engineer's response was received.
  8. Drawing number and detail references, as appropriate.
  9. Field dimensions and conditions, as appropriate.
  10. Identification of related Minor change in the work, Construction Change Directive, and Proposal Request, as appropriate.
  11. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

#### PART 2 – PRODUCTS

This part not used.

#### PART 3 – EXECUTION

This part not used.

\*\*\*END OF SECTION 01000\*\*\*





Reply: \_\_\_\_\_  
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Response By: \_\_\_\_\_

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

File Distribution:

**SECTION 01001  
SITE PERMITS**

**PART 1 – GENERAL**

1.01 SUMMARY OF WORK

- A. Construction of this project must meet the terms and conditions of the site permits issued by the regulatory review agencies. The construction of the Great Pond Road Pump Station is subject to the permit requirements set forth in the Conditional Use Permit issued by the City of Portland Zoning Board of Appeals; the Administrative Authority issued by the City of Portland Planning Department; and the Natural Resource Protection Act (NRPA) Tier 1 Wetland Alteration Permit issued by the Maine Department of Environmental Protection (MeDEP). The portion of cross-country utility installation work across private property shown on Sheet C-9 of the plan set is subject to the permit requirements set forth in the NRPA Permit-by-Rule issued by the MeDEP for this work.

Copies of the applicable permits issued for this project are appended to this section of the specifications. The special permit conditions that are to be met by the Contractor are as follows:

- City of Portland Conditional Use Permit  
No conditions identified.
- City of Portland Administrative Authority  
Condition No. #
- NRPA Tier 1 Wetland Alteration Permit  
Special Condition No. #  
Standard Condition No. #
- NRPA Permit-By-Rule  
Part C – Standards.

The Owner will be responsible for meeting all other conditions of these permits for this project not otherwise identified above.

- B. Copies of the Permit Applications and Correspondence during review of the Permits may be inspected during normal working hours at the office of:

DeLuca-Hoffman Associates, Inc.  
Consulting Engineers  
778 Main Street, Suite 8  
South Portland, Maine 04106  
(207) 775-1121

- C. Any contractor who desires to view the Permit Applications and associated correspondence must contact DeLuca-Hoffman Associates, Inc. 48 hours prior to inspecting the information.

**PART 2 – PRODUCTS**

This part not used.

**PART 3 – EXECUTION**

This part not used.

\*\*\*END OF SECTION 01001\*\*\*

**SECTION 01001**

**ATTACHMENT A**

**CITY OF PORTLAND CONDITIONAL USE**

# CITY OF PORTLAND, MAINE

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## ZONING BOARD OF APPEALS

Gordon Smith-chair  
Sara Moppin-secretary  
William Getz  
Mark Bower  
Eric Larsson

January 7, 2013

Jay Hewett  
Portland Water District  
PO Box 3553  
Portland, ME 04104

RE: Corner of Great Pond Road & 3<sup>rd</sup> Street, Peaks Island  
CBL: 085 S003  
ZONE: IR-2

Dear Mr. Hewett,

At the January 3, 2013 meeting, the Zoning Board of Appeals voted 5-0 to grant the Conditional Appeal to build a sewage pumping station. I am enclosing a copy of the Board's decisions.

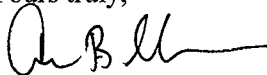
You will also find an invoice for the fees that are still owed for the processing fee, the legal ad and the notices for the appeal. Please submit your payment on receipt of this invoice.

Now that the conditional use appeal has been approved, you need to submit an application to build the sewage pumping station. I have enclosed an application for the building permit. You have six months from the date of the hearing, January 3, 2013, referenced under section 14-474(f), to obtain the building permit, or your Zoning Board approval will expire. You should also talk to Barbara Barhydt in the Planning Division about what site plan review you will need for the project. Her phone number is 874-8699 and her email is [bab@portlandmaine.gov](mailto:bab@portlandmaine.gov).

Appeals from decisions of the Board may be filed in Superior Court in accordance with Rule 80B of the Maine Rules of Civil Procedure.

Should you have any questions please feel free to contact me at 207-874-8709.

Yours truly,



Ann B. Machado  
Zoning Specialist

Cc. file

# CITY OF PORTLAND, MAINE

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## ZONING BOARD OF APPEALS

### ZONING BOARD APPEAL DECISION

**To:** City Clerk  
**From:** Marge Schmuckal, Zoning Administrator  
**Date:** January 4, 2013  
**RE:** Action taken by the Zoning Board of Appeals on January 3, 2013.

**Members Present:** Sara Moppin (secretary), Gordon Smith (chair), Mark Bower, William Getz and Eric Larsson

**Members Absent:** none

#### 1. Old Business

##### A. Variance Appeal:

227-229 York Street, Neil Reiter, leesee, Tax Map 044, Block E, Lot 002, B-1

Neighborhood Business Zone: The applicant is planning to open a restaurant. Three off-street parking spaces are required. The appellant is requesting a variance to waive the off-street parking requirement. Representing the appeal are Tom Landry, the manager for the owner A Better Maine LLC, and the leesee's representative, Stella Hernandez. **The Zoning Board of Appeals voted 3-2 to deny the appeal.**

##### B. Conditional Use Appeal:

227-229 York Street, Neil Reiter, leesee, Tax Map 044, Block E, Lot 002, B-1

Neighborhood Business Zone: The appellant is seeking a Conditional Use Appeal under section 14-163(a)(1) to open a restaurant. Representing the appeal is the leesee's representative, Stella Hernandez. **The Zoning Board of Appeals granted the applicant a continuance that expires on November 19, 2013, a year from the original date of the application.**

#### 2. New Business

##### A. Conditional Use Appeal:

Corner of Great Pond Road & 3<sup>rd</sup> Street, Peaks Island, Portland Water District, buyer,

Tax Map 085, Block S, Lot 003, IR-2 Island Residential Zone: The appellant is seeking a Conditional Use Appeal under section 14-145.9(c)(1) to build a sewage pumping station on the vacant lot. Representing the appeal are Jay Hewett from the Portland Water District and Michael Tadema-Wielandt from DuLuca-Hoffman Associates, Inc.

**The Zoning Board of Appeals voted 5-0 to grant the appeal.**

**B. Disability Variance Appeal:**

13 Carroll Street, Gladys Garcia and Benjamin Crocker, owners, Tax Map 062, Block B, Lot 020, R-6 Residential Zone: The applicants are seeking a disability variance under section 14-473(c)(2) to install a handicap ramp. The appellants are requesting a side setback of 37 inches instead of the required ten foot side yard setback [section 14-139(a)(4)(c)]. Representing the appeal are the owners and their contractor, Lance Yule. **The Zoning Board of Appeals voted 5-0 to grant the appeal.**

**Enclosure:**

Decision for Agenda from January 3, 2013

One DVD

CC: Mark Rees, City Manager

Jeff Levine, AICP, Director Planning & Urban Development

Barbara Barhydt, Planning Division

Mary Davis, Housing and Neighborhood Services Division

# CITY OF PORTLAND, MAINE

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## ZONING BOARD OF APPEALS

IR-2 Island Residential Zone Sewage Pumping Station

### Conditional Use Appeal

#### DECISION

Date of public hearing: January 3, 2013

Name and address of applicant: Portland Water District  
c/o Michael E. Tadema-Wielandt, P.E.  
DeLuca-Hoffman Associates, Inc.  
778 Main Street, Suite 8  
South Portland, ME 04106

Location of property under appeal: Great Pond Road, Peaks Island – 085-S-003

#### For the Record:

Names and addresses of witnesses (proponents, opponents and others):

Jay Hewitt, Portland Water District  
Michael Tadema-Wielandt, DeLuca-Hoffman  
Robert Bannham, 1532 Washington Ave

Exhibits admitted (e.g. renderings, reports, etc.):

David Sullins, 24 3rd Street



Findings of Fact and Conclusions of Law:

The Applicant is requesting a conditional use permit for a property located within the IR-2 zone, in order to add a sewage pumping station. The project site is a 10,752 sq. ft. (0.25 acre) parcel located at the corner of Great Pond Road and 3<sup>rd</sup> Street. The proposed pumping station will serve 31 residences.

The project will include approximately 4,400 linear feet of new gravity sanitary sewer in the northwestern and southern portions of Peaks Island. The project will also include the installation of a subsurface wet well and valve pit, a 13'x17' wood frame building to house the electric panels, telemetry system controls and emergency generator, and a paved driveway.

A. Conditional Use Standards pursuant to Portland City Code §14-145.9(c)(1):

1. The sewage pumping station is suitably screened and landscaped so as to ensure compatibility with the surrounding neighborhood.

Satisfied 5 Not Satisfied     

Reason and supporting facts:

Applicant provided detailed landscaping plan and detailed testimony on proposed species all of which will be native.

B. Conditional Use Standards pursuant to Portland City Code §14-474(c)(2):

1. There are unique or distinctive characteristics or effects associated with the proposed conditional use.

Yes      No 5

Reason and supporting facts:

Attention was paid to make the design similar to nearby structures. Lighting will be minimal. This station is similar to other stations currently in use on island. There will be minimal smells and fumes associated with station.

2. There will be an adverse impact upon the health, safety, or welfare of the public or the surrounding area.

Yes \_\_\_ No 5

Applicant will obtain a license for encroachment into street.

Reason and supporting facts:

Applicant testified that environmental conditions will improve due to upgrades to existing facilities. Many neighbors are in support of this pumping station. No ~~adverse impacts~~ <sup>are testified that there will be</sup> ~~adverse impacts~~ <sup>adverse impacts</sup>

3. Such impact differs substantially from the impact which would normally occur from such a use in that zone.

Yes \_\_\_ No 5

Reason and supporting facts:

This station is very similar to another pumping station nearby on the island and will be nearly identical in appearance.

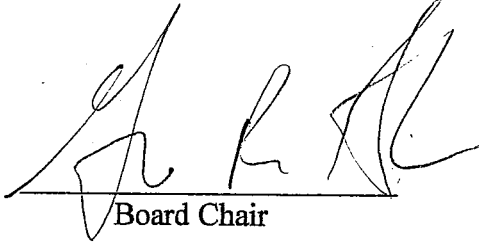
**Conclusion:** (check one)

5 Option 1: The Board finds the standard described in section A above has been satisfied and that not all of the factors (1 through 3) described in section B above are present, and therefore GRANTS the application.

\_\_\_ Option 2: The Board finds that the standard described in section A above has been satisfied, and that while not all of the factors (1 through 3) described in section B above are present, certain additional conditions must be imposed to minimize adverse effects on other property in the neighborhood, and therefore GRANTS the application SUBJECT TO THE FOLLOWING CONDITIONS:

\_\_\_ Option 3: The Board finds that not the standard described in section A above has not been satisfied and/or that all of the factors (1 through 3) described in section B above are present, and therefore DENIES the application.

Dated: January 3, 2013



Board Chair

O:\OFFICE\Jen\IR-2 conditional use appeal Portland Water District.docx

**SECTION 01001**

**ATTACHMENT B**

**CITY OF PORTLAND ADMINISTRATIVE AUTHORITY**

**(PENDING)**

**SECTION 01001**

**ATTACHMENT C**

**NRPA TIER 1 WETLAND ALTERATION PERMIT**

**(PENDING)**

**SECTION 01001**

**ATTACHMENT D**

**NRPA PERMIT-BY-RULE**

- (17) All excavated material must be stockpiled either outside the protected natural resource or on mats or platforms. Hay bales or silt fence must be used, where necessary, to prevent sedimentation. All excavated material must be removed to a location more than 75 feet from the protected natural resource, unless otherwise approved by the DEP, and properly stabilized with vegetation upon project completion.
- (18) Disturbance of vegetation must be avoided if possible. If vegetation must be disturbed during the activity, similar types and amounts of vegetation must be re-established immediately upon completion of the activity and must be maintained.
- (19) Non-native species may not be planted in disturbed areas.
- (20) Riprap projects must be constructed in accordance with the plans or drawings submitted pursuant to subsections B(3) and (4) of this section, as applicable.

**D. Definitions.** The following terms, as used in this chapter, have the following meanings, unless the context indicates otherwise:

- (1) Fill. a. (verb) To put into or upon, supply to, or allow to enter a water body or wetland any earth, rock, gravel, sand, silt, clay, peat, or debris; b. (noun) Material, other than structures, placed in or adjacent to a water body or wetland.
- (2) Riprap. Heavy, irregularly-shaped rocks that are fit into place, without mortar, on a slope. Square or rectangular rocks with flat faces, such as quarry stone or manufactured blocks, do not qualify as “irregularly-shaped”.
- (3) Structure. Anything built for the support, shelter or enclosure of persons, animals, goods or property of any kind, together with anything constructed or erected with a fixed location on or in the ground. Examples of structures include buildings, utility lines and roads.

## **9. Crossings (utility lines, pipes and cables)**

### **A. Applicability**

- (1) This section applies to the installation, maintenance and replacement of an overhead utility line across a river, stream or brook excluding outstanding river segments identified in 38 M.R.S.A. Section 480-P.
- (2) This section applies to the installation, maintenance and replacement of a submerged utility line across a coastal wetland, freshwater wetland, great pond, river, stream, or brook excluding outstanding river segments identified in 38 M.R.S.A. Section 480-P.
- (3) This section applies to the installation, maintenance and replacement of an overhead utility line across or adjacent to a coastal wetland, freshwater wetland or great pond provided the line is within the right-of-way of, or adjacent to the path of, an existing traveled way.
- (4) This section does not apply to a submerged utility crossing that is part of a larger project involving multiple crossings of a natural resource or more than one natural resource. Projects consisting of multiple natural resource crossings must obtain an individual permit under the Natural Resources Protection Act.

- (5) This section does not apply to an activity that is not or will not be in compliance with the terms and conditions of permits issued under the Site Location of Development Law, 38 M.R.S.A. Sections 481 to 490, the Storm Water Management Law, 38 M.R.S.A. Section 420-D, or the Natural Resources Protection Act, 38 M.R.S.A. Sections 480-A to 480-Z.
- (6) This section does not apply to an activity that will not conform to the local shoreland zoning ordinance.

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NOTES:

- (1) Contact the local Code Enforcement Officer for information on local shoreland zoning requirements.
- (2) In a great pond, the placement of water lines to serve a single-family house or the installation of cables for utilities, such as telephone and power cables, is exempt from NRPA permit requirements under 38 M.R.S.A. Section 480-Q (1) provided that the:
  - (a) Excavated trench for access to the water is backfilled and riprapped to prevent erosion;
  - (b) Excavated trench on the landward side of the riprapped area is seeded and mulched to prevent erosion; and
  - (c) Bureau of Parks and Lands has approved the placement of the cable across the bottom of the great pond to the extent that it has jurisdiction.
- (3) Approval for crossing any state-owned (submerged) land must be obtained from the Department of Conservation, Bureau of Parks and Lands, State House Station 22, Augusta, ME 04333.
- (4) A permit will be required from the US Army Corps of Engineers for the following types of projects:
  - (a) Any activity involving open trench excavation in a waterbody or where the impact (direct and indirect) to wetlands exceeds 4,300 square feet;
  - (b) Any activity in coastal waterways;
  - (c) Any activity within a river, stream or brook between October 2 and July 14 ;or
  - (d) Any activity involving work in waterways designated as Essential Fish Habitat for Atlantic salmon including all aquatic habitats in the watersheds of the following rivers and streams, including all tributaries to the extent that they are currently or were historically accessible for salmon migration: St. Croix, Boyden, Dennys, Hobart Stream, Aroostook, East Machias, Machias, Pleasant, Narraguagus, Tunk Stream, Patten Stream, Orland, Penobscot, Passagassawaukeag, Union, Ducktrap, Sheepscot, Kennebec, Androscoggin, Presumpscot, and Saco River.

A copy of the PBR notification and original photographs, not photocopies, should be submitted to the Corps of Engineers for these activities (US Army Corps of Engineers, 675 Western Avenue, Suite #3, Manchester, ME 04351. Tel. (207) 623-8367).

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**B. Submissions**

- (1) The applicant is required to submit photographs of the area which will be affected by the activity proposed.
- (2) Photographs showing the completed project and the affected area must be submitted within 20 days of the activity's completion. The photographs must be sent with a copy of the notification form or labeled with the applicant's name and the town in which the activity took place.
- (3) For any work involving trenching or disturbance of substrate in a coastal wetland, great pond, river, stream or brook that occurs between October 2 and July 14, notice of approval of the timing of the activity from the Department of Inland Fisheries and Wildlife, the Atlantic Salmon Authority and the Department of Marine Resources must be submitted to the DEP with the notification form, unless otherwise approved by the DEP based upon the location of the project. In addition, for a utility crossing of marine or estuarine waters at any time of year, notice of approval of the timing from the Department of Marine Resources must be submitted to the DEP with the notification form.

**C. Standards**

- (1) The following measures must be taken to prevent erosion of soil or fill material from disturbed areas into the resource:
  - (a) Staked hay bales or silt fence must be properly installed between the area of soil disturbance and the resource before the activity begins;
  - (b) Hay bales or silt fence barriers must be maintained until the disturbed area is permanently stabilized;
  - (c) Within 7 calendar days following the completion of any soil disturbance, and prior to any storm event, mulch must be spread on any exposed soils;
  - (d) All disturbed soils must be permanently stabilized; and
  - (e) Within 30 days of final stabilization of the site, any silt fence must be removed.

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NOTE: For guidance on erosion and sedimentation controls, consult the Maine Erosion and Sediment Control BMPs, dated March 2003. This handbook and other references are available from the DEP.

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- (2) Disturbance of wetland vegetation must be avoided if possible. If wetland vegetation must be disturbed during the activity, it must be reestablished immediately upon completion of the activity and must be maintained.
- (3) Non-native wetland plants may not be planted in disturbed areas.
- (4) If the activity occurs in a coastal wetland, great pond, river, stream or brook between October 2 and July 14, the activity must occur during the time period approved by the Department of Inland Fisheries and Wildlife, the Atlantic Salmon Authority and the Department of Marine Resources.

- (5) The trench in and adjacent to the wetland must be refilled with the material that was excavated. The original grading and elevation of the wetland must be restored. Residual fill material must be removed from the wetland or water body and properly stabilized. Pipe bedding material such as crushed stone or sand may be used provided clay dams or synthetic boots are used where appropriate to prevent wetland draining through the bedding material.
- (6) Any trench excavation that occurs within a river, stream or brook must be performed either during a period when no water is flowing, or utilize a dry crossing method such as diverting water flow by coffer dam and pumping around the area of excavation. The trench width in any natural resource must be no wider than necessary to install the device.
- (7) The crossing may not obstruct any recreational usage of the water body.
- (8) Wheeled or tracked equipment may not operate in the water. Equipment operating on the shore may reach into the water with a bucket or similar extension. Equipment may cross streams on rock, gravel or ledge bottom.
- (9) All wheeled or tracked equipment that must travel or work in a vegetated wetland must travel and work on mats or platforms in order to protect wetland vegetation.
- (10) Any debris or excavated material must be stockpiled either outside the wetland or on mats or platforms. Hay bales or silt fence must be used, where necessary, to prevent sedimentation.
- (11) Any debris generated during the activity must be prevented from washing downstream and must be removed from the wetland or water body. Disposal of debris must be in conformance with Maine Hazardous Waste, Septage and Solid Waste Management Act, 38 M.R.S.A. Section 1301 *et seq.*
- (12) Temporary roads constructed of fill are not allowed in the resource except that fill may be used on top of mats or platforms for equipment access.
- (13) The use of untreated lumber is preferred. Lumber pressure treated with chromated copper arsenate (CCA) may be used only if necessary and only if use is allowed under federal law and not prohibited from sale under 38 M.R.S.A. 1682, and provided it is cured on dry land in such a manner to expose all surfaces to the air for a period of at least 21 days prior to construction. Wood treated with creosote or pentachlorophenol must not be used where the wood will come in contact with water.
- (14) Blasting in inundated areas is prohibited.

**D. Definitions.** The following terms, as used in this chapter, have the following meanings, unless the context indicates otherwise:

- (1) **Crossing.** Any activity extending from one side to the opposite side of a protected natural resource, or to an island or upland within a protected natural resource whether under, through or over that resource. Such activities include, but are not limited to roads, fords, bridges, culverts, utility lines, water lines, sewer lines and cables, and the clearing and removal of vegetation necessary to install and maintain these crossings.

- (2) Fill. a. (verb) To put into or upon, supply to, or allow to enter a water body or wetland any earth, rock, gravel, sand, silt, clay, peat, or debris; b. (noun) Material, other than structures, placed in or adjacent to a water body or wetland.
- (3) Land adjacent to a protected natural resource. Any land area within 75 feet, measured horizontally, of the normal high water line of a great pond, river, stream or brook or the upland edge of a coastal wetland or freshwater wetland.
- (4) Riprap. Heavy, irregularly-shaped rocks that are fit into place, without mortar, on a slope. Square or rectangular rocks with flat faces, such as quarry stone or manufactured blocks, do not qualify as “irregularly-shaped”.
- (5) Structure. Anything built for the support, shelter or enclosure of persons, animals, goods or property of any kind, together with anything constructed or erected with a fixed location on or in the ground. Examples of structures include buildings, utility lines and roads.
- (6) Utility lines, pipes and cables. Wires and pipes providing utility services. The term includes telephone and electric wires, gas, oil, water and sewer pipelines, and their support structures, whether public or private.
- (7) Non-native wetland plants. Wetland grasses, forbs, shrubs, or trees not native to the State of Maine, for example, common reed (*Phragmites communis*) and purple loosestrife (*Lythrum salicaria*).

## 10. Stream crossings (bridges, culverts and fords)

### A. Applicability

- (1) This section applies to the construction of a bridge span or culvert crossing of a river, stream or brook, and associated accessway construction within 25 feet of the river, stream or brook crossing excluding the following:
  - (a) Crossings of outstanding river segments identified in 38 M.R.S.A. Section 480-P;
  - (b) Crossings of any river as defined by 38 M.R.S.A. Section 436-A(11), the Mandatory Shoreland Zoning Act (information is available at the Town Office); or
  - (c) Crossings of any portion of a river, stream or brook that experiences tidal action.

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NOTE: Temporary structures do not require a permit from the department under the Natural Resources Protection Act (NRPA) provided no filling and minimal soil disturbance occurs. All crossings involving filling in and adjacent to a river, stream or brook, such as culvert crossings, are subject to the NRPA and must first receive a permit before construction.

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- (2) This section also applies to the establishment of a permanent stream ford for purposes of timber harvesting, livestock, agriculture and construction and maintenance of a utility line.

**SECTION 01025  
MEASUREMENT AND PAYMENT**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Lump Sum Bid Items
- B. Unit Price Bid Items
- C. Allowance Bid Items
- D. Other Work

1.02 RELATED DOCUMENTS AND SECTIONS

- A. Section 00410 – Bid Form
- B. Section 00700 – Standard General Conditions
- C. Section 00800 – Supplementary Conditions
- D. Individual Specification Sections

1.03 SCHEDULE OF BASE BID ITEMS

**A. Bid Item No. 1 – Engineer's Field Office**

- 1. The work includes providing a field office for the exclusive use of the Engineer during the project in accordance with Section 01000, 1.2 of the specifications. It shall include all heat, light, water, and telephone service for all calls (excluding long distance) for observation of the work.
- 2. Method of Measurement: The Engineer's field office shall have a single lump sum measurement.
- 3. Basis of Payment: The payment for the Engineer's field office shall be:
  - 1/3 of the lump sum payment shall be made after the field office is installed.
  - 1/3 of the lump sum payment shall be made after the project is 50% complete.
  - 1/3 of the lump sum payment shall be made upon substantial completion of the project.

**B. Bid Item No. 2 – Traffic Control, Mobilization and Demobilization**

- 1. Traffic control, mobilization, and demobilization shall include all work associated with providing, installing, and maintaining construction signs and traffic control devices acceptable to the City of Portland Department of Public Services as well as the mobilization and demobilization of equipment, materials, and personnel during the project.
- 2. Method of Measurement: Traffic control, mobilization, and demobilization shall have a single lump sum payment for the project irrespective of the number of construction shutdowns which occur during the project.
- 3. Basis of Payment: Payment shall be made as follows:
  - 10% after start of the project and completion of all test pits,
  - 20% after 60 contract calendar days have been completed,
  - 20% after 120 contract calendar days have been completed,
  - 20% after 180 contract calendar days have been completed,
  - 30% upon substantial completion of the project.

**C. Bid Item No. 3 – Test Pit Excavation**

1. Test pit excavation, including compacted backfill and cold bituminous concrete mix, in accordance with Section 2 - Excavation.
2. Method of Measurement: The volume of test pit excavation, in cubic yards, will be determined by in place measurement of earth removed.
3. Basis of Payment: The accepted quantity of test pit excavation, including compacted backfill and cold bituminous concrete mix, will be paid for at the unit price bid for Item No. 3, per cubic yard.

**D. Bid Item No. 4 – Provide, Install, and Maintain Sheet piling, Bracing and Trench Protection**

1. Sheet piling, shoring, bracing, trench sloping, underpinning or other methods required to prevent cave-in or loose soil from falling into excavation in accordance with Section 02220.
2. Method of Measurement: None.
3. Basis of Payment: The accepted quantity of excavation protection outlined above, including removal and disposal will be paid for at the lump sum price bid for Item No. 4.

**E. Bid Item No. 5 – Rock Excavation, Including Disposal and Replacement with Select Backfill**

1. Rock excavation, including removal, disposal and replacement with compacted select backfill, in accordance with Section 02220 and 02240.
2. Method of Measurement: The volume of trench rock excavation in cubic yards will be determined by the vertical distance from the surface of ledge to the bottom of pipe bedding, measured along the centerline of pipe and the trench pay width as defined on the Drawings. For structures, the surface of the ledge will be sectioned to determine its average surface elevation to bottom of granular base. Horizontal dimensions shall be 2 feet outside the maximum concrete line. Boulders in excess of 2 cubic yards will be measured by Engineer upon removal from the excavation.

Portland Cement Concrete and Bituminous Concrete Pavement will not be considered or measured for payment under this item.

3. Basis of Payment: The payment for rock excavation shall be at the unit price bid for:

Bid Item No. 5	Rock Excavation	Per Cubic Yard.
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**F. Bid Item No. 6 – Common Excavation Associated with Roadway Restoration Work**

1. Common excavation shall include the excavation and removal of materials; including surface items such as pavement, concrete, and unsatisfactory materials within the excavated areas, to the limits defined in the typical sections and plan views for restoration of roadways.

The reuse of acceptable onsite excavation material within the project site shall be incidental to the project and Bid Item No. 6. In addition, any onsite excavation materials classified as surplus material in accordance with Section 02220, paragraph 3.13 of these specifications shall be hauled and disposed of at no additional cost to the project.

2. Method of Measurement: The quantity of common excavation will be determined by the average end method based upon the “neat” lines shown on the sections. No payment for excavation for utilities, pipeline installation, appurtenances, and retaining walls shall be made.

3. Basis of Payment: The payment shall be made under the following item:

Bid Item No. 6	Common Excavation Associated with Roadway Restoration Work	Per Cubic Yard
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**G. Bid Item No. 7 – Excavation Below Grade**

1. Excavation below grade shall include the excavation and removal of materials below the normal bottom of the pipe bedding to the depth of authorized below grade excavation. It includes the replacement and compaction of the excavated material with a gravel borrow which meets the requirements of the current Maine Department of Transportation Specifications for 703.06, Type D subbase gravel material.
2. Method of Measurement: Excavation below grade including disposal and backfilling with approved subbase gravel shall be measured on a cubic yard basis. In trench areas, the volume shall be determined by the depth from the bottom of the normal pipe bedding to the authorized below grade elevation, the length of the section, and the trench pay width defined on the plans. In areas of appurtenances, the depth shall be from the bottom of the normal base bedding and the area shall be defined as being two feet beyond the maximum outside dimension of the appurtenant structure.
3. Basis of Payment: Excavation Below Grade shall be paid for under the following item:

Bid Item No. 7	Excavation Below Grade	Per Cubic Yard
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**H. Bid Item No. 8 – Select Backfill**

1. Select backfill materials and compaction in accordance with Section 02220 – Excavation, Backfill, and Compaction.
2. Method of Measurement: The volume of select backfill material, in cubic yards, will be determined as follows:
  - a. For pipelines:
    - Width shall be the trench pay width as defined in Contract Drawings.
    - Length shall be the horizontal distance along the trench where the Engineer has authorized use of offsite materials.
    - Depth shall be depth of material placed above an elevation equal to the top of the pipe plus 6 inches.
  - b. Appurtenant Structures
    - Depth shall be from underside of concrete foundation or slab to underside of road gravel or, if applicable, underside of loam.
    - The area shall be excavation limit, 2 feet outside maximum concrete line, minus areas of structure and pipeline trench.
3. Basis of Payment: The accepted quantity of offsite select backfill, including compaction, will be paid for at the unit price bid for Item No. 8 – Select Backfill, per cubic yard installed. No payment will be made for offsite select backfill to replace rock.

Bid Item No. 8	Select Backfill	Per Cubic Yard
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**I. Bid Item No. 9 – Sawcut Existing Pavement**

1. The work includes saw cutting pavement in a “neat” line as indicated on the contract plans or as directed by the Engineer. There are certain portions of the work where it is anticipated old Portland Cement concrete pavement will be encountered and must be removed to complete the work. The Portland Cement concrete shall be removed by saw cutting or other means which will provide a smooth edge.
2. Method of Measurement: Saw cutting existing Portland Cement concrete pavement shall be measured on a linear foot basis along the edge of the trenches defined by the trench section pay width. Where the trench crosses Portland Cement concrete pavement on both sides of the trench, each side will be measured. No measurement will be made for recutting Portland Cement concrete due to additional removal or recutting due to undermining of the pavement as the work proceeds or for cutting Portland Cement concrete pavement outside of the trench pay width defined on the contract drawings.

Sawcut pavement shall be measured based upon the linear foot.

3. Basis of Payment: The accepted linear feet of saw cut existing pavement shall be paid under the following item:

Bid Item No. 9	Sawcut Existing Pavement	Per Linear Foot
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**J. Bid Item No. 10 – Mill Existing Bituminous Pavement In-Place (3” Depth)**

1. Bituminous Concrete Milling shall include loading and hauling of pavement grinding for reuse on the project site or to a storage site acceptable to the City of Portland within a 2 mile radius of the project site.

Removing of pavement surface shall include all work associated with the removal and cleanup of the work area. The equipment used for removing the bituminous pavement surface shall be cold milling machine or power operated planer capable of removing the existing pavement to the required depth, width, grade, and slope.

2. Method of Measurement: Bituminous Concrete Milling shall be measured on the basis of square yard with no deductions made for areas occupied by existing catch basins or manholes.
3. Basis of Payment: The accepted quantities will be paid for by the square yard under the following item:

Bid Item No. 10	Mill Existing Bituminous Pavement In-Place (3” Depth)	Per Square Yard
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**K. Bid Item No. 11 – Remove and Reset Sign or Mail Box**

1. Bid Item No. 11 shall include the removal and resetting of existing signs and mail boxes that are determined to be in conflict with the completion of the work associated with this Contract. The Contractor shall take care to protect the signs and mailboxes during the removal and replacement work. No separate project will be made for the replacement of signs or mail boxes damaged as a result of the Contractor’s negligence.
2. Method of Measurement: Standard street signs and mail box removal and resetting will be measured by each installed, complete in place.
3. Basis of Payment: The accepted quantity of each bid item will be paid under the following items:

Bid Item No. 11	Remove and Reset Sign or Mail Box	Per Each
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**L. Bid Item No. 12 – Remove Existing Structure**

1. The work of this bid item shall include the removal of the structure specified for on the drawings. This includes the excavation surrounding the structure, disposal of the structure, and replacement with backfill material in accordance with Section 02220.
2. Method of Measurement: Removal of existing structures shall be measured per each.
3. Basis of Payment: Payment shall be made under the following item:

Bid Item No. 12      Remove Existing Structure      Per Each

**M. Bid Item No. 13 – Alter Existing Structure**

1. Alterations to existing structures include, but are not limited to, adjustments to manhole invert channel caused by new pipe connections or removal of existing pipe connections, and removal and plugging of existing catch basin lead and replacing with a new lead connection conforming to the project plans and specifications.
2. Method of Measurement: Alter Existing Structure shall be measured per each.
3. Basis of Payment: Payment shall be made under the following item:

Bid Item No. 13      Alter Existing Structure      Per Each

**N. Bid Item No. 14 – Adjust Existing Structure**

1. Adjust existing structure shall include the reconstruction of the structure to the required grade. It shall include the reuse of the existing frames, grates, and covers unless otherwise directed. This item shall also include the cleaning of each structure, and the replacement of unacceptable frames, grates, and/or cover as noted on the plans.
2. Method of Measurement: Measurement shall be per each.
3. Basis of Payment: Payment shall be made under the following item:

Bid Item No. 14      Adjust Existing Structure      Per Each

**O. Bid Item No. 15 – Calcium Chloride**

1. Calcium Chloride may be used as an agent to control dust. The Contractor shall notify the Owner or their representatives prior to the placement of calcium chloride. All loose materials shall be swept off pavement areas prior to placement of calcium chloride.
2. Method of Measurement: The calcium chloride shall be measured by weight with the quantity agreed upon with the Engineer prior to placement.
3. Basis of Payment: Calcium chloride shall be paid for on the basis of the approved weight at the unit bid price under:

Bid Item No. 15      Calcium Chloride      Per Ton

**P. Bid Item No. 16 – Water for Dust Control**

1. Water may be used as an agent to control dust. The Contractor shall notify the Owner or their representative prior to placing water for dust control.

All loose material shall be swept from the pavement prior to placement of water for dust control.



The Contractor shall be responsible for determining conditions which warrant placement of water for dust control except that the Owner or the Engineer may request the use of water for dust control at any time.

2. Method of Measurement: The Contractor shall use a vehicle with a tank equipped with a sight gauge to allow the volume of water to be determined. The quantity shall be agreed upon with the Engineer prior to placement.
3. Basis of Payment: Water for dust control shall be paid on the basis of the approved volume under:

Bid Item No. 16	Water for Dust Control	Per 1,000 Gallon Unit
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**Q. Bid Item No. 17 – Hot Bituminous Concrete Surface, Superpave 12.5 mm, and Bid Item 18 – Hot Bituminous Concrete Binder, Superpave 19 mm**

1. The work shall include providing, installing hot bituminous concrete pavement for streets and driveways within the limits of roadway restoration work as identified on the plans, or as directed by the Engineer.
2. Method of Measurement: Measurement shall be based upon certified weight slips.
3. Basis of Payment: Payment shall be made based upon the approved tonnage as follows:

Bid Item 17	Hot Bituminous Concrete Surface Superpave 12.5 mm	Per Ton
Bid item 18	Hot Bituminous Concrete Binder Superpave 19 mm	Per Ton

**R. Bid Item No. 19 – Base Gravel, Type B**

1. The work shall include providing, installing, compacting, testing, and protection of aggregate materials for roadways as designed for reconstruction.  
  
It does not include gravel used for utility trenches outside of street reconstruction areas, which is incidental to those utilities.
2. Method of Measurement: The volume of base gravel will be determined by the specified depth of gravel multiplied by the area of gravel placement as measured in the field.
3. Basis of Payment: Payment shall be made at the unit price for Bid Items 19 and 25 per cubic yard.

**S. Bid Item No. 20 – Place, Spread, Grade, and Compact Pavement Grindings**

1. The Contract drawings identify several roadway segments that are to be restored with a pavement grinding surface. The work associated with this bid item shall include the placement, spreading, grading, and compaction of pavement grinding materials along the designated roadway areas. The final pavement grinding surface restoration area shall match existing roadway travel surface widths to the extent practicable and as determined by the Engineer.
2. Method of Measurement: Measurement shall be per square yard.
3. Basis of Payment: payment shall be made under the following:

Bid Item No. 20	Place, Spread, Grade, and Compact Pavement Grindings	Per Square Yard
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**T. Bid Item No. 21 – 1¼” Diameter HDPE SDR 11 (Pre-Insulated) Low Pressure Force Main; Bid Item No. 22 – 1½” Diameter HDPE SDR11 (Pre-Insulated) Low Pressure Force Main; Bid Item No. 25 – 4” Diameter PVC SDR 21 Sewer Force Main Including Bends, Fittings, and Thrust Restraint; Bid Item No. 26 – 4” Diameter PVC SDR35 Sewer Service Lateral Including Bends and Caps; Bid Item No. 28 – 8” Diameter PVC SDR 35 Sewer Main in Single Pipe Trench (<12 Feet Deep); Bid Item No. 29 – 8” Diameter PVC SDR 35 Sewer Main in Single Pipe Trench (>12 Feet Deep); Bid Item No. 30 – 8” Diameter PVC SDR 35 Sewer Main in Multiple Pipe Trench (<12 Feet Deep); Bid Item No. 31 – 6” Diameter PVC SDR 35 Underdrain with Cap; Bid Item No. 32 – 8” Diameter PVC SDR 35 Storm Drain Pipe; Bid Item No. 33 – 12” Ductile Iron Storm Drain or Culvert Pipe; Bid Item No. 34 – 18” Diameter RCP Class III Culvert Pipe**

1. The work under these payment items shall include installation of pipe, gaskets, flanges, fittings, including pressure testing. It also includes excavation, backfill, bedding, and compaction of trench materials.
2. Method of Measurement: The length of pipe shall be measured in linear feet along the centerline of pipe from center to center of appurtenances minus the inside of dimension of the structure along the axis of measurement.

Measurement for sewers will also include consideration of the pipe trench type. Where no other pipes are installed in the trench, the measurement shall be for a sewer installed in a single pipe trench. Where other pipes are installed in the trench, the measurement shall be for a sewer installed in a multiple trench.

Measurement for all storm drains shall be the actual footage installed including tapered ends where required. Measurement for service leads shall be from the centerline of the main line sewer to the end of the lead.

3. Basis of Payment: The accepted quantities will be paid for at the unit prices for the appropriate items. Connecting of pipes to existing structures, both permanent and temporary, and the placement of caps and witness stakes at the terminus of service leads, shall be considered incidental to pipe installation.

Payment shall be made under the following:

Bid Item No. 21	1¼” Diameter HDPE SDR 11 (Pre-Insulated) Low Pressure Force Main	Per Linear Foot
Bid Item No. 22	1½” Diameter HDPE SDR11 (Pre-Insulated) Low Pressure Force Main	Per Linear Foot
Bid Item No. 25	4” Diameter PVC SDR 21 Sewer Force Main Including Bends, Fittings, and Thrust Restraint	Per Linear Foot
Bid Item No. 26	4” Diameter PVC SDR35 Sewer Service Lateral Including Bends and Caps	Per Linear Foot
Bid Item No. 28	8” Diameter PVC SDR 35 Sewer Main in Single Pipe Trench (<12 Feet Deep)	Per Linear Foot
Bid Item No. 29	8” Diameter PVC SDR 35 Sewer Main in Single Pipe Trench (>12 Feet Deep)	Per Linear Foot
Bid Item No. 30	8” Diameter PVC SDR 35 Sewer Main in Multiple Pipe Trench (<12 Feet Deep)	Per Linear Foot
Bid Item No. 31	6” Diameter PVC SDR 35 Underdrain with Cap	Per Linear Foot

Bid Item No. 33	8" Diameter PVC SDR 35 Storm Drain Pipe	Per Linear Foot
Bid Item No. 33	12" Ductile Iron Storm Drain or Culvert Pipe	Per Linear Foot
Bid Item No. 34	18" Diameter RCP Class III Culvert Pipe	Per Linear Foot

**U. Bid Item No. 23 – Low Pressure Force Main Shutoff Valve; Bid Item No. 24 – Low Pressure Force Main Terminus Cleanout; and Bid Item No. 27 – 8" x 4" PVC SDR 35 Tee Wye for Sewer Service Laterals**

1. Low pressure force main shutoff valves shall be acceptable for use in sanitary wastewater applications. The curb stop shall have word "sewer" cast in. Low pressure force main terminus cleanout shall be provided in accordance with detail provided on plan. 8" x 4" Tees shall be a premanufactured tee wye assembly approved by shop drawings for installation along the main sewer line. Installation methods which result in the service lead projecting into the main line sewer or storm drain which affect the structural and watertight integrity of the main line sewer or storm drain will not be accepted.

2. Method of Measurement: Measurement shall be per each.

3. Basis of Payment: Payment shall be made under the following:

Bid Item No. 23	Low Pressure Force Main Shutoff Valve	Per Each
Bid Item No. 24	Low Pressure Force Main Terminus Cleanout	Per Each
Bid Item No. 27	8" x 4" PVC SDR 35 Tee Wye for Sewer Service Laterals	Per Each

**V. Bid Item No. 35 – 4' Diameter Sanitary Sewer Manhole; Bid Item No. 36 – 5' Diameter Internal Drop Sanitary Sewer Manhole; Bid Item No. 37 – 2' x 2' Square Catch Basin**

1. Manholes, catch basins, and structures, including excavation, backfilling, granular base, compacting, brick invert channels, pipe connections, frames and covers, steps, mortar, bricks, temporary pavement repair, and leakage tests in accordance with Sections 02220, 02240, 02720, and 02730.

2. Method of Measurement: Where units are in vertical feet, the structure will be measured from the invert of the lowest pipe to the top of the casting frame complete in place and accepted.

Any internal piping, fittings, and all other work associated with appurtenances shall be considered part of the work and no separate measurement will be made.

Adjusting existing structure frames and covers shall be measured for those structures which currently exist and are not scheduled to be removed. No measurement will be made for adjusting structure frames and covers installed as part of this contract.

For structures measured by each or lump sum, the measured amount will be the number of completed units actually installed and accepted.

3. Basis of Payment: The accepted quantity will be paid at the unit or lump sum bid price for the following items:

Bid Item No. 35	4' Diameter Sanitary Sewer Manhole	Per Vertical Foot
Bid Item No. 36	5' Diameter Internal Drop Sanitary Sewer Manhole	Per Vertical Foot
Bid Item No. 37	2' x 2' Square Catch Basin	Per Each

**W. Bid Item No. 38 – Remedial Grading and Drainage Work Along Island Avenue**

1. The work associated with this bid item shall include removal of all existing cross culverts and driveway culverts as shown on the contract drawings. In addition, the work of this bid item shall include all excavation work to reshape and define the drainage swale along the easterly side of Island Avenue as shown on Sheets C-10 and C-11 of the Contract drawings.

Separate pay items have been established for the installation of new cross culverts, appurtenant drainage structures, and surface restoration work.

2. Method of Measurement: Measurement shall have a single lump sum measurement.
3. Basis of Payment: Payment shall be made based upon percentage of work completed and accepted by the Engineer.

**X. Bid Item No. 39 – Loam, Seed and Mulch**

1. Loam and seed shall include preparation of the subgrade, furnishing and installing loam, raking and removal of stones, fertilizing, lining, mulching, seeding, watering, repair and maintenance for a one-year period in accordance with the specifications.

2. Method of Measurement: Loam and seed shall be measured as follows:

- Along main line trenches: Actual disturbed areas within 8 feet of the trench centerline.
- Along service leads: Actual disturbed areas up to a 16-foot width and 5 feet beyond the service lead cap.
- Measurements shall be made on the basis of 1,000 s.f. units.

3. Basis of Payment: Payment shall be made for 70 percent of the approved number of units after the area has been seeded and mulched. Payment for the remaining 30 percent of the approved numbers of units shall be made after the initial mowing and removal of excess mulch.

Payment will be made under:

Bid Item No. 39	Loam, Seed and Mulch	Per Unit
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**Y. Bid Item No. 40 – Riprap Outlet and Channel Lining and Bid Item No. 41 – Vegetated Swale Erosion Control Blanket**

1. The Island Avenue remedial grading and drainage work shown on Sheets C-10 and C-11 identifies areas for the installation of rip rap outlet aprons, riprap channel linings, and erosion control blankets within vegetated swale areas. The work associated with these bid items shall include installation of rip rap stone materials, including underlying geotextile fabric and bedding material, as well as, placement and achieving of erosion control blanket in accordance with the details contained in the contract drawings.

2. Method of Measurement: Measurement for each of these bid items shall be per square yard complete and accepted by the Engineer.

3. Basis of Payment: Payment shall be made under the following:

Bid Item No. 40	Rip Rap Outlet and Channel Lining	Per Square Yard
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Bid Item No. 41	Vegetated Swale Erosion Control Blanket	Per Square Yard
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**Z. Bid Item No. 42 – Rigid Insulation Over Pipes**

1. Rigid Insulation shall be a 2” thickness and shall be placed at the width of the trench.
2. Measurement shall be by the linear foot of rigid insulation actually installed measured along the centerline of the trench.
3. Payment shall be for the approved number of linear feet at the appropriate unit price bid for:

Bid Item No. 42          Rigid Insulation Over Pipes          Per Linear Foot

**AA. Bid Item No. 43 – Cross Country Sewer Surface Restoration Work**

1. The work associated with this bid item shall include the installation of erosion control measures and restoration of the cross country sewer installation work as shown Sheet C-9 (Station 140+30 to Station 144+20). The surface restoration work associated with the cross country sewer installation work is subject to the terms and conditions of a Natural Resource Protection Act Permit by Rule as issued by the MeDEP. All work associated with this bid item shall be performed in accordance with the restoration requirements contained in this permit.
2. Method of Measurement: Measurement shall be based upon the area of restoration as measured in the field.
3. Basis of Payment: Payment shall be made under the following:

Bid Item No. 43          Cross Country Sewer Surface  
Restoration Work          Per Acre

**BB. Bid Item No. 44 – Great Pond Road Pump Station**

1. The work associated with this bid item shall include the construction of a duplex submersible pump station with separate wet well and valve pit chamber, 13’ x 17’ pump station control building housing electrical and telemetry equipment, including standby generator, and associated site and landscaping improvements. The work of this bid item does not include rock excavation associated with the installation of the pump station appurtenant structures, which shall be paid separately under bid item no. 5.
2. Method of Measurement: The Great Pond Road Pump Station shall have a single lump sum measurement.
3. Basis of Payment: The payment for the Great Pond Road Pump Station shall be based upon the schedule of values and work progress set forth in the General Conditions and Section 01000 of the Technical Specifications.

**CC. Bid Item No. 45 – Contaminated Soils Disposal**

1. An allowance has been established for the work associated with this bid item. This work shall include all labor, equipment and materials for the excavation, hauling, and offsite disposal at a licensed facility for non-hazardous petroleum hydrocarbon contaminated soils as determined by field testing completed by the Owner during the excavation of soil materials within a portion of the project site as identified on the plans. The Owner will be responsible for performing all analytical testing of the excavated materials and preparation of required paperwork associated with the disposal process.

The Contractor shall be required to submit an itemized invoice of time of labor, equipment, and materials (including disposal manifest and disposal fees) for actual work completed as part of this bid item.

2. Method of Measurement: The approved invoice amount shall be subtracted from the allowance amount.

3. Basis of Payment: Payment shall be made on a time and materials basis as set forth in the General Conditions and subtracted from the allowance amount. Only the invoiced amount shall be paid.

**DD. Bid Item No. 46 – Clay Trench Dam**

1. The work associated with this bid item shall include the installation of a clay trench dam in accordance with Detail J on Sheet C-12 of the plan set. The locations of the clay trench dam installations are shown on the utility profile sheets and may be modified in the field as directed by the Engineer.
2. Method of Measurement: Measurement shall be per each.
3. Basis of Payment: Payment shall be made under the following:

Bid Item No. 46	Clay Trench Dam	Per Each
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**EE. Bid Item No. 47, 48, 49, 50, 51, 52 and 53 – Water Main – Various Materials & Depth of Bury**

1. Method of Measurement: Measurement shall be per linear feet as measured along the centerline of the pipe for the actual number of linear feet of pipe installed, not including fittings.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for installation and maintenance of temporary water systems, excavating, shoring and bracing, dewatering, traffic control, pipe, laying and jointing, removal and disposal of existing piping and appurtenances, capping existing pipes that are not removed, bedding, backfilling, testing and associated work as specified and shown on the Drawings.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**FF. Bid Item No. 54 and 55 – 1” Copper Service Assembly – Long Side/Short Side**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, gravel, shoring and bracing, dewatering, pipe, corporation, saddle, fittings, connection to existing service, service box, rod, curb stop, traffic control, backfilling and associated work as specified and shown on Drawings. Long Side Services are those where the water main is on the opposite side of the street from the location of the curb stop; Short Side Services are those where the water main is on the same side of the street as the curb stop.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**GG. Bid Item No. 56 – Existing Service Pipe –Reconnect Only**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, gravel, shoring and bracing, dewatering, corporation, pipe and fittings that match existing material as necessary to reconnect an existing service pipe to the new main, traffic control, backfilling and associated work as specified and shown on Drawings.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**HH. Bid Item No. 57 and 58 – 1-1/2”, and 2” Copper Service Assembly**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, gravel, shoring and bracing, dewatering, tapping saddle, corporation, service box with foot piece, 5/8 SS rod, ball valve, standard CI valve box, connection to customer service or water main, traffic control, backfilling and associated work as specified and shown on Drawings. Copper pipe shall be measured and paid separately under Bid Items 50 and 53.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**II. Bid Item No. 59 and 60 – RS Gate Valves**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, shoring and bracing, dewatering, valve, valve box, traffic control, backfill, testing and associated work as specified and shown on Drawings.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**JJ. Bid Item No. 61, 62, 63, 64, 65, 66, 67, 68 and 69 – Ductile Iron Fittings**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, shoring and bracing, dewatering, ductile iron fitting of the type and size indicated, installation, traffic control, backfill, testing and associated work as specified and shown on the Drawings.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**KK. Bid Item No. 70 – Hydrant Assembly**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, shoring and bracing, dewatering, hydrant tee, 6-inch hydrant control valve, valve box, 6-inch ductile iron pipe, hydrant traffic control, thrust blocks, backfill, testing and associated work as specified and shown on Drawings.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**LL. Bid Item No. 71 – 1” Air Valve Assembly**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, shoring and bracing, dewatering, corporation, angle valve, fittings, operating rod, service box, valve box, installation, traffic control, backfill, testing and associated work as specified and shown on the Drawings.
3. Schedule of Payment: Installation – 75%; Testing – 25%

**MM. Bid Item No. 72 and 73 – 1” and 2” Blow-Off Assembly**

1. Method of Measurement: Measurement shall be per actual number installed.
2. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, shoring and bracing, dewatering, fittings, thrust block, valve boxes, backfill, testing, cleanup and associated work as specified and shown on Drawings.
3. Schedule of Payment: Installation – 75%; Testing – 25%

1.04 ALTERNATES

A. Description of Requirements:

Definition: An alternate is an amount proposed by Bidders and stated on the Bid Form that will be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either scope of work or in products, materials, equipment, systems or installation methods described in Contract Documents.

Coordination: Coordinate related work and modify or adjust adjacent work as required to ensure that work affected by each accepted alternate is complete and fully integrated into the project.

Notification: Immediately following award of Contract or decision by Owner on the alternates, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates, if any.

Schedule: A "Schedule of Alternates" is included at the end of this section. Specifications and drawings included in other portions of the contract contain requirements for materials and methods necessary to achieve the work described under each alternate.

Include as part of each alternate, miscellaneous devices, appurtenances and similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

B. Alternates – General:

Testing, Acceptance, Requirements: Refer to the individual work sections of the specifications and other contract documents for requirements of work to be performed as "Alternates". Refer to the Contract for indication of which alternates (as listed in Instructions to Bidders) have been accepted or will be considered for acceptance during construction.

Accepted alternates are in full force and effect, as though included originally in the Base Bid. Each must be completely integrated and coordinated with the surrounding work.

Bidding Instructions for Alternates: Prices for alternates shall include overhead, profit, and all other expense items incidental to the work.

Bidders shall Bid on all Alternates: The term "No Bid" shall not be used. If the price for an alternate results in neither an addition nor reduction to the Base Bid sum, the words "No Change" shall be inserted in the appropriate spaces.

The Owner shall have the right to accept or reject any or all alternates or portions of any alternate where unit prices are provided. Alternates may be accepted in any order and in the case of unit price alternates, in part, or in total end, not necessarily in the order in which they are listed in this section or in the Bid forms.



1.05 SCHEDULE OF BID ALTERNATES

**A. Bid Alternate No. 1 (Diamond Pass)**

1. Bid Alternate No. 1 is a deductive alternate associated with the installation of approximately 81 linear feet of 8" diameter gravity sewer main, two manholes, 4" sanitary sewer services to three properties, and 1¼" diameter low pressure force main service lateral to a fourth property. The work associated with Bid Alternate No. 1 shall also include all trench excavation (including rock removal), backfill, and surface restoration work along Diamond Pass to complete the sewer installation work.
2. Method of Measurement: An itemized bid tabulation has been provided in the Bid Form for the work associated with Bid Alternate No. 1. The Contractor shall utilize the unit prices established as part of the Base Bid to determine the cost associated with each bid item. Measurement for each bid item shall be in accordance with the individual bid items described in Paragraph 1.03 of this specification.
3. Basis of Payment: Payment shall be made based upon the accepted quantity of work for each bid item.

**B. Bid Alternate No. 2 (Sunset Road)**

1. Bid Alternate No. 2 is a deductive alternate which includes the installation of approximately 350 linear feet of 1½" diameter common low pressure force main with 1¼" diameter low pressure force main service laterals to seven (7) abutting properties. The work associated with Bid Alternate No. 2 shall also include all trench excavation (including rock removal), backfill, and surface restoration work along Sunset Street to complete the sewer installation work.
2. Method of Measurement: An itemized bid tabulation has been provided in the Bid Form for the work associated with Bid Alternate No. 2. The Contractor shall utilize the unit prices established as part of the Base Bid to determine the cost associated with each bid item. Measurement for each bid item shall be in accordance with the individual bid items described in Paragraph 1.03 of this specification.
3. Basis of Payment: Payment shall be made based upon the accepted quantity of work for each bid item.

**C. Bid Alternate No. 3 (Winding Way Water Main Extension)**

1. Bid Alternate No. 3 is an additive alternate associated with the installation of approximately 340 linear feet of 4" diameter water main with water service laterals to abutting properties. The work associated with Bid Alternate No. 3 shall also include all trench excavation (including rock removal) and backfill of the water main extension work.
2. Method of Measurement: An itemized bid tabulation has been provided in the Bid Form for the work associated with Bid Alternate No. 3. The Contractor shall utilize the unit prices established as part of the Base Bid to determine the cost associated with each bid item. Measurement for each bid item shall be in accordance with the individual bid items described in Paragraph 1.03 of this specification.
3. Basis of Payment: Payment shall be made based upon the accepted quantity of work for each bid item.

1.06 OTHER WORK

All other work required to complete the project as defined by the contract documents shall be considered incidental to the contract and no separate measurement or payment will be made.

1.07 DELETION OF WORK

The Owner reserves the right to delete the work required under any/all bid items. No change in the unit price bid for other items will be permitted if the Owner adopts this option.

PART 2 – PRODUCTS

This part not used.

PART 3 – EXECUTION

This part not used.

\*\*\*END OF SECTION 01025\*\*\*

**SECTION 01090**  
**DEFINITIONS AND STANDARDS**

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. General: This section specifies procedural and administrative requirements for compliance with governing regulations and the codes and standards imposed upon the work. These requirements include the obtaining of permits, licenses, inspections, releases, and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes, and standards.
- B. Regulations: **“Regulations”** is defined to include laws, statutes, ordinances, and lawful orders issued by governing authorities, as well as those rules, conventions, and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.
- C. Governing Regulations: Refer to General and Special Provisions for requirements related to compliance with governing regulations.

1.02 DEFINITIONS

- A. General Explanation: A substantial amount of specification language consists of definitions for terms found in other contract documents, including drawings. (Drawings must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon.) Certain terms used in contract documents are defined in this article. Definitions and explanations contained in this section are not necessarily either complete or exclusive, but are general for the work to extent that they are not stated more explicitly in another element of the contract documents.
- B. General Requirements: The provisions or requirements of Division 1 sections apply to entire work of contract and, where so indicated, to other elements which are included in project.
- C. Indicated: The term ”indicated” is a cross-reference to graphic representations, notes, or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as “shown”, “noted”, “scheduled”, and “specified” are used lieu of “indicate”, it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
- D. Directed, Requested, etc.: Where not otherwise explained, terms such as “directed”, “requested”, “authorized”, “selected”, “approved”, “required”, “accepted”, and “permitted”, mean “directed by Architect/Engineer”, requested by Architect’s/Engineer’s, and similar phrases. However, no such implied meaning will be interpreted to extend the Architect’s/Engineer’s responsibility into Contractor’s area of construction supervision.
- E. Approve: Where used in conjunction with Architect’s/Engineer’s response to submittals, requests, applications, inquiries, reports, and claims by Contractor, the meaning of term “approved” will be held to limitations of Architect’s/Engineer’s responsibilities and duties as specified in the contract. In no case will “approval” by Architect/Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of contract documents.
- F. Project Site: The term “project site” is defined as the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on drawings, and may or may not be identical with the description of land upon which project is to be built.

- G. Furnish: Except as otherwise defined in greater detail, term “furnish” is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- H. Install: Except as otherwise defined in greater detail, term “install” is used to describe operations at project site including unloading, unpacking, assembly, erection, planning, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations, as applicable in each instance.
- I. Provide: Except as otherwise defined in greater detail, term “provide” means furnish and install, complete and ready for intended use, as applicable in each instance.
- J. Installer: The term “installer” is defined as the entity (person or firm) engaged by Contractor or its subcontractor or sub- subcontractor for performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.
- K. Testing Laboratory: The term “testing laboratory” is defined as an independent entity engaged to perform specific inspections or tests of the work, either at project site or elsewhere, and to report, and (if required) interpret results of those inspections or tests.
- L. Substantial Completion: The term “substantial completion” is defined as a stage of completion sufficient for the Owner to have beneficial use of the Work of the Contract for the purpose intended, less only minor corrections and repairs that can be performed while the Owner has occupied the building and without undue annoyance to personnel. It shall also include major final cleaning required under the contract, removal of all surplus equipment and material not required for completion or remaining work, and the placement of all remaining materials and equipment in convenient locations as approved by the Owner.

#### 1.03 FORMAT AND SPECIFICATION CONTENT EXPLANATION

- A. Specification Production: None of the following explanations will be interpreted so as to modify substance of the contract requirements. Portions of these specifications have been produced by Architect’s/Engineer’s standard methods of editing master specifications, and may contain minor deviations from traditional writing formats. Such deviations are a natural result of this production technique, and no other meaning shall be implied or permitted.
- B. Section Numbering: Section number is used to facilitate cross-references in the contract documents. Sections are placed in Project Manual in numeric sequence; however, numbering sequence is not complete, and listing of sections at beginning of Project Manual must be consulted to determine numbers and names of specification sections in contract documents.
- C. Page Numbering: Pages are numbered independently for each section, and are recorded in listing of sections (Index or Table of Contents) in the Project Manual. The section number is shown together with the page number at the bottom of each page, to facilitate the location of text in the Project Manual.
- D. Project Identification: Project name (either complete or abbreviated) is recorded at top of each page of specifications to minimize possible misuse of specifications, or confusion with other project specifications.
- E. Specification Content: Because of methods by which this project specification has been produced, certain general characteristics of content and conventions in use of language are explained as follows:
  - 1. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text, and may include “prescriptive”, “open generic-descriptive”, “compliance with standards”, “performance”, “proprietary”, or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.
  - 2. Overlapping and Conflicting Requirements: Where compliance with two or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement is

intended and will be enforced, unless specifically detailed language written into the contract documents clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently-equal-but-different requirements, and uncertainties as to which level of quality is more stringent, to Architect/Engineer for a decision before proceeding.

3. Contractor's Options: Except for overlapping or conflicting requirements, where more than one set of requirements is specified for a particular unit of work, option is intended to be contractor's, regardless of whether or not it is specifically indicated as such.
4. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended to be the minimum for the work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Architect/Engineer for decisions before proceeding.
5. Specialists; Assignments: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements should not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the work; they are also not intended to interfere with local union jurisdiction settlements and similar conventions.

Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

6. Trades: Except as otherwise indicated, the use of titles such as "carpentry" in specification text, implies neither that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as "carpenter"), nor that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.
7. Abbreviations: The language of specifications and other contract documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of self-explanatory nature have been included in texts. Specific abbreviations have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of specification requirements with notations on drawings and in schedules. These are frequently defined in notations on drawings and in schedules. These are frequently defined in section at first instance of use. Trade associations and titles of general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of the contract documents so indicates.

#### 1.04 DRAWING SYMBOLS

- A. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated.

#### 1.05 INDUSTRY STANDARDS

- A. General Applicability of Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, applicable standards of the construction industry have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies were bound herewith. Refer to other contract documents for resolution of overlapping and conflicting requirements which result from the application of several different industry standards to the same unit of work. Refer to individual unit of work sections for indications of which specialized codes and standards the Contractor must keep at the project site, available for reference.

1. Referenced Standards: (referenced directly in contract documents or by governing regulations) have precedence over non-referenced standards which are recognized in industry for applicability to work.
  2. Non-referenced Standards: are hereby defined to have no particular applicability to the work, except as a general requirement of whether the work complies with standards recognized in the construction industry.
  3. Industry Standards: recognized in the construction industry are hereby defined, except as otherwise limited in contract documents, to have direct applicability to the work, and will be so enforced for performance of the work. The decision as to whether an industry code or standard is applicable to the work, or as to which of several standards is applicable, is the sole responsibility of the Architect/Engineer.
- B. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.
1. Undated Standards: At the request of the Architect/Engineer, Contractor or governing authority, submit a change order proposal where an applicable industry code or standard has been revised and reissued after the date of the contract documents and before the performance of the work affected. The Architect/Engineer will decide whether to issue the change order to proceed with the updated standard.
- C. Copies of Standards: The contract standards require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with recognized industry standards applicable to that part of the work. Copies of applicable standards are not bound with the contract documents.

Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source.

Although certain copies of standards needed for enforcement of the requirements may be required submittals, the Architect/Engineer reserves the right to require the Contractor to submit additional copies of these standards as necessary for enforcement of the requirements.

- D. Abbreviation and Names: Where acronyms or abbreviations are used in the specifications or other contract documents, they are defined to mean the industry recognized name of the trade association, standards generating organization, governing authority or other entity applicable to context of text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Company available in most libraries.

#### 1.06 GOVERNING REGULATIONS/AUTHORITIES

- A. General: The procedure followed by Architect/Engineer has been to contact governing authorities where necessary to obtain information needed for the purpose of preparing contract documents, recognizing that such information may or may not be of significance in relation to Contractor's responsibilities for performing the work. Contact governing authorities directly for necessary information and decisions having a bearing on performance of the work. Contact governing authorities directly for necessary information and decisions having a bearing on performance of the work.
1. Copies of Correspondence: During the preparation of the contract documents, the Architects/Engineer maintained a file of correspondence with governing authorities. This file is available at the Architect's/Engineer's office for reference by bidders/contractors. The Architect/Engineer will provide, if requested, copies of such applicable correspondence at the cost of reproduction.
  2. Attached Copies: Certain items of correspondence (but not by way of limitation) are believed to include information which is generally applicable to the performance of the work, and these items have been reproduced and included in the Project Manual at the end of this section, as follows:

3. Copies of Regulations: Obtain copies of the following regulations and retain at the project site during the Contract Time, available for reference by parties at the site who have a reasonable need for such reference.

1.07 TRADE UNION JURISDICTIONS

- A. It is a procedural requirement that the Contractor maintain, and require prime subcontractors to maintain, complete current information on jurisdictional matters, regulations, actions and pending actions, as applicable to the work. Discuss new developments at appropriate project meetings at the earliest feasible dates, and record information of relevance along with the actions agreed upon. The manner in which contract documents have been organized and subdivided is not intended to be an indication of jurisdictional or trade union agreements. Assign and subcontract the work, and employ tradesmen and laborers, in a manner which will not unduly risk jurisdictional disputes of a kind which could result in conflicts, delays, claims, and losses in the performance of the work.

\*\*\*END OF SECTION 01090\*\*\*

**SECTION 01320  
SCHEDULES, REPORTS, PAYMENTS**

**PART 1 GENERAL**

**1.01 SUBMITTALS**

- A. The Contractor shall submit a Progress Schedule in accordance with Section 01330 Submittals.

**1.02 COORDINATION**

- A. Coordinate both the procedural timing and the listing (naming and sequencing) of reports/activities required by provisions of this section and other sections. Update at monthly or shorter time intervals. Make appropriate distribution of each report and updated report to entities involved in the Work including Engineer and Owner. In particular, provide close coordination of progress schedule, schedule of values, listing of subcontracts, schedule of submittals, progress reports, and payment requests.

**1.03 PROGRESS SCHEDULE**

- A. **Bar Chart Diagram**: Secure critical time commitments for performing major elements of the Work. Within 30 days after award of the Contract, submit a comprehensive bar chart type progress schedule indicating activity-coded symbols for each major category or unit of work to be performed at site, and including minor units which are, nevertheless, involved in overall sequencing of the Work. Arrange schedule to graphically show major sequences required in intermeshing of work, and to show how Substantial Completion is scheduled to allow for Engineer's procedure for certification thereof. Prepare and maintain the bar chart diagram schedule on sufficiently wide sheet or series of sheets of stable transparency or other reproducible stock, to show required data clearly for entire Construction Time, and to permit reproduction for required distribution.
- B. **Phasing**: Arrange schedule with notations to show how sequence of work is affected by requirements for phased completion, work by separate Contractors, work by Owner, pre-purchased materials, coordination with existing work, non-interruptible services, site restrictions, provisions for future work, seasonal variations, environmental control and similar provisions of total Project. Refer to the other sections of Division 1 and other Contract Documents for requirements.
- C. **Individual Work Stages**: Within long activities showing fabrication or installation of major units of work (6 months and longer) show estimated percentage-of-completion markers at 10 percent increments. As each unit of work progresses, mark each long activity with a contrasting mark (at 10 percent increments) to show actual percentage-of-completion.
- D. **Cost Correlation**: Immediately below date line at heading of chart, provide a double-line cost correlation line ("Precalculated" and "actual") to show dollar-volume of work performed as of same dates used for preparation of payment requests. Refer to subsequent article for cost reporting and payment procedures. Use those same dates as primary vertical lines of schedule.
- E. **Distribution**: Following initial submittal to and response by Engineer, print and distribute the bar chart diagram to Engineer (4 copies), separate Contractors (if any), principal Subcontractors and Suppliers or fabricators, and others with a need-to-know schedule-compliance requirement. Post copies in Project meeting rooms and field (temporary) offices, if applicable. Distribute and post subsequent updated issues to same entities, when revisions are made; except delete entities from distribution when they have completed assigned work and are no longer involved in performance of scheduled work.
- F. **Update Schedule**: Provide updated schedule with each monthly payment request. Updates should highlight any changes in critical path, any delays due to Suppliers, Subcontractors or the Contractors own activities. Payment will not be authorized without submitting schedule updates to the Engineer



1.04 REPORTING

- A. Daily Reports: The Contractor shall prepare a daily report, recording the following information concerning events at the site; and submit duplicate copies to Engineer at regular intervals not exceeding weekly intervals.
- a. List of Subcontractors at the site.
  - b. Count of personnel at the site, by job classification.
  - c. List of major equipment utilized on site, noting equipment parked or broken down.
  - d. High/low temperatures, general weather conditions.
  - e. Accidents (refer to accident reports).
  - f. Meetings and significant decisions.
  - g. Unusual events (refer to special reports).
  - h. Stoppages, delays, shortages, losses.
  - i. Emergency procedures, Field Orders.
  - j. Orders/requests by governing authorities.
  - k. Change Orders received, implemented.
  - l. Services connected, disconnected.
  - m. Equipment or system tests and start-ups.
  - n. Partial completions, occupancies.
  - o. Substantial completions authorized.

1.05 PAYMENT REQUESTS

- A. General: See General Conditions for payment procedures. It is recognized that certain applications involve extra requirements, including initial application, application at times of Substantial Completion, and final payment application.
- B. Payment Application Times: The "date" for each progress payment is as indicated in Contract.
- C. Payment Application Forms: Use forms provided by the Engineer.
- D. Application for Preparation: Except as otherwise indicated, complete every entry provided for on the form, including notarization and execution by authorized persons. Incomplete applications will be returned by the Engineer without action.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

\*\*\*END OF SECTION 01320\*\*\*

**SECTION 01330**  
**SUBMITTALS**

PART 1 – GENERAL

1.01 DEFINITIONS

A. Submittal Descriptions (SD): Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

- SD-01 Preconstruction Submittals: Submittals which are required prior to a notice to proceed on a new contract. Submittals required prior to the start of the next major phase of the construction on a multi-phase contract. Schedules or tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work, submitted prior to contract notice to proceed or next major phase of construction.

Certificates of insurance.  
Surety bonds.  
List of proposed subcontractors.  
List of proposed products.  
Construction Progress Schedule.  
Submittal register.  
Health and safety plan.  
Work plan.  
Quality control plan.  
Environmental protection plan.

- SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

- SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

- SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

- SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

- SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

- SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

- SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

- SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and must state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

- SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This Data is intended to be incorporated in an operations and maintenance manual or control system.

- SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Special requirements necessary to properly close out a construction contract. For example, Record Drawings, manufacturer's help and product lines necessary to maintain and install equipment. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

B. Approving Authority: Office or designated person authorized to approve submittal.

C. Work: As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

## 1.02 SUBMITTALS

A. The Contractor shall submit a Submittal Register as specified herein.

## 1.03 USE OF SUBMITTAL REGISTER

A. Submittal register will be delivered to the Contractor. Register will have the following fields completed, to the extent that will be required by the Owner during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-04 Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal.

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Owner; retain data which is output in columns (a), (g), (h), and (i) as approved.

A. Contractor Use of Submittal Register: Submit submittal register. Verify that all submittals required for project are listed and add missing submittals. Contractor shall complete and update the following fields on the submittal register:

Column (a) Activity Number: Activity number from the project schedule.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals.

B. Approving Authority Use of Submittal Register:

Update the following fields.

Column (j) List date of submittal receipt.

Columns (k) through (p) indicating submittal review action code and date of review.

Column (q) List approval date.

C. Review Action Code:

Entries used shall be as follows (others may be prescribed by Transmittal Form):

NET – No Exceptions Taken

MCN – Make Corrections Noted

RR – Revise and Resubmit

R – Rejected

D. Copies Delivered to the Owner: Deliver one copy of submittal register updated by Contractor to Owner with each invoice request.

1.04 PROCEDURES FOR SUBMITTALS

A. Reviewing, Certifying, Approving Authority: The Engineer shall be responsible for reviewing and certifying that the submittals are in compliance with contract requirements.

B. Constraints:

- a. Submittals listed or specified in this contract shall conform to provisions of this section, unless explicitly stated otherwise.
- b. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.
- c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.
- d. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

C. Scheduling:

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.
- b. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 20 working days for submittals for Engineer approval. Period of review for submittals with Engineer approval begins when Engineer receives submittal from Contractor. Period of review for each resubmittal is the same as for initial submittal.

D. Variations: Variations from contract requirements require Owner approval and will be considered where advantageous to Owner.

E. Proposing Variations: When proposing variation, deliver written request to the Engineer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Owner. If lower cost is a benefit, also include an estimate of the cost saving. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

- F. Warranting That Variations Are Compatible: When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.
- G. Review Schedule Is Modified: In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Engineer of submittals with variations.
- H. Contractor's Responsibilities:
- a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.
  - b. Transmit submittals to Engineer in accordance with schedule on approved Submittal Register, and to prevent delays in the work, delays to Owner, or delays to separate Contractors.
  - c. Advise Engineer of variation, as required by paragraph entitled "Variations."
  - d. Correct and resubmit submittal as directed by Engineer. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the Contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority. Direct specific attention in writing or on resubmitted submittal, to revisions not requested by approving authority on previous submissions.
  - e. Furnish additional copies of submittal when requested by Engineer, to a limit of 10 copies per submittal.
  - f. Complete work which must be accomplished as basis of a submittal in time to allow submittal to occur as scheduled.
  - g. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted", except to the extent that a portion of work must be accomplished as basis of submittal.
- I. Engineer Responsibilities:
- a. Note date on which submittal was received from Contractor on each submittal.
  - b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.
  - c. Review submittals for conformance with project design concepts and compliance with contract documents.
  - d. Act on submittals, determining appropriate action based on Engineer's review of submittal. When Engineer is approving authority or when variation has been proposed, forward submittal to Owner with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The Engineer's review of submittal determines appropriate action.
  - e. Ensure that material is clearly legible.
  - f. Stamp each sheet of each submittal with a certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.
  - g. Sign certifying statement or approval statement. Stamped signatures are not acceptable.
  - h. Update submittal register as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by Engineer.

i. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

J. Owner's Responsibilities: When approving authority is Engineer, the Owner will:

- a. Note date on which submittal was received from Contractor, on each submittal for which the Engineer is approving authority.
- b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- c. Identify returned submittals with one of the actions defined in paragraph entitled "Actions Possible" and with markings appropriate for action indicated.

K. Actions Possible: Submittals will be returned with one of the following notations:

- a. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.
- b. Submittals marked "approved," "approved as submitted," or "reviewed" authorize Contractor to proceed with work covered.
- c. Submittals marked "approved as noted," "approval except as noted; resubmission not required," or "furnish as corrected" authorize Contractor to proceed with work as noted provided Contractor takes no exception to the notations.
- d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

#### 1.05 FORMAT OF SUBMITTALS

- A. Transmittal Form: Transmit each submittal, except sample installations and sample panels, to office of approving authority. Transmit submittals with transmittal form prescribed by Engineer and standard for project. The transmittal form shall identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.
- B. Identifying Submittals: Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:
  - a. Project title and location.
  - b. Construction contract number.
  - c. Section number of the specification section by which submittal is required.
  - d. Submittal description (SD) number of each component of submittal.
  - e. When a resubmission, add alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.
  - f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier Contractor associated with submittal.
  - g. Product identification and location in project.

C. Format for SD-02 Shop Drawings:

- a. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 24 by 36 inches.
- b. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.
- c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."
- d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.
- e. Drawings shall include the nameplate data, size and capacity. Also include applicable federal, military, industry and technical society publication references.

D. Format of SD-03 Product Data and SD-08 Manufacturer's Instruction:

- a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.
- b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.
- c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and format as required for submission of SD-07 Certificates.
- d. Product data shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Submittals shall also include applicable federal, military, industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for SD-07 Certificates.
- e. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.
- f. Submit manufacturer's instruction prior to installation.

E. Format of SD-04 Samples:

- a. Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:
  - (1) Sample of Equipment or Device: Full size.
  - (2) Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.
  - (3) Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.
  - (4) Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.



- (5) Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.
  - (6) Color Selection Samples: 2 by 4 inches.
  - (7) Sample Panel: 4 by 4 feet.
  - (8) Sample Installation: 100 square feet.
- b. Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.
  - c. Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples shall be in undamaged condition at time of use.
  - d. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.
  - e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.
- F. Format of SD-05 Design Data and SD-07 Certificates:
- a. Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.
- G. Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports:
- a. Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.
  - b. Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.
- H. Format of SD-10 Operation and Maintenance Data (O&M):
- a. O&M Data format shall comply with the requirements specified in Section 01782 - Operation And Maintenance Data
- I. Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals:
- a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.
- 1.06 QUANTITY OF SUBMITTALS
- A. Number of Copies of SD-02 Shop Drawings:
- a. Submit one (1) electronic copy of submittals of shop drawings.
- B. Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions:
- a. Submit in compliance with quantity requirements specified for shop drawings.
- C. Number of Samples SD-04 Samples:
- a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.
  - b. Submit one sample panel. Include components listed in technical section or as directed.

- c. Submit one sample installation, where directed.
- d. Submit one sample of non-solid materials.
- D. Number of Copies SD-05 Design Data and SD-07 Certificates:
  - a. Submit in compliance with quantity requirements specified for shop drawings.
- E. Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports:
  - a. Submit in compliance with quantity with quality requirements specified for shop drawings.
- F. Number of Copies of SD-10 Operation and Maintenance Data:
  - a. Submit six copies of O&M Data to the Engineer for review and approval.
- G. Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals:
  - a. Unless otherwise specified, submit administrative submittals compliance with quantity requirements specified for shop drawings.

#### 1.07 FORWARDING SUBMITTALS

- A. Submittals Required from the Contractor: As soon as practicable after award of contract, and before procurement of fabrication, forward to the Engineer: DeLuca-Hoffman Associates, Inc., 778 Main Street, Suite 8, South Portland, ME 04106, Attn: Joseph Laverriere, submittals required in the technical sections of this specification, including shop drawings, product data and samples.
- B. O&M Data: The Engineer for this project will review and approve O&M Data to verify the submittals comply with the contract requirements; submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.
  - a. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Engineer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

#### 1.08 APPROVED SUBMITTALS

- A. The Engineer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Engineer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

#### 1.09 DISAPPROVED SUBMITTALS

- A. The Contractor shall make all corrections required by the Engineer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. The Contractor shall make all corrections required by the Engineer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal shall be resubmitted as one requiring "approval" action, requiring both Designer of Record and Owner approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Engineer.

1.10 WITHHOLDING OF PAYMENT

- A. Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment for materials incorporated in the work will be made if all required Designer of Record or required Owner approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.11 TRANSMITTAL FORM

- A. A transmittal form supplied by the Contractor and approved by the Engineer shall be used for submittals. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

\*\*\*END OF SECTION 01330\*\*\*

**SECTION 01400**  
**PROCEDURES AND PERFORMANCES - QUALITY CONTROL**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Minimum Requirements: Minimum requirements for quality control, procedures, and performance work of a general nature include but are not necessarily limited to the following:
1. Supervisory personnel.
  2. Tradespersons and workmanship standards.
  3. Utilities.
  4. Electrolytic corrosion prevention.
  5. Inspections, tests and reports.
  6. General installation provisions.
  7. Cutting and patching.
  8. Cleaning and protection.
  9. Environmental controls (water pollution and dust control).
  10. Repair and maintenance of existing underground piping.

1.02 SUPERVISORY PERSONNEL: Submit staff names and duties prior to the start of construction; submit a listing of principal staff assignments, naming persons and listing their addresses and telephone numbers. Specifically indicate persons to contact in the event of emergency or problems at the Project site who are available 24 hours a day, 7 days a week.

1.03 TRADESPERSONS AND WORKMANSHIP STANDARDS: Persons performing work at the site shall be skilled and knowledgeable in methods and craftsmanship needed to produce required quality levels for workmanship in the completed work. Remove and replace work which does not comply with workmanship standards as specified and as recognized in the construction industry for applications indicated. Remove and replace other work damaged or deteriorated by faulty workmanship. Remove and replace workers responsible for non-complying work and/or poor workmanship.

1.04 UTILITIES:

- A. General: Coordinate with Owner through its site representative. Follow their recommendations and requirements for protection and repair of utilities. Maintain protection of utilities for the duration of the Work. Prior to starting work become familiar with all utilities and pipelines which may be affected by performance of the Work and have them located in the field as the Work progresses, and costs associated with field locations by utilities shall be borne by the Contractor.
- B. Damage to Utilities: Repair damage resulting from Contractor's operations to the satisfaction of the Engineer and the utility company involved. Repairs are at the Contractor's expense.
- C. Underground Utilities: Alignment and elevations of known underground utilities are indicated on the Drawings where possible. Completeness and accuracy of this information is not guaranteed and some underground utilities are not shown.

The Contractor shall be responsible for locating underground utilities either by contacting the appropriate utility company or by using non-intrusive testing equipment. The Contractor shall be fully and solely responsible for any damage to existing utilities.

- D. Grade and Alignment Changes: Adjustments in grade and alignment of the Work or utilities may be made by the Engineer to avoid interference. Where utilities must be relocated, and the utility is not "shown on plans", payment will be negotiated as Extra Work provided (a) the Engineer is notified and (b) additional costs are estimated prior to the relocation.

- 1.05 ELECTROLYTIC CORROSION PREVENTION: Prevent galvanic action, bimetallic corrosion, anodic or cathodic action, and electrolysis at all electrical grounds and for all piping. Do not allow contact of dissimilar metals further apart than 0.35 on the galvanic scale (electromotive series or table of oxidation potentials). For convenience, the electrode potential of common metals in this type of construction is listed below.

	Electrode Potential Volts (Relative to Hydrogen)
Magnesium	+2.37
Aluminum	+1.70
Zinc	+0.76
Chromium	+0.56
Iron and Steel	+0.44
Cadmium	+0.40
Nickel	+0.25
Tin	+0.14
Lead	+0.13
Copper	-0.34

Unless otherwise indicated, provide dielectric insulators between ferrous and nonferrous pipe and equipment.

1.06 INSPECTIONS, TESTS AND REPORTS:

- A. General: Provide testing and inspection services where required by Contract Documents. Cooperate with all testing laboratory personnel.

Where no testing is specifically required, but the Owner or Engineer decides that testing is required, the Owner may direct that such testing be performed under current standards for testing. Payment will be made as described in this Section.

- B. Reports: Submit test/inspection reports, including agency's analysis of results and recommendations where applicable, in duplicate to Engineer except as otherwise indicated, submit copies directly to governing authorities where required or requested and submit a copy to the Owner's site representative.

C. Payment for Testing:

1. General: Where testing is the Owner's responsibility, payment will be made as stated below unless other requirements are given in technical sections. Testing which is the responsibility of the Contractor will be designated in technical sections.
2. Initial Testing: Owner will pay for initial tests as outlined in Article 13 of the General Conditions.
3. Retesting: Costs of all retesting due to non-compliance will be paid by the Contractor. The cost of retesting will be determined by Engineer.
4. Contractor's Convenience Testing: Inspections and tests performed exclusively for the Contractor's convenience will be paid for by the Contractor.
5. Testing of Potentially Defective Work: Costs of testing Work performed that is considered potentially defective due to non-compliance with these Specifications shall be the responsibility of the Contractor.

- D. Qualifications of Testing Laboratory: The Testing Laboratory shall be completely independent of the Contractor and any of the Contractor's affiliates. It shall be acceptable to Engineer, Owner, and Contractor, meeting ASTM requirements for type of testing to be performed. Minimum of three years experience for type of test to be performed.

- E. Coordination of Testing: Notify the Engineer when work will be ready for testing. Allow 48 hours prior notice to schedule tests with testing laboratory.

If scheduled tests or sampling cannot be performed when scheduled, costs due to the delay will be paid by the Contractor.

#### 1.07 MEETINGS:

- A. General: Refer to General Conditions. Attend all project meetings when requested by the Owner or Engineer to discuss coordination, scheduling, progress, and performance of Work. Meetings may be scheduled at least once per month at a location designated by the Owner or Engineer.

#### 1.08 SURVEYS:

- A. General: Refer to General Conditions. Surveys shall be performed by a Maine State licensed surveyor.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.01 GENERAL INSTALLATION PROVISIONS:

- A. Inspection of Conditions: Require Subcontractor and Installer of each major unit of work to inspect substrate to receive the work, and conditions under which work will be performed report (in writing to Contractor) unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.
- B. Inspect each item of material or equipment immediately prior to installation, and reject defective items.
- C. Provide attachment and connection devices and methods for securing work properly as it is installed; true to line and level, and within recognized industry tolerances if not otherwise indicated.
- D. Recheck measurements and dimensions of the Work, as an integral step of starting each installation.
- E. Install work during conditions of temperature, humidity, exposure, forecasted weather, and status of Project completion which will ensure best possible results.
- F. Provide equipment and systems which are complete and perform properly in the completed Work.

#### 3.02 CUTTING AND PATCHING:

- A. General: Do not cut-and-patch structural work in a manner resulting in reduction of load-carrying capacity or load/deflection ratio. Submit proposed cutting and patching to Engineer for approval before proceeding. Do not cut-and-patch operational or safety-related components in a manner resulting in reduction of capacities to perform in manner intended. Do not cut-and-patch work which is exposed in a manner resulting in reduction of visual qualities. As judged solely by Engineer, remove and replace work judged by Engineer to be cut-and-patched in an unsatisfactory manner.
- B. Materials: Provide materials which will result in equal-or-better work than work being cut-and-patched. Use materials identical with original materials where recognized that satisfactory results can be produced.
- C. Temporary Support and Protection: Provide adequate temporary support for work to be cut. Provide adequate protection of other work during cutting-and-patching.
- D. Cut work by methods least likely to damage work to be retained and work adjoining. Where physical cutting action is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.

- E. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.

3.03 CLEANING AND PROTECTION:

- A. General: Clean and protect site work in progress and adjoining work on a continuous basis. At reasonable intervals, not less than weekly, completely remove debris and waste materials from site. Removal of waste and debris shall be coordinated with Owner to ensure proper disposal of hazardous materials. The Engineer may specify more frequent cleanup intervals if necessary, at no extra cost to the Owner. Protect installed work to prevent damage or deterioration. Perform maintenance on newly installed work as necessary through construction period. Adjust and lubricate operable components to ensure operability without damage.
- B. Limiting Exposures of Work: Protect work whether completed or in progress, from harmful, dangerous, damaging, or otherwise deleterious exposures during construction period.

3.04 ENVIRONMENTAL CONTROLS:

- A. Water Pollution Control: Take all precautions necessary to prevent contaminating, polluting, or silting of water courses or water storage areas.
- B. Dust Control: Use calcium chloride to control dust caused by construction operations, whether on- or off-site. Provide periodic sweeping daily or as required by the Engineer.
- C. Wetland Protection: Take all precautions necessary to prevent filling of wetlands and soil disturbance in or adjacent to wetlands beyond the extent shown on the contract drawings or as stipulated in the environmental wetland permits issued for this project (refer to Section 01001 – Site Permits).

\*\*\*END OF SECTION 01400\*\*\*

**SECTION 01600**  
**PRODUCTS AND SUBSTITUTIONS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION OF REQUIREMENTS:**

**A. Definitions:**

1. "Products" is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for Project or taken from Contractor's stock of previously purchased products.
2. "Materials" is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, installed or applied to the Work.
3. "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, etc.).

Definitions in this paragraph are not intended to negate the meaning of other terms used in Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

- B. Substitutions:** The requirements for substitutions do not apply to specified Contractor options on products and construction methods. Revisions to Contract Documents, where requested by Owner or Engineer, are "change" not "substitutions." Contractor's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute "substitutions," and do not constitute a basis for Change Orders, except as provided for in Contract Documents. Otherwise, Contractor's requests for changes in products, materials and methods of construction required by Contract Documents are considered requests for "substitutions," and are subject to requirements hereof.
- C. Standards:** Refer to Section 01090 - Definitions and Standards" for applicability of industry standards to products of Project, and for acronyms used in text of specification sections.

**1.02 QUALITY ASSURANCE:**

- A. Source Limitations:** To the greatest extent possible provide products, materials and equipment of a singular generic kind and from a single source.
- B. Compatibility:** Select products and materials which are compatible with other products and materials already selected and are suitable for proper performance in the completed work.

**1.03 SUBMITTALS:** Requests for Substitutions: Submit as Shop Drawings, fully identified for product or method being replaced by substitution, including related specification section and drawing number(s), and fully documented to show compliance with requirements for substitutions. Include product data/drawings, description of methods, samples where applicable, Contractor's detailed comparison of significant qualities between specified item and proposed substitution, statement of effect on construction time and coordination with other affected work, cost information or proposal, and Contractor's statement to the effect that proposed substitution will result in overall work equal-to-or-better-than work originally indicated.

**1.04 PRODUCT DELIVERY-STORAGE-HANDLING:** Deliver, handle and store products in accordance with manufacturer's recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Control delivery schedules to minimize long-term storage of products at site and overcrowding of construction spaces.



1.05 WARRANTIES (GUARANTEES):

- A. Categories of Specific Warranties: Warranties on the Work include (but are not necessarily limited to) those of the General Conditions, and specific warranties related to individual units of Work.
- B. Specified Product Warranty: A warranty which is required by Contract Documents, to be provided for a manufactured product incorporated into the work regardless of whether manufacturer has published a similar warranty.
- C. Start of Warranties: Warranties are to commence on date of Substantial Completion.
- D. Reinstatement of Warranty Period: Except as otherwise indicated, when work covered by a product warranty has failed or requires correction and has been corrected by replacement or restoration, warranty shall be reinstated by written endorsement for a period of time equal to original warranty period of time, starting on date of acceptance of replaced or restored work.
- D. Replacement Cost, Obligations: Costs of replacing or restoring failing warranted units or products is Contractor's obligation, without regard for whether Owner has already benefited from use through a portion of anticipated useful service lives.

PART 2 - PRODUCTS

2.01 GENERAL PRODUCT COMPLIANCES:

- A. General: The compliance requirements, for individual products as indicated in Contract Documents, are multiple in nature and may include generic, descriptive, proprietary, performance, prescriptive, compliance with standards, compliance with codes, conformance with graphic details and other similar forms and methods of indicating requirements, all of which must be complied with.
- B. Procedures for Selecting Products: Contractor's options for selecting products are limited by Contract Document requirements, and governing regulations, and are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are not necessarily limited to, the following for various indicated methods of specifying:
  - 1. "Or Equal": See General Conditions and Supplementary Conditions.
  - 2. "Named": Defined to mean manufacturer's name for product, as recorded in published product literature, of latest issue as of date of Contract Documents. Refer requests to use products of a later (or earlier) model to Engineer for acceptance before proceeding.
  - 3. Standards, Codes and Regulations: Where compliance with an imposed standard, code or regulation is required, selection from among products which comply with requirements including those standards, codes and regulations, is Contractor's option.
  - 4. Performance Requirements: Provide products which comply with specific performances indicated, and which are recommended by manufacturer (in published product literature or by individual certification) for application indicated. Overall performance of a product is implied where product is specified with only certain specific performance requirements.
  - 5. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements, using specified ingredients and components, and complying with specified requirements for mixing, fabricating, curing, finishing, testing and similar operations in manufacturing process.

2.02 SUBSTITUTIONS:

- A. General: See General Conditions.
- B. Work-Related Submittals: Contractor's submittal of, (and Engineer's review of) Shop Drawings, product data, or samples which relate to work not complying with requirements of Contract Documents, does not constitute an acceptable or valid request for, nor approval of, a substitution.

2.03 GENERAL PRODUCT REQUIREMENTS:

- A. General: Provide products which comply with requirements, and which are undamaged and unused at time of installation, and which are complete with accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for intended use and effect.
- B. Standard Products: Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar applications.
- C. Continued Availability: Where additional amounts of a product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to Owner at such later date.

PART 3 - EXECUTION (NOT USED)

\*\*\*END OF SECTION 01600\*\*\*

**SECTION 01700  
PROJECT CLOSEOUT**

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS: Closeout is defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of Contract, occupancy by Owner and similar actions evidencing completion of the Work. Time of closeout is directly related to "Substantial Completion", and therefore may be either a single time period for the entire Work or a series of time periods for individual parts of the Work which have been certified as substantially complete at different dates. That time variation (if any) shall be applicable to other provisions of this section.

1.02 PREREQUISITES TO SUBSTANTIAL COMPLETION:

A. General: Prior to requesting Engineer's inspection for certification of Substantial Completion (for either entire Work or portions thereof), complete the following and list known exceptions in request:

1. In progress payment request, coincident with or first following date claimed, show either 100% completion for portion of the Work claimed as "Substantially Complete", or list incomplete items, value of incompleteness, and reasons for being incomplete.
2. Include supporting documentation for completion as indicated in these Contract Documents.
3. Advise Owner and Engineer of pending insurance change-over requirements.
4. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications, Record Drawings, O&M Manuals, and similar documents.
5. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Engineer.
6. Complete start-up testing of systems, and instruction of Owner's operating/maintenance personnel. Discontinue (or change over) and remove from Project site as appropriate, temporary facilities and services, along with construction tools and facilities, and similar elements.
7. Provide Partial Waiver of Lien from each Subcontractor, supplier and the Contractor. All money due to Subcontractors and suppliers shall be withheld from payment to the Contractor until Waivers of Lien indicate no money owed. This money shall be in addition to the 2% Retainage and value of the punchlist.

B. Inspection Procedures: Upon receipt of Contractor's request, Engineer will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, Engineer will either prepare certificate of Substantial Completion, or advise Contractor of work which must be performed prior to issuance of certificate, and repeat inspection when requested and assured that the Work has been substantially completed. Results of completed inspection will form initial "punchlist" for final acceptance.

1.03 PREREQUISITES TO FINAL ACCEPTANCE:

A. General: Prior to requesting Engineer's final inspection for certification of final acceptance and final payment, as required by General Conditions, complete the following and list known exceptions (if any) in request:

1. Submit final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit updated final statement, accounting for final changes to Contract Price, including all remaining documentation for and Change Orders.
  3. Submit copy of Engineer's final punchlist of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed and dated by Engineer.
  4. Submit any final documents requested by Engineer.
  5. If applicable, submit final liquidated damages settlement statement, acceptable to Owner.
  6. Revise and submit evidence of final, continuing insurance coverage complying with insurance requirements.
  7. Provide Final Waiver of Lien from each Subcontractor, supplier and the Contractor. All money due to Subcontractors and suppliers shall be withheld from payment to the Contractor until Waivers of Lien indicate no money owed. This money shall be in addition to the 2% Retainage and value of the punchlist.
- B. Reinspection Procedure: Upon receipt of Contractor's notice that the Work has been completed, including punchlist items resulting from earlier inspections, and excepting incomplete items delayed because of acceptable circumstances, Engineer will reinspect the Work. Upon completion of reinspection, Engineer will either prepare certificate of final acceptance or advise Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, procedure will be repeated.

1.04 RECORD DOCUMENT SUBMITTALS:

- A. General: The Contractor shall provide the Owner with final Record Drawings developed on AutoCad. Do not use record documents for construction purposes. Provide access to record documents for Engineer's reference during normal working hours.
- B. Record Drawings: Maintain a white-print set (blue-line or black-line) of Contract Drawings and Shop Drawings in clean, undamaged condition, with mark-up of actual installations which vary substantially from the Work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately; however, where Shop Drawings are used for mark-up, record a cross-reference at corresponding location on working drawings. Mark with red erasable pencil. Give particular attention to concealed work, which would be difficult to measure and record at a later date. Note related change order numbers where applicable. Organize final Record Drawing sheets into manageable sets, bind with durable paper cover sheets with appropriate title, dates and other identification on cover of each set.

The Owner shall supply the Contractor with the original Contract Drawings, on 3-1/2" disks, for use in developing the Record Drawings. Prepare final Record Drawings on AutoCad. Submit both AutoCad files and a set of reproducible Mylars.

The Owner and Engineer shall own the original and Record Drawings. The Contractor may not duplicate, transfer or otherwise use the Drawings or files for purposes other than the construction of the contracted project.

- C. Record Specifications: Maintain one copy of Specifications, including Addenda, Change Orders, and similar modifications issued in printed form during construction, and mark-up variations (of substance) in actual Work in comparison with text of Specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date. Note related Record Drawing information and product data, where applicable.

- D. Record Product Data: Maintain one copy of each product data submittal, and mark-up significant variations in actual Work in comparison with submitted information. Include both variations in product as delivered to site, and variations from manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned at a later date. Note related Change Orders and mark-up of Record Drawings and Specifications.
- E. Miscellaneous Record Submittals: Refer to other sections of these Specifications for requirements of miscellaneous recordkeeping and submittals in connection with actual performance of the Work. Immediately prior to date(s) of final completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference.
- F. Maintenance Manuals: Organize equipment Operation & Maintenance manual information into six (6) suitable sets of manageable size, and bind into individual binders properly identified and indexed (thumb-tabbed) according to equipment tag number. Include emergency instructions, spare parts listing, copies of warranties, wiring diagrams, recommended "turn-around" cycles, inspection procedures, Shop Drawings, product data, and similar applicable information. Bind each manual of each set in a heavy-duty, 3-ring vinyl-covered binder, and include pocket folders for folded sheet information. Mark identification on both front and spine of each binder.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

- 3.01 CLOSEOUT PROCEDURES: General Operating/Maintenance Instructions: Arrange for each Subcontractor and Installer of work requiring continuing maintenance or operation, to meet with Owner's personnel, at Project site, to provide basic instructions needed for proper operation and maintenance of entire Work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures. Review maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning and similar procedures and facilities. For operational equipment, demonstrate start-up, shut-down, emergency operations, noise and vibration adjustments, safety, economy/efficiency adjustments, energy effectiveness, and similar operations. Review maintenance and operations in relation with applicable warranties, agreements to maintain, bonds, and similar continuing commitments
- 3.02 FINAL CLEANING:
  - A. General: Special cleaning for particular units of work is specified in the specific specification sections. General cleaning during progress of the Work is specified in Section 01400 – Procedures and Performances – Quality Control. Additional final clean-up requirements are as follows:
    - 1. Remove labels which are not required as permanent labels.
    - 2. Clean transparent materials to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace broken glass and damaged transparent materials.
    - 3. Clean all exposed exterior and interior hard-surfaced finishes, to a dirt-free condition, free of dust, stains, films and similar substances.
    - 4. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubricant and other substances.
    - 5. Clean all of the concrete floors and surfaces in the Cooling Water Building broom clean.

6. Clean light fixtures, lamps and unit heaters in the Cooling Water Building so as to function with full efficiency.
  7. Clean project site, including landscape development areas, of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petro-chemical spills and other foreign deposits. Rake grounds which are neither planted nor paved, to a smooth, even- textured surface.
- B. Removal of Protection: Except as otherwise requested by Engineer, remove temporary protection devices and facilities which were installed during course of the Work.
- C. Disposal of Wastes: Do not burn waste materials at site, or bury debris or excess materials on Owner's property, or discharge volatile or other harmful or dangerous materials into drainage systems. Remove waste materials from site and dispose of in a lawful manner.

\*\*\*END OF SECTION 01700\*\*\*

## **SECTION 01732 INSTALLATION**

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. This Section describes general requirements for installing products. Additional product installation requirements are included in the Specification Sections

#### 1.2 INSTALLATION QUALITY ASSURANCE AND QUALITY CONTROL

- A. Provide appropriate quality assurance for installing products, and provide quality control over Suppliers, products, services, Site conditions, and workmanship to provide Work of specified quality.
- B. Install products in accordance with approved Shop Drawings, the Contract Documents, and Supplier's installation data. If Supplier's data conflict with the Contract Documents, obtain clarification from Engineer before proceeding.
  - 1. Supplier's installation data includes Supplier's written instructions; drawings; illustrative, wiring and schematic diagrams; diagrams identifying external connections, terminal block numbers and internal wiring; and all other such information pertaining to installation of products and equipment that is not furnished with Shop Drawings. Included are all Supplier's printed installation instructions, including those that may be attached to equipment.
- C. Contractor's installers shall be experienced in the types of Work required.

#### 1.3 SERVICES OF SUPPLIER'S REPRESENTATIVE

- A. When specified, provide competent, qualified representatives of product Supplier to provide services specified, including supervising installation, adjusting, and testing of products

### PART 2 – PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

##### A. General:

- 1. Prior to installing products, complete preparation of surfaces on which products are to be installed. Prior to installing products on new concrete, concrete shall achieve sufficient compressive strength to support the products.
- 2. Maintain Work area in a broom-clean condition during installation of products.
- 3. Use proper tools to assemble products. Do not deform or mar surface of shafts, nuts, and other parts.
- 4. Do not support rigging from building or structure without written permission of Engineer. Contractor is responsible for and shall repair all damage to building or structure resulting from his operations.
- 5. During installation, maintain products in neutral position and do not exert undue stress on products.
- 6. Tighten connections requiring gaskets evenly all around to ensure uniform stress over entire gasket.
- 7. Use only an oil bath heater to expand couplings, gears, and other mechanical components to be expanded for installation. Do not force or drive couplings, gears, and other mechanical components onto equipment shafts, or subject them to open flame or torch.
- 8. Do not alter or repair products and do not burn or weld products unless specified in the Contract Documents or allowed by Engineer.

9. Provide plugs in lubrication holes to prevent entry of foreign material.

B. Setting and Erection:

1. Wedging is not allowed. Use minimum number of shims required in leveling equipment being installed. Shims shall be Type 304L stainless steel, clean and free of slag. Provide shims, filling pieces, keys, packing, red or white lead grout, and other products necessary to properly align, level, and secure apparatus in place. Install products plum and level, unless otherwise specified, and demonstrate plumbness and level to Engineer. Bring parts to proper bearing after installation and erection.
2. Using experienced millwrights, carefully set and align equipment on foundations, after equipment soleplates or baseplates, as applicable, have been shimmed to true alignment at anchorages. Set anchorages in place and tighten nuts against shims. Check bedplates or wing feet of equipment after securing to foundations and, after confirming alignments, grout soleplates or baseplates, as applicable, in place.
2. Anchorages:
  - a. Provide anchorage setting drawings in time to coordinate with fabrication of products and the Work at the Site.
3. Ream misaligned holes. Do not "force" bolts or keys.
4. Where applicable, properly align equipment with associated piping and utility connections, without exerting undue stress on connecting piping and utilities.

C. Alignment and Leveling:

1. Verify that all shafts, couplings, and sheaves are properly aligned and adjust to required tolerances.
2. Align couplings while equipment is free from external loads.
3. Check angular and parallel alignment and record actual alignment and submit to Engineer. Alignment shall be within tolerances specified in Contract Documents and as recommended by Supplier of the product.
4. Use laser indicators or dial indicators for checking angular and parallel alignment. Using dial indicators requires that, during rotation of half couplings in performance of test, dial indicator shall be maintained in same relative position, and dial indicator readings taken at same place on circumference of coupling.

D. Threaded Connections:

1. Apply a molybdenum disulfide, anti-seize compound to threads in mechanical connections such as bolts, studs, cap screws, tubing, and other threads, unless otherwise specified.

\*\*\*END OF SECTION 01732\*\*\*



**SECTION 01750  
STARTING, TESTING AND ADJUSTING**

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements of this Section apply to, and are a component part of, each section of the specifications.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01330 Submittals:

SD-06 Test Reports

Test reports shall be submitted in accordance with the paragraphs entitled, "Factory Tests", "Functional Test" and "Final Acceptance Test," of this section.

Test procedures and the recording forms shall be submitted according to paragraph entitled, "Test Procedures."

1.03 TESTS REQUIRED

- A. Tests shall be performed to verify proper functioning and other assemblies and components that need to be tested as an interrelated whole.

1.04 FACTORY TESTS

- A. Tests shall be performed at the factory to verify proper build. These test results will be used in the "Final Acceptance Test" section to verify no shipping damage and proper installation.

1.05 FUNCTIONAL TEST

- A. Contractor shall perform an "in-house" test to verify that the system and components have been properly installed and are functioning properly. Test shall be performed in the presence of the Engineer. Test shall be completed and found acceptable when system has performed per other sections and referenced industry standards.

1.06 FINAL ACCEPTANCE TEST

- A. Contractor shall perform a formal test with full documentation using the approved recording form. Engineer will witness this test and issue a written final acceptance. Final test data shall be provided to the Engineer. Data shall have a cover letter/sheet clearly marked with the system name, date, and the words "Final Test Data - Forward to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database."

1.07 TEST PROCEDURES

- A. Test procedure and recording forms that document the test steps shall be submitted for approval to the Engineer 21 calendar days prior to the proposed test date. Procedure shall consist of step by step instruction to verify system parameters, components, and functions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

\*\*\* END OF SECTION 01750 \*\*\*

**SECTION 01782**  
**OPERATION AND MAINTENANCE DATA**

**PART 1 GENERAL**

**1.01 SUBMITTALS**

- A. The Contractor shall submit Operation and Maintenance Manuals in accordance with Section 01330 - SUBMITTAL PROCEDURES:

**1.02 OPERATION AND MAINTENANCE MANUALS**

- A. Submit the number of copies the Contractor needs plus three (3) sets of bound Operation and Maintenance (O&M) Manuals that include operation and maintenance data for process equipment and building systems (including heating, ventilation, plumbing, and electrical) along with one (1) electronic version on CD.
- B. Organization: Operation manuals for equipment will be compiled into binders with similar equipment. As a minimum, provide separate binders for the following systems:

1. Process Equipment
2. Process Control System
3. Building Heating, Ventilation, and Plumbing Systems
4. Building Electrical System

- C. Binders: Provide vinyl covered 3-ring, spring-post binders. The binders shall be a maximum of 2-inches and shall be no more than 80% full. The binders shall include a pocket on the interior for loose pages. The binder cover and spine shall have clear sleeves for the insertion of printed heavy-weight labels that identify the binder contents. The binder labels shall include the following information. Use minimum of 12 point font for spine and 14 point font for cover.

1. Project Name: as indicated on the Contract Documents
2. Binder contents - general description
3. Volume number (e.g., Vol. 1 of 2), if more than one binder is needed
4. Date

**1.03 OPERATION AND MAINTENANCE DATA**

- A. Submit Operation and Maintenance (O&M) data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The manuals shall be submitted to the Engineer prior to the training of Owner personnel. The Contractor shall compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal.
- B. Package Quality: Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.
- C. Package Content: Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission.
- D. Changes to Submittals: Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Engineer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

#### 1.04 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

- A. Operating Instructions: Include specific instructions, procedures, and illustrations for the following phases of operation:
- B. Safety Precautions: List personnel hazards and equipment or product safety precautions for all operating conditions.
- C. Operator Prestart: Include procedures required to set up and prepare each system for use.
- D. Startup, Shutdown, and Post-Shutdown Procedures: Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.
- E. Normal Operations: Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.
- F. Emergency Operations: Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones operations of systems controlled.
- G. Operator Service Requirements: Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.
- H. Environmental Conditions: Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.
- I. Preventive Maintenance: Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair.
- J. Lubrication Data: Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":
  - 1. A table showing recommended lubricants for specific temperature ranges and applications.
  - 2. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
  - 3. A Lubrication Schedule showing service interval frequency.
- K. Preventive Maintenance Plan and Schedule: Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.
- L. Corrective Maintenance (Repair): Include manufacturer's recommended procedures and instructions for correcting problems and making repairs.
- M. Troubleshooting Guides and Diagnostic Techniques: Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

- N. Wiring Diagrams and Control Diagrams: Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.
  - O. Maintenance and Repair Procedures: Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.
  - P. Removal and Replacement Instructions: Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.
  - Q. Spare Parts and Supply Lists: Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.
  - R. Corrective Maintenance Work-Hours: Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.
  - S. Appendices: Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:
  - T. Parts Identification: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog
  - U. Warranty Information: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.
  - V. Personnel Training Requirements: Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.
  - W. Testing Equipment and Special Tool Information: Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.
  - X. Contractor Information: Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.
- 1.05 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES
- A. Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

B. Data Package 1:

1. Safety precautions
2. Maintenance and repair procedures
3. Warranty information
4. Contractor information
5. Spare parts and supply list

C. Data Package 2:

1. Safety precautions
2. Normal operations
3. Environmental conditions
4. Lubrication data
5. Preventive maintenance plan and schedule
6. Maintenance and repair procedures
7. Removal and replacement instructions
8. Spare parts and supply list
9. Parts identification
10. Warranty information
11. Contractor information

D. Data Package 3:

1. Safety precautions
2. Normal operations
3. Emergency operations
4. Environmental conditions
5. Lubrication data
6. Preventive maintenance plan and schedule
7. Troubleshooting guides and diagnostic techniques
8. Wiring diagrams and control diagrams
9. Maintenance and repair procedures
10. Removal and replacement instructions
11. Spare parts and supply list
12. Parts identification
13. Warranty information
14. Testing equipment and special tool information
15. Contractor information

E. Data Package 4

1. Safety precautions
2. Operator prestart
3. Startup, shutdown, and post-shutdown procedures
4. Normal operations
5. Emergency operations
6. Operator service requirements
7. Environmental conditions
8. Lubrication data
9. Preventive maintenance plan and schedule
10. Troubleshooting guides and diagnostic techniques
11. Wiring diagrams and control diagrams
12. Maintenance and repair procedures
13. Removal and replacement instructions
14. Spare parts and supply list

15. Corrective maintenance man-hours
16. Parts identification
17. Warranty information
18. Personnel training requirements
19. Testing equipment and special tool information
20. Contractor information

F. Data Package 5:

1. Safety precautions
2. Operator prestart
3. Start-up, shutdown, and post-shutdown procedures
4. Normal operations
5. Environmental conditions
6. Preventive maintenance plan and schedule
7. Troubleshooting guides and diagnostic techniques
8. Wiring and control diagrams
9. Maintenance and repair procedures
10. Spare parts and supply list
11. Testing equipments and special tools
12. Warranty information
13. Contractor information

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

\*\*\*END OF SECTION 01782\*\*\*

**SECTION 02100  
SITE PREPARATION**

**PART 1 – GENERAL**

**1.01 GENERAL PROVISIONS:**

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section. Scheduling constraints as identified in the contract shall be strictly adhered to.

**1.02 DESCRIPTION OF WORK:**

- A. Clearing shall consist of clearing the surface and the ground of the designated areas of all trees, down timber, logs, snags, brush undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, and the disposal from the project of all spoil materials resulting from clearing.

This work shall also include the preservation from injury to defacement of all vegetation and objects designated to remain. The stumps shall be left in place or removed as specified under Section B.

- B. Grubbing shall consist of clearing the surface and the ground of the designated areas of all stumps, roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing. Unless specifically shown otherwise, all cleared areas shall be grubbed.
- C. Protection of trees and vegetation schedule for preservation. Work outside of the defined contract work limits as identified by grading or limit of work lines is expressly prohibited.

**1.03 RELATED WORK SPECIFIED ELSEWHERE:**

Section 02150	Demolition
Section 02180	Subsurface Investigation
Section 02220	Excavation
Section 02240	Backfilling for Pipelines and Structures
Section 02600	Paving and Sidewalks
Section 02920	Lawn and Seed

**PART 2 – PRODUCTS**

This part not used.

**PART 3 – EXECUTION**

**3.01 CONSTRUCTION METHODS:**

- A. Areas of vegetation within the limit of work shall be cleared and grubbed. All stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed except where specifically identified on the project plan for preservation.

- B. All holes remaining after the grubbing operation in excavation areas where the depth of holes exceeds the depth of the proposed excavation shall be filled with acceptable material, moistened, and properly compacted in layers to the 95% density. Any suitable material that can be used as topsoil will be stockpiled or placed on designated slopes.
- C. The downslope areas of any excavations or earth stockpile areas shall be projected with hay bales or erosion control fence.

\*\*\*END OF SECTION 02100\*\*\*



**SECTION 02150  
DEMOLITION**

**PART 1 – GENERAL**

**1.01 GENERAL PROVISIONS:**

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section. Demolition shall be accomplished in a manner to retain all elements of the project which are to be incorporated into the final project.

**1.02 DESCRIPTION OF WORK:**

A. Section Includes:

1. Demolition shall include, unless otherwise noted on Drawings, removal of existing objects of improvements, whether indicated on drawings or not, that would, in the opinion of the Owner, prevent or interfere with progress or completion of proposed work.
2. Permits, fees, and licenses shall be secured and paid for by the Contractor, including disposal charges as required, to ensure progress of the work will proceed.
3. Work shall comply with requirements of governing authorities in demolition of existing pavement, curbs and gutters, drainage structures, and utilities as may be required.
4. Demolition requires removal and disposal off site of the following:
  - a) Existing utility pipelines, valves, and fittings indicated on the Drawings or as required by specifications.
  - b) Existing concrete structures and appurtenance structures as indicated on the Drawings or as required by Specifications. Any portion of existing 12” diameter ductile iron water main that is identified for removal may be salvaged by the Contractor for reuse as driveway culvert material.
  - c) All materials removed and not reused as part of the Contract shall be considered surplus materials. All surplus materials shall be removed and disposed off offsite by the Contractor unless otherwise identified below for salvage by the City of Portland or Portland Water District.

B. Salvaged Items

1. All existing hydrants removed as part of the water main removal work shall remain the property of the Portland Water District. The Contractor shall remove and stockpile existing hydrants at the Central Maine Power Company parcel located at 324 Island Avenue.
2. All bituminous pavement grindings not reused as part of the roadway restoration work shall be excavated, loaded, hauled, and stockpiled at the designated site on Peak Island and remain the property of the City of Portland.

**1.03 RELATED WORK SPECIFIED ELSEWHERE:**

Section 01500	Temporary Facilities
Section 02100	Site Preparation
Section 02180	Subsurface Investigation
Section 02220	Excavation
Section 02920	Lawn and Seed

1.04 JOB CONDITIONS:

- A. Structures to be demolished will be discontinued in use and vacated prior to start of work.
- B. Owner assumes no responsibility for condition of structures to be demolished.
- C. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable.
- D. Items of salvageable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed. Storage or sale of removed items on site will not be permitted.
- E. Explosives shall not be brought to site or used without written consent of authorities having jurisdiction. Such written consent will not relieve the Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. The performance of any required blasting shall comply with governing regulations.

1.05 PROTECTIONS:

A. Summary:

- 1. Ensure safe passage of persons around all areas of demolition.
- 2. Conduct operations to prevent damage to adjacent buildings, structures, other facilities, or injury to persons.
- 3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and of adjacent facilities to remain.
- 4. Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.
- 5. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.
- 6. Prevent interruption of existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.
- 7. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities. Refer to Section 01500 – Temporary Facilities, for additional details and requirements.
- 8. Make arrangements, before initiating demolition, for relocating, disconnection, rerouting, abandoning, or similar action as may be required relative to utilities and other underground piping, to permit work to proceed without delay. Arrangements shall be made in accordance with regulations of authorities of utilities concerned, including but not restricting any other services not mentioned, such as overhead and underground power and telephone lines and equipment, gas piping, storm sewers, sanitary sewers, or water piping. Contractors shall not use water when it may create hazardous or objectionable conditions, such as ice, flooding, and/or pollution.
- 9. Use water sprinkling and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level.
- 10. Comply with governing regulations pertaining to environmental protection.
- 11. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

PART 2 – PRODUCTS

This part not used.

## PART 3 – EXECUTION

### 3.01 DEMOLITION OF STRUCTURES:

- A. Demolish structures completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to Owner and authorities having jurisdiction.
- B. Demolish concrete and masonry in small sections. Break up and remove concrete slabs-on-grade unless otherwise shown to remain.
- C. Demolish and remove below-grade construction and concrete slabs on grade to a minimum depth of two feet below proposed subgrade unless otherwise indicated on the Drawings for complete removal.

### 3.02 FILLING VOIDS:

- A. Completely fill below-grade areas with voids resulting from demolition or removal of structures (underground fuel storage tanks, wells, cisterns, etc.) using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.
- B. Ensure that areas to be filled are free of standing water, frost, frozen material, trash, and debris prior to fill placement.
- C. Place fill materials in horizontal layers not exceeding eight inches (8”) in loose depth and compact each layer at optimum moisture content of fill material to density equal to original adjacent ground, unless subsequent excavation for new work is required.
- D. Grade surface to match adjacent grades and to provide flow to surface drainage structures after fill placement and compaction.

### 3.03 DISPOSAL OF DEMOLISHED MATERIAL:

- A. Remove from site debris, rubbish, and other materials resulting from demolition operations.
- B. No burning of any materials, debris, or trash on-site or off-site will be allowed, except when allowed by the appropriate governing authority. If allowed as stated above, burning shall be performed in manner prescribed by governing authority. Attend burning materials until fires have burned out or have been extinguished.
- C. Transport materials removed from demolished structures and dispose of off-site to areas which are approved for disposal by governing authorities and appropriate owners.
- D. The Contractor shall enter into a contract for the transportation and disposal of all solid waste with a licensed disposal site. The Contractor shall provide a copy of the contract and manifest documents to the owner assuring the demolition material is adequately disposed of.

### 3.04 UTILITY SERVICES:

- A. Demolish and remove outside utility lines as follows:
  - 1. Any utility which is abandoned and located within 36 inches of the final finish grade.
  - 2. Any storm drain which is to be abandoned.
  - 3. Any overhead utility which is discontinued.
  - 4. Other abandoned lines which would interfere with performance of this contract.
- B. Plug and seal any abandoned utility lines not scheduled for removal in Section 3.04A as follows:

1. All pipelines shall be plugged at any appurtenant opening or point of breakage which occurs during construction of the work.
2. The portion of appurtenant utility structures which are more than 36 inches below grade shall be dewatered, all entry lines shall be sealed, and the void shall be filled and compacted with clean stone gravel or sand.

3.05 COORDINATION WITH OTHER WORK:

- A. The demolition shall be scheduled and coordinated by the Contractor with the work of other sections.

\*\*\*END OF SECTION 02150\*\*\*

**SECTION 02180  
SUBSURFACE INVESTIGATION**

**PART 1 – GENERAL**

1.01 **GENERAL PROVISIONS:**

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.02 **DESCRIPTION OF WORK:**

- A. Test probes were performed by Northern Test Borings, Inc. of Gorham, Maine during the preparation of construction documents. The purpose of the test probes was to determine the approximate depth to bedrock. No soil samples were obtained; therefore, all excavation shall be considered unclassified. The Contractor may conduct his own subsurface investigations after requesting and receiving approval from the District prior to submitting a bid. The request for approval shall be accompanied by a plan indicating the location and type of investigations to be undertaken by the Contractor.

1.03 **RELATED WORK SPECIFIED ELSEWHERE:**

Section 02100	Site Preparation
Section 02150	Demolition
Section 02220	Excavation
Section 02240	Backfilling for Pipelines and Structures
Section 02600	Paving and Sidewalks
Section 02713	Water System
Section 02720	Storm Drainage System
Section 02730	Sanitary Sewer System
Section 02740	Manholes and Catch Basins
APPENDIX 1	Subsurface Investigation Probe Logs

**PART 2 – PRODUCTS**

2.01 **REPORT:**

- A. Subsurface conditions have been investigated by probes. Location of the probes is shown on the Contract plans. Logs of the probes are contained in Appendix 1 of these Specifications.
- B. The probes are not warranted to show the actual subsurface conditions except at the location of said probes and at these points are subject to inaccuracies inherent in methods used and to variations in the driller's classification and interpretation of soil layers.

Subsurface information is included only as an aid to the Bidder and it is the obligation of the Bidder to draw their own conclusions of subsurface conditions from their own investigations prior to submitting a bid proposal. The Contractor agrees, in signing his contract, that the Contractor will make no claims against the District or Engineer, if in carrying out the work the Contractor finds that the actual conditions encountered in performing the work do not conform to conditions presented, discussed, or anticipated prior to the commencement of work.

**PART 3 – EXECUTION**

- A. This section not used.

\*\*\*END OF SECTION 02180\*\*\*

## **SECTION 02217 - EXCAVATION AND BACKFILLING FOR WATER MAINS**

### **PART 1: GENERAL**

#### **1.1 SCOPE:**

- A. This section includes all excavation for water mains, hydrants and appurtenances, including drainage, sheeting and bracing, backfilling, disposal of surplus material, and miscellaneous grading. All work shall be done as indicated on the drawings and as herein specified.
- B. Excavation for water mains shall be the width and depth as indicated on the standard details. Excavation for hydrants and appurtenances shall provide suitable room for their construction.
- C. The CONTRACTOR shall furnish and place all sheeting, bracing and supports, and necessary dewatering, and shall carry out the excavation in such a manner as to eliminate all possibilities of undermining or disturbing existing pipelines, utilities, roadways, shoulders and/or structures.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE:**

Bedding and Backfill Material - Section 02219

### **PART 2: PRODUCTS**

#### **2.1 EQUIPMENT:**

Equipment shall be at CONTRACTOR'S option.

### **PART 3: EXECUTION**

#### **3.1 EXCAVATION:**

- A. When any pavement, regardless of type, must be cut, it shall be done in a neat and symmetrical manner by use of a saw, chisel, or other suitable method. In no case shall pavement be torn up with a backhoe bucket except between and inside of cuts previously made as above. Should any further pavement be broken, outside of the cuts, as by blasting, such damaged pavement shall be cut out in a neat and orderly fashion.
- B. The CONTRACTOR shall perform all excavation of every description and of whatever substances encountered to the depths shown on the drawings or directed by the ENGINEER.

- C. No extras will be allowed for quicksand excavation, muck excavation, or any other type unless specifically provided for in the bidding schedule.
- D. Surplus excavated material may be used at other parts of the construction project as required for fill, etc. Excess material shall be disposed of by the CONTRACTOR.
- E. The sidewalls of all trench excavation shall be kept as nearly vertical as possible in all roadways, lawns, near homes, etc. by sheeting, bracing, or other means. The width of the trench at a point six (6) inches above the top of the water pipe shall not be greater than the width detailed. If the type of excavated material will not allow the width detailed, then the trench shall be properly sheeted and braced. The cost of sheeting, bracing, or other means is included in the cost of the pipelines and no extras will be allowed.
- F. The excavation shall be made to secure a flat bottom trench (undisturbed earth bottom) for the full length of the pipe so as to give a uniform support to the pipe and shall be in accordance with ANSI A21.50 (AWWA C150), Type 2 Laying Condition.
- G. The bottom of the trench shall be accurately graded to provide support to the full length of the pipe barrel. Excavate at each bell to prevent bell from bearing on trench bottom.

### 3.2 EXCAVATION BELOW TRENCH GRADE:

- A. By mistake of CONTRACTOR: Where the bottom of the trench shall, by mistake of the Contractor, have been taken out to a greater depth than required, it shall be refilled to the proper grade with bedding material, and all to be placed and compacted as specified. The CONTRACTOR shall receive no additional compensation.
- B. By instruction from ENGINEER: If, in the opinion of the ENGINEER, existing material below trench grade is unsuitable for properly laying the pipe, the CONTRACTOR will excavate and remove the unsuitable material and replace the same with bedding material as authorized by the ENGINEER and properly compacted to his satisfaction. The CONTRACTOR will be paid under the item titled "Unsuitable Material Excavated Below Trench Grade."

### 3.3 EXCAVATION NEAR EXISTING UTILITIES, ETC.

- A. It will be necessary to excavate near existing pipes, drains and other utilities in certain locations. Some of these have been indicated on the drawings, but no attempt has been made to show all of the services and the completeness and accuracy of the information given is not guaranteed. The CONTRACTOR shall call "Dig-Safe" at least three business days in advance of any excavation to allow utilities to locate underground facilities.

- B. As the excavation approaches pipes, conduits, or other underground structures and utilities, digging by machinery shall be discontinued and the excavation shall be done by hand tools.
- C. If the utility is of the opinion that at any point sufficient or proper support has not been provided, they may order additional supports placed at the expense of the CONTRACTOR. Compliance with such order shall not relieve the CONTRACTOR from his responsibility for the sufficiency of such supports. It shall be the responsibility of the CONTRACTOR to prevent damage to or displacement of utilities and to consult with and request the concurrence of the utility company's representative in this matter at all locations. The cost of protecting such utilities shall be considered incidental to the cost of laying the pipe.

#### 3.4 TRENCH SURCHARGES:

The excavated material shall be placed adjacent to the excavation in a manner to cause no excessive surcharge on the trench bank nor to obstruct free access to hydrants and valves. Should traffic or other conditions make it impractical or unsafe to stack material adjacent to trench, it shall be hauled and stored at a location provided by the CONTRACTOR and at the expense of the CONTRACTOR. When required, it shall be re-handled and used in backfilling the trench by the CONTRACTOR and at his expense.

#### 3.5 SHEETING AND BRACING:

- A. The CONTRACTOR shall be responsible for the design, construction, maintenance and safety of all sheeting and bracing required to support the sides of the excavation and to prevent the movement of earth which could in any way damage or endanger adjacent structures, utilities, roadways, increase the width of the excavation to more than that specified, or delay the work.
- B. All sheeting, bracing and shoring is to be included in prices bid for several items of work in bidding schedule and will not be paid for as separate items.
- C. No shoring shall be left in place unless so directed by the OWNER / PORTLAND WATER DISTRICT.

#### 3.6 DRAINAGE AND DEWATERING OF EXCAVATIONS:

- A. The CONTRACTOR shall conduct his operations so as to prevent at all times the accumulation of water, ice and snow in excavations or in the vicinity of excavated areas so as to prevent water from interfering with the progress or quality of the work. Under no conditions shall water be allowed to rise in unbackfilled trenches after pipe has been placed.



- B. Accumulated water, ice and snow shall be promptly removed and disposed of by dewatering. Disposal shall be carried out in a manner which will not create a hazard to public health; nor cause injury to public or private property, work completed or in progress, or public streets; nor cause any interference in the use of streets and roads by the public. Pipes under construction shall not be used for drainage of excavations.
- C. During construction, when an unstable condition in the pipe sub-grade has been created due to the CONTRACTOR'S excavation, the sub-grade shall be stabilized by dewatering or other means accepted by the OWNER / PORTLAND WATER DISTRICT.

### 3.7 BACKFILLING - GENERAL:

- A. In general and unless other material is indicated on the drawings or is specified, material used for backfilling trenches and excavations around structures shall be suitable material which was removed in the course of making the construction excavations or as specified.
- B. Frozen materials shall not be placed in the backfill, nor shall material be placed upon frozen material. Previous frozen material shall be removed or shall be otherwise treated as required before new backfill is placed.
- C. Backfilling shall be done as soon as practical after the pipe has been laid and jointed.

### 3.8 SUITABLE BACKFILL MATERIAL

Suitable backfill material shall be the following or a combination of the following:

- (1) Excavated material that will compact to the compaction requirements.
- (2) Material that does not contain rocks larger than 8" in any dimension.
- (3) Dry clay backfill free from lumps.
- (4) Wet clay that alone would pump but when mixed with sand and/or gravel will be stable and will compact.

### 3.9 BACKFILLING PIPE TRENCHES:

- A. As soon as practicable after the pipes have been laid and jointed, backfilling shall begin and shall proceed until it is completed or has sufficient backfill to allow pipe testing.
  - (1) The first layer of suitable backfill material shall be brought half-way up the pipe and compacted to 80% maximum density and then the normal backfilling shall begin and shall be compacted as specified.

- (2) All backfill shall be thoroughly compacted by hand tamping as placed, by use of mechanical or vibratory compactors, or by other acceptable methods.
  - (3) Remainder of the trench shall be backfilled as follows:
    - a) In paved areas, road shoulders and seeded areas, the entire depth of trenches above the center line of the pipe shall be backfilled in eight (8) inch layers with suitable backfill material and each layer thoroughly and carefully compacted as specified. Bring backfill up to bottom of gravel base and/or loam.
    - b) In other areas, the trench above the centerline of the pipe shall have suitable backfill material placed and compacted in eighteen (18) inch maximum layers as specified.
- B. The nature of the excavated materials will govern both their acceptability for backfill and the method best suited for their placement and compaction in the backfill.
- (1) Both the materials and the methods shall be subject to the acceptance of the OWNER / PORTLAND WATER DISTRICT.
  - (2) No stones or rock larger than 8" in the greatest dimension shall be placed in the backfill.
- C. Backfilling in public right-of-way, along the streets or highways in or along shoulder, berm or backslope shall be done in accordance with the specifications and requirements of the state or municipality, whichever is responsible for the street or highway involved. Responsibility for the fulfillment of permit conditions or any other applicable requirements of the street or highway authority shall be the obligation of the CONTRACTOR. Surface restoration shall be carried out to the satisfaction of the street or highway authority or as shown on the plans.
- D. Backfilling shall follow pipe laying as closely as reasonable, so that a minimum of trench shall be open at any time. The regulations of the highway authorities shall be observed as regards the amount of trench to be open at any one time. Over night, and especially over weekends and holidays, the amount of open trench shall be zero. Any caved-in trench, especially after heavy rain and flooding, shall be cleaned out and the bottom consolidated before any additional pipe shall be laid.

### 3.10 TOP OF BACKFILL:

- A. In paved and shoulder areas, backfill shall be carried up to pavement or shoulder sub-grade ready to receive the gravel base. In other areas, backfill shall be brought up to adjacent finished grade minus the depth of any required

topsoil and so as to provide a finished surface slightly mounded over the trench. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, and shall then be refilled and compacted with the surface restored to required grade and degree of compaction, mounded over, and smoothed off, at no additional expense.

- B. In unpaved areas, the gravel topping shall be left in a smooth and even condition, with no large stone on or in the surface. In cases where a paved surface has been broken, a temporary bituminous patch and/or a permanent paving restoration shall be made as required by the appropriate local or state road authority.

### 3.11 COMPACTION:

- A. Compaction densities specified herein shall be the percentage of the maximum density obtainable at optimum moisture content as determined and controlled in accordance with AASHTO Standard T-180, Method A or D depending on the material size. Field density tests shall be made in accordance with AASHTO Standard T-147.

Each layer of backfill shall be moistened or dried as required and shall be compacted to the following densities, unless otherwise specified in the project specifications.

(1) Bedding material	80%
(2) Suitable backfill material under paved or shoulder areas	90%
(3) Gravel base:	
(a) Under paved areas	95%
(b) In shoulder areas	90%
(c) As replacement for unsuitable material excavated below grade	90%
(4) Loam areas	90%
(5) All other areas	85%

- B. Methods and equipment proposed for compaction shall be subject to prior acceptance by the OWNER / PORTLAND WATER DISTRICT. Compaction generally shall be done with vibrating equipment. Displacement of, or injury to, the pipe and structure shall be avoided. Movement of in-place pipe or structures shall be at the CONTRACTOR'S risk. Any pipe or structure damaged thereby shall be replaced or repaired as directed by the OWNER / PORTLAND WATER DISTRICT and at the expense of the CONTRACTOR.

### C. Testing:

- (1) Field density tests may be ordered by the OWNER / PORTLAND WATER DISTRICT for each foot of depth of backfill at an average interval of 200 feet along the trench.
- (2) The CONTRACTOR shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The CONTRACTOR shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.
- (3) Any costs of retesting required as a result of failure to meet compaction requirements shall be borne by the CONTRACTOR.

### 3.12 FILL AND GRADING:

- A. Excavated material not required for backfilling around pipes or structures may be used for fill in areas which require material for re-grading.
- B. The re-grading shall be carried out as directed by the OWNER / PORTLAND WATER DISTRICT so that all surface water will drain towards brooks or drainage pipes.
- C. All material shall be of such nature that after it has been placed and properly compacted, it will make a dense and stable fill.

### 3.13 PROTECTION OF EXISTING STRUCTURES:

- .A. All existing pipes, wires, poles, fences, property line markers and other items, which must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from injury by the CONTRACTOR, at no additional cost to the OWNER / PORTLAND WATER DISTRICT. Should such items be injured, they shall be restored by the CONTRACTOR, without compensation therefore, to at least as good condition as that in which they were found immediately before the work was begun.

### 3.14 ACCOMMODATION OF TRAFFIC:

- A. The CONTRACTOR shall construct and maintain, without extra compensation, such adequate and proper bridges over excavations as may be necessary or as directed for the safe accommodation of pedestrians and vehicles. The CONTRACTOR shall furnish and erect, without cost to the OWNER / PORTLAND WATER DISTRICT, substantial barricades at crossing of trenches, or along the trench, to protect the traveling public.
- B. The CONTRACTOR shall not obstruct fire hydrants.

**SECTION 02219 - BEDDING AND BACKFILL MATERIAL**

**PART 1: GENERAL**

**1.1 SCOPE:**

- A. The CONTRACTOR shall furnish, place and compact various types of bedding material and trench sand as called for in the specifications or as directed.
- B. The types and quality of bedding and backfill material are specified in this section, but its use for pipe bedding, backfill, replacement of unsuitable material excavated below trench grade, and other uses are as specified elsewhere.

**1.2 RELATED WORK SPECIFIED ELSEWHERE:**

- A. Excavation and Backfilling for Water Mains - Section 02217

**PART 2: PRODUCTS**

**2.1 MATERIALS:**

- A. Bedding Material:
  - 1. Screened or crushed gravel bedding material shall be hard durable particles free from organic matter, lumps of clay and other deleterious substances. The gradation shall meet the requirements of the following table and MDOT specifications Section 703.06 Type B aggregate

<u>Sieve Size Designation</u>	<u>% By Weight</u>
1/2 inch	35 - 75
1/4 inch	25 - 60
No. 40	0 - 25
No. 200	0 - 5.0

- 2. Select backfill as specified below may be used for bedding material.
- 3. Bedding material shall not contain particles of rock which have any dimensions greater than 4".

B. Select Backfill:

1. Sand backfill shall be hard, durable particles of granular material with 100% passing the 1/2" sieve and between 0-15% passing the #200 mesh. All percentages are by weight. Sand shall be graded so as to secure the required compaction.

C. Backfill:

1. Suitable native material that does not contain stone or rock particles with any dimensions greater than 8".
2. Bank Run gravel borrow consisting of uniformly graded granular material having no rocks with a maximum dimension greater than 8" and that portion passing a 3-inch square mesh sieve shall contain no more than 70% passing 1/4 inch mesh sieve and not more than 10% passing a No. 200 mesh sieve.

PART 3: EXECUTION

3.1 METHODS:

- A. The materials will be used in accordance with the requirements of the various sections of the specifications, drawings and standard details.

**SECTION 02220  
EXCAVATION**

**PART 1 – GENERAL**

**1.01 GENERAL PROVISIONS:**

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

**1.02 DESCRIPTION OF WORK:**

- A. "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of said material on or off the project site or relocation to other portions of the site of materials removed.
- B. Excavation shall consist of the removal of all material encountered in grading and constructing the project within the limits of construction. This work shall include the following:

1. Excavation for all structures, utilities, appurtenances, and general site work shown on the Drawings.
2. Excavation for all structures, footings, and foundations.
3. Excavation for all underground mechanical and electrical utilities and buried electrical and mechanical appurtenances.

Common excavation shall include the removal and disposal of boulders, solid mortared stone masonry and concrete masonry when each is less than 3 cubic yards in volume and all soft and disintegrated rock which can be removed with ordinary excavating machinery. It shall include grubbing which consists of the removal and disposal of all stumps, roots, bushes, grass, turf or other objectionable material. Rock excavation shall be solid material which requires the use of explosives or pneumatic jackhammers for removal and is larger than 3 cubic yards.

4. Removal of on-site utilities and culvert pipes identified on the Plans.
  5. Removal of on-site water main piping, fittings and valves as identified on the plans.
- C. It shall include muck excavation which shall consist of the removal and disposal of saturated or unsaturated mixtures of soils and organic matter not suitable for embankment and roadway subgrade foundation material regardless of moisture content.
- D. This work shall also include the removal and disposal of the any existing bituminous concrete paving that is not milled as part of the project. The removal of the existing bituminous concrete pavement shall not be considered "rock excavation."

**1.03 RELATED WORK SPECIFIED ELSEWHERE:**

Section 02100	Site Preparation
Section 02150	Demolition
Section 02180	Subsurface Investigation
Section 02240	Backfilling for Pipelines and Structures
Section 02270	Temporary Erosion Controls
Section 02600	Paving and Sidewalks
Section 02713	Water System
Section 02720	Storm Drainage System
Section 02730	Sanitary Sewer System
Section 02740	Manhole and Catch Basin Structures
Section 02920	Lawn and Seed

## PART 2 – PRODUCTS

This part not used.

## PART 3 – EXECUTION

### 3.01 PAVEMENT EXCAVATION:

- A. All pavement excavation shall be performed separately from other excavation.
- B. Prior to commencing pavement excavation a saw cut shall be made at the limit of work to prevent damage to the pavement outside of the limit of work.
- C. Pavement removal shall consist of the excavation, removal, and disposal of all bituminous concrete, as shown on the Contract Drawings.

### 3.02 TRENCH EXCAVATION:

- A. Upon removal of surface materials as specified in other sections, the Contractor shall remove earth to the depth required for utility installation, or to the surface of solid rock which cannot be removed by standard excavating equipment, whichever is first encountered.
- B. Trenches shall be excavated of all materials except solid rock, to the depths and widths indicated on the Plans. Any excavation below design grades shall be refilled with heavy gravel, thoroughly compacted, for which no additional payment shall be made.
- C. The Contractor shall engage a Professional Engineer, licensed in the State of Maine, to design all sheeting, shoring, and bracing systems required for the project in accordance with Section 1.01. The Contractor shall furnish, put in place and maintain, at his own expense, such sheeting, bracing, trench shields or other facilities necessary to support the sides of the trench to prevent any movement which could in any way injure adjacent utilities, buildings, pipe lines, or other structures, or delay the work, or endanger workmen or bystanders. At all times the installation of such bracing, sheeting, or other protective facilities shall be sufficient to assure the safety of all workmen and any others in the vicinity of the work site. All trenching procedures, including sheeting, bracing, and other protective facilities, shall be accomplished in full compliance with local, State and Federal Safety Standards, including the latest requirements of the Occupational Safety and Health Act. The Contractor is solely responsible for accomplishing the excavation in a safe manner in compliance with all appropriate safety requirements. Sheeting, bracing, or other protective facilities shall be removed upon completion of the pipe line installation, unless such removal will endanger the work installed or adjacent structures or facilities. As soon as withdrawn, the voids left shall be carefully filled with sand and compacted. Any sheeting or bracing left in place shall be cut at least two (2) feet below the finished grade of paving.
- D. If a stable trench cannot be achieved by sloping, then sheeting, bracing, trench shields, or other protective devices in compliance with all safety standards shall be installed as described above. Such sloping must be compatible with the work limits provided by the Contract Drawings. In no case shall work or equipment extend beyond the limits unless the Contractor makes prior specific arrangements with the Owner.

### 3.03 EXCAVATION FOR STRUCTURES:

- A. Earth shall be excavated to the depths and sections required for installation of all building footings, tank pads, catch basins, manholes, electrical standards, or other appurtenant facilities. Care shall be taken that the foundation areas of structures are not excavated below grade or are disturbed so as to lessen their bearing capacity. Should the proposed foundation areas be disturbed, additional excavation shall be made to undisturbed soil, and heavy gravel shall be placed and compacted to secure a stable foundation pad. If existing foundation areas are disturbed, the Owner shall be notified immediately. Corrective and remedial measures shall be taken to the satisfaction of the Owner at no additional cost.



- B. All excavations for structures shall be sheeted, braced, sloped, or otherwise protected in the same manner and meeting the safety requirements and conditions specified above under Sections 1.01, 3.02 C, D.
- C. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete form work, installation of services, other construction, and for inspection.
- D. In excavating for footings and foundations, take care not to disturb bottom of excavations. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.04 ROCK EXCAVATION:

- A. When during the process of excavation rock is encountered, the Contractor shall be required to perform accurate measurements of the bedrock elevations for the purposes of quantifying the volume of rock excavation to be paid under the contract. No material claimed as rock shall be excavated, blasted or removed until the following procedures have been performed. The Contractor shall have the following options to measuring rock elevations:
  - 1. Removal of overburden soil materials, including as much weathered rock as possible with conventional excavating equipment, and expose bedrock surface. The Contractor shall employ and pay for an approved licensed civil engineer or land surveyor acceptable to the Engineer to obtain elevations of the rock before removal of same, develop cross sections or profiles of the rock, and provide computations of rock excavation within the limit lines of the excavation.
  - 2. Probing through the overburden, including penetration through as much weathered rock as possible, may be performed at 25' intervals along the centerline of utility trench excavations to determine the depth to the bedrock surface. The Contractor shall employ and pay for a drill rig to perform the probes through the overburden prior to any drilling for blasting purposes. The drill probe work shall be observed and witnessed by the Engineer. The Contractor shall also employ and pay for an approved licensed civil engineer or land surveyor acceptable to the Engineer to develop profiles of the rock before removal of same and provide computations of rock excavation within the limit lines of the excavation.

Notify the Engineer before proceeding with any excavating, blasting or removal of materials which might be claimed as rock. The Contractor shall not proceed with the removal of the material claimed as rock until the material has been classified by the Engineer. Failure to notify the Engineer and obtain measurements of the rock elevations prior to any excavation shall forfeit the Contractor's right-of-claim to any credits.

Contractor shall quantify rock excavation and provide Engineer with sections and profiles for review.

Engineer shall provide to the Contractor a letter of authorization to proceed with the excavation of material claimed as rock. The letter shall indicate the agreed-upon quantity of rock for the portion of work covered by the Contractor's measurements.

Rock shall be trimmed so that none protrudes within 6 inches of all utilities when said utilities are installed to correct line and grade.

B. Blasting:

- 1. Blasting shall be performed only after approval has been given by the Owner for such operation.
- 2. All blasting shall be performed in accordance with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc., or the "Construction Safety Rules and Regulations, as adopted by the State Board of Construction Safety, Augusta, Maine, and Maine Department of Transportation "Safety Specifications" Section 107.12, Use of Explosives. Blasting through the over burden will not be allowed.

3. The Contractor shall conduct a Pre-Blast Survey including photographs of all structures within the Blasting Area and provide the Engineer with a written report of the Pre-Blast Survey. It should also be noted that several private water supply wells exist within and adjacent to the project work area. During the preparation of the Pre-Blast survey, the Contractor shall verify the location and existence of private water supply wells and take all necessary precautions to protect the quality and quantity of water supply within the well. In some instances the Contractor may elect to remove bedrock with the use of explosives in order to protect the private water supply wells. The Contractor shall be responsible for any damage to private water supply wells as a result of blasting activities and shall pay all cost to replace the private water supply, if determined necessary.
  4. The Contractor shall provide the Engineer with a Blasting Log for the work. The Blasting Log shall contain the following information:
    - a) Location
    - b) Time and Date
    - c) Number of holes
    - d) Amount and type of explosives used per hole.
    - e) The names of persons, companies, corporations, or public utilities contacted, owning, leasing, or occupying property or structures in proximity to the site of the work of the Contractor's intention to use explosives.
  5. Drilling equipment will be equipped with suitable dust control apparatus which must be kept in repair and used during all drilling operations.
- C. The volume of trench rock excavation for pipelines, utilities, appurtenant structures, and footings will be computed on the following basis: The depth will be the vertical distance from the bottom of the pipe or footing bedding to the surface of the ledge or bottom of subgrade level for structures and pavement sections, measured on the center line of the pipe or footing. The pipe trench width shown on the Plans will be taken as the pay width for pipe work.

Trench rock excavation for footings shall have the horizontal pay widths of twenty-four (24) inches beyond the concrete lines. After the ledge has been uncovered by the Contractor, elevations will be taken where necessary to determine the profile of the ledge.

- D. Open mass rock excavation for structures shall be measured by cross sectioning the ledge surface. The depth shall be between the sectioned surface and the bottom of the concrete or gravel base, if called for. The horizontal limits shall be twenty-four (24) inches beyond the concrete lines unless otherwise noted on the Contract Drawings. All overblast not specifically required by the Contract or over-excavation shall be at the Contractor's expense. Any sections over-excavated shall be brought to grade with heavy gravel below grade or ¾" crushed stone as determined by the Engineer.
- E. Mass rock excavation in roadway areas shall be measured and computed using the average and area method. The depth shall be between the sectioned surface and the bottom of the gravel base.

### 3.05 TEST PIT EXCAVATION:

- A. Where designated on the Plans and where further directed by the Engineer, the Contractor shall make test pit excavations to expose existing facilities and obtain measurements or elevations. Extreme care must be taken to protect any existing utilities or structures so uncovered. All safety requirements under Section 3.02 shall apply to test pit excavation. Upon completion of necessary measurements, the test pit shall be backfilled in accordance with the provisions of Section 02240. In paved areas, the Contractor shall place and compact temporary bituminous cold mix paving over the test pit area.

### 3.06 UNAUTHORIZED EXCAVATION:

- A. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.

- B. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavating bottom, without altering required top elevations. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the Engineer.
- C. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Engineer.
- D. When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions.

3.07 STABILITY OF EXCAVATIONS:

- A. Slope side of excavations to comply with local, state and federal codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe conditions until completion of backfilling. Refer to Section 43 of the Supplemental General Conditions.

3.08 REMOVAL OF WATER:

- A. The Contractor shall provide and maintain all facilities necessary for water control, including, but not limited to ditching, piping, pumping, bailing, and well pointing. The excavations shall be kept clear of ground water, surface water, seepage, sewer, or storm water during the progress of the work and until the finished work is safe from damage.
- B. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work, damage to pavements, other surfaces or property, and to minimize siltation to existing water courses. If necessary to protect such water courses, the Contractor shall provide sediment ponds. The cost of such measures shall be incidental to other work and no separate payment will be made.

3.09 PROTECTION OF WORK, PROPERTY, PERSONS:

- A. The Contractor shall ascertain the true location of all underground structures of any kind whatsoever and shall be completely responsible for same regardless of their indication on Plans or Specifications. He shall make such arrangements as may be required to protect, adjust, or replace same with the appropriate authority.
- B. This project is subject to all of the safety and health regulations (Sec. 29 CFR 1518 as amended). Occupational Safety and Health Act (OSHA) as promulgated by the U.S. Department of Labor, April 1971. The Contractor is directly responsible for adhering to all requirements of this act.
- C. The Contractor shall not enter upon private property for any purpose without first obtaining the permission of the Owner.
- D. The Contractor shall protect carefully all land monuments and property markers. Property markers disturbed during construction shall be replaced by a Land Surveyor, registered in the State of Maine, at the Contractor's expense.

3.10 MAINTENANCE OF TRAFFIC:

- A. The Contractor shall be responsible for scheduling his work in such a manner that it shall be carried on to provide safe passage at all times for public traffic and with a minimum of obstruction to traffic.
- B. The Contractor shall maintain at least one-way traffic over the area during the working day, and shall provide all of the necessary warnings, signs, flags, and flagmen to accomplish this. Further, the Contractor shall leave the area in a satisfactory state at the end of each day so as to provide two-way (i.e., two lane) traffic during the night and over the weekend. Access to all driveways must be provided at the close of each work day.

- C. The City of Portland Public Services Department, Fire Department, and Police Department will be kept continually aware of the status of any street closings during the term of construction. The Contractor shall provide and pay for all traffic officers as necessary to assure traffic passage and safety. The Contractor shall provide and place all warning signs, flares, lights, and barricades as required. All traffic controls shall be in accordance with the Manual on Uniform Traffic Control Devices for Highways published by the U.S. Department of Commerce. The cost of all traffic controls, officers, etc., shall be included in the bid amount for the project.

3.11 MAINTENANCE:

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

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, frost, or adverse weather, scarify surface, reshape, and compare to required density prior to further construction.

- C. Protection: Contractor to protect all soils, compacted gravel, sand and drainage fill material under poured slabs and in areas where slabs will be poured within the building; from frost, freezing temperatures, and excessive moisture. All expenses associated with protective and temporary heating shall be at the Contractor's expense.

- D. Excavation: Excavations shall be properly maintained while they are open and exposed. Sufficient suitable barricades, warning lights, floodlights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition.

- E. Existing Flows: The existing sanitary sewage and drain systems shall be kept in operation throughout this project. Wherever the excavation exposes or disturbs an existing sewer or drain, the Contractor shall make provisions for maintaining such flows until the excavation and other work is completed. At no time shall raw sewage be allowed to flow on the ground surface, or to stand in the excavation.

3.12 RESPONSIBILITY FOR DAMAGE CLAIMS:

- A. The Contractor and his surety shall indemnify and save harmless the Owner, his officers and employees, from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, or property on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in construction of the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or of any other law, ordinance, order or decree; and so much of the money due the said Contractor under and by virtue of his contract as shall be considered necessary by the Owner for such purpose, may be retained; or in case no money is due, his surety may be held until such suit or suits, action or actions, claim or claims, for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Owner.

- B. The Contractor shall promptly pay all bills for labor, materials, machinery, water, tools, equipment, trucks, automobiles, freight, fuel, light and power and for all things, contracted for or used by him on account of the work herein contemplated, and if at any time during the progress of the work or before final payment of any money due the Contractor under the terms of this Contract, any claim for labor, materials, water, tools, equipment, trucks, automobiles, freight, fuel, light and power, or for any of the things specified as aforesaid, and until the validity of such claims shall be established and finally determined, and if determined the amount so retained if it be sufficient for that purpose; otherwise, or if at any time the Owner shall be satisfied that any of such claims are invalid or groundless, any amount so retained shall be paid to said Contractor, or in case of default of Contract to the Contractor's surety, and the said Owner shall not be

liable to any individual, firm, or party if he does not hold and retain any money due this Contract for the purpose of payment of such claim.

If the moneys so retained under this Contract are insufficient to pay all such claims presented to said Owner and adjudged by any court of competent jurisdiction to be valid obligations of said Contractor, then Contractor shall repay the Owner all sums so paid. The Owner, at its option, may also use any moneys due or to become due under this Contract for the purpose of paying any claims presented to said Owner. Should the Contractor neglect to pay any undisputed claim, made in writing to the Owner, within thirty (30) days after the completion of the work, but continuing unsatisfied for a period of ninety (90) days, the owner may pay such claim and deduct the amount thereof from the balance due the Contractor.

3.13 DISPOSAL OF EXCESS AND WASTE MATERIALS:

- A. Removal from Owner's Property: Remove excess excavated material, trash and waste materials, and dispose of it off Owner's property. Refer to Section 02150 – Demolition, for items to be salvaged by the Owner.

Grade material to the satisfaction of the Owner of the property on which the material is deposited. Keep roads free of debris. Use suitable watertight vehicles for hauling wet materials over roads and streets. Clean up materials dropped from or spread by vehicles promptly or when directed by the Engineer.

- B. Excavation, Removal and Disposal of Contaminated Soils: An allowance bid item has been established in the Bid Form for the excavation, hauling and offsite disposal at a licensed facility for non-hazardous petroleum hydrocarbon contaminated soils as determined by field testing completed by the Owner during the excavation of soil materials within a portion of the project site as identified on the plans. The Owner will be responsible for performing all analytical testing of the excavated materials and preparation of required paperwork associated with the disposal process.

The Contractor shall be required to submit an itemized invoice of time of labor, equipment, and materials (including disposal manifest and disposal fees) for actual work completed as part of this work that will be paid under the established allowance bid item.

\*\*\*END OF SECTION 02220\*\*\*

**SECTION 02240  
BACKFILLING FOR PIPELINES AND STRUCTURES**

**PART 1 - GENERAL**

1.01 **GENERAL PROVISIONS**

Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.02 **DESCRIPTION OF WORK**

- A. The work of this Section includes all labor, materials, and equipment to perform all backfilling operations for pipelines and appurtenances in or outside of building line backfill below building slabs and around foundations, walks, pavements, and general site areas; and backfill required in conjunction with underground mechanical and electrical utilities.
- B. Backfilling operations shall follow the installation of pipe or appurtenant placements as soon as practical. Backfilling of foundations shall not be complete prior to approval of the Engineer.

1.03 **RELATED WORK SPECIFIED ELSEWHERE**

Section 02100	Site Preparation
Section 02150	Demolition
Section 02180	Subsurface Investigation
Section 02220	Excavation
Section 02270	Temporary Erosion Controls
Section 02713	Water System
Section 02720	Storm Drainage System
Section 02730	Sanitary Sewer System
Section 02740	Manhole and Catch Basin Structures

**PART 2 - PRODUCTS**

2.01 **MATERIALS**

- A. Heavy Gravel Below Grade

In areas where the Engineer authorizes excavation below the standard pipe bedding or structure limit shown on the Plans, the Contractor shall backfill such below-grade excavation with a heavy bank run gravel. Heavy gravel shall be bank run, uniformly graded, having no stones larger than eight (8) inches maximum dimension. Not more than 20% shall pass a 200 mesh sieve. Gradation shall be such that compaction by normal vibratory or compressed air compaction equipment will provide a firm, stable base to the satisfaction of the Engineer. No roots or other organic debris will be permitted in the gravel material.

- B. ¾ Inch Crushed Stone

<u>Sieve Size</u>	<u>Percent Finer By Weight</u>
1 inch	100
¾ inch	90-100
3/8 inch	20-50
No. 4	0-10

C. Filter Fabric

Filter fabric, where required by Plans, shall be a non-woven material with a minimum average trapezoidal tear strength of 50 lb. tested in accordance with ASTM D4533-85 and a minimum weight of 4.5 oz./square yard in accordance with ASTM D-3776-85. The fabric shall have a minimum coefficient of permeability of 0.3 cm/sec and a water flow rate of 170 gal/min/sf when tested in accordance with ASTM D-4491-85. Filter fabric shall be installed in accordance with the manufacturer’s recommendations. The fabric shall be laid smooth with a minimum overlap of 8” between adjacent panels.

Filter fabric shall be used around all underdrains. The filter fabric shall completely encapsulate the piping and a bedding and backfill of ¾ inch crushed stone. The use of fabric sleeves for underdrains without stone shall not be permitted.

D. Pipe Bedding in Trenches

Pipe Bedding (Granular Base) for pipe materials shall meet the requirements of the aggregate schedules provided on the Plans.

E. Bedding and Backfill of Underdrains

All underdrains shall be bedded and backfilled with ¾ inch crushed stone. The stone and the underdrain shall be encapsulated in filter fabric as specified in Paragraph C of this section.

F. Select Backfill Above Pipelines

Upon completion of the pipe laying and bedding, the trench shall be backfilled to a point above the top of the pipeline as shown on the project plans with a granular material meeting the requirements shown on the Contract Drawing Schedules. The material shall meet the requirements of AASHTO Specification M145-49 as revised, Classification A-3 or better unless otherwise specified on the contract drawings. Upon placement, the select backfill shall be compacted such that 92% of optimum density defined by AASHTO Specification T-180 is obtained.

G. Base for Appurtenances

Base for appurtenances shall be ¾” crushed stone placed with a minimum aggregate thickness of 12 inches or as specified on the Contract Drawings.

H. Footing Aggregate and Structural Fill

All building footings, structural slabs, and foundations shall be placed on a granular borrow with a 4” maximum size and which meets the following gradation:

<u>Sieve Size</u>	<u>Percent Finer</u> <u>By Weight</u>
4 Inch	100
3 Inch	90-100
No. 4	35-70
No. 40	5-35
No. 200	0-5

The aggregate thickness shall be a minimum of 12 inches or as specified on the contract drawings.

I. Slab Aggregate

All non-structural slabs shall be placed on a minimum of 6 inches of material meeting the requirements of paragraph H of this section and a 2-inch layer of clean sand meeting the following gradation requirements.

<u>Sieve Size</u>	<u>Percent Finer By Weight</u>
1 inch	100
3/8 inch	85-100
No. 200	0-5%

A vapor barrier meeting the requirements of Division 7 shall be installed between the 6 inches of compacted fill and the 2-inch sand bed.

J. Paved Walkway or Gravel Areas

Subgrade fills: Use satisfactory common borrow or excavated material which meets the following requirements:

- Material shall be free from frozen material, perishable, rubbish, peat and other unsuitable material.
- The moisture content shall be sufficient to provide the required compaction and stable embankment. In no case shall the moisture content exceed 4 percent above optimum as determined in accordance with AASHTO T180 Method C or D.

K. Grassed Areas

Use satisfactory material which meets the requirements of paragraph J of this section.

L. Rip Rap and Pavement Base and Subbase Materials

Refer to Sections 02600 and 02270.

**PART 3 - EXECUTION**

3.01 PROOF ROLLING

All subgrade areas of roadway and pavement areas shall be proof rolled with a heavy loaded dump truck or roller prior to commencing the backfilling operation. Soft or unsuitable soils shall be excavated and replaced with granular backfill material which meets the MDOT Specification 703.06 Type D.

3.02 COMPACTION AND THICKNESS OF LIFTS

Fills placed on site should meet the following compaction and lift thickness criteria:

<u>Location</u>	<u>Maximum Lift Thickness</u>	<u>Percent Compaction</u>
Beneath and within 5 feet of the building	8 to 10 inches	95
Beneath pavement, roads, sidewalks and driveways		
Base and Subbase Courses	6 inches	95
Subgrade Fills	6 to 8 inches	93
Embankments		
Behind Retaining Walls and Adjacent to Structures	12 inches	93



### 3.03 UTILITY AND APPURTENANCES

- A. Backfill shall be placed in layers not exceeding 12 inches thick and thoroughly compacted by mechanical means to obtain 95% of optimum density when tested in accordance with AASHTO T-180.
- B. Backfill within 24 inches of the sidewalls of all appurtenances shall meet the gradation requirements contained in Section 2.01.F.

### 3.04 GRADING

General: Uniformly grade areas within limit of work under this Section including adjacent transition areas. Smooth finished surfaces within specified tolerances or slopes between points where elevations or contour lines are given, or between such points and existing grades.

#### A. Lawns

Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevation.

#### B. Walks

Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.

#### C. Pavements

Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than ½" above or below required subgrade elevation.

#### D. Building Lines

Grade areas adjacent to building lines to drain away from building and prevent ponding.

#### E. Grading Surfaces of Fill Under Building Slabs

Grade smooth and even, free of voids, compacted as specified and to the required elevations. Provide final grades within a tolerance of ½" when tested with a 10-foot straight edge.

### 3.05 QUALITY ASSURANCE

- A. The Owner will engage an independent soil testing service for quality control testing during earthwork operations in accordance with Section 01400. The Owner may request test of any areas on the project.
- B. When initial tests indicate noncompliance with the contract documents, all subsequent retesting occasioned by the noncompliance shall be performed by the same testing laboratory at the Contractor's expense.

\*\*\*END OF SECTION 02240\*\*\*

**SECTION 02270**  
**TEMPORARY EROSION CONTROLS**

PART 1 – GENERAL

1.01 GENERAL PROVISIONS:

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

- A. Provide all labor, materials, and equipment necessary to provide, install, and maintain temporary erosion control measures.
- B. The Contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the construction period. In addition, certain aspects of this project are subject to specific requirements with respect to seasonal work limits, amount of area which can be exposed at a given time, and stabilization measures. Refer to Section 01001-Site Permits.

Protected resources as referred to in this document include wetlands, streams or water bodies, and trees or vegetation outside of the work limit.

It shall be the responsibility of the Contractor to implement, monitor, and maintain the temporary erosion control measures for the project and to avoid turbid discharges from the site, to avoid fugitive dust emissions, to avoid sediment from leaving the site, or affecting areas outside of the project work limits.

The erosion control measures specified are required to be installed in accordance with the details provided with the construction plans and manufacturer's recommendations. The method and details of the installation of these erosion control methods are of vital importance to insure the effectiveness of the erosion control measures. It is a requirement of the contract documents that these methods be incorporated on the site.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

Section 01001	Site Permits
Section 02100	Site Preparation
Section 02150	Demolition
Section 02220	Excavation
Section 02920	Lawn and Seed

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. Refer to Section 02920 for specific material requirements associated with loam and seed for stabilizing vegetated areas.

B. Mulch:

Furnish hay mulch for lawns, roadway slope areas and cross-country areas at 90 lbs/1000 sq. ft. Temporary mulch shall meet the same requirements.

C. Rip Rap:

Rip rap, where required on the Plans, shall be plain rip rap and meet the requirements of the State of Maine Department of Transportation Standard Specifications for Highways and Bridges, 1990, as revised and the details shown on the Contract Drawings. Filter fabric for placement below the rip rap shall be Terratex SD or approved equal. Rip rap placement shall be completed as soon as culverts are placed, embankments formed or ditches graded. Unless otherwise specified on the contract drawings, the rip rap shall have a maximum size of 12 inch and a  $d_{50}$  size of 6". The rip rap shall be free of soil and loose material.

D. Erosion Control Mesh:

Erosion control mesh shall be installed in ditches with longitudinal slopes of 2 percent or more unless rip rap is required. The loam shall be placed in the ditch, with final grading, seeding and mulching and the mesh shall be installed within 48 hours of loam placements. Fabric shall be installed by unrolling in the direction of expected water flow. Install an anchor trench at the top and bottom of the slope to prevent water from getting under the edge of the fabric. Adjacent fabric panels should be overlapped at least 4 inches. Secure fabric by placing square top staples every foot along edges and overlaps and on three foot centers in between. Staple spacing may be increased depending on conditions.

E. Erosion Control Fence:

The erosion control fence shall be “Environfence” as manufactured by Mirafi, or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Temporary erosion control measures shall be installed in accordance with the details contained in the Contract drawings and in accordance with the MeDEP Maine Erosion and Sediment Control BMPs Manual, latest revision.

3.02 REMOVAL OF EROSION CONTROL MEASURES:

- B. Erosion control silt fences and hay bales may be removed after a 90 percent “catch” of grass has been established.

\*\*\*END OF SECTION 02820\*\*\*

**SECTION 02536 – TEMPORARY WATER SYSTEMS**

**PART 1: GENERAL**

**1.1 SCOPE**

- A. In order to maintain uninterrupted water service to Water District customers, the CONTRACTOR shall provide temporary above ground water systems where necessary
  
- B. The temporary water systems consist of mains, services and fire department outlets. The above ground systems shall be installed only for the duration of deep water main replacement and removed promptly after main replacement is complete.
  
- C. Connections to an existing water source shall be installed and provided by the OWNER / PORTLAND WATER DISTRICT. All material for the temporary water systems, except as otherwise indicated, shall be supplied by the CONTRACTOR. The PORTLAND WATER DISTRICT has approved 2 manufacturers for the temporary mains and 100-psi poly tube for individual services. Only authorized PORTLAND WATER DISTRICT personnel shall operate control valves attached to these systems.

**PART 2: PRODUCTS**

**2.1 MATERIALS**

- A. Approved Pipe:

Certainteed Certa-Lok Yellowmine	Restrained Joint PVC pressure pipe and fittings
AquaMine (Victaulic Co)	Restrained Joint PVC pressure pipe and fittings

## PART 3: EXECUTION

### 3.1 METHODS

- A. Temporary above ground water mains shall be installed in a manner to protect the public water supply and minimize customer service interruption. To allow the PORTLAND WATER DISTRICT to notify it's affected customers, the CONTRACTOR shall provide the OWNER / PORTLAND WATER DISTRICT a minimum of 5 working days notice prior to installing any temporary lines.
- B. The size and approximate location of the temporary systems are shown on the drawings. The Contractor must obtain the approval of the OWNER / PORTLAND WATER DISTRICT for any changes prior to installation of the system.
- C. Temporary mains shall typically be installed behind sidewalks or along the edge, and within the public right of way. The mains shall follow a uniform straight course and shall not bow to accommodate long sections of pipe. Temporary mains shall not be installed on private property. The route of service lines installed from the mains to houses shall be acceptable to the property owner.
- D. The Contractor shall follow the pipe manufactures installation guidelines when installing temporary systems. Additionally, an approved joint lubrication for the installation of potable water pipe shall be used on all joints prior to connecting pipe.

### 3.2 WATER SOURCE:

- A. The OWNER / PORTLAND WATER DISTRICT will provide necessary connections at fire hydrants, including an approved backflow device and meter. A chlorine tap will also be provided.

### 3.3 DISINFECTION:

- A. All 2" diameter and larger temporary mains shall be chlorinated, sampled, and tested for bacteria prior to activating any portion of the temporary mains. (See disinfection specification for deep mains).

### 3.4 LEAKAGE TEST:

- A. All systems shall be watertight. A static pressure test shall be performed on all systems prior to disinfecting any portion of the system.

## B. Test Procedure

- A. Install a pressure gauge at furthest end of the system.
- B. Open main feed valve to fully charge the system with water and bleed all air.
- C. Record the static pressure reading.
- D. Close main feed valve.
- E. The system must hold static pressure for a minimum of 30 minutes.

## 3.5 VEHICLE & PEDESTRIAN ACCOMMODATION

- A. Driveway crossings - A gravel or cold patch raised berm shall be placed over temporary mains to prevent vehicles from dragging along the ridge.
- B. Sidewalk crossings - A gravel or cold patch raised berm shall be placed over temporary mains to eliminate tripping hazards. In areas where the berm would prevent rainwater drainage, plywood ramps shall be installed the full width of the sidewalk and over the temporary mains
- C. Roadway crossings - Temporary mains shall be buried just below the surface of the roadway. The pipe shall be protected with clean sand or material free from rocks, as the rocks tend to punch through the pipe when exposed to heavy traffic. The use of cold patch or QPR as fill material is acceptable.
- D. Curbing or esplanade rise - To accommodate curb rise, pre-fabricated certalock bends and/or elbows shall be used. Sweeping or bending the actual pipe is not an acceptable method unless the sweep lies flat on the ground and is not obstructing walkways. A traffic barrel shall be placed near the curb at offset connections to protect the offsets from being damaged by vehicles.

## 3.6 INSTALLATION

- A. Cutting pipe - Follow manufacturer's installation instructions. All joints, including those on cut lengths of pipe, shall be grooved to provide a restrained joint. Pre-fabricated bends, elbows, and tees shall be used when changing direction.
- B. Blow off - A 1" blow off shall be installed at the ends of all temporary mains. The blow off shall be constructed using a 1" brass female curb stop.
- C. Isolation Valves - Shall be 2" brass female curb stops for 2" mains and 4" resilient wedge valves for 4" mains (grip rings shall be used for 4" valves).

Valves shall be located as shown on the plan. The valves are attached to the mains using pre-fabricated adapters.

- D. Service line connections - All temporary individual service lines shall be ¾" poly tube rated at a minimum working pressure of 100 psi. The service lines shall be connected to a 2"x ¾" factory tapped restrained joint coupling, then a ¾" close brass nipple, a ¾" female curb stop and a brass poly tube adapter ¾" insert x male. The tube shall be extended to a sill cock (outside faucet) and connected using the same poly tube adapter. Any anti-siphon sill cocks will be disassembled by Portland Water District authorized personnel. Excavating and connecting into the existing deep service lines may be necessary to provide temporary water service if properties have malfunctioning sill cocks or no exterior plumbing. Prior to connecting the service, a garden hose connection, including a brass boiler drain or sill cock valve shall be installed in the line. All service lines shall be flushed prior to activating mains.
  
- E. Shutting meters - After activating the temporary lines, all meters shall be shut off. Only Portland Water District authorized personnel may de-activate meters.

### 3.7 MAINTENANCE

- A. The contractor shall be responsible for maintaining the temporary systems during the regular workday including making repairs to the systems. The District's Inspector must be on site prior to any work, or repairs being performed on the temporary water systems. District crews will respond to all after hour's emergencies. All affected customers shall be notified as soon as possible prior to any service interruption.
  
- B. The contractor is required to keep an inventory of repair parts on hand, enabling a quick response to any type of problem. Restrained joints shall be maintained. The use of non-restrained joint couplings is prohibited. Joint leaks shall be cut out and replaced with appropriate pipe and couplings. The use of stainless steel wrap around repair clamps over pinholes is acceptable.

## **SECTION 02537 - DUCTILE IRON WATER PIPE & FITTINGS**

### **PART 1: GENERAL**

#### **1.1 SCOPE:**

- A. This section includes the furnishing and installing of ductile iron water pipe and ductile iron or cast iron fittings as specified.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE:**

- A. Excavation and Backfill for Water Mains - Section 02217
- B. Bedding and Backfill Material - Section 02219

#### **1.3 SUBMITTALS:**

- A. Submit shop drawings for all material in accordance with the provisions of Section 01330.

### **PART 2: PRODUCTS**

#### **2.1 MATERIALS:**

- A. Ductile iron pipe:
  - 1. All ductile iron pipe shall be cement lined and bituminous coated with "push-on" type joints.
  - 2. The pipe shall conform to the following standards:
    - (a) Ductile Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids: ANSI Specification A21.51 (AWWA C151). Exterior bituminous coating shall be 2 mils dry film thickness, minimum.
    - (b) Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings: ANSI Specification A21.11 (AWWA C111).



- (c) Cement-Mortar Lining for Cast Iron Pipe and fittings: ANSI Specification A21.4 (AWWA C104), except cement lining to be twice the thickness specified, and bituminous seal coated twice. Seal coat shall be bituminous paint, oil cut (emulsion not acceptable), 2 mils dry film thickness, minimum.
- 3. Pipe thickness Class 52.
- 4. The design of the push-on joint shall allow 5 degrees deflection in any direction without loss of pressure rating or leakage.
- 5. Acceptable Manufacturers:
  - 1. American Cast Iron Pipe
  - 2. Griffin Pipe
  - 3. U.S. Pipe
  - 4. Clow Pipe
  - 5. McWain Pipe (Not Atlantic States)

B. Ductile Iron fittings:

- 1. All ductile iron fittings shall be cement lined, fusion bonded epoxy coated inside and outside and shall be mechanical joint.
- 2. The fittings shall conform to the following standards:
  - (a) Material shall be ASTM A536 grade 70-50-05, in accordance with AWWA C153 (latest revision) for fittings 3" thru 24".
  - (b) Fittings shall be cement lined in accordance with AWWA C104 or fusion bonded epoxy coated with a 5 mil nominal thickness per AWWA C550 and C116.
  - (c) Exterior and interior fusion bonded epoxy coating with 5 mils minimum dry film thickness per AWWA C550 and C116.
  - (d) Sleeves shall not be cement lined but shall be bituminous coated inside 4 mils minimum dry film thickness. All sleeves shall be long body type.
  - (f) Mechanical joints shall be furnished in accordance with AWWA C111 with accessories: ductile iron glands, gaskets, Cor-Ten T-bolts and nuts.
  - (g) Class 350 pressure rating in accordance with AWWA C153 for 3" thru 24" diameters.

- (h) The “compact design” fittings must provide adequate space for the MJ joint and accessories to be installed without special tools.

C. Mechanical joint sleeves:

- (1) Reference specification ANSI A21.1 (AWWA C110)
- (2) Body: (center ring) - long pattern, ductile iron meeting or exceeding ASTM A536, minimum paint coating exterior finish of 4 mils dry film thickness.
- (3) Glands: (end rings) - ductile iron meeting or exceeding ASTM A536 to fit AB-CD cast and/or ductile iron pipe, minimum paint coating exterior finish of 4 mils DFT.
- (4) Gaskets - virgin SBR rubber, compounded for water service, exceeding ASTM D2000.
- (5) Bolts - Cor-Ten or equivalent T-head bolts and heavy hex nuts, or 316 stainless steel bolts and nuts.

D. Tapping Sleeves:

- (1) Tapping sleeves shall be ductile iron with recessed outlet flange for tapping valve.
- (2) Tapping sleeve shall conform to AWWA C-207, Class D, with rated maximum working pressure of 200 psi.
- (3) The side rubber gaskets shall be rectangular in cross-section and fit into grooved channels in the casting. These gaskets shall extend the entire length of the sleeve and shall not require cutting or trimming to match MJ end gaskets.
- (4) Tapping sleeve shall be AB-CD pattern to permit use of plain rubber and duck-tipped gaskets for various O.D. piping sizes.
- (5) Mechanical joint with accessories furnished; glands, gaskets, and Cor-Ten T-bolts and nuts or equal.
- (6) All flange outlet bolts shall be 304 stainless steel.
- (7) Interior and exterior to be fusion bonded epoxy coated with minimum D.F.T. of 5 mils.
- (8) The sleeve shall be provided with a ¾” F.I.P.T. test port and brass plug.

- (9) Approved Manufacturers (4"-12"):
  - a) AFC
  - b) Mueller Co.
  - c) U.S. Pipe
  - d) Tyler / Union
  - e) Powerseal Model 3490 and 3490MJ

E. Pipe Joint Restrainer:

- (1) use in conjunction with mechanical joint fitting.
- (2) The joint restraint ring and its wedging components shall be made of ductile iron conforming to ASTM A536.
- (3) Dimensions of the restrainer must allow use with standard MJ bell conforming to AWWA C111 and AWWA C153.
- (4) Restrainer must restrain up to 350 psi of working pressure.
- (5) Torque limiting twist off nuts shall be used to insure proper actuation of the restraining wedges when using Sigma, Ford or Ebba products..
- (6) Approved manufacturers:
  - Sigma Super Lug
  - Ford Uni-Flange Series 1400
  - Ebba Mega Lug
  - Romac Grip Ring
  - Star Grip Series 300
  - Romac Romagrip
  - MJ FIELDLOK Gasket

F. Bolts and nuts:

General description of properties required:

- (1) Stainless steel - Type 304 - contains the addition of Molybdenum to the nickel-chromium steels.

Specific chemical composition:

- Carbon - .08% maxi.
- Manganese - 2.00% max.
- Silicone - 1.00% max.
- Phosphorus - 0.04% max.

Sulphur - 0.03% max.  
Chromium - 16 - 18.00%  
Nickel - 10 - 14.00%  
Molybdenum - 2 - 3.00%  
SAE No. - 30316  
ASM No. 5361A, 5524A, 5573, 56488, 5690D

- (2) Cor-Ten steel: Trade name for cold formed T-head bolts containing alloying elements such as copper, nickel and chrome.

Specific chemical composition:

Carbon - 0.2% max.  
Manganese - 1.25% max.  
Sulphur - 0.05% max.  
Nickel - 0.25% min.  
Copper - 0.20% min.  
Combined (Ni, Cu, Cr) - 1.25% min.

G. Polyethylene encasement (if specified on drawings):

- (1) Ductile iron pipe and fittings shall be encased in low-density polyethylene film tubes in accordance with AWWA Standard C105 - latest revision in locations indicated on the drawings.
- (2) Polyethylene film shall conform to the following requirements of ASTM D1248-89:
- (a) Raw Material -  
Type: 1  
Class: A (natural color)  
Grade: E-1  
Flow Rate: 0.4g/10 min. (maximum)  
Dielectric Strength: Volume resistivity,  $10^{15}$  ohm-cm, (min.)
- (b) Physical properties:  
Tensile Strength: 1200 psi (min.)  
Elongation: 300%, (min.)  
Dielectric Strength: 800V/mil thickness, (min.)
- (3) Low-density polyethylene film shall have a nominal thickness of 0.008 in. (8 mil.) with a minus tolerance of 10% of the nominal thickness.

H. Pipe Insulation (for underground applications only)

1. Where shown on the drawings, pipe shall be insulated with an extruded expanded polystyrene foam material fabricated to fit the outside diameter of the pipe.
2. Insulation may be applied in the field in accordance with manufacturer's recommendations.
3. Insulation thickness shall be 2".
4. Insulation shall be "Styrofoam" brand as manufactured by Dow Chemical Co. or equal.

PART 3: EXECUTION

3.1 PIPE LAYING CONDITIONS:

- A. The interior of each pipe shall be inspected while being joined to see that the alignment is preserved and to assure that no dirt or debris has entered the pipe after laying and partial backfilling.
- B. Pipe fittings and accessories shall be carefully lowered into the trench, piece by piece, by means of derrick, crane, slings and other suitable tools and equipment, in a manner such as to prevent damage to the material or to its protective coating and linings. No chain or slings shall be passed through the inside bore of any pipe or valve or fitting. Under no circumstances shall piping materials be dropped or dumped into the trench.

3.2 LAYING DUCTILE IRON PIPE:

- A. As soon as the excavation is completed and the existing trench bottom has been brought to the proper grade, the pipe shall be laid.
- B. All pipe, before being lowered into the trench, shall be inspected inside and out. Both ends shall be cleaned and any visible dirt or debris removed from inside the pipe. Care shall be taken to lay the pipe to true lines and grades as shown on the drawings.
- C. Coupling holes shall be excavated so that the barrel of the pipe shall bear upon the trench bottom.
- D. Blocking under the pipe will not be permitted.
- E. Each section shall rest upon the pipe bed for the full length of its barrel.

- F. The circular rubber gasket shall be inserted in the gasket seat provided. A thin film of gasket lubricant shall be applied to the inside surface of the gasket. Gasket lubricant shall be a solution of vegetable soap or other solution supplied by the pipe manufacturer.
- G. The spigot end of the pipe shall be cleaned and entered into the rubber gasket in the bell, using care to keep the joint from contacting the ground. The joint shall then be completed by forcing the plain end to the seat of the bell. Pipe which is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.
- H. Pipe shall be aligned with the preceding unit and laid so as to form a close joint with the adjoining pipe and bring the inverts continuously to the required line and grade.
- I. No length of pipe shall be laid until the previous length has had sufficient material tamped about it to firmly secure it in place so as to prevent any movement or disturbance.
- J. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work, except by permission of the ENGINEER.
- K. The pipe shall be laid with the bell ends facing the direction of the laying, unless otherwise permitted by the ENGINEER.
- L. Joints, when made, shall be done in the manner prescribed by the manufacturer of the pipe. In the case of rubber gasket joints, these joints shall be made up in accordance with the American National Standards for the jointing of cast iron pressure pipe and fittings. (ANSI/AWWA C111/A21.11).
- M. Thrust blocks shall be used behind tees, bends, or other fittings where shown. Size shall be appropriate for soil conditions and thrust forces acting on the specific fitting.

### 3.3 TRENCH BOTTOM:

- A. Should the trench bottom contain unsuitable material, as indicated in Section 02217, Article 3.2-b, the CONTRACTOR shall over-excavate and replace with bedding material as required and authorized by the ENGINEER. The quantity of unsuitable material will be measured from the bottom outside of the pipe.
- B. Should ledge be encountered, it shall be removed to a depth of 6" below the bottom of the pipe, and replaced with bedding material.

### 3.4 CUTTING PIPE:

- A. All ductile iron pipe shall be cut using abrasive wheel cutter, rotary wheel hand cutter (with carbide cutter) or a guillotine pipe saw. All cuts shall be square and even with no ragged rough ends.
- B. Field cut pipe lengths shall be beveled and filed to avoid damage to the gasket and facilitate making the joint.
- C. When the cut end of pipe is to be used as a joint, the outside of the cut end shall be tapered back about 1/8-inch at an angle of about 30 degrees with the centerline of the pipe. This shall be done with a coarse file or a portable grinder.

### 3.5 TEMPORARY PLUGS:

When pipe laying is not actually in progress, the openings of pipes shall be closed by temporary watertight plugs or other accepted means.

### 3.6 RETAINER GLANDS:

Install retainer glands on all mechanical joints of fittings, valves and hydrants.

### 3.7 POLYETHYLENE ENCASEMENT:

- A. In locations shown on the Drawings, tube type polyethylene encasement shall be installed on all ductile iron pipe and fittings in accordance with AWWA Standard C105 - latest revision, Method A. Circumferential wraps of tape or plastic tie straps shall be placed at 2-ft. intervals along the barrel of the pipe.
- B. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight or watertight enclosure. All lumps of clay, mud, cinders, and so forth, on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or embankment material from becoming trapped between the pipe and the polyethylene.
- C. The polyethylene film shall be fitted to the contour of the pipe to effect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due to backfilling operations. Overlaps and ends shall be secured with adhesive tape, string, plastic tie straps, or any other material capable of holding the polyethylene encasement in place until backfilling operations are complete.

**SECTION 02539 – NON-METALLIC WATER PIPE**

**PART 1: GENERAL**

1.1 **SCOPE:**

- A. This section includes the furnishing and installing of Non-Metallic water pipe.

1.2 **RELATED WORK SPECIFIED ELSEWHERE:**

- A. Excavation and Backfill for Water Mains - Section 02217
- B. Bedding and Backfill Material - Section 02219

1.3 **SUBMITTALS:**

- A. Submit shop drawings for all material in accordance with the provisions of Section 01330.

**PART 2: PRODUCTS**

2.1 **MATERIALS:**

A. PVC Pipe:

1. Approved Materials Include:

Certainteed Certa-Lok Yellowmine	Restrained Joint PVC pressure pipe and fittings
AquaMine (Victaulic Co)	Restrained Joint PVC pressure pipe and fittings

- 2. PVC pipe shall be certified for potable-water use meeting the requirements of NSF 61.
- 3. The pressure rating shall be 200 p.s.i. minimum.
- 4. The pipe shall be furnished in standard 20 foot laying lengths.
- 5. Provide "Permanent Use" gaskets for buried water mains.



B. High Density Polyethylene Tubing

1. Provide CTS HDPE Service Tubing rated for 200 psi, minimum.
2. Conform to AWWA C-901, ASTM D3350 and ASTM D2737.

C. Pipe Detection System Materials

1. Detectable warning tape shall be buried approximately one foot above all Non-metallic pipe. Tape shall be 6" wide and read "Buried Water Line". Tape shall be manufactured for below ground applications and contain a core such as aluminum for detection.
2. In addition an 8 gauge bare copper electrical wire shall be fastened to the buried PVC pipe to facilitate electronic pipe locating. The wire shall be fastened at two locations per length and not at any joint.

PART 3: EXECUTION

- A. Provide trench excavation and pipe bedding as required the pertinent specification sections of this contract.
- B. Joint all materials using materials and methods recommended and approved by the material manufacturer.
- C. Install pipe detection systems specified above.
- D. Install backfill as required the pertinent specification sections of this contract.
- E. Restore the surface as directed by the Engineer.

END OF SECTION

## **SECTION 02591 - GATE VALVES, HYDRANTS, AND RELATED APPURTENANCES**

### **PART 1: GENERAL**

#### **1.1 SCOPE**

- A. This section includes furnishing and installing gate valves, air valves, hydrants, valve boxes, and related appurtenances.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE:**

Ductile Iron Water Pipe - Section 02537

### **PART 2: PRODUCTS**

#### **2.1 MATERIALS:**

- A. Gate valves 12" and under shall meet the following requirements:
- (1) All provisions of AWWA C509 standards for resilient-seated gate valves, latest revision.
  - (2) Be rated for zero leakage at 200 psi water working pressure and have a 400 psi hydrostatic test for structural soundness.
  - (3) Have two "O" rings situated such that the sealing "O" ring above the stem thrust collar can be replaced with the valve under pressure in the full open position.
  - (4) Have stem thrust collar of manganese bronze integrally cast to stem and shall have two thrust washers, placed one above and one below the stem thrust collar, made of a synthetic polymer with physical properties suitable for the application.
  - (5) O-ring packing plate, bonnet and valve body shall be cast iron or ductile iron.
  - (6) Have a grade D,E manganese bronze, non-rising stem which shall turn right to open.
  - (7) Stem nuts shall be grade D,E manganese bronze and shall be independent of the wedge.

- (8) Ductile iron wedge, less guiding mechanisms, shall be fully encapsulated and permanently bonded with a resilient elastomer. The interior exposed surface of the wedge shall be epoxy coated or painted with two complete coats of bituminous paint. The wedge shall be constructed such as to allow the flushing of the interior exposed surface during operation.
- (9) Each valve shall have a smooth unobstructed waterway which shall not be less than the full nominal diameter of the valve.
- (10) The internal and external valve body, including stuffing box and bonnet, and the interior exposed surface of the wedge shall be epoxy coated to a total thickness of at least 8 mils dry film thickness applied by the fusion bonding or electrostatic bonding process. Interior coating shall meet the requirements of AWWA C550.
- (11) Two inch square ductile iron operating nut, with a countersunk 316 stainless steel or silicon bronze hold down nut; or the operating nut shall be pinned completely through the stem with a tapered stainless steel pin.
- (12) Valve ends shall be mechanical joint per AWWA C110 and furnished with Cor-Ten bolts and nuts, or equivalent.
- (13) Seal plate and bonnet bolts and nuts shall be Type 316 or Type 304 stainless steel.
- (14) The following valves have been approved for use by the Portland Water District.
  - a. USP Metroseal
  - b. AFC Series 2500
  - c. Mueller A-2360
  - d. Clow Series F6100

B. Hydrants: All hydrants shall conform to the following requirements:

- (1) AWWA C502 standard for dry-barrel fire hydrants
- (2) Open right.
- (3) All bronze alloy parts exposed to water shall be made from grade A, D or E bronze.

- (4) "Traffic" or "Breakaway" barrel. Traffic model hydrant with breakaway feature shall have segmented cast iron flanges, break type rod coupling set equal to, or below, the line of the top flange of the lower barrel, and an approved rubber gasket between the barrels. Frangible bolts are not acceptable.
- (5) One 4-1/2 inch pumper connection and two 2-1/2 inch hose connections. Hose and pumper connection threads to be National Standard Threads. Nozzles shall be threaded in with positive O-ring sealing mechanism.
- (6) Valve opened by turning valve in clockwise direction. Ductile iron or bronze pentagonal operating nut 1-13/16 inch (top) tapering to 1-7/8 inch (bottom).
- (7) A travel stop nut shall be provided in the top of the hydrant.
- (8) Port covers shall be supplied without chains and with pentagonal operating nuts as specified above.
- (9) Barrel length shall be 6 feet of cover, 6-1/2 feet of bury or 5 1/2 cover, 6' bury.
- (10) Hydrant extensions shall be such that the location of the hydrant valve and seat shall remain in, or at, the shoe.
- (11) Hydrant shoe or base shall have a 6-inch mechanical joint inlet, a 5-1/4 inch valve opening with non-draining permanently plugged bronze seat, and a bronze to bronze valve seat and sub-seat arrangement. The blocking area on the bottom and back of the shoe shall have minimum bearing areas of 30 square inches and 20 square inches, respectively.
- (12) The hydrant stem shall have a minimum diameter of 1-inch and an approved rust inhibitor from the top valve plate to 12 inches above.
- (13) Sealing shall be accomplished with rubber O-rings and approved rubber gaskets throughout.
- (14) All buried mechanical joint bolts and nuts shall be ASTM A325 Type 3 high strength steel (Cor-Ten) or acceptable equivalent. All buried flange joint bolts shall be 304 stainless steel or silicone bronze.
- (15) Protective coatings shall consist of the following:
  - a. All paintings and coatings shall be a minimum of 3 mils dry film thickness.

- b. The internal area of the hydrant base, normally exposed to water, including the internal body of hydrant shoe and lower valve plate, shall be epoxy coated.
- c. All internal and external cast iron or ductile iron components shall be coated with an approved bituminous coating, 3 mils minimum.
- d. Coatings for upper barrel - Exterior:
  - 1. Surface preparation: Blast clean SSPC-SP-6
  - 2. Primer: Sherwin Williams Red Oxide E61RC21, 1.5 mils, dry
  - 3. Finish coat: Regl Yellow, F78Y30, 1.5 mils, dry
  - 5. Total dry film thickness: 3 mils minimum
- e. Coatings for bonnet, operating nut, port caps:
  - 1. Surface preparation: Blast clean, SSPC-SP-6
  - 2. Primer: Glidden #5207-White, 2-3 mils, dry
  - 3. Second coat: Glidden #4392-Aluminum, 2-3 mils, dry
  - 4. Finish coat: Glidden #4392-Aluminum, 2-3 mils, dry or sufficient paint to hide the second coat
  - 5. Total dry film thickness: 6 mils minimum

(16) Hydrant flow shall completely stop with no more than 200 ft.-lbs. of torque applied to the operating nut.

(17) Failure to shut completely at no more than 200 ft.-lbs. of torque will be cause for rejection of that hydrant.

(16) Approved hydrants:

- a. Clow Eddy – with lower stem machined from bar stock
- b. American Darling B62-B-1; B62B-5

C. Valve boxes: All valves buried in the ground shall be equipped with a cast iron slide type, two-piece, extension box with a top flange. Valve boxes shall be sized to completely cover the valve.

- (1) The valve box bottom section shall be slide-type with bell-type base. Manufacturer: North American Manufacture
- (2) The valve box top section shall be slide-type 36 inches long (minimum). No top flange and no "bead" or bottom flange. Manufacturer: North American Manufacture
- (3) The valve box cover shall be a 2" drop-type cover to fit the 7-1/4" opening of the top section. Manufacturer: Bibby St-Croix (No substitute)
- (4) The valve box intermediate (mid) section shall be slide-type with a minimum 3" belled bottom. Base section No. 645 may be used as an alternate. Manufacturer: North American Manufacture
- (5) Material shall be cast or ductile iron free from defects.
- (6) Interior and exterior of all components shall be bituminous coated with a minimum of 4 mils dry film thickness.

D. Angle valves shall conform to the following:

- (1) For sizes 3/4" - 1" the valves shall have a brass ball that is Teflon (or equivalent) coated.
- (2) The ball shall be supported by seats which are watertight in either direction.
- (3) The valve shall have a full-port opening.
- (4) The valve shall open with 1/4 turn (90 degrees) with a check or stop.
- (5) The valve shall not have a drain.
- (6) The valve stem shall have two "O" rings and a bronze ring lock which holds the stem solidly in the valve body.
- (7) The valve body shall be of angle design, heavy duty, and made from materials meeting the requirements of AWWA C800, latest revision.

E. Copper Tubing shall conform to the following:

- (1) Type K conforming to ASTM B88, with compression fittings.

F. Corporation Stops shall conform to the following:

- (1) Shall be ball valve design with a brass ball that is teflon coated or brass ball with Teflon seats.
- (2) ON-OFF identification mark on the operating nut
- (3) Supported by two seats for watertight shutoff in either direction
- (4) The valve shall have a full port opening
- (5) The body of the corporation stop shall be of heavy-duty design
- (6) The valve working pressure shall be 300 p.s.i.
- (7) Acceptable manufacturers:
  - A. Y. McDonald
  - Cambridge Brass
  - Ford Meter Box Co.
  - Mueller Co.

G. Curb Stops shall conform to the following:

- (1) Valves shall be a brass ball that is teflon coated
- (2) The ball shall be supported by seats which are water tight in either direction
- (3) The valve shall have a full port opening
- (4) The valve shall open with 1/4 turn with a check or stop
- (5) The valve shall not have a drain
- (6) The valve stem shall have two "O" rings and a bronze ring lock which holds the stem solidly in the valve body.
- (7) The valve body shall be of heavy-duty design
- (8) The working pressure shall be 300 p.s.i.
- (9) Acceptable manufacturers:
  - A. Y. McDonald
  - Cambridge Brass
  - Ford Meter Box Co.
  - Mueller Co.

H Service Box and Rod shall conform to the following:

- (1) Service box shall be 1-inch schedule 40 steel pipe with top having 1-inch NPT pipe threads for screw-on cover or coupling
- (2) Service box shall be Erie style with 6'-0" slide type riser. Approved manufacturer: Larouche, Clow Canada
- (3) Service box cover shall be Quincy type (heavy duty) that screws on service box
- (4) Service box cover shall be tapped with a 1-inch rope thread with a solid brass plug with pentagon operating head. Approved manufacturer: Bibby, Larouche, Clow Canada
- (5) The standard foot piece (for 3/4- and 1-inch curb stops) shall be heavy-duty (Ford style or equal) cast iron design. Approved manufacturer: Larouche
- (6) The large, heavy duty foot piece (for 1-1/2- and 2-inch curb stops) shall have an arch that will fit over 2-inch ball valve curb stops. Approved manufacturer: Larouche
- (7) Service rods shall be 36 inches in length for all services and 24 inches in length for air valves and have a self-aligning design. Approved manufacturer: North American Manufacture
- (8) Service rods shall be of circular dimension and constructed of 1/2-inch diameter, minimum, 304 stainless steel for services one inch and less in diameter. Use 5/8-inch diameter minimum, 304 stainless steel for services greater than 1-inch in diameter.
- (9) Service rods shall have a yoke design that is an integral part of the rod
- (10) The curb-stop attachment pin shall be a brass cotter pin
- (11) The rod "wrench flat" shall have a minimum thickness of 1/4" tapered to 1/16" and width of 5/8" or 1/2"

I. Service Saddles (to be installed with 1 1/2" & 2" corporation stops):

- (1) The service saddle shall have the "large sized" body, the same as associated with the "service repair" saddle, which shall have a minimum diameter of 6 in. and multiple "O" ring type sealing.



- (2) The saddle body shall be constructed of epoxy coated ductile iron.
- (3) The sealing gasket(s) shall be either Buna-N rubber or SBR rubber (ASTM D2000).
- (4) There shall be two holding bands, U-bolt type, made of 304 stainless steel.
- (5) Approved manufacturer:  
Smith-Blair

### PART 3: EXECUTION

3.1 Valves with boxes are to be placed in the line of the pipe where required.

- A. No extra allowance will be made for the extra cost of setting same due to cutting pipe, etc.
- B. All nuts on valves shall be checked for tightness before the valve is lowered into the trench. Valves must be adjusted so they will work easily and properly and must be left with the valves closed.
- C. Installation of mechanical joint valves and fittings shall conform with Section 02537.
- D. Thrust blocks shall be used where shown on the plans.

### 3.2 AIR VALVES

- A. Air valves shall be installed at all high points along the water main, as shown on the plans or as directed.
- B. Air valves shall conform to the detail provided and be carefully tapped into the top of the main.

### 3.3 VALVE BOXES and SERVICE BOXES

- A. All valves shall be fitted with a standard valve box or service box and rod set at the proper elevation on the valve and concentric with the operating nut, straight, square and plumb. The top shall be set to the proper surface grade and, after backfilling and settlement have taken place, these valve box top sections and service boxes shall be straightened, reset or adjusted as necessary. At least two permanent location measurements to the valve must be obtained. Backfill around boxes shall be mechanically tamped within a five-foot radius of the box.

### 3.4 SERVICES

- A. Services will be installed at locations designated by the OWNER. See detail sheet for service connection. The service sizes are indicated on the drawings.

### 3.5 HYDRANTS

- A, Hydrant flow shall completely stop with no more than 200 ft.-lbs. of torque applied to the operating nut. Failure to shut completely at no more than 200 ft.-lbs. of torque will be cause for rejection of that hydrant.

## **SECTION 02594 - PRESSURE AND LEAKAGE TESTS OF WATER MAINS**

### **PART 1: GENERAL**

#### **1.1 SCOPE:**

- A. Furnish all labor, materials, equipment, gages and related items necessary to complete all pressure and leakage tests of all water mains.

### **PART 2: PRODUCTS**

#### **2.1 MATERIALS:**

Materials shall be at CONTRACTOR'S option.

### **PART 3: EXECUTION**

#### **3.1 PRESSURE AND LEAKAGE TESTS:**

- A. After the pipe has been laid and backfilled, it shall be pressure tested and tested for leakage in the presence of the OWNER / PORTLAND WATER DISTRICT.
- B. All tests shall be conducted at a time and in a manner to minimize as much as possible any interference with the operation of the existing water system. The OWNER / PORTLAND WATER DISTRICT will supply all water necessary for testing. The CONTRACTOR shall supply all labor, materials and equipment necessary to make any necessary connections to the water system and to carry out the tests.
- C. The CONTRACTOR shall excavate and provide a corporation tap for pressure and leak testing as directed by the OWNER / PORTLAND WATER DISTRICT. The CONTRACTOR is responsible for all work associated with the excavation, including proper trench protection, barricades and proper backfilling and compaction upon successful completion of the test.
- D. The pipe shall be slowly filled with water and all air expelled from the pipe. If permanent air vents are not located at all high points, CONTRACTOR shall install corporation stops at such high points to bleed off air as the line is filled with water.
- E. A pressure test pump will be connected to the new main at the testing point. The pressure will be slowly increased to 150 psi and allowed to stabilize (+/-2.5 psi) for a minimum of 15 minutes.

- F. A reservoir of potable water shall be connected to the test pump and the initial level of water recorded.
- G. The pump pressure shall be maintained at 150 psi for one hour with all make up water withdrawn from the reservoir.
- H. After one hour, the water level in the reservoir will be measured and the volume of water drawn from the reservoir calculated and compared with the following allowable leakage:

$$\text{Allowable Leakage (gph)} = \frac{\text{Pipe Length (feet)} \times \text{Nominal Diameter (inches)}}{10,876^*}$$

\*Correct only for 150 psi test pressure

- I. If any test discloses leakage greater than that specified above, the CONTRACTOR shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.
- J. Final acceptance of the lines will not occur until satisfactory tests have been passed.

## **SECTION 02595 - DISINFECTION OF WATER MAINS**

### **PART 1: GENERAL**

#### **1.1 SCOPE**

- A. Furnish all labor, materials, equipment, and incidentals necessary to disinfect the distribution system.
- B. Do not disinfect water mains until all testing required by Section 02594 has been satisfactorily completed.

### **PART 2: PRODUCTS**

#### **MATERIALS:**

- A. The CONTRACTOR shall chlorinate the new main in accordance with the continuous feed method specified in Section 5.2 of AWWA Standard C651-latest revision, using 5% to 15% sodium hypochlorite solution.

### **PART 3: EXECUTION**

#### **3.1 DISINFECTION:**

Upon satisfactory completion of the pressure and leak test, all new water mains shall be disinfected before they are placed into service in accordance with Section 5.2 of AWWA Standard C651-latest revision and the procedures specified herein.

#### **3.2 FLUSHING:**

- A. Section of pipe to be disinfected shall first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, then a suitably sized tap should be provided.
- B. All taps required by the CONTRACTOR for chlorination or flushing purposes, or for temporary release of air, shall be provided by him as part of the construction of the water main.
- C. Flushing shall proceed for 4 hours at a flow velocity of 2.5 feet per second.

3.3 REQUIREMENTS OF CHLORINE:

Before being placed into service, the main shall be chlorinated so that a chlorine residual of not less than 10 parts per million remains in the water after standing 24 hours in the pipe. Chlorine residual at start of test shall be at least 50 parts per million.

3.4 POINT OF APPLICATION:

The preferred point of application of the chlorinating agent is at the beginning of the pipeline or any valved section of it and through a corporation stop inserted in the pipe. The water injector for delivering the chlorine solution water into the pipe should be supplied from a tap made on the pressure side of the gate valve controlling the flow into the pipeline extension. Alternate points of application may be used when accepted or directed by the OWNER / PORTLAND WATER DISTRICT.

3.5 RATE OF APPLICATION:

Water from the distribution system, or other source of supply as accepted by the OWNER / PORTLAND WATER DISTRICT, shall be controlled to flow very slowly into the newly laid pipeline during application of the chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the newly laid pipe that the dosage applied to the water will be sufficient to achieve at least 50 parts per million unless otherwise directed by the OWNER / PORTLAND WATER DISTRICT.

3.6 PREVENTING REVERSE FLOW:

Valves shall be operated by the OWNER / PORTLAND WATER DISTRICT so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Check valves may be used, if needed.

3.7 RETENTION PERIOD:

Treated water shall be retained in the pipe at least 24 hours. After this period, the chlorine residual at pipe extremities and at other representative points shall be at least 10 parts per million.

3.8 CHLORINATING VALVES AND HYDRANTS:

In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent and under normal operating pressure.

3.9 FINAL FLUSHING AND TESTING:

- A. Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe at its extremity until the replacement water throughout its length shows, upon tests, that the residual chlorine is not in excess of that to be carried in the system. The replacement water shall be allowed to reside in the pipeline for 24 hours (+/- 4 hours) prior to sampling for physical, bacteriological and chemical testing.
- B. After the retention period, water samples collected from the treated piping system, as directed by the OWNER / PORTLAND WATER DISTRICT, shall show satisfactory bacteriological results. Bacteriological analyses shall be performed by the OWNER / PORTLAND WATER DISTRICT.
- C. Chlorine residual of water being flushed from the newly laid pipe following chlorination must be neutralized by treating with one of the chemicals listed in the table below.

AMOUNTS OF CHEMICALS REQUIRED TO NEUTRALIZE VARIOUS RESIDUAL CHLORINE CONCENTRATIONS IN 100,000 GALLONS OF WATER\*

<u>Residual Chlorine Concentration (mg/l)</u>	<u>Sulphur Dioxide</u>	<u>Sodium Bisulfate</u>	<u>Sodium Sulfite</u>	<u>Sodium Thiosulfate</u>
1	0.8	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
10	8.3	12.5	14.6	12.0
50	41.7	62.6	73.0	60.0

\*Except for residual chlorine concentration, all amounts are in pounds.

3.10 REPETITION OF FLUSHING AND RESULTS:

Should the initial disinfection process result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the CONTRACTOR until satisfactory results are obtained.

**SECTION 02600  
PAVING AND SIDEWALKS**

**PART 1 – GENERAL**

**1.01 GENERAL PROVISIONS:**

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

**1.02 DESCRIPTION OF WORK:**

- A. The work of this Section includes the furnishings of all labor, materials, and equipment necessary to permanently surface sections of roadway, sidewalks, and parking areas. The work shall include the placement of aggregate subbase, aggregate base, and bituminous concrete binders and surfaces, and concrete slabs.

**1.03 RELATED WORK SPECIFIED ELSEWHERE:**

Section 02100	Site Preparation
Section 02150	Demolition
Section 02180	Subsurface Investigation
Section 02220	Excavation
Section 02240	Backfilling for Pipelines and Structures
Section 02920	Lawn and Seed

**PART 2 – PRODUCTS**

**2.01 AGGREGATE BASE AND SUBBASE GRAVEL:**

- A. Aggregates base gravel shall conform to the requirements specified in Section 700, Materials, of the MDOT Standard Specifications for Highways and Bridges.

Aggregate Base Course	703.06 (a) – Type B (maximum 2” stone size)
Aggregate Subbase Course	703.06 (b) – Type D (maximum 4” stone size)

Pavement grindings will not be considered acceptable for use as aggregate base gravel material.

- 2.02 **TACK COAT:** Emulsified asphalt; AASHTO M-140/ASTM D 997 or M 208/ASTM D 2397, SS-1h, CSS-1, or CSS-1h, diluted with one part water to one part emulsified asphalt.

**2.03 PAVED AREAS:**

A. **General:**

1. **Materials:** For this work the applicable sections of the State of Maine Department of Transportation Standard Specifications for Highways and Bridges, latest revision (herein referred to as MDOT Spec.), shall apply. Bituminous material shall meet the requirements of Sections 401 and 702 of the MDOT Specifications.
2. **Trench Cap:** Aggregates shall conform to Superpave 19 mm and 12.5 mm, Section 703.09 of the MDOT Specifications.
3. **Binder:** Aggregates shall conform to Superpave 19 mm, Section 703.09 of the MDOT Specifications.
4. **Surface Paving:** Aggregates shall conform to Superpave 12.5 mm, Section 703.09 of the MDOT Specifications.
5. **Sidewalk Paving:** Aggregates shall conform to Superpave 9.5 mm, Section 703.09 of the MDOT Specifications.



## PART 3 – EXECUTION

### 3.01 BASE AND SUBBASE COURSES:

#### A. General:

1. Compaction and thickness of lifts for base and subbase courses shall be in accordance with Section 02240, 3.02 of this Specification. The maximum compacted thickness of any subbase layer shall not exceed 8 inches unless the Contractor demonstrates by a test section that the required compaction can be obtained. If compacted layers more than 8 inches are allowed, the Contractor shall agree to make the necessary excavations and backfilling in the course for the Engineer to determine the density.
2. When layers are of differently graded aggregate, fine grading of the lower layer will not be required.
3. Each layer of aggregate shall be placed over the full width of the section. Should existing traffic or other conditions restrict operations over the full width, the Engineer may authorize the Contractor to place less than full width layers. When the Contractor places material to complete the full width, the exposed edge of the previously placed aggregate shall be cleaned of all contamination before additional base or subbase aggregate is placed adjacent thereto.

#### B. Shaping, Compacting, and Stabilizing:

1. Compaction of each layer shall continue until a density of not less than 95 percent of the maximum density has been achieved for the full width and depth of the layer. The maximum density shall be determined in accordance with AASHTO T-180 Method C or D, corrected by the Soils Laboratory Adjustment Chart available at the Soils Laboratory, Bangor, Maine. The surface and compaction and stability shall be satisfactorily maintained.
2. If the top of any layer becomes contaminated by degradation of the aggregate or addition of foreign material, the contaminated material shall be removed and replaced with the specified material.
3. All layers of aggregate subbase gravel course shall be compacted to the required after placing. As soon as the compacting of any layer has been completed, the next layer shall be placed unless otherwise authorized.
4. The Contractor shall bear full responsibility for and make all necessary repairs to the subbase course and the subgrade until the full depth of the subbase course is placed and compacted. Repairs shall be considered incidental to the contract.
5. The top of any aggregate base or subbase course layer shall be scarified and loosened for a minimum depth of 1 inch immediately prior to the placing of the next layer of granular material. This scarifying shall be considered incidental to placing the course, and no separate payment will be made.
6. The surface of each layer shall be maintained during compaction operations in such a manner that a uniform texture is produced and the aggregate firmly keyed. The moisture content of the material shall be maintained at the proper percent to attain the required compaction and stability.

- C. Surface Tolerance: The completed surface of the subbase or base course shall be shaped and maintained to a tolerance, above or below the required cross-sectional shape of 3/8”.

### 3.02 TACK COAT:

- A. Apply to contact surfaces of previously constructed asphaltic concrete base courses or Portland cement concrete and surfaces abutting or projecting into asphalt concrete and surfaces abutting or projecting into asphalt concrete pavement.
- B. Apply tack coat to asphaltic concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat on the surface of all such bases where asphaltic concrete paving will be constructed.

- C. Apply emulsified asphalt tack coat in accordance with APWA Section 2204 and applicable state highway specifications.
- D. Apply at minimum rate of 0.03 gallon per square yard of surface.
- E. Allow to dry until at proper condition to receive paving.

3.03 PAVED AREAS:

- A. Trench Cap: The existing bituminous concrete surface shall be neatly cut or sawed six (6) inches back from the original trench cut, or as may be required to remove any cracked or frayed material. The road gravel placed shall be brought to a level below existing grade sufficient to accommodate the thickness of trench cap specified, and graded. A coating of emulsified asphalt (tack coat) shall be applied to the edge of the existing pavement prior to placement of the bituminous concrete trench cap. Bituminous concrete shall then be placed in 2 lifts and the final lift rolled to match existing paving. Care will be taken to assure a good joint bond between the new and the old paving. Trench cap thickness and gradation shall be as indicated on the Contract Drawings.
- B. Bituminous Concrete: Placement of Bituminous concrete shall conform to Section 401 of the MDOT specifications.

3.04 QUALITY ASSURANCE

The Contractor shall provide gradation tests for all aggregate base and subbase materials prior to initializing placement. The gradation tests shall be certified by an independent test laboratory.

During construction the Contractor's laboratory shall obtain representative samples of the aggregate and perform compaction tests. Any materials not in compliance with the specified gradation and compaction will not be accepted. The Contractor shall be responsible for all measures required to bring the defective work into compliance with the specifications including payment for the cost of subsequent testing.

\*\*\*END OF SECTION 02600\*\*\*

**SECTION 02720  
STORM DRAINAGE SYSTEM**

**PART 1 – GENERAL**

1.01 **GENERAL PROVISIONS:**

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.02 **DESCRIPTION OF WORK:**

- A. Provide all labor, equipment, materials, and incidentals necessary to complete the work in this section and/or as shown on the drawings.

1.03 **RELATED WORK SPECIFIED ELSEWHERE:**

Section 02100	Site Preparation
Section 02150	Demolition
Section 02180	Subsurface Investigation
Section 02220	Excavation
Section 02240	Backfilling for Pipelines and Structures
Section 02740	Manhole and Catch Basin Structures

**PART 2 – PRODUCTS**

2.01 **GENERAL:**

- A. Provide pipes and pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated on the plan. Where a type is not indicated on the contract drawing, the Contractor may select from the following list except that PVC or ADS N-12 pipe will not be permitted for pipelines over 6 inches in diameter which will be exposed to sunlight after completion of the project. Shop drawings or catalog cuts or the specific materials to be used on the project and their location shall be approved by the Engineer prior to bringing any pipe materials to the project site.

2.02 **REINFORCED CONCRETE PIPE:**

- A. ASTM C 76, Class III unless otherwise indicated.

B. **Fittings:**

Reinforced concrete, same strength as adjoining pipe, tongue-and-groove gasketed joints complying with ASTM C 443.

2.03 **POLYVINYL CHLORIDE (PVC) PIPE:**

- A. ASTM D 3034, SDR 35

B. **Fittings:**

PVC, elastomeric joints complying with ASTM D 3212 using elastomeric seals complying with ASTM F477. For pipes 18 inches and over, Johns Manville PS-10 will be accepted.

2.04 ADS N-12 PIPE:

- A. The ADS N-12 pipe as manufactured by Advance Drainage Systems and meeting AASHTO M-294 shall be acceptable for storm drains and culverts. Performance data for fittings and couplings shall be submitted by the Contractor to the Engineer for approval. For the purposes of bedding and backfill, use the requirements for PVC non-pressure pipe.

2.05 DUCTILE IRON PIPE:

- A. Ductile Iron Pipe shall meet the requirements of ANSI A21.51 (AWWA C151) Class 52 piping. Pipe shall have a 1/16" thick cement lining manufactured in accordance with ANSI A21.4 (AWWA C104). Joints shall be either bell type or mechanical type except where the plans require mechanical joint pipe.

1. Mechanical Type:

Mechanical joint pipe shall be jointed by employing tapered rubber or armored gaskets forced home into a tapered groove by a cast iron follower. Bolts and nuts shall be of high strength cast iron and all nuts shall be pulled up using a torque wrench which will not permit unequal stresses in the recommendations of the manufacturer of the pipe and bolts for the various sizes. Joints shall conform to the AWWA Specification recommendations.

2. Bell Type:

Bell and Spigot: Provide double seal, compression type molded neoprene gaskets.

2.06 UNDERDRAIN:

- A. PVC SDR 35 perforated underdrain pipe with ring-tite joints conforming to ASTM F 758. Holes shall be 120° double row, 3/8" in diameter. Pipe with a filter fabric sleeve is not acceptable.

2.07 ADAPTER SLEEVES:

- A. Where two dissimilar pipe materials are jointed, provided a suitable coupling manufactured specifically for this purpose. Tees and connections shall be made using pre-manufactured fittings.

PART 3 – EXECUTION

3.01 PIPE LAYING:

- A. The pipe shall be accurately laid to the line and grades to the satisfaction of the Engineer. The line and grade may be adjusted by the Engineer from that shown on the Drawings to meet field conditions and no extra compensation shall be claimed therefor.

The Owner or his representative reserves the right to check the elevations and alignment on any pipe for conformance with proposed line and grade. Installed grades shall be within the tolerance of plus or minus 0.02 feet from theoretical computed grades. Alignment shall be within a tolerance of plus or minus 0.04 feet. Pipe grade shall be defined as the invert elevation of the pipe. Pipe not meeting the grade tolerance or of poor alignment shall be adjusted by the Contractor.

- B. No pipe laying will be allowed to begin at any point other than a manhole or other appurtenance without the expressed consent of the Engineer. The interior of each length of pipe will be swabbed and wiped clean before laying the next length. No length of pipe shall be laid until the previous length has had sufficient fine material placed and tamped about it to secure it firmly in place to present any disturbance. Bell ends shall be laid uphill. Whenever the work is stopped temporarily, or for any reason whatsoever, the end of the pipe shall be carefully protected against dirt, water, or other extraneous material. Bedding shall be as shown on the Plans.

- C. The pipe shall be cut as necessary for appurtenances.

In general, the pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.

- D. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely, in a manner approved by the Engineer, to prevent entrance of trench water, dirt, or other substance.
- E. All joints shall be made in a dry trench in accordance with the manufacturer's recommendations.
- F. A minimum of 2 pipe lengths or pipe stubs shall be used between any two appurtenances.
- G. Reinforced concrete pipe shall be installed whenever the storm drainage system is located under building foundations.
- H. Cleanouts for underdrains shall be installed in accordance with the contract drawing details. When a corrugated flexible underdrain is used an adaptor coupling specifically made for mating the dissimilar pipes shall be used.

\*\*\*END OF SECTION 02720\*\*\*

**SECTION 02730  
SANITARY SEWER SYSTEM**

**PART 1 – GENERAL**

1.01 **GENERAL PROVISIONS:**

A. **Related Documents:**

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.02 **DESCRIPTION OF WORK:**

- A. The work includes the installation of gravity sewers and force main piping required for the project.
- B. Provide all labor, equipment, materials, and incidentals necessary to complete the work in this section and/or as shown on the drawings. Shop drawings or catalog cuts of all materials and fittings shall be approved by the Engineer prior to ordering or delivering any materials to the project site.
- C. All sanitary sewer system work shall be performed in accordance with the requirements of the Portland Water District.

1.03 **RELATED WORK SPECIFIED ELSEWHERE:**

Section 02100	Site Preparation
Section 02150	Demolition
Section 02180	Subsurface Investigation
Section 02220	Excavation
Section 02240	Backfilling for Pipelines and Structures
Section 02740	Manhole and Catch Basin Structures

1.04 **SUBMITTALS:**

- A. **Manufacturer's** product data and installation instructions.
- B. **Certified copies** of tests on pipe units.
- C. **Construction Records:** Record depth and location of the following:
  - 1. House service capped ends, cleanouts, bends in house service, connection points to sewer main.
  - 2. Bends, thrust blocks in force mains.
  - 3. Repairs to existing pipes.

Record neatly in a permanently bound notebook and submit at Substantial Completion. Provide access to records for the District at all times. Submit copies to the District on a weekly basis

**PART 2 – PRODUCTS**

2.01 **PIPE AND FITTINGS:**

- A. **General:** Provide fittings of same type and class of materials as pipe. Provide commercially manufactured wyes or tee/gyes for service connections. Fitting must have single piece gasket.
- B. **PVC Non-Pressure Pipe and House Services (Sewer):** 4" through 12" Diameter: ASTM D3034 or ASTM D3033, strength requirement SDR 35; push-on joints, ASTM D3212; gaskets, ASTM F477.

C. PVC Pressure Pipe (Forcemain):

1. Less than 4" Diameter: Pipe shall be IPS conforming to ASTM D2441, strength requirement DR 21; push-on joints, ASTM D3139; gaskets, ASTM F477. All fittings to be ductile iron mechanical joint, AWWA C110 with 250 psi minimum pressure rating.
2. 4" Diameter and Larger: ASTM D2241, Class 150, strength requirement DR 18, with cast iron pipe outside diameters; push-on joints, ASTM D3132; gaskets, ASTM F477.

D. HDPE Low Pressure (Pre-Insulated) Force Main:

1. Less than 4" Diameter: Pipe shall be IPS produced from approved HDPE pipe grade resin conforming to ASTM D3350, strength requirement SDR 11, 160 psi. HDPE fittings shall be in accordance with ASTM D3261 and shall be manufactured by injection molding, a combination of extrusion and machining, or fabricated from HDPE pipe conforming to this specification or Ductile Iron. The low pressure force main pipe shall be supplied pre-insulated with a protective jacket, as manufactured by Perma-Pipe or approved equal. The polyurethane insulation shall have a minimum thickness of 1". The protective shall be polyester resin/fiberglass (FRP) reinforced composite directly applied on the insulating foam.

2.02 MISCELLANEOUS:

A. Flexible Couplings: Use and location shall be approved by the District.

1. Type A: Dresser Style 53 as manufactured by Dresser, or approved equal.
2. Type B: Neoprene sleeve with stainless steel bands by Fernco, or approved equal.

B. Pipe Supports: Saddle type, steel, painted, adjustable, by ITT Grinnell, or approved equal.

C. Geotextile Fabric: Propex 4508 by Amoco Fabrics Co., or approved equal.

D. Forcemain Marking Tape: Lineguard III by Tri-Sales, Inc., 2" wide, green; detectable with magnetic locators, or approved equal.

E. Rigid Insulation: Extruded closed-cell rigid foamed polystyrene, 2 inch thickness, width of trench, Styrofoam HI-60, by Dow Chemical, or approved equal.

F. Air and Vacuum Valves:

1. Construction: Cast iron body and cover, ASTM A126; Stainless steel concave float, ASTM A240 T304; Stainless steel float stem, ASTM A581 T303; Buna-N needle and seat; Brass plug, ASTM B124. Operating pressure from 0 to 150 psi.
2. Outlet: 1-inch diameter. Provide a short nipple and a return elbow with piping as shown on the Drawings.
3. Inlet: 2-inch diameter. Provide taps, piping and valves as shown on the Drawing.
4. Coating: Red oxide phenolic primer paint.
5. Model: ACO 443 Sewage Combination Air Valve as manufactured by Valve and Primer Corporation, or approved equal.

2.03 PIPING WITHIN APPURTENANCE STRUCTURES:

A. Materials and Workmanship:

1. Short lengths of pipe with couplings shall not be used where a "random" length is long enough.
2. Flanges shall be USAS standard unless otherwise noted on the Drawings. Where steel flanges are made up to ductile iron flat faces flanges, the raised face on the steel flange shall be removed. All flat flanged joints shall have full-faced gaskets.

3. The inner edges of all pipe ends shall be reamed, filed or ground to remove burrs, and all weld beads and spatter shall be removed.
4. The Contractor shall be responsible for checking the complete removal of scale from the pipe before installation.

B. Screwed Construction:

1. General: Pipe lines shall be made up with as few joints as possible. Short length of pipe with couplings shall not be used where a "random" length is long enough. All threading shall be done with threading machines.
2. Joints: Screwed joints shall have clean machine cut threads with inner edge reamed, filed, or ground to remove burrs, and shall be made up with a suitable tape which shall be applied to the make thread only. If it is necessary to back off a joint after it has once been made up with compound, the threads shall be cleaned and new tape applied before making the joint.
3. Joint Compound: For screwed piping, Teflon tape shall be used as pipe joint compound.
4. Flanges: In making up the pipe in the shop, flanges shall be screwed solidly on the pipe with the pipe projecting through the flanges, after which the pipe and flange shall be refaced. Screwed flanges made up in the field shall conform to the Shop Specification for flanges, but the pipe shall not project through the face and the refacing may be omitted.

C. Flanged Construction:

1. Bolts, Studs, and Nuts: Bolting material shall be in accordance with the requirements of the applicable piping class and shall be furnished by the Contractor. At a minimum, the material shall be Grade B, carbon steel meeting the requirements of ASTM A-307.
2. Gaskets: Dimensions shall be in accordance with the requirements of the applicable piping class, and shall be furnished by the Contractor unless otherwise specified or noted. Material shall be red sheet rubber 1/8" thickness.
3. Procedures: All bolts shall be tightened with suitable wrenches only, and hammering or pumping shall not be permitted. In tightening these joints, care shall be taken to secure uniform pressure on the gasket and to avoid over-stressing the bolts or dishing the flanges. In no case shall bolts be pulled up with greater effort than can be exerted by one man pulling steadily on wrench longer than thirty times the diameter of the bolts. Extreme care shall be exercised in making up joints between Van Stone flanges and iron or bronze flanges.

2.04 MARKING ON EACH PIPE LENGTH:

- A. Class of pipe.
- B. Date of manufacture.
- C. Name of manufacturer.
- D. Pipe size shall be nominal diameter as shown on Drawings or as specified.

2.05 MATERIALS FOR VALVES:

A. Gate Valves:

1. Smaller than 3 inches: Fed. Spec. WW-V-54, bronze, gate, type III, class B.
2. Three inches and larger: Iron body, bronze mounted, double disc with parallel or inclined seats, water working pressure 175 psig. non-rising stem type turning counterclockwise to open.
  - a. Underground: AWWA C500.



- b. Above Ground in Pits: Fed. Spec. WW-V-58, type II.
- 3. Operations:
  - a. Underground: Except for use with post indicators, furnish valves with 2 inch nut for socket wrench operation. Valves used with post indicators shall be constructed for connection thereto.
  - b. Above Ground and in Pits: Handwheels.
- 4. Joints: Ends of valves shall accommodate, or be adapted to, pipe installed.
- B. Check Valves: All check valves are to be class 150 with flanges faced and drilled per 125 pound template.
  - 1. The swing check valve shall be constructed with heavy cast iron or cast steel body with a bronze or stainless steel seat ring, a non-corrosive shaft for attachment of weight and level and complete non-corrosive cushion chamber.
  - 2. It shall absolutely prevent the return of water, oil, or gas back through the valve when the inlet pressure decreases below the delivery pressure. The valve must be tight seating, and must operate without hammer or shock. The seat ring must be renewable and shall be securely held in place by a threaded joint.
  - 3. The cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The cushioning shall be by air and the cushion chamber shall be so arranged that the closing speed will be adjustable to meet the service requirements.
  - 4. The valve disc shall be of cast iron or cast steel and shall be suspended from a non-corrosive shaft which will pass through a stuffing box and be connected to the cushion chamber on the outside of the valve.

#### 2.06 VALVE BOXES:

- A. Provide each underground gate valve with a valve box; adjustable, telescoping, heavy-patter type, M & H line as manufactured by Dresser Industries.
- B. Material: Cast Iron, 3/16" minimum thickness.
- C. Designed and constructed to prevent direct transmission of traffic loads to pipe or valve with the lower section of box designed to enclose operating nut and stuffing box of valve and rest on valve bonnet.
- D. Adjustable through at least 6 inch vertically without reduction of the lap between sections to less than 4 inches.
- E. Size: As indicated on Drawings, 4-1/2 inches minimum inside diameter and lengths as necessary for depths of valves with which boxes are to be used.
- F. Covers:
  - 1. Close fitting, dirt-tight, and top flush with top of box rim.
  - 2. Cast into top; an arrow with the word "Open" to indicate direction of turning the open valve and the word "Sewer".

#### 2.07 VALVE ACCESSORIES:

- A. Operating Wrenches: Provide one T-handle operating wrench of 5/8 inch round stock and length necessary to permit operation of valves by operators of average height working in upright position.

## PART 3 – EXECUTION

### 3.01 INSTALLATION OF GRAVITY PIPE AND FITTINGS:

- A. Methods: Install in accordance with manufacturer's recommendations. Use a laser beam for line and grade unless otherwise permitted by the District. Secure each length of pipe with bedding before placing next length. Plug open ends when work is suspended. Bed pipe as shown on Drawings. A 30-inch minimum cover over the top of PVC pipe and DIP pipe should be provided before the trench is wheel-loaded.
- B. Grade and Line:
  - 1. Grade and Line shall be sufficient to provide minimum velocities of 2.0 fps. Lay pipe to line and grade shown on the Drawings as reviewed and approved by the District. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between these points.
  - 2. Line and grade may be adjusted as approved by the District, when required by field conditions.
- C. Conditions: Lay pipe in the dry. Do not use installed pipe to remove water from work area.
- D. Flush and clean all pipe and remove all debris and materials. Flushing and cleaning methods shall be in accordance to District Standards and approved by the District. Gravity flushing is not acceptable.
- E. Connections to Manholes: Any connections shall be in accordance with District Standards. Connections to existing wastewater manholes shall be performed under PWD Inspection. Connections shall be cored as opposed to being drilled/chiseled. Connections to existing structures must not result in additional infiltration. Any joints shall be located within 3 feet of inside surface of manholes and catch basins.
- F. House Service Fittings and Leads:
  - 1. Size of service leads 4" unless otherwise indicated.
  - 2. Depth and location of service to be determined in field, as approved by the District.
  - 3. Provide tee/wye or wye fittings on main line pipe. Extend services to an edge of Right-of-Way as determined by the District.
  - 4. Provide clean outs as required.
  - 5. Plug, or cap, and stake ends of new service. Provide stake that extends from plug or cap to 1 foot above ground surface. Provide the District with measurements of pipe installed and in obtaining swing ties to ends of leads.
  - 6. All service connections must be shown on as-built drawings.
  - 7. No residential service connections shall be allowed to tie into District owned sewer force mains.

### 3.02 INSTALLATION OF FORCEMAINS AND PRESSURE PIPE:

- A. Grade and Line: Lay pipe to line and grade as approved by the District. Do not allow positive-negative grade discontinuities. See Article 3.01 B above.
- B. Methods, Conditions, and Connections to Manholes: See Articles 3.01 above.
- C. Install warning tape continuously from the pump stations to the end of each force main. At ends of rolls and repairs, splice tape with 3-foot overlap connected with duct tape. Supply the District with one full roll for future repairs. Extend to grade of each manhole and at pump stations.
- D. Thrust Protection: Provide thrust protection at all bends in forcemains in accordance with Standards and as approved by the District.
- E. Terminus: Forcemains shall terminate in manholes prior to connecting to District owned sewer mains.

3.03 UTILITIES TO BE ABANDONED: Close open ends of abandoned underground utilities that are not indicated to be removed. Provide sufficiently strong closures, such as caps or brick and mortar, acceptable to the District to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed. CONTRACTOR may remove abandoned utilities with written permission of the District or Town.

3.04 INSULATION:

- A. Install as shown on approved Drawings.
- B. Provide 2-inch minimum thickness for sewer, forcemain, and water main, compacted sand layers directly above and below insulation.

3.05 TESTING OF SANITARY SEWERS:

- A. General: Test all sanitary sewer pipes after backfilling. Install all house service leads on main line before testing. Perform tests in presence of the District. A maximum of 1000 feet of pipe may be installed but not tested at any time.
- B. Gravity Sewer Leakage Tests: Use low pressure air test as follows:
  - 1. Plug ends of section to be tested.
  - 2. Supply air slowly to the pipe to be tested until the air pressure inside the pipe is 4.0 psi greater than the average back pressure of any groundwater submerging the pipe.
  - 3. Disconnect air supply and allow a minimum of two minutes for stabilization of pressure.
  - 4. Following stabilization period measure drop in pressure over the test period within the following times:

<u>Nominal Pipe Size (in.)</u>	<u>Test Period (min.)</u>
4	4
6	4
8	6
10	6
12	7
15	8
18	9
21	11
24	13

- 5. Acceptable drop: No more than 1.0 psi.
- C. Forcemain and Pressure Sewer Tests: Use hydrostatic test as follows:
  - 1. Fill section of pipe with water and expel all air.
  - 2. Pressurize to 1.5 times the normal operating pressure but not less than 60 psi.
  - 3. Measure leakage over a 2-hour test period.
  - 4. Acceptable leakage: Less than 10 gallons per day per inch diameter per mile of pipe tested.
- D. Deflection Test for PVC Gravity Sewer Pipe: Test 100% of pipe with "GO-NO-GO" gauge allowing maximum deflection per ASTM D3034, Appendix X1, Table X1.1.
- E. TV Inspection: All sewers and drains shall be inspected by an approved CONTRACTOR using TV pipe inspection. Defects in materials and/or workmanship found during the inspection shall be corrected by the CONTRACTOR.

- F. Repair and/or replace all pipes not passing tests, using materials and methods approved by the District, and retest.

\*\*\*END OF SECTION 02730\*\*\*

**SECTION 02740  
MANHOLES AND CATCH BASINS**

**PART 1 – GENERAL**

1.01 **GENERAL PROVISIONS:**

- A. Related Documents: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.02 **DESCRIPTION OF WORK:**

- A. The Contractor shall furnish all labor, materials, forms, and equipment necessary to construct all appurtenant structures shown on the Plans or required by the Specifications. Prior to commencing the work, the Contractor shall provide a complete list of the manufacturers with shop drawings for all appurtenances. Work orders showing all angles and elevations of pipe connections shall be submitted for each appurtenance.

1.03 **RELATED WORK SPECIFIED ELSEWHERE:**

Section 02100	Site Preparation
Section 02150	Demolition
Section 02180	Subsurface Investigation
Section 02220	Excavation
Section 02240	Backfilling for Pipelines and Structures
Section 02720	Storm Drainage System
Section 02730	Sanitary Sewer System

1.04 **SUBMITTALS:**

- A. Shop Drawings: Submit for precast manholes and all precast concrete items. Show components to be used, elevations of top of precast sections, base and pipe inverts, location of pipe penetrations, steps, for each manhole. Verify finish grade elevation at each proposed manhole location in the field.
- B. Product Data: Submit manufacturers' product data and installation instructions for frames, covers, grates, precast items, manhole sleeves, joint sealants, and frost barrier.

**PART 2 – PRODUCTS**

2.01 **MATERIALS:**

A. **Precast Concrete Items:**

1. Precast Manhole Sections: Manhole structures shall be precast reinforced concrete of the dimensions indicated on the Plans conforming to ASTM C478 and ASTM C913 "Standard Specifications for Precast Concrete Water and Wastewater Structures". Sections shall be installed with a flexible plastic gasket equal to or better than "Ram-Nek" as manufactured by K. T. Snyder Co., Houston, Texas, or sections may be fabricated to accept Telex "0" rubber gaskets as manufactured by Hamilton Kent Manufacturing Co., Kent, Ohio. The outside of the brick work required to bring the rim to grade shall be plastered with at least 3/8" mortar, thoroughly troweled to leave a smooth waterproof exterior surface.
2. Manhole steps shall be polypropylene reinforced with steel rod polypropylene plastic. Steps shall be cast or anchored into walls of precast sections to form a ladder with a distance of 12" between steps. Steps shall be provided in manholes and valve pit chamber, but are not to be provided within catch basins or pump station wet well structure.
3. The Contractor shall furnish the name of the manufacturer to the Engineer prior to commencing work.

4. Anti-floatation Slab Design Certificate: The CONTRACTOR may provide the precast structures requiring anti-floatation slabs as one complete unit. If provided as a monolithic unit, submit a certificate of design signed by a Professional Engineer registered in the State of Maine, certifying that the structure including the slab has been designed to withstand all forces including soil, traffic and hydrostatic in accordance with all applicable laws, regulations, rules and codes.
- B. Manholes (Includes Wet Well):
1. Base Sections: Precast monolithic construction with steps (no steps in wet well). Bases shall be placed in a well compacted layer of crushed stone.
  2. Barrel Sections: Precast with steps (no steps in wet well).
  3. Top Sections: Precast eccentric cone with steps. Use flat cover for wet well, if shown on Drawings or approved by the District.
  4. Steps: Polypropylene reinforced with steel rod. Meet OSHA requirements, minimum width 16". Cast into concrete.
  5. Pipe to Manhole Connections:
    - a. Pipe diameter 6" or larger: Flexible manhole sleeves shall be CP series manufactured by Interpace Corp., or approved equal. Size to fit diameter and type of pipe without use of gaskets.
    - b. Pipe diameter less than 6": Thermoplastic pipe sleeve shall be Link-Seal Century Line Model CS100 by Thunderline Corp. with sleeve seal equal to "Link-Seal" by Thunderline Corp., or approved equal.
  6. Joints Between Precast Sections: Watertight, shiplap-type seal with two rings of one-inch diameter butyl rubber sealant one-inch diameter butyl rubber sealant.
- C. Drop and Valve Manholes:
1. General: Conform to requirements for manholes. Provide pipe and accessories as shown on Drawings.
  2. Riser Support Bracket: 10 gauge, Type 304, No. 3 finish stainless steel.
- D. Catch Basins:
1. Base Sections: Precast monolithic construction.
  2. Barrel Sections: Precast monolithic construction.
  3. Top Sections: Precast eccentric cone. Use flat cover for wet well, if shown on Drawings or approved by the District.
  4. Joints Between Precast Sections: Watertight, shiplap-type seal with two rings of one-inch diameter butyl rubber sealant.
- E. Inverts:
1. Epoxy Coated Precast Concrete: Provide preformed channel in accordance with channel invert orientation approved for each manhole installation. Concrete fill shall be 4000 psi. Invert channel shall be sealed with epoxy coating suitable for wastewater applications.
  2. 180 Degree Straight Through Manholes: One piece molded fiberglass invert with integral pipe connections that are factory precast integral with the manhole base, "Fiberliner 2000 Invert System" as manufactured by Fiberliner 2000 New England, Inc, Tel. (508) 349-7401; or approved equal.

3. Non Straight Through Manholes: One-piece plastic composite invert, "Reliner" as manufactured by Reliner – Duran, Inc. Tel. (860) 434-0277; or approved equal. Provide concrete backfill with brick table.
    - a. Concrete: 3000 psi.
    - b. Sewer Brick: ASTM C32, Grade SS, hard brick.
    - c. Mortar: Type M, ASTM C270. Use Type II Portland cement, Type S lime. Proportions for Mortar: 1 part Portland cement, 1/4 part hydrated lime, 3 to 3 3/4 parts sand.
- F. Risers:
1. General: Rubber riser rings are preferred.
    - a) Rubber adjustment riser rings manufactured from a rubber fibrepolyurethane prepolymer composite, "Infra-Riser" as manufactured by GNR Technologies Inc., Tel. (514) 366-6116; or approved equal.
    - b) No more than 3 courses of brick may be used. Any work must be acceptable to the District.
- G. Frames, Covers, and Grates:
1. Material: Cast iron, ASTM A48 Class 30.
  2. Manhole Frames and Covers: For manholes 6' or more in vertical height, use minimum 24" diameter opening. For manholes 6' or less in vertical height, use a min. 28" diameter opening. Weight of 350 pounds, labeled with "SEWER" in 3" high raised letters on cover for sewer manholes. Standard frames and covers shall be Model M267S by Etheridge Foundry, or approved equal.
  3. Hatches: Hatches shall be equipped with heavy forged brass hinges, stainless steel hinge pins, spring operators, automatic hold open arm with release handle,
- H. Floor Boxes: Floor boxes to be cast-in-place. Floor boxes to be constructed of cast iron with bronze bushings to preserve stem alignment, Clow Model F-5695, or approved equal.
- I. Miscellaneous:
1. Manhole Cover Lifting Tools: Provide two (2) cover lift lifting tools by Etheridge Foundry, or approved equal, compatible with manhole covers provided.
  2. Frost Barrier: U.V. resistant, high grade polyethylene, minimum thickness six (6) mils.
  3. Joint Sealants:
    - a. Butyl Rubber Sealant: One (1) inch diameter strips manufactured by Kent Seal, or approved equal.
    - b. Butyl Rubber Caulking: Conform to AASHTO M-198, Type B.
  4. Sewer Manhole Inverts: Provide inverts as specified or as shown. Configuration to be as required by connecting pipes and as shown on Drawings.
- J. Bitumastic Coating:
- Bitumastic coating shall consist of two (2) coats of Mobil Corp. Coal Tar Coating or approved equal. The coating shall be used on the exterior of all sanitary appurtenances.

## PART 3 – EXECUTION

### 3.01 INSTALLATION OF MANHOLES/PRECAST STRUCTURES:

- A. Placement: Place precast bases and structures on compacted bedding material so bottom of structure is plumb and pipe inverts are at proper elevations. Place manhole barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout. Construct manhole inverts in accordance with specifications.
- B. Joints: Follow manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1 inch diameter butyl rubber sealant. Point joints inside and out with butyl caulk.
- C. Frame and Covers:
  - 1. Set to final grade as shown on the Drawings and as specified. Provide adequate temporary covers to prevent accidental entry until final placement of frame and cover is made.
  - 2. Use two rings of 1 inch diameter butyl rubber sealant between frame and rubber riser. Provide downward force to frame so as to compress the joint, provide a watertight seal, and prevent future settlement. Point compressed joint with butyl rubber caulk sealant.
  - 3. Set manhole frames and covers to final grade only after pavement base course has been applied, or after final grading of gravel roads.
- D. Inverts: As specified.
- E. Steps: Replace any steps that are out of plumb and proper horizontal placement.
- F. Frost Barriers: Wrap each manhole to the maximum excavation depth or not less than 6 feet below grade, with a minimum of four layers of 6 mils each of the polyethylene.
  - 1. Clean manhole exterior of all dirt and remove any protrusions.
  - 2. Apply a 6-inch wide vertical strip of bituminous waterproofing adhesive from the top of manhole to the greatest excavation depth, but not in excess of 6 feet.
  - 3. Start poly wrap at adhesive strip and proceed around manhole continuously, overlapping adhesive strip a minimum of 24 inches on the final layer.
  - 4. Tuck and pleat poly at top in a continuous manner, minimizing size of folds. Extend poly past top of manhole frame and temporarily tuck remainder inside frame, until final backfill and paving.
  - 5. Paved areas: Cut poly flush with manhole rim after pavement is in place.
  - 6. Unpaved areas: Pull loose ends of poly together, remove excess air and tie off end with galvanized wire. Bury with manhole below grade.

### 3.02 LEAKAGE TESTING – MANHOLES

- A. General: Tests must be observed by the District. Manholes must be complete, including backfill, for final test acceptance except for shelf and invert. Plug all pipes and other openings in the manhole walls prior to test.
- B. Exfiltration Test:
  - 1. Plug pipes into and out of MH and secure plugs.
  - 2. Lower groundwater table (GWT) to below MH. Maintain GWT at this level throughout test. Provide means of determining GWT level at any time throughout test.
  - 3. Fill MH with water to top of cone.
  - 4. Allow a period of time for absorption (determined by CONTRACTOR).



5. Refill to top of cone.
6. Determine volume of leakage in an 8 hour (min) test period and calculate rate.
7. Acceptable leakage rate: Not more than 1 gallon per vertical foot per 24 hours.
8. The District reserves the right to require an infiltration test if the District is not satisfied with the exfiltration test.

C. Vacuum Test:

1. Manholes may be vacuum tested in lieu of the exfiltration test. The vacuum tests must be performed prior to backfilling the manhole, filling joints, and constructing the manhole inverts and benches. All pipe connections shall be made prior to the test.
2. Plug pipe openings and securely brace the plugs and pipe.
3. Set the tester onto the top section of the manhole and inflate the compression band to affect a seal between the structure and the vacuum base.
4. Connect the vacuum pump to the outlet port, open the valve, start the motor, and draw a vacuum of 10" mercury.
5. Close the valve and monitor the vacuum gauge.
6. The test shall pass if the vacuum holds at 10" mercury or drops no lower than 9" within the following times:

<u>Depth of Manhole (feet)</u>	<u>Time (min.)</u>
0 - 10	3.0
10 - 15	3.5
15 - 20	4.0
20 - 25	4.5
>25	5.0

7. If the vacuum drops in excess of the prescribed rate, the CONTRACTOR shall locate the leak, make proper repairs, and retest the manhole.
8. If the unit fails the test after repair, the unit shall be water exfiltration tested.

3.03 REPAIRS:

- A. Determine causes of all leaks and repair them. Perform earthwork required if manhole has been backfilled.
- B. Perform repairs using methods and materials approved by the District. Remove and replace or reconstruct manhole if necessary. Remove and replace defective sections if required by the District.

\*\*\*END OF SECTION 02740\*\*\*

SECTION 02920  
LAWN AND SEED

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
  - 1. Fine grading, loaming, liming, and fertilizing.
  - 2. Seeding: Lawn
  - 3. Mulch.
- B. Related Sections include the following:
  - 1. Division 2 Section "Site Clearing" for topsoil stripping and stockpiling.
  - 2. Division 2 Section "Earthwork" for excavation, filling and backfilling, and rough grading.
  - 3. Division 2 Section "Exterior Plantings".

1.03 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01330.
- B. Product Data: For each type of product indicated.
- C. Material List: Before seeding materials are delivered to job site, submit to the Landscape Architect a complete list of seeding and other items proposed to be installed.
  - 1. Include complete data on source, size and quality.
  - 2. Demonstrate complete conformance with requirements of this Section.
  - 3. This shall in no way be construed as permitting substitution for specific items described in Drawings or these Specifications unless substitution has been approved in advance by the Landscape Architect.
- D. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of

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production and date of packaging.

1. Prior to installation, deliver certificates to the Architect.
- E. Qualification Data: For landscape Installer.
- F. Topsoil Test Reports for existing surface soil and imported topsoil: Submit topsoil analysis done by a soil testing agency such as Maine Soil Testing and Analytical Lab Tel: (207) 581-2934) for review by the Owner's representative. State recommended quantities for amendments necessary to produce satisfactory topsoil as state in the specifications herein.
- G. Planting Schedule: Indicating anticipated planting dates for each type of planting.
- H. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments including organic material or compost to be added to produce satisfactory topsoil.
  2. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 100 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
  3. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers with labels legible at time of Architect's inspection.
1. Labels shall identify analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, location of packaging, and name of seed grower. Damaged packages will not be accepted.
- B. Deliver fertilizer in sealed waterproof bags, printed with manufacturer's name, weight, and guaranteed analysis.
- C. Immediately remove from the site seeding materials that are not true to name and

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materials which do not comply with the provisions of this Section of these Specifications.

- D. Protect seeding materials before, during and after installation and to protect the installed work and materials of other trades.
- E. Replacements: In the event of damage or rejection, immediately make repairs and replacements necessary to the approval of Architect, at no additional cost to Owner.

1.07 SCHEDULING

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
  - 1. Spring Planting: April 15<sup>th</sup> to June 30<sup>th</sup>.
  - 2. Fall Planting: August 15<sup>th</sup> to September 15<sup>th</sup>.
  - 3. Variance: If special conditions exist which may warrant a variance in the above planting dates, a written request shall be submitted to Architect stating special conditions for proposed variance. Permission for variance will be given if warranted in opinion of Landscape Architect. Regardless of time of seeding, Contractor shall be responsible for full growth of grass.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.08 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continues until acceptable lawn or meadow is established, but for not less than the following periods:
  - 1. Seeded Lawns: Shall continue until Substantial Completion, but not less than **90** days and 4 mowings.
  - 2. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season (April 15<sup>th</sup> through October 15<sup>th</sup>).
- B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth lawn.
  - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4-inches.
  - 1. Schedule watering to prevent wilting, puddles, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
  - 2. Water lawns in a satisfactory manner during and immediately after planting and not less than twice per week until Substantial Completion.
- D. After grass has sprouted, seeded areas, which fail to show uniform stand of grass for any reason, shall be reseeded repeatedly until uniform stand is attained. Scattered bare spots approximately 8 inches in size, evenly distributed in any lawn area will be allowed at

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discretion of Landscape Architect.

- E. First mowing for turf/lawn areas shall be done when average height of grass is 3 inches, with mower set to cut at a height of 2 inches. Subsequent mowings shall be made at not over two week intervals, with the height of cut set at 2 inches. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. With prior permission of Landscape Architect, mowings during periods of slow growth or dormancy may be spaced at greater intervals. Lawn Post fertilization: Apply fertilizer after initial mowing and when grass is dry.
  - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.
- F. If lawn or grass is established in the fall and maintenance is required to continue into spring months, lawn and grass shall receive an application of lime and fertilizer in the spring. Lime and fertilizer shall be spread in a uniform layer over entire lawn surface, at the rates recommended by a soil test administered at that time.
- G. Correct graded areas that settle during the first 12 months after Provisional Acceptance in lawn areas, including loaming and seeding. Reseeding shall be done as herein specified.
- H. When initial maintenance period has not elapsed before the end of the planting season, or if lawn/turf is not fully established continue maintenance during next planting season.

PART 2 - PRODUCTS

2.01 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: Seed of grass species as follows, with not less than 95 % germination, not less than 85 % pure seed and not more than 0.5 % weed seed:
  - 1. Lawn - Allen, Sterling & Lothrop, Falmouth, ME; Park Mixture
    - a. 35 % VNS Kentucky bluegrass.
    - b. 20 % VNS Creeping Red Fescue
    - c. 15 % Improved Turf Type Tri-Rye
    - d. 15% VNS Chewing Fescue
    - e. 15% VNS Annual Ryegrass
- C. Wet, moldy, or otherwise damaged seed will be rejected.

2.02 PLANTING LAWNS

- A. Fine grade lawn areas to finish grades, filling as needed or removing surplus dirt and floating areas to a smooth uniform grade as indicated on grading plans. All lawn areas shall slope to drain.

Where no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls (such as walks, curbs, catch basins, elevations at steps or

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building) and elevations shown on plans. Roll, scarify, rake and level as necessary to obtain true, even lawn surfaces. All finish grades shall meet approval of the architect before grass seed is shown.

- B. Loosen topsoil to depth of 12-inches in areas where topsoil has been spread. Add specified soil amendments and mix thoroughly into top 6-inches of topsoil, till surface to level, fine texture.
- C. Grade and roll prepared lawn surface. Water thoroughly but do not create muddy soil condition.
- D. Sow seed uniformly in two directions in the quantity recommended by the seed producer, except as otherwise indicated. Rake seed lightly into top 1/8 inch of soil surface. Water thoroughly with fine spray.
- E. Protect seeded areas against erosion by spreading straw to a uniform loose depth of 1-1/2 inches.

2.04 TOPSOIL

- A. General: Topsoil, except that existing on site, will not be made available by Owner. Contractor shall be responsible for supplying any additional topsoil needed and hauling it to site. It shall be obtained from naturally well-drained areas. Whether from on- or off-site source, topsoil shall be fertile, friable natural loam containing no less than 6% nor more than 12 % organic matter of total dry weight. Topsoil shall have a pH value 5.5 - 6.5. If topsoil does not fall within required pH range, limestone or aluminum sulfate shall be added to bring pH within specified limits. Topsoil shall not contain soluble salts greater than 500 parts per million and shall not contain toxic substances that may be harmful to plant growth. Topsoil shall be without admixture of subsoil and shall be cleaned and free from clay lumps, stones, stumps, roots, or similar substances 3/4-inch or more in diameter, debris, or other objects which might be a hindrance to planting operations. Soil shall not be used for planting while in frozen or muddy condition. Furnish all topsoil required to complete work. Contractor shall dispose of removed materials.
- B. Maximum particle size shall be 3/4-inch with maximum of 3% retained on 1/4-inch sieve. Composition shall be in the following range:

	<u>% of Total Weight</u>	<u>Average %</u>
Sand	50 - 70	60
Silt	18 - 35	25
Clay	5 - 20	15

- C. Initial Testing: Submit representative samples taken from on-site topsoil and borrow sources to a Soil Testing Laboratory for chemical and physical analysis. Each sample shall be composed of 10 small grab samples from throughout the source mixed together. Indicate to the testing agencies that turf is to be planted and provide the name of the Owner. Forward to the Landscape Architect two copies of analysis and recommendations of testing agencies.
- D. Final Testing: After the final topsoil has been amended and mixed as recommended, take

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representative samples and submit them to a Soil Testing Laboratory for chemical and physical analysis. Each sample shall be composed of 10 small grab samples from throughout the source mixed together. Make final amendments to topsoil to meet specification, based on test results.

2.05 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, ground dolomitic limestone, approved for agriculture, containing not less than 85 % of total carbonates with a minimum of 30 % magnesium carbonates. Limestone shall be ground to a fineness that allows 50 % to pass through a 100 mesh sieve and 90 % to pass through a 20 mesh sieve.
- B. Aluminum Sulfate: Commercial grade, unadulterated. Deliver in containers with the name of material and manufacturer, and net weight of contents.

2.06 ORGANIC SOIL AMENDMENTS

- A. Compost: Shall meet Maine Department of Environmental Protection guidelines under Chapter 567: Section C and must be approved for commercial landscaping. Vendor shall provide approximate nitrogen availability calculations for soil blending and complete set of available plant nutrients, pH, trace metals, total volatile solids, and soluble salts, measured water holding capacity and maturity measurements. It shall be weed seed free and consist of approximately equal portions of municipal bio-solids, short paper fiber, wood ash and sawdust and be the product of 15 days of thermophillic aerobic decomposition followed by 90 days of curing.

Compost will be adequately stabilized, pathogen free with acceptable odor. Material shall pass through a 3/8-inch mesh screen, be friable and free of stones, sticks and all objectionable debris. Compost source is subject to the review of Architect. Compost shall meet the following parameters:

C:N Ratio	20:1 to 35:1
Total Nitrogen	<1.5%
Maturity Index	Stable to Very Stable
Texture	100% passing 3/8-inch screen
Soluble Salts	<4 mmhos/cm
Moisture Content	40% to 60%
Total Volatile Solids	<60%
Density	800 - 1200 lbs. /cy

Product: Earthlife Products; BFI Organics, 5 Fundy Road, Falmouth, ME or approved equal or Benson Farm Earth Products, Gorham, Maine.

- B. Peat: Shall be moist, finely shredded, consisting of 90 % organic moss peat, be brown in color, and suitable for horticultural purposes. Shredded particles shall not exceed 1-inch in diameter. Peat shall be measured in air dry condition, containing not more than 35 % moisture by weight. Ash content shall not exceed 10 %.

2.07 COMMERCIAL FERTILIZER

- A. Fertilizer shall conform to the following:
  - 1. When applied as a topsoil amendment, fertilizer shall have an analysis that will

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deliver appropriate amounts of nitrogen, phosphorus, and potassium as required to remedy deficiencies revealed by testing the topsoil. Recommendations shall be noted by the soil analysis.

2. When used as a top dressing for the maintenance of sod, fertilizer shall conform to the following:

<u>Constituent</u>	<u>% Present by Weight</u>
Nitrogen (N)	10
Phosphorous (P)	8
Potassium (K)	4

- a. 50% of nitrogen shall be derived from natural organic source of urea form.
  - b. Available phosphorous shall be derived from super phosphate, bone meal, or tankage
  - c. Potassium shall be derived from muriate of potash containing 60% potash.
- B. Fertilizer shall be delivered in manufacturer's standard container printed with manufacturer's name, material weight, and guaranteed analysis.
- C. Fertilizers with N-P-K analysis other than that stated above may be used provided that the application rate per square foot of nitrogen, phosphorus, and potassium is equal to that specified.

2.08 WATER

- A. Water shall be suitable for irrigation and free from ingredients harmful to seeded areas.

2.09 MULCH

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley. No material shall be used which is so wet, decayed, or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings or other short fibered material shall be used unless directed.
- B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 % and a pH range of 4.5 to 6.5. Provide in moisture resistant sealed bags marked with the manufacturer's name, the air-dry weight, and composition of the contents.
- C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.
- D. Hydro Mulch: Shall be Terra-Sorb G.B., or an approval equal. Add Terra-Sorb to the hydro seed tank at the amount of 60 pounds per acre.
- E. Mulch Binder: Asphalt emulsion, ASTM D977, Grade SS-1, non-toxic and free of plant growth or germination inhibitors.

PART 3 - EXECUTION

3.01 EXAMINATION



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- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance.
  - 1. Confirm that subgrade is to a true, smooth slope, parallel and at the depth shown on Drawings below finish grade, for seed bed areas. There must be sufficient grade staked, as determined by Architect, to insure correct line and grade of subgrade and finished grade.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION OF SUBGRADE

- A. Immediately prior to being covered with topsoil, loosen or cultivate the top 6- to 12-inches of subgrade. Subgrade shall be brought to true and uniform grade, and shall be cleared of stones, sticks, and other foreign material greater than 1-1/2 inches in any dimension and legally dispose of them off Owner's property.
  - 1. Where construction activities create compacted soils, loosen or cultivate subgrade to a depth of 12- to 18-inches in the location of planting beds.

3.03 TOPSOIL SPREADING

- A. Topsoil shall not be spread until it is possible to commence seeding operations within 24 hours. If topsoil is spread prior to this time, it shall be cultivated to loosen soil prior to seeding.
- B. Topsoil shall not be placed when either subgrade or topsoil material are frozen, excessively wet, or excessively dry.
- C. Place and spread topsoil over areas designated on the Drawings as "loam and seed" or "lawn", and in plant beds in a uniform layer to a thickness which will compact to depth required to bring surfaces to required elevation. Unless otherwise indicated, minimum depth in lawn areas shall be **6 inches** after compaction, and **12-inches** in planting beds.
- D. After spreading topsoil in designated areas, topsoil shall be carefully prepared by scarifying or harrowing, and by removing stones over one inch in diameter. Topsoil shall be free of smaller stones in excessive quantities, as determined by Architect.
- E. Roll entire surface with a roller weighing not more than 100 pounds per foot of width. During rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil, and the surface regraded and rolled.
- F. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.

3.04 FERTILIZER AND CONDITIONERS APPLICATION

- A. Fertilizer and conditioners shall be applied at the following rates:
  - 1. Aluminum Sulfate: As required by test results of topsoil.
  - 2. Limestone: As required by test results of topsoil.
  - 3. Fertilizer: As required by test results of topsoil.
- B. Mixing with Topsoil: Fertilizer and conditioners shall be spread over entire areas to be

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seeded at application rates indicated above. Materials shall be uniformly and thoroughly mixed into top 4 inches of topsoil by discing, rototilling, or other approved method. In areas inaccessible to power equipment, use hand tools. Adjacent to trees and shrubs use hand tools to avoid disturbance of the roots.

3.05 FINISH GRADING

- A. Finish Grading: Grade surfaces to a smooth, uniform surface plane without sharp breaks. Surface shall have a loose, uniformly fine texture. Grade to within 1/2-inch (13 mm) of finish elevation. Remove stones, roots, and other debris greater than 1-inch in any dimension, which are visible at the surface and fill resulting holes with topsoil, leaving a uniform planar surface.
- B. Finish grade surface with a drag or rake. Round out all breaks in grade, smooth down all lumps and ridges; fill in all holes and crevices. Rolling with a light roller is acceptable, if surface is scarified afterward.
- C. In the event of settlement, Contractor shall readjust the work to required finish grade.
- D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.06 SEEDING

- A. Sow seed evenly with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph or when it is raining or snowing. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  - 1. Do not use wet seed, or seed that is moldy or otherwise damaged.
  - 2. Rake seed in lightly.
- B. Sow seed at the rate recommended by Allen, Sterling & Lothrop, Falmouth, ME.
  - 1. Lawn: 1 lb. per 200 sq. ft. of area.
- C. Cultipacker, or approved similar equipment, may be used to cover the seed and to firm seed bed in one operation. In areas inaccessible to cultipacker, seeded ground shall be lightly raked and rolled in two directions with a water ballast roller. Extreme care shall be taken during seeding and raking to insure no change shall occur in finish grades and that seed is not raked from one spot to another.
- D. Promptly after seeding, wet seeded area thoroughly, keeping all areas moist throughout the germination period 4-6 weeks. Initial watering shall continue until the equivalent of a 2-inch depth of water has been applied to entire seeded surface, at a rate which will not dislodge the seed. Watering shall be repeated thereafter as frequently as required to prevent drying of surface, until grass attains an average height of 1/4-inch. Watering methods and apparatus, which may cause erosion of surface, shall not be permitted.
- E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form continuous blanket 1½-inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

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1. Anchor straw mulch by crimping into topsoil with suitable mechanical equipment.
- F. Protect:
1. Protect adjacent and adjoining areas from hydro-seeding and hydro-mulching overspray.
  2. Do not seed in planter beds.
- 3.07 HYDROSEEDING
- A. Hydro seeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydro seed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
1. Mix slurry with nonasphaltic tackifier.
  2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
- 3.08 SATISFACTORY LAWNS
- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 % over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 2-inches by 2-inches.
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.
- 3.09 CLEANUP AND PROTECTION
- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove non-degradable erosion-control measures after grass establishment period.

END OF SECTION 02920

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PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the layout, soil preparation, bed establishment, excavation for and planting of the following:
  - 1. Trees.
  - 2. Shrubs.
  - 3. Ground cover.
  - 4. Plants.
- B. Related Sections include the following:
  - 1. Division 2 Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
  - 2. Division 2 Section "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
  - 3. Division 2 Section "Lawns and Grasses."

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01330.
- B. Product Data: For each type of product indicated.
- C. Material List: Thirty days before any planting materials are delivered to the job site, submit to the Architect a complete list of plants, dark mulch and other items proposed to be installed:
  - 1. Include a complete data on source, size and quality.
  - 2. Demonstrate complete conformance with requirements of this Section.
  - 3. This shall in no way be construed as permitting substitution for specific items described in Drawings or these Specifications, unless substitution has been approved in advance by the Architect.
- D. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:
  - 1. Manufacturer's certified analysis for standard products.
  - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- E. Qualification Data: For landscape installer.
- F. Material Test Reports: For existing surface soil and imported topsoil.
- G. Planting Schedule: Indicating anticipated planting dates for exterior plants.

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- H. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.

1.04 QUALITY ASSURANCE

- A. Source Quality Control:
1. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.
  2. Analysis and Standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis and approval by a Maine Certified Landscape Professional (207-225-3998).
- B. Standards:
1. Plants and planting material shall meet or exceed the specifications of Federal and State laws requiring inspection for plant disease and insect control.
  2. Quality and size shall conform to the current edition of "Horticultural Standards" for number one grade nursery stock, as adopted by the American Association of Nurserymen. 3. Plants shall be true to name and one of each bundle or lot shall be tagged with the name and size of the plants, in accordance with the standards of practice of the **American Association of Nurserymen**. Botanical names shall take precedence over common names.
  3. Substitutions:
    - a. In the event that trees, shrubs, or other plant material specified in drawings are in the opinion of Contractor, impossible or unreasonably difficult to obtain, Contractor shall immediately notify Architect to discuss appropriate substitutions in writing. No substitutions of plant material may be made without prior written approval of Landscape Architect.
    - b. Contractor shall notify Landscape Architect in writing of any plant material that is inappropriate for proposed site conditions in the opinion of Contractor. Substitutions shall be processed as per paragraph 4a. above.
- C. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- D. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil, both existing and imported.
1. Report suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
  2. Materials shall not be used in construction until Architect has reviewed test results.
- E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

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- F. Observation: Landscape Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
  - 1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Digging Plant Material: Plants shall not be dug at nursery or approved source until Contractor is ready to transport them from their original locations to project site or acceptable storage location.
- B. Transportation of Plant Material: Plants transported to project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to body of vehicle to prevent injury to plants. Closed vehicles shall be adequately ventilated to prevent overheating of plants.
  - 1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
  - 2. Plants shall be kept moist, fresh, and protected at all times. Such protection shall encompass entire period during which plants are in transit, being handled, or are in temporary storage.
  - 3. Unless otherwise authorized by Landscape Architect, notify Architect at least two working days in advance of anticipated delivery date of any plant material. Provide the Landscape Architect with legible copy of bill of lading, showing quantities, kinds, and sizes of materials included for each shipment.
- C. Do not prune trees and shrubs before delivery, except as approved by Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.
- D. Handle planting stock by root ball.
- E. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.
  - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material. Keep balls moist and their solidity carefully preserved.
  - 2. Do not remove container-grown stock from containers before time of planting.
  - 3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.
  - 4. Exterior plants shall not be allowed to dry out or freeze.
  - 5. Both duration and method of storage of plant materials shall be subject to approval of Architect.

1.06 REJECTION OF MATERIALS

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- A. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.
- B. Upon arrival at temporary storage location or project site, plants shall be inspected for proper shipping procedures. Should the roots be dried out, large branches be broken, balls of earth broken or loosened, or areas of bark be torn, Architect will reject the injured plant.
- C. When a plant has been rejected, remove it from project site and replace it with one of the required size and quality.

1.07 COORDINATION

- A. Planting Season: Regardless of dates specified below, planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
  - 1. Potted and Container Grown Plants:
    - a. Spring: April 1 to July 15.
    - b. Fall: August 15 to November 15.
  - 2. Balled and Burlapped Plants:
    - a. Spring: April 1 to June 15.
    - b. Fall: August 15 to October 15.
  - 3. Planting season may be extended only with written permission of Landscape Architect.
- B. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Architect.
  - 1. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.08 INITIAL ACCEPTANCE

- A. Notification: Landscape Architect will inspect all work of this Section for Substantial Completion upon written notice of completion. Written request shall be received by Landscape Architect per requirements of Division 1 but not less than ten calendar days before anticipated date of inspection.
- B. Acceptance of plant material by Architect shall be for general conformance to specified size, character, and quality, and shall not diminish Contractor's responsibility for full conformance to Contract Documents.
- C. Upon completion and re-inspection of all repairs or renewals necessary in judgment of the Architect, the Architect will recommend to Owner that acceptance of work of this Section be given.

1.09 MAINTENANCE

- A. Maintenance by Contractor shall begin immediately after each plant is planted and shall continue until Project **Substantial Completion or 90 days, whichever is longer**.
  - 1. When initial maintenance period has not elapsed before the end of the planting season, the maintenance period shall continue into the next planting season.

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- B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, fertilizing, tightening and repairing stakes and guy supports, resetting plants to proper grades or upright position, restoration of the planting saucer, as required to establish healthy, viable plantings. Restore or replace damaged tree wrappings. Spray plant materials as required to keep them free of insects and disease.
- C. Planting areas and plants shall be protected against trespassing and damage for the duration of maintenance period. If plants become damaged or injured, they shall be treated or replaced as directed by Landscape Architect at no additional cost to Owner.
- D. Provide equipment and means for proper application of water to those planted areas not equipped with an irrigation system.
- E. Restoration: Pavements and planted areas, structures and substructures not specifically provided for in the contract, disturbed by the Contractor during the execution of the work shall be restored by Contractor, in a manner satisfactory to Landscape Architect, to their original condition at no cost to Owner.
- F. Following Acceptance or Maintenance Period by Contractor, whichever comes last, maintenance of plant material shall become the Owner's responsibility. Contractor shall provide Owner with instructions and service as follows:
  - 1. Provide Owner with typewritten recommended maintenance program.
  - 2. Contractor shall make periodic inspections, not less than every month, at no extra cost to Owner, during warranty period to determine what changes, if any, should be made to Owner's maintenance program.
  - 3. Submit written report of each inspection to Architect outlining corrective measures required to keep warranty valid.

1.10 WARRANTY PERIOD AND REPLACEMENTS

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of Contract Documents, and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.
- B. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor's control.
  - 1. Warranty Period for All Plant Materials: One year from date of Substantial Completion.
  - 2. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
  - 3. Replace exterior plants that are more than 25% dead or in an unhealthy condition at end of warranty period.
  - 4. Replacement plants shall be free of dead or dying branches and branch tips and shall bear foliage of a normal density, size and color. Replacements shall closely match adjacent specimens of same species. Replacements shall be subject to requirements stated in this Specification.
  - 5. Warranty of replacement plants shall extend for an additional one year period from date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at end of said extended guarantee period, Owner may elect



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subsequent replacement or credit for each item.

- C. At the end of warranty period, and no less than five days prior to final inspection, staking and guying materials and ties shall be removed from site.

1.11 FINAL INSPECTION AND ACCEPTANCE OF PLANT MATERIAL

- A. Notification: At the end of warranty period, provide Architect with written notice of end of warranty period requesting inspection of work for Final Acceptance. Request shall be received per the requirements of Division 1 but not less than ten calendar days before the anticipated date for Final Inspection.
- B. Upon completion and re-inspection of full repairs or replacements necessary in the judgment of the Architect at that time, the Architect will recommend to Owner that Final Acceptance of Work of this Section be given.

PART 2 - PRODUCTS

2.01 PLANT MATERIALS

- A. General: Materials shall be true to species and variety specified and shall be nursery grown in accordance with good horticultural practice under climatic conditions similar to those in the locality of project for at least two years. They shall have been root-pruned within last two years and shall be freshly dug. No heeled-in plants or plants from cold storage will be accepted.
- B. Unless specifically noted otherwise, plants shall be of specimen quality; exceptionally heavy; and symmetrical, heavily branched with an even branch distribution, densely foliated and/or budded, and a strong, straight, distinct leader where this is characteristic of species. Plants shall possess a normal balance between height and spread. The Architect will be the final arbiter of acceptability of plant form.
- C. Plants shall be sound; healthy; vigorous; and free of disease, insects, pests and their eggs or larvae.
- D. Plants shall have a well-developed fibrous root system.
- E. Plants shall be free of physical damage such as scrapes, broken or split branches, scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, or other defects. These defects shall not interrupt more than 25% of the circumference of the plant cambium.
- F. Plants shall conform to measurements indicated on Plant List. Plants larger than specified may be used only if accepted by Landscape Architect. Use of such plants shall not increase Contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant.
- G. Plants shall be measured when branches are in their normal position. If a range of size is given, no plant shall be less than minimum size, and not less than 50 percent of the plants shall be as large as maximum size specified. Measurements specified are minimum size, acceptable after pruning where pruning is required. Plants that meet measurements but do

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not possess a normal balance between height and spread shall be rejected.

- H. Plants shall not be pruned before delivery. Trees with multiple leaders, unless specified, will be rejected.
  - I. Plants indicated as "B&B" shall be balled and Burlapped. They shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Balls shall be firmly wrapped with burlap or similar material and bound with twine, cord, or wire mesh. Where necessary to prevent breaking or cracking of the ball during the process of planting, the ball may be secured to a platform. In no case shall ball size be less than 11 inches in diameter for each inch of caliper.
- 1. Plants shall be grown for at least two years under climatic conditions similar to those in the locality of the Project.
- J. Container grown plants shall be well rooted and established in container in which they are growing. They shall have grown in the container for a sufficient length of time for root system to hold planting medium when taken from container, but not long enough to become root bound. Container grown plants exceeding the sizes indicated in ANSI Z60.1 shall have containers that are not less than 75% of ball sizes for comparable B&B plant material. Each container plant shall be inspected and root pruned as needed.
  - 1. Canes or Trunk(s) and Branches:
    - a. Very well formed and sturdy.
    - b. Branching plentiful and uniformly distributed to form a well-balanced plant.
    - c. Scars shall be free of rot and not exceed 1/4 the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
    - d. Pruning scars clean cut leaving little or no protrusion from the trunk or branch.
    - e. Graft union completely healed.
    - f. No mechanical or pest damage.
    - g. No extreme succulence.
  - 2. Foliage:
    - a. Densely supplied with healthy, vigorous leaves of normal size, shape, color, and texture (except shrubs moved bare-root or deciduous shrubs when dormant).
    - b. No holes, cavities, or depressed areas caused by broken or dead branches or insufficient foliage.
    - c. No chlorosis.
    - d. Pest or mechanical damage barely perceptible with no more than 5% of total foliage affected.
    - e. No frost or cold damage discernible.
  - 3. Root System:
    - a. Sturdily established in container.
    - b. Shall not be excessively root bound except plants deliberately grown root bound to produce a dwarf plant.
    - c. No large roots growing out of container.
    - d. No noxious weeds in container.
- K. Tagging: Plants shall be tagged with waterproof label bearing legible designation of correct plant name and size. Labels shall be attached securely to all plants, bundles and containers of plant materials delivered with care that those attached directly to plants will not restrict growth.
- L. Certificate of Inspection: Shall accompany invoices for plants as may be required by law for

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transportation. File certificates with Architect prior to acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection of plants at project site.

2.02 PLANTS

- A. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.

2.03 TOPSOIL

- A. Topsoil can be obtained from a previously established stockpile on project site, to extent that suitable material is available. Additional topsoil required shall be obtained from off-site sources.
- B. Topsoil, whether stripped from site or supplied from off-site, shall be a loam as defined by the USDA Soil Conservation Service, Soil Classification System, and shall have the following mechanical analysis:

<u>Textural Class</u>	<u>% of Total Weight</u>	<u>Average %</u>
Sand (0.05 - 2.0 mm dia. range)	50 to 70	60
Silt (0.002 - 0.05 mm dia. range)	18 to 35	25
Clay (less than 0.002 mm dia. range)	5 to 20	15

- C. Topsoil shall comply with following characteristics:
  - 1. Shall be free of earth clods, plant parts, stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.
  - 2. 95% shall pass a 2.0-mm sieve.
  - 3. Organic matter content shall be 6 to 12% of total dry weight.
  - 4. pH Range: 5.5 to 6.5 phosphorus/potassium; low to medium range.
  - 5. Soluble Salt: Not greater than 500 ppm.

2.04 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural limestone containing minimum 90 percent total calcium carbonate by weight. Provide ground dolomitic limestone graded within the following limits:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
No. 10	100
No. 20	90
No. 100	50

- B. Aluminum Sulfate: Commercial grade, unadulterated. Deliver in containers with name of material and manufacturer, and net weight of contents.

2.05 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.

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2. Dark brown to black in color.
  3. Shall be low in content of mineral and woody material.
  4. Shall be granulated or shredded.
  5. Product: Benson Earth Products, Gorham, Maine.
- B. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
- C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.06 PLANTING SOIL

- A. Planting soil shall be a mixture of 4 parts topsoil and 1 part compost by volume.
- B. Planting soil shall have pH value range of 5.5 to 7.0.
1. If planting soil mixture does not fall within required pH range, limestone or aluminum sulfate shall be added to bring pH within specified limit.
  2. To remedy deficiencies, implement amendments as recommended by soil analysis for planting beds.

2.07 WATER

- A. Water shall be suitable for irrigation and shall be free from ingredients harmful to plant life.

2.08 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, phosphorous, and potassium. Fifty percent of fast- and slow-release nitrogen shall be derived from natural organic source of urea formaldehyde. Available phosphorus shall be derived from super phosphate, bone meal, or tankage. Potassium shall be derived from muriate of potash containing 60% potash. Amounts of nitrogen, phosphorous, and potassium shall be in amounts recommended in soil reports from a qualified soil testing agency.
- B. Fertilizer shall be delivered to site in original, unopened containers, each bearing name of manufacturer and product name, and showing weight and manufacturer's guaranteed analysis. Fertilizer that becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.
- C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50% water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
  2. Product: Osmocote Slow Release 14-14-14 analysis.
- D. Controlled-Release Fertilizer: Provide one of the following products:
1. Agriform 20-10-5; Sierra Chemical Co.
  2. Planting Tablets: Milpitas, CA 95035.

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3. EZY-Grow Fertilizer Packet; EZY-Grow Landscape Specialties.

2.09 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of 100% fine-shredded dark composted pine bark, of uniform size and free from rot, leaves, twigs, debris, stones, or any material harmful to plant growth. Bark shall have been shredded and stockpiled no less than two months and no more than two years before use.

2.10 STAKES AND GUYS

- A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2- by 2-inches by length indicated, pointed at one end.
- B. Guy and Tie Wire: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106-inch in diameter.
- C. Guy Cable: 5-strand, 3/16-inch diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3-inches long, with two 3/8-inch galvanized eyebolts.
- D. Hose Chafing Guard: Reinforced rubber or plastic hose at least 3/4-inch in diameter, black, and cut to lengths required to protect tree trunks from damage.
- E. Turnbuckles: Galvanized steel having 3-inch minimum lengthwise opening fitted with screw eyes.
- F. Eyebolts shall be galvanized, having a 1-inch opening fitted with screw length of 1-inch.
- G. Deadman: Sound, rough sawn lumber 2 x 4-inches, or other material approved by the Architect. Duckbills may be used, with approval from the Architect.
- H. Tree Paint: Tree paint shall be an approved waterproof adhesive and elastic paint, manufactured and customarily used for painting cuts on trees. It shall contain an antiseptic ingredient and be free from kerosene, creosote, coal tar or any other injurious material.
- I. Flags: Standard surveyor's plastic flagging tape, white, 6-inches long.

2.11 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
1. Product: Wilt-Pruf; Wilt-Pruf Products, Inc., Essex, CT 06426.
- B. Fungicide: Shall be zinc ethylene bisdithiocarbonate (Zineb), or equal.
- C. PHC Tree Saver: Mycorrhizal Fungi with Rhizosphere Bacteria for trees and shrubs.

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3.01 EXAMINATION

- A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance.
  - 1. Verify subgrade is at proper elevation and has uniform grade.
  - 2. Notify Architect in writing of unacceptable rough grading or subgrade.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION OF PLANTING SOIL

- A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth. Mix specified soil amendments with topsoil at the rates specified. Delay mixing if planting will not follow placing of planting soil within a few days.
  - 1. Mix PHC Tree Saver evenly into the upper 8-inches of the backfill soil next to the root ball of trees and shrubs. Pack around the root ball then mulch and water until soil is saturated.
- B. Unless otherwise specified or indicated on the Drawings, the mixture (thoroughly mixed by volume) shall be used for backfill around trees and shrubs:
  - 1. Compost to Topsoil: 1 to 4 parts.
- C. Pit and Trench Type Backfill: Mix planting soil prior to backfilling and stockpile at the site. For planting beds, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

3.03 PREPARATION OF PLANTING AREAS

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Locations of plant material as shown on drawings are approximate. Final positioning of plant material shall be made under supervision of Landscape Architect.
- D. Separate subgrade soils from the upper topsoil portions and remove immediately wherever encountered during planting operations.
- E. Notify Landscape Architect in writing of soil or drainage conditions that Contractor considers detrimental to growth of plant material. State condition and submit proposal in writing to Architect for correcting condition.
- F. Test drainage of five plant beds and pits, chosen by the Landscape Architect, shall be done by filling with water twice in succession. Time at which water is put into pit or bed for a second filling shall be noted. Landscape Architect shall then be notified of the time it takes for pit or bed to drain completely.
  - 1. If water does not drain completely, planting operations shall not proceed until Landscape Architect has reviewed test drainage results and may require a change to

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the installation procedure.

- G. Apply anti-desiccant to Rhododendrons using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
  - 1. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.

3.04 FILTER FABRIC

- A. Filter fabric shall be installed where indicated on the Drawings. Unless otherwise indicated, filter fabric shall be overlapped 6-inches along all edges.

3.05 JUTE EROSION CONTROL FABRIC

- A. Biodegradable, 1-inch, open weave jute erosion control fabric shall be installed on slopes equal to or exceeding 1:3 indicated on Drawings to be planted with ground cover. Fabric shall be overlapped 6 inches along all edges and pinned with galvanized steel wire pins, minimum 6 inches long. Top edge shall be turned under minimum 6-inches and backfilled.

3.06 PLANTING BED ESTABLISHMENT

- A. Loosen subgrade of planting beds to a minimum depth of 12-inches. Cultivate all plant beds to depth of not less than 18-inches where there are construction activities, i.e. adjacent structures and compacted soils. Remove stones larger than 1½-inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply fertilizer directly to subgrade before loosening.
  - 2. Apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
    - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    - b. Mix lime with dry soil before mixing fertilizer.
  - 3. Spread planting soil mix to a depth of not less than 12-inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.

3.07 TREE AND SHRUB EXCAVATION

- A. Pits and Trenches: Excavate circular pits in accordance with Typical Planting Details. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
  - 1. Excavate approximately three times as wide as ball diameter for balled and Burlapped stock.
- B. Subsoil removed from excavations may not be used as backfill.

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- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

3.08 TREE AND SHRUB PLANTING

- A. Protect plants from sun and drying winds. Plants that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil, wet moss, or other acceptable material and shall be kept well watered. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled from the bottom of the ball only.
- B. Set balled and Burlapped stock plumb and in center of pit or trench with top of root ball in same relationship to finish grade as they bore to ground from which they were dug.
  - 1. Remove burlap and wire baskets from tops of root balls and 1/3 of the way down the sides, but do not remove from under root balls. If non-biodegradable wrap is used, remove totally. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  - 2. Place planting soil mix around root ball in layers, tamping lightly every 6 inches to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
  - 3. Remove nursery plant identification tags.
  - 4. Form shallow saucer around tree as indicated on Drawings.
- C. Containerized plants shall be removed from container taking care not to damage roots. Side of root ball shall be scarified to prevent root bound condition. Set stock plumb and in center of pit or trench with top of root ball 1-inch above adjacent finish grades.
  - 1. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- D. Bring finish grade in planting areas to grades indicated on Drawings.
- E. Organic Mulching: Apply 3-inch average thickness of organic mulch extending 12-inches beyond edge of planting pit or trench. Do not place mulch within 3-inches of trunks or stems.
- F. Immediately after planting, water plants thoroughly.

3.09 APPLICATION OF FERTILIZER

- A. Fertilizer shall be applied when planting pits are backfilled two-thirds full. Fertilizer application shall be of the type, rate, and timing recommended by the testing agency for each plant type.
- B. Slow-Release Fertilizer:
  - 1. Fertilization schedule for trees and shrubs using slow release 4 oz. packet system shall be per manufacturer's recommendations.
  - 2. Fertilizer packets shall be placed 6 to 8 in. deep below top of planting soil around root balls of plants. Packets shall be spaced evenly depending on the number of packets required.



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3.10 STAKING, GUYING AND WRAPPING

- A. Each tree shall be staked or guyed only if indicated on planting plan immediately after planting. Drive ground anchors into ground by manual or machine method at approximately 45 degree angle to ground plane and distributed at 120 degree intervals around trunk of tree. Preload anchors after driving until anchor turns in the ground at 90 degree angle to line of driving force. Anchor assembly will rise 2 to 6-inches during pre-loading. Attach guying cables, turnbuckles and hose, and secure until tree is rigidly guyed. On all guys, 1/3 distance up from ground to trunk, secure white plastic flagging 1-inch x 18-inches, tied securely.
  - 1. Trees 3" in caliper or greater shall be guyed using 120 degree, three-guy method, or as shown on the Drawings.
  - 2. Trees less than 3" in caliper shall be staked using 180 degree, two-stake method.
  - 3. Plants shall stand plumb after staking or guying.
  - 4. Maintain supports in place during entire guarantee period.

3.11 TREE AND SHRUB PRUNING

- A. Prune, thin, and shape trees and shrubs only at time of planting and as directed by Architect.
- B. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.
  - 1. Use only clean, sharp tools.
  - 2. Cuts shall be made flush, leaving no stubs. No tree paint shall be used.

3.12 GROUND COVER AND PERENNIAL PLANTING

- A. Set out and space ground cover and plants as indicated.
- B. Dig holes large enough to allow spreading of roots, and backfill with planting soil.
- C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.13 PLANTING BED MULCHING

- A. Mulch backfilled surfaces of planting beds, tree pits, and other areas indicated within two days of planting.
  - 1. Organic Mulch: Apply 3-inch average thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.
    - a. Mulch shall be applied to entire planting bed area, and not individual plants.

3.14 CLEANUP AND PROTECTION

- A. During exterior planting, keep adjacent pavings and construction clean and work area in an

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orderly condition.

- B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.15 DISPOSAL

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 02930

**SECTION 3300  
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

- A. Work Included: Provide cast-in-place concrete, including formwork and reinforcement, where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 QUALITY ASSURANCE:

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with "Specifications for Structural Concrete for Buildings," ACI 301, except as may be modified herein.
- C. Do not commence placement of concrete until mix designs have been reviewed and approved by the Engineer and all governmental agencies having jurisdiction, and until copies of the approved mix designs are at the job site and the batch plant.
- D. Comply with "Cold Weather Concreting," ACI 306, except as may be modified herein.

1.03 SUBMITTALS:

- A. Laboratory Test Reports and Mix Designs: Submit laboratory test reports for concrete materials and design mix tests if trial batch method is used for proportioning concrete mixes.
- B. Provide required records of strength tests if field experience method is used for proportioning concrete mixes.
- C. Shop Drawings, Reinforcement: Provide in accordance with requirements of Section 01330.

PART 2 - PRODUCTS

2.01 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Forms for exterior concrete columns shall be fiberglass. Forms shall be furnished in the largest practicable sizes to minimize the number of joints. Provide form material with sufficient thickness to withstand the pressure of newly-placed concrete without bow or deflection.
- B. Forms of Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in the finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Provide factory fabricated, removable or snap back ties of approved design. Wire shall be back at least 1-1/2 inches from the surface and leave a hole less than 1 inch in diameter after being snapped.

2.02 REINFORCING MATERIALS:

- A. Comply with the following minimums:
  - 1. Bars: ASTM A 615, Grade 60, deformed, unless otherwise shown on the Drawings.
  - 2. Welded Wire Fabric (WWF): ASTM A 185.
  - 3. Fiber Reinforcement: 3/4" nylon fibers as manufactured by Nycon, Inc., Nylo-Mono as manufactured by Forta Corporation or approved equal.
  - 4. Bending: ACI 318
- B. Fabricate reinforcement to the required shapes and dimensions, within fabrication tolerances stated in the CRSI "Manual of Standard Practices."
- C. Do not use reinforcement having any of the following defects:
  - 1. Bar lengths, depths or bends exceeding the specified fabricating tolerances.
  - 2. Bends or kinks not indicated on the Drawings or required for this Work.
  - 3. Bars with cross-section reduced due to excessive rust or other causes.

2.03 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C 150, Type I or II
- B. Aggregate, general:
  - 1. ASTM C 30, uniformly graded and clean
  - 2. Do not use aggregate known to cause excessive shrinkage
- C. Aggregate, course: Crushed rock or washed gravel with 1/4" minimum size.
- D. Aggregate, fine: Natural washed sand of hard and durable particles varying from fine to medium particles passing a 3/8" sieve, of which at least 12% (by weight) shall pass a #50 sieve.
- E. Water: Clean and potable.
- F. Admixtures:
  - 1. Water reducing agent: "WRDA" by W.R. Grace & Co., "Pozzolith 100" by Master Builders Company, or equal, approved by the Engineer and conforming to ASTM C 494, Type A.
  - 2. Air-entraining agent: "Darex" by W.R. Grace & Co., "MB-VR" by Master Builders Company, or equal, approved by the Engineer and conforming to ASTM C 260. The air-entraining agent and the water reducing agent must be by the same manufacturer.
  - 3. No other admixtures may be used without approval of the Engineer. Calcium chloride will not be permitted.

2.04 RELATED MATERIALS:

- A. Liquid Membrane Curing Compound: Complying with ASTM C 309, Type 1, Class A. Curing shall not impair bonding of any material to be applied directly to the concrete. Use Cur-to-Spec MS compound by ProSoCo, Inc. for exterior concrete sidewalks, or approved equal.
- B. Floor Hardener: "Saniseal 5" by Master Builders Company, or equal, approved by the Engineer. Apply to exposed concrete floors not receiving floor cover.
- C. Non-Shrink Grout: Embeco Pre-Mixed Grout" by Master Builders Company, or equal, approved by the Engineer.

- D. Backing rod for Resilient Caulk at Control Joints: 3/8 inch polyethylene closed cell material equal to Sonofoam by Sonneborn.
- E. Resilient Caulk for Control Joints and Expansion Joints: Non-priming one component polyurethane sealant as manufactured by Sonneborn, or equal, as approved by the Engineer. Use type NP-1 for vertical surfaces and type SL-1 for horizontal surfaces.
- F. Water-repellent and "Chloride Ion Screen": Consolideck Salt guard by ProSoCo, Inc.. Apply to exterior concrete sidewalks.
- G. Joint filler at slab perimeters: 1/4 inch thick asphalt impregnated board, of same depth as slab less 3/4 inch for sealer, by Burke, W. R. Meadows, Johns Manville or Hohmann and Barnard.

2.05 STORAGE OF MATERIALS:

- A. All materials shall be stored to prevent damage from the elements and other causes. Materials which are judged to be unacceptable for this project shall be immediately removed from the site.

2.06 PROPORTIONING AND DESIGN OF MIXES:

A. Proportions:

1. Concrete shall be a homogeneous mixture of Portland Cement, water, fine aggregates, and coarse aggregates proportioned within the limits specified in this Section.
2. Classes:
  - a. Class A: General use for reinforced sections.
  - b. Class B: Mass pours at locations shown on the DRAWINGS.
  - c. Class C: Pipe encasements, pipe cradles, and fill concrete.
3. Proportioning Table: See the end of this section.
4. Proportion admixtures according to the manufacturer's recommendations.
5. Mix Design:
  - a. Select the proportion of ingredients to produce proper placability, durability, strength, and other required properties.
  - b. Proportion the mixture so that it will work readily into corners and angles of the forms and around reinforcement by the methods of placing and consolidating used on the job, but without permitting the materials to segregate or excessive free water to collect on the surface.
  - c. Determine the water-cement ratio to attain the required strength in accordance with the following Proportioning Table.
6. An alternate mix design employing the same ingredients proposed for use, and used successfully on a previous project under similar conditions to these anticipated on this project may be used provided the following are submitted and approved:
  - a. The concrete mix design.
  - b. Reports for at least 20 consecutive sets of 7 and 28 day concrete strength tests made from the same materials and sources covering a period of at least 6 months.
  - c. Reports of current compliance tests of fine and coarse aggregates made of materials from the same source.

B. Mixing:

1. General: All concrete shall be Ready Mixed concrete.
2. Admixtures (when approved by the Engineer):
  - a. Add all admixtures to the mixer as a solution and dispense automatically by a metering device having a measuring accuracy of  $\pm 3$  percent.
  - b. Add different admixtures separately.
  - c. Add retarders directly after cement is introduced.
3. Retempering:
  - a. Do not retemper concrete that has set.
  - b. Add water only to the extent that the permissible slump and the maximum water-cement ratio is not exceeded. No water may be added to the mix once the deposition of a load has commenced.
  - c. Do not add cement or water without the written approval of the Architect.

PROPORTIONING TABLE

Class And Use	28 day Min. Compressive Strength (psi)	Max. Size Coarse Aggregate (inches)	Percent Air (± 1%)	Max. Slump (inches)	Min. Cement Factor #/C.Y.	Max. W/C ##
Class A1 Foundation Ftgs.	3,000	1-1/2"	5	4"	564#	0.55
Class A2 Fdn Walls, Steps, Pads	3,000	3/4"	6	4"	564#	0.50
Class A3 Pile Supported Slabs	4,000	3/4"	0	4"	*	*
Class A4 Beams & Columns	3,500	3/4"	6	4"	611#	0.40
Class A5 Structural Fill On Precast Plank	3,000	3/8"	7-1/2	3"	611#	0.45
Class A6 Exterior Slab on Grade, Steps & Sidewalks	4,000	3/4"	7	4"	*	*
Class B Mass Pour	2,500	2-1/2"	5	4"	470#	0.65
Class C Pipe Encasements, Cradles and Fills	2,000	2-1/2"	5	3"	423#	0.65

\*The determination of the Water-Cement Ratio and Minimum Cement Factor to acquire the required strength shall be in accordance with Method 1 or Method 2 of ACI Standard 301, Paragraph #3.8.2.1 and 3.8.2.2

Note: A water reducing additive may be required to make a workable mix and stay below the maximum water/cement ratio.

## PART 3 - EXECUTION

### 3.01 SURFACE CONDITIONS:

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

### 3.02 REINFORCING:

- A. Comply with the following, as well as the specified standards, for details and methods of reinforcing placement and supports.
  - 1. Clean reinforcement and remove loose dust and mill scale, earth, and other materials which reduce bond or destroy bond with concrete.
  - 2. Position, support, and secure reinforcement against displacement by forms, construction and the concrete placement operations.
  - 3. Place reinforcement to obtain the required coverages for concrete protection.
  - 4. Slab Reinforcing
    - a. Slabs-on-Grade with exposed finish: use welded wire fabric.
    - b. Slabs-on-Grade to receive floor covering: use welded wire fabric or fiber reinforcing.
    - c. Elevated Slabs: use welded wire fabric.
  - 5. Install welded wire fabric in longest lengths practical, lapping adjoining pieces a minimum of one full mesh. Cut every other wire at control joints in slabs-on-grade.
  - 6. Unless otherwise shown on the Drawings, or required by governmental agencies having jurisdiction, lap bars 24 diameters minimum.

### 3.03 EMBEDDED ITEMS:

- A. Do not embed piping, other than electrical conduit, in structural concrete.
  - 1. Locate conduit to maintain maximum strength of the structure.
  - 2. Increase the thickness of the concrete if the outside diameter of the conduit exceeds 30% of the thickness of the concrete.
- B. Set bolts, inserts, and other required items in the concrete, accurately secured so they will not be displaced, and in the precise locations needed.

### 3.04 MIXING CONCRETE:

- A. Transit mix the concrete in accordance with provisions of ASTM C 94.
- B. Mixing water:
  - 1. At the batch plant, withhold 2-1/2 gal. of water per cu. yd. of concrete.
  - 2. Upon arrival at the job site, add all or part of the withheld water (as required for proper slump) before the concrete is discharged from the mixer.
  - 3. Mix not less than five minutes after the withheld water has been added, and not less than one minute of that time immediately prior to discharge of the batch.



4. Unless otherwise directed, provide 15 minutes total mixing time per batch after first addition of water.
- C. Do not use concrete that has stood for over 30 minutes after leaving the mixer, or concrete that is not placed within 90 minutes after water is first introduced into mix.

3.05 PLACING CONCRETE:

A. Preparation:

1. Remove foreign matter accumulated in the forms.
2. Rigidly close openings left in the formwork.
3. Wet wood forms sufficiently to tighten up cracks. Wet other material sufficiently to maintain workability of the concrete.
4. Use only clean tools.

B. Conveying:

1. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
2. Deposit concrete as nearly as practicable in its final location so as to avoid separation due to rehandling and flowing.
3. Do not use concrete which becomes non-plastic and unworkable, or does not meet required quality control limits, or has been contaminated by foreign materials.
4. Remove rejected concrete from the job site.

C. Placing concrete in forms:

1. Deposit concrete in horizontal layers not deeper than 24", and avoid inclined construction joints.
2. Remove temporary spreaders in forms when concrete has reached the elevation of the spreaders.

D. Placing concrete slabs:

1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
2. Bring slab surfaces to the correct level with a straightedge, and then strike off.
3. Surface tolerance shall not exceed 1/8" in 10 feet when tested with a 10 foot straightedge.
4. Use bullfloats or darbies to smooth the surface, leaving the surface free from bumps and hollows.
5. Do not sprinkle water on the plastic surface. Do not disturb the slab surface prior to start of finishing operations.

E. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40 deg. F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F and

not more than 80 deg. F at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.
4. All temporary heat, form insulation, insulated blankets, coverings, hay or other equipment and materials necessary to protect the concrete work from physical damage caused by frost, freezing action, or low temperature shall be provided prior to start of placing operations.
5. When the air temperature has fallen to or is expected to fall below 40 deg. F, provide adequate means to maintain the temperature in the area where concrete is being placed between 50 deg. and 70 deg. F. for the length of time required by ACI 306.

3.06 QUALITY CONTROL TESTING DURING CONSTRUCTION:

- A. The contractor will employ a testing laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports.
- B. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
  1. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.
  2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each set of compressive strength test specimens.
  3. Concrete Temperature: Test hourly when air temperature is 40 deg. F (4 deg.C) and below, and when 80 deg. F (27 deg. C) and above; and each time a set of compression test specimens made.
  4. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
  5. Compressive Strength Tests: ASTM C 39; one set for each 50 cu yds or fraction thereof, of each concrete class placed in any one day or for each 5,000 sq ft of surface area placed; 1 specimen tested at 7 days and 2 specimens tested at 28 days. The fourth cylinder shall be used for additional tests as necessary, being retained at laboratory for necessary period as approved by Architect/Engineer.
    - a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
    - b. When total quantity of a given class of concrete is less than 50 cu yds, strength test may be waived by Architect if, in his judgment, adequate evidence of satisfactory strength is provided.
    - c. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
    - d. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.

- e. Test results will be reported in writing to Architect, Building Inspector, and Contractor on the day following the day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- C. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

3.07 CONSOLIDATION:

A. General:

1. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.
2. Do not vibrate forms or reinforcement.
3. Do not use vibrators to transport concrete inside the forms.

3.08 JOINTS:

A. Construction joints:

1. Do not use horizontal construction joints except as may be shown on the Drawings.
2. If additional construction joints are found to be required, secure the Engineer's approval of joint design and location prior to start of concrete placement.

B. Expansion joints:

1. Do not permit reinforcement or other embedded metal items that are being bonded with concrete (except dowels in floors bonded on only one side of the joints) to extend continuously through any expansion joint.
2. Fill expansion joints full depth with expansion joint material approved by the Engineer.

C. Control Joints:

1. Interior Slabs-on-grade: Saw out joints in slabs where indicated on DRAWINGS, within 48 hours of finishing. Cut to be 1-1/2 inch in depth and as narrow as possible; cut to a straight line.
2. Exterior Slabs-on-grade: Cut control joints to a depth of one-quarter of the slab depth.

3.09 CONCRETE FINISHING:

A. Except as may be shown otherwise on the Drawings, provide the following finishes at the indicated locations.

1. Scratch finish:

- a. Apply to monolithic slab surfaces that are to receive concrete floor topping or mortar setting bed.

2. Float finish:
  - a. Apply to monolithic slab surfaces that are to receive trowel finish and other finishes specified hereinafter, and to slab surfaces which are to be covered with membrane or elastic waterproofing or insulation.
3. Trowel finish:
  - a. Apply to monolithic slab surfaces that are to be exposed to view, unless otherwise shown, and to slab surfaces that are to be covered with resilient flooring, carpeting, paint, or other thin-film finish coating system. Use self-leveling underlayments or trowelable leveling and patching compounds to fill cracks, holes, and depressions.
4. Non-slip broom finish:
  - a. Apply to exterior concrete surfaces including steps, ramps, platforms and similar pedestrian and vehicular areas. Apply broom finish immediately after bullfloating or darbying. For concrete sidewalks, apply trowel finish after broom finish.
5. Cementitious Finish on Exposed Concrete:
  - a. Apply Thoroseal white finish in accord with manufacturer's recommendations to all exposed concrete surfaces except slabs. Rub to remove fins and spiral form ridges, and fill voids.

### 3.10 CURING:

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures and cure concrete in cold weather conditions in compliance with the requirements of ACI 306.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period
  1. Curing shall be continued for at least 7 days in the case of all concrete except high-early-strength concrete for which the period shall be at least 3 days. Alternatively, if tests are made of cylinders kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive strength has reached 70 percent of the specified strength, f<sub>c</sub>. If one of the curing procedures below is used initially, it may be replaced by one of the other procedures any time after the concrete is 1 day old provided the concrete is not permitted to become surface dry during the transition.
- D. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified.
  1. Provide moisture curing by following methods.
    - a. Keep concrete surface continuously wet by covering with water.
    - b. Continuous water-fog spray.
    - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-in. lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows:
  - a. Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width with sides and ends lapped at least 3 in. and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Provide curing compound to slabs as follows:
  - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's direction. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener or with a covering material bonded to concrete such as concrete, waterproofing, damp-proofing, membrane roofing, flooring, painting, and other coatings and finish materials, unless otherwise acceptable to Architect.
  - c. No chemical curing, sealing, or parting agents of any kind shall be used without the written approval of the finish floor manufacturer.
4. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
5. Exterior concrete sidewalks to be cured with Cur-to-Spec MS by ProSoCo, Inc. and treated with Consolideck Saltguard by ProSoCo, Inc., following manufacturer's guidelines in the application of these products.

3.11 REMEDIAL WORK:

- A. Repair or replace deficient work as directed by Architect and at no additional cost to the Owner.

3.12 ENGINEER'S REVIEW:

- A. The engineer will conduct periodic reviews of the construction as it progresses for compliance with the provisions of the Plans and Specifications.
- B. If additional visits are required as the result of the Contractor's failure to perform his work in accordance with the Plans and Specifications or if additional design and drafting time is required for corrective measures caused by the failure of the Contractor to perform in accordance with Plans and Specifications, the Contractor shall reimburse the Architect at the rate of 2.3 times direct personal expense plus out-of-pocket expenses incurred.

\*\*\*END OF SECTION 03300\*\*\*

**SECTION 13303  
GREAT POND ROAD PUMP STATION**

**PART 1 - GENERAL**

**1.01 GENERAL PROVISIONS:**

- A. **Related Documents:** Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.
- B. The work of this section shall comply with all Local, State and Federal electrical and sanitary codes.

**1.02 DESCRIPTION OF WORK:** Provide prefabricated pump station as shown on the Drawings including:

Precast Concrete Wet Well Structure  
Precast Concrete Valve Pit Chamber  
Pumps and Motors  
Piping and Valves  
Slide Away Coupling, Base and Rail System  
Electrical, Control, and Alarms  
Miscellaneous Components

**1.03 RELATED WORK SPECIFIED ELSEWHERE:**

Division 2 – Site Work  
Division 16 – Electrical

**1.04 QUALITY CONTROL:**

A. **Standards:**

- 1. National Electric Code
- 2. Building Code Requirements for Reinforced Concrete, ACI 318

- B. **Pump Station Fabricator:** Firms regularly engaged in pump station fabrication whose products have been in satisfactory use in similar service for at least ten (10) years. One manufacturer will provide all structures, equipment and appurtenances, regardless of their original manufacturer. The following are approved as acceptable manufacturers of the precast concrete pump station:

- Superior Concrete – Auburn, Maine
- American Concrete Industrial Inc. – Auburn, Maine
- George R. Roberts Co. – Alfred, Maine
- Stevens Electric & Pump Service, Inc. – Monmouth, Maine

**1.05 SUBMITTALS:**

- A. **Product Data:** Submit the following with the period specified in Section 01330:

- 1. Complete materials list of all items to be provided, including supplier and estimated delivery dates.
- 2. Manufacturer's specifications and product data required to demonstrate compliance with requirements.
- 3. Manufacturer's recommended installation procedures.
- 4. Manufacturer's recommended testing operation and maintenance procedures.

5. Certified factory tests and certified factory pump curves on the units to be provided.
  6. Production and assembly schedule.
- B. Certificate of Design: Submit a certificate of design of wet well and valve pit by a Professional Engineer registered in Maine.
- C. Design Calculations: Do not submit design calculations for review.
- D. Operation and Maintenance Manual: Upon receipt of approved Shop Drawings and prior to installation of pump station, submit the operation and maintenance manual including the following:
1. General:
    - Equipment function
    - Normal operating characteristics
    - Limiting conditions
    - Bound in tabbed, three ring binders
  2. Installation Instructions:
    - Alignment
    - Adjustment
    - Checking
  3. Operating Instruction:
    - Startup
    - Routing and normal operations
    - Regulation and control
    - Shut down
    - Emergency
  4. Lubrication and Maintenance Instructions.
  5. Guide to Troubleshooting.
  6. Numbered Parts List and Predicted Life of Parts Subject to Wear.
  7. Drawing:
    - Outline
    - Cross section
    - Wiring diagram
    - Assembly
  8. Test Data and Performance Curves.
- E. Provide Equipment Supplier's Written Report That Equipment:
1. Has been properly installed and lubricated.
  2. Is in accurate alignment.
  3. Is free from undue stress imposed by piping or mounting bolts.
  4. Has been operated under full load conditions and that satisfactory operation has been obtained.

PART 2 – PRODUCTS

2.01 PRECAST CONCRETE ENCLOSURES:

A. Concrete Requirements:

1. Min. 28 day compressive strength of concrete 4000 psi
2. Reinforcing steel min. yield stress 40,000 psi
3. Min. concrete cover 1”
4. Min. cement content 564 lbs. per cubic yard
5. Entrained air 6% +/- 1%
6. Design to resist soil loads, surcharges, and buoyant forces.
7. Trowel finish on floors

B. Horizontal Joints: Shiplap type, sealed with a) two 1” butyl rubber sealant strips meeting Federal Specifications SS-S-00210 and b) E-Z Wrap joint wrap, 9” wide, rubberized backing, as manufactured by Press Seal Gasket Co., Fort Wayne, IN.

C. Waterproof: Waterproof all exterior below grade surfaces with HLM 1300S by Sonneborn or equal; 55 mils thick. Waterproofing is to be field applied only. To be done only after joint wrap has been applied at joints. To be applied to a well dried surface and only under manufacturers recommended ambient conditions.

D. Construct Wet Well: Construct wet well fillets with 3,000 psi concrete.

E. Coat Interior: Coat interior of pump station wet well structure with coal tar epoxy; 3 coats with total dry film thickness not less than 15 mils.

2.02 SEWAGE PUMPS:

A. Provide: Two (2) submersible non-clog wastewater pumps Model AMX 434-206-7.5TC ASC, 8 1/8” Impeller, as manufactured by HOMA Pump Technology, Inc., Ansonia, CT or approved equal. Pumps to have 7.5 horse power motor (non-explosion proof), 230/460 volt, three phase, 60 hertz. Each pump will be driven with an A.C. variable frequency drive.

B. Performance: Each pump shall meet the following specifications:

- Design Point 1
  - Flow Rate (GPM) 130
  - At TDH (Feet) 43.4
- Design Point 2
  - Flow Rate (GPM) 180
  - At TDH (Feet) 49.3
- Speed (RPM) 1750
- Motor Horsepower 7.5
- Minimum Shutoff Head (Feet) 36.2
- Impeller Diameter (Inches) 8 1/8”

C. Impeller: Dynamically balanced, single-vane, open, with pump out vanes or shroud on backside to reduce solids from entering the mechanical seal and wear ring area. The impeller shall be cast iron ASTM-48 Class 40. The impeller shall be trimmed to meet specific performance characteristics.



- D. Seal: Seal shall be a double mechanical in an oil filled chamber. A moisture sensor detection system shall be integrated as standard within the oil filled chamber. Seal faces shall be silicone carbide.
- E. Bearings: Upper bearing shall be single row, ball. The lower bearing shall be double row, ball. Both shall be permanently lubricated with grease and oversized for maximum B-10 life.
- F. Discharge Base: Discharge base shall be designed to support the total weight of the pump and slide away mechanism. The coupling shall be of an integral part of the pump. It shall be so constructed that, when lowered onto the discharge base, the knife action of the vertical metal-to-metal seal provides a self-sealing, non-clogging unit. It shall have guides for ease of raising and lowering on stainless steel guides. The base shall be bolted directly to the floor. The vertical flanged elbow shall be 125 lb. ANSI standard.
- G. Motors: The submersible motor shall be IE3 Premium Efficient with VFD duty windings, Class H insulation and 1.15 service factor. Protection against excessive temperature shall be provided by a heat sensor thermostat attached to the stator windings.
- H. Shaft: The common motor and pump shaft shall be of 430F stainless steel.
- I. Tests: Each unit shall be given a factory certified test.
- J. Spare Parts: Provide 1 set spare impeller for each pump.

## 2.03 PIPING AND VALVES:

### A. Ductile Iron Pipe:

1. Pipe: ANSI A21.5, ANSI/AWWA C151, Class 53, Size as shown on Drawings.
2. Flanged Fittings: Cast Iron, ANSI B16.1 including bolting, 175 psi pressure rating.
3. Mechanical Joint Fittings: Cast Iron, ANSI A21.10 (AWWA C110), ANSI A2.11 (AWWA C111), 250 psi pressure rating.
4. Gaskets for Flanged Joints: ANSI B16.21 full-faced.

### B. Galvanized Steel Pipe: ASTM A53 or A120, hot-dipped galvanized, threaded fittings, Class 150, size as shown on Drawings.

### C. Copper Tubing:

1. Tube: Type L, ASTM B88 and Type K, ASTM B42.
2. Fittings: Cast copper, ANSI B16.18; wrought copper ANSI B16.22; solder joint type. Dielectric compression type brass by Ford Meter Box Co.

### D. PVC Pipe:

1. Pipe: Schedule 40, ASTM D 1785, size as shown on Drawings.
2. Fittings: Socket weld, Schedule 40, ASTM D2486.
3. Solvent cement: ASTM D 2564.

E. Valves:

1. Check Valve: Equal to GA Industries or Clow, sized as shown on Drawings. Iron body, bronze mounted, outside lever and weight, ANSI #125 flanges.
2. Gate Valves: Shall be equal to American Series 2500 resilient wedge gate valve. Gate valves shall have 125 lb. faced and drilled flanged ends, O-ring stem packing, a hand wheel and shall open-left.

F. Hangers and Supports:

1. For Ductile Iron Pipe: Supports: 4" adjustable, cast iron saddle, locknut nipple and reducer, assembled; equal to ITT Grinnel Fig. 264. Hangers: 1/2" galvanized hanger rods, threaded both ends; welded steel wall bracket equal to ITT Grinnel Fig. 195; adjustable clevis equal to ITT Grinnel Fig. 260.
2. For PVC/CPVC Pipe: Hot dipped galvanized steel fasteners, anchors, rods, straps, trim, and angles.

G. Pressure Gauge Assemblies:

1. Provide: Pressure gauges range 0-60 psi, equal to Ashcroft; Diaphragm seals, equal to Ashcroft; Quick Disconnectors, equal to Swagelock; provide each stem with SS protector cap and each body with protector plug.
2. Supply one disconnect body and plug for each discharge pipe. Supply two oil filled pressure gauge/diaphragm/quick disconnect stem and cap assemblies. Supply both assemblies in a padded, heavy carry case.

H. Miscellaneous:

1. Pipe Sleeves: Hot dipped galvanized steel pipe sleeves with waterstop collars as manufactured by Thunderline Corp.; "Link-Seal" compatible.
2. Link Seal: Mechanical type rubber seal with stainless steel bolts and units as manufactured by Thunderline Corp.
3. Manhole Boot: Flexible manhole sleeve equal to CP series manufactured by Interpace Corp. sized to fit diameter and type of pipe without the use of gaskets.

I. Installation:

1. General: Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Align piping accurately at connections, within 1/16" misalignment tolerance.
2. Plastic Pipe/Tube Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.
3. Solvent-Cemented Joints: ASTM D 2235, and ASTM F 402.
4. Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on Drawings, or as reviewed by ENGINEER. Install sleeves accurately centered on pipe runs.

- 2.04 ELECTRICAL SYSTEM: Reference Division 16 – Electrical
- 2.05 CONTROL SYSTEM: Reference Division 16 – Electrical
- 2.06 MISCELLANEOUS COMPONENTS:
- A. Valve Manhole and Pump Station Access Hatches: Reference Section 02740 – Manholes and Catch Basin Structures.
  - B. Stainless Steel Chains: As shown for removing pumps from wet well; size 3/8 inch minimum.
- 2.07 FINISHES:
- A. General: Prepare surfaces and apply finishes as recommended by finish manufacturer. Provide finish products equal to the Sherwin Williams products specified below.
  - B. Piping: Vent:
    - 1st Coat: Kern Kromik Metal Primer, B50 N2, at 3 mils DFT.
    - Top Coat: 2 coats Industrial Enamel, B54 Series, at 2 mils DFT.
    - Color: Black
- 2.08 FACTORY TESTING ASSEMBLY:
- A. Test motors, pumps, controls, and electrical panels for proper operation. Make corrections and adjustments prior to shipping pump station.
  - B. Factory Assemble and “match mark” all precast items for ease of installation.

### PART 3 – EXECUTION

- 3.01 INSTALLATION:
- A. General: Comply with instructions of pump station manufacturer. Provide Operation and Maintenance Manuals to ENGINEER prior to installation of pump stations.
  - B. Placement: Place precast items as shown on the Drawings so structure is plumb and pipes are at proper elevation. Plug all lifting holes inside and out with non-shrink grout.
  - C. Waterproofing: Apply joint sealant and waterproofing at site as per paragraph 2.01-B. C. of this section.
  - D. Power Supply: Coordinate installation with power company. Provide complete system from pump station to point of connection to power company.
- 3.02 INITIAL STARTUP:
- A. Provide at least one factory trained manufacturer’s representative for field assembly and for a minimum of a day for initial startup of pump station.
  - B. Provide specialists as necessary to assist with unique startup and adjustment procedures.
- 3.03 FIELD TESTING:
- A. Process Equipment Tests: Test pump stations for proper operation for a minimum of three (3) consecutive days. Each pump must operate for a minimum of two hours during the test. Provide water for tests. Test control system for operation of lead and lag pumps and alternating of pumps. At start and end of test period

operate each pump at the design head and measure and record pumping capacity, motor speed, and horsepower.

- B. Piping: Test pump lines as force mains.
- C. Wet Wells and Valve Manholes: Test as manholes.
- D. Alarm and Telemetry System Tests: When entire alarm and telemetry system is complete, test all system functions.
- E. Defects and Adjustments: Correct defects, replace defective equipment, and make adjustment to provide a properly operating system. Repeat tests if required by ENGINEER.
- F. Notify ENGINEER and OWNER at least three (3) days prior to tests.

3.04 OPERATOR INSTRUCTION:

- A. Provide instruction for up to four (4) operators for complete operation, maintenance, and alarm response procedures for all systems in the pump station. Provide level and number of hours of instruction to satisfy ENGINEER and OWNER that operating personnel are completely trained.
- B. Instructor: One person familiar with all systems, approved by the ENGINEER and OWNER.

\*\*\*END OF SECTION 13303\*\*\*

## **SECTION 16000 - ELECTRICAL WORK**

### **PART 1 - GENERAL**

#### **1.01 GENERAL:**

Include Conditions of the Contract and applicable parts of Division 1.

Examine all other sections of the Specifications for requirements which affect the work of this Section, whether or not such requirements are particularly mentioned herein.

Coordinate the work of this Section with the related work of other trades, and cooperate with such trades to assure the steady progress of all work of this Contract.

Where the National Electrical Code appears in this specification, it shall be interpreted to mean the latest edition.

#### **1.02 SCOPE:**

The work covered by this Section consists of furnishing all labor, materials, equipment, supplies, devices, electrical apparatus, fixtures, and lamps and the performance of all operations necessary for the installation and/or modification of electrical facilities in and about the structure and around the grounds, as indicated on the Contract Documents.

Work shall include all costs involved in modifying power distribution at the facilities and any costs involved with any other special utilities on the project. Without limiting the work required under this specification section, the following is included:

1. Provision of new power feed to new facilities.
2. Provision of new power feed and alarm wiring for new facility from new equipment.
3. Provision of new power distribution for new facilities.
4. Wiring and installation of equipment required for stand-by power as specified.
5. All other ancillary electrical installations, etc.

#### **1.03 WORK OF OTHER SECTIONS:**

Refer to other Sections in this specification as appropriate.

1.04 SUBMITTALS:

- A. Shop Drawings: Within thirty days after award of the Contract, submit shop drawings in accordance with the requirements of the General Conditions and in the manner described therein. Shop drawings shall indicate specifications section and paragraph requiring equipment indicated.

Shop drawings are required on all major pieces of equipment in the following list, but not necessarily limited thereto: breakers; motor starters; contractors; relays of ally types involved; push button stations; pull junction, and terminal boxes; disconnect switches; lighting fixtures; etc.

- B. Samples: Within thirty days after award of the Contract, submit samples of all materials requested by the Engineer. Samples shall be prepared and submitted in accordance with the requirements of General Conditions, all postage and transportation costs being paid by the Contractor submitting same.

- C. Record Drawings: In accordance with requirements of the Supplementary General Conditions, the Subcontractor shall furnish and keep on the job at all times one complete set of blackline prints of the electrical work, on which shall be clearly, neatly and accurately noted, promptly as the work progresses, all architectural and electrical changes, revisions and additions to the work. Wherever work is installed otherwise than as shown on the Contract Drawings, such changes shall be noted.

The Subcontractor shall indicate on these prints the daily progress by coloring in the various apparatus and associated appurtenances as they are installed.

No approval of requisition for payment for work installed will be given unless supported by record prints as required above.

At the conclusion of work, prepare record drawings in accordance with the requirements of the Supplementary General Conditions.

- D. Operating Instructions and Maintenance Manual: The Subcontractor shall instruct, to the Owner's satisfaction, such persons as the Owner designates in the proper operation and maintenance of systems and their parts.

Parties indicated above sign affidavits stating that the above instructions were given by the Electrical Subcontractor.

Furnish in accordance with General Conditions operating and maintenance manuals and forward same to the Engineer for transmittal to the Owner.

The operating instructions shall be specific for each system and shall include copies of posted specific instructions.

For maintenance purposes, provide shop drawings, parts lists, specifications and manufacturer's maintenance bulletins for each piece of equipment. Provide name, address and telephone number of the manufacturer's representative and service company, for each piece of equipment so that service or spare parts can be readily obtained.

- E. Manufacturers' Data: Within thirty days of award of Contract, the Subcontractor shall submit for Engineer's approval a complete list of manufacturers' names of all materials and equipment proposed for the project.

After approval of the above list, the Subcontractor shall submit for Engineer's approval complete detailed manufacture's data consisting of bulletins, shop drawings, and parts lists of the materials and equipment to be furnished, as required.

Shop drawings and manufacturers' data submitted must bear the Electrical Subcontractor's stamp stating that the shop drawings and data have been checked and meet the plans and specifications before being submitted for Engineer's approval, or they will not be considered and will be returned for resubmission. If the shop drawings and data show proposed variations from the requirements of the plans and specifications because of standard practice or other reason, specific mention shall be made of such variations in the letter of transmittal.

The Electrical Subcontractor shall assume the entire cost and responsibility for any changes in the work which may be occasioned by approval of materials other than those specified.

Errors, omissions, and coordination of shop drawings shall be the sole responsibility of the Subcontractor whether or not the shop drawings are approved.

In the event that any specified manufacturer's number has been superseded by a new number since the writing of this specification, the new manufacturer's number shall be immediately submitted to the Engineer for approval. It shall be the responsibility of the Subcontractor to notify the Engineer of any superseded manufacturers' numbers mentioned in these specifications.

#### 1.05 QUALITY ASSURANCE:

- A. Applicable Standards, Permits and Codes:

The installation shall comply with all laws applying to electrical installations in effect in Gorham, Maine, and with regulations of any other governmental body or agency having jurisdiction, including OSHA; with regulations of the National Electrical Code where such regulations do not conflict with those laws, with the regulations of the municipality involved, with the telephone utility, and with ASHRAE Standard 70, as amended.

File all required notices and plans. Obtain and pay for all permits, inspections, licenses, and certificates required for work under this Section.

If any portion of the electrical plans or specifications conflict with any laws or ordinances with regard to type of materials, equipment, or fixtures to be used, the Electrical Subcontractor shall bring it to the Engineer's attention at least seven days before submitting the bid. Otherwise the cost of all work necessary to make the installation comply with said laws or ordinances shall be paid by the Electrical Subcontractor and shall become a part of this Contract.

#### 1.06 EXAMINATION OF SITE AND CONTRACT DOCUMENTS:

Before submitting prices or beginning work, thoroughly examine the site and the Contract Documents.

No claim for extra compensation will be recognized if difficulties are encountered which an examination of site conditions and Contract Documents prior to executing the Contract would have revealed.

#### 1.07 DRAWINGS:

The Subcontractor shall refer to the electrical drawings and the floor plans and details for a full comprehension of the extent and detail of the work to be performed. These drawings are intended to be supplementary to the specifications, and any work indicated, mentioned, or implied in either is to be considered as specified by both.

All work shown on the drawings is intended to be approximately correct to the scale of the drawings, but figured dimensions and detailed drawings are diagrammatic and are not intended to show every detail of construction or the exact location of equipment. Where building construction makes it advisable or necessary to change the location of equipment, the Subcontractor shall perform such work without cost to the Owner on written request of the Engineer. Any doubt as to the intended location of equipment shall be resolved by the Engineer before proceeding with the installation.

The intent is to obtain an electrical installation of all systems, complete in every detail within and about the building, and with all facilities properly interconnected with power and telephone. The Electrical Subcontractor shall furnish and install all such parts as may



be necessary to complete the systems in accordance with the best trade practice and to the satisfaction of the Engineer. Upon completion, the electrical systems and all equipment throughout the structures shall operate properly and adequately and function as intended.

Testing by Contractor: Provide equipment and personnel for operating test of electrical system.

Changes by Contractor: The contract drawings indicate the extent and schematic arrangement of the conduit and wiring systems. If changes from the drawings are deemed necessary by the Contractor, submit details of such changes within 30 days of award of Contract. Make no changes without written authorization of Engineer. Where conduit routings are not indicated, coordinate with Engineer, General Contractor, and other Subcontractors to insure no conflicts result from routings selected.

#### 1.08 ELECTRICAL REFERENCE SYMBOLS:

Standard symbols have been employed where such will meet the need. These are augmented and modified to illustrate as necessary. The chart on the Contract Drawings is intended to illustrate all symbols and explain the function and installation method of the device represented. When not clear, or where one has been inadvertently omitted, it shall be the responsibility of the Electrical Subcontractor to obtain a ruling on the intent before proceeding with any work.

#### 1.09 TEMPORARY POWER:

The Electrical Subcontractor shall furnish and install temporary feeders of proper capacity power required for the building while under construction. Owner's existing facility service may be utilized for Construction power, if adequate for equipment required while maintaining Owner's facility in Operation. If existing service is inadequate for Contractor, Contractor is responsible for providing an alternate source of power at no added cost to Owner. Sufficient outlets shall be installed at convenient locations so that extension cords of not over 50 feet will reach all areas requiring power.

The General Contractor and all subcontractors shall furnish their own extension cords and such lamps as may be required for their work, and shall pay for the cost of temporary wiring of construction offices or shanties used by them and any temporary wiring of a special nature for light and power required other than that mentioned above.

#### 1.10 GUARANTEE:

Attention is directed to provisions of the General Conditions regarding guarantees and warranties for work under this Contract.

Manufacturer shall provide standard guarantees for work under this Section. However, such guarantees shall be in addition to and not in lieu of all other liabilities which the

manufacturer and Subcontractor may have by law or by other provisions of the Contract Documents.

All materials, items or equipment and workmanship furnished under this Section shall carry the standard warranty against all defects in material and workmanship for a period of not less than one year from the date of final acceptance of the work. Any fault due to defective or improper material, equipment, workmanship or design which may develop within that period shall be made good, forthwith by and at the expense of the Subcontractor, including all other damage done to areas, materials and other systems resulting from this failure.

This Subcontractor shall guarantee that all elements of the systems are of sufficient capacity to meet the specified performance requirements as are set forth herein or as indicated.

Upon receipt of notice from the Owner of failure of any part of the systems or equipment during the guarantee period, the affected part or parts shall be replaced by the Subcontractor.

This Subcontractor shall furnish, before the final payment is made, a written guarantee covering the above requirements.

1.11 ALTERATIONS:

A. The Subcontractor shall execute all new work, etc., as indicated or required to provide a complete installation in accordance with the intent of the drawings and specifications.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS:

A. All materials, devices, and equipment, unless specifically excepted, shall be new.

2.02 IDENTIFICATIONS:

All materials shall bear UL labels where such have been established for the particular device.

All devices shall show make, type, serial number (where applicable), voltage, amperage, wattage, motor ratings, and all other pertinent data.

All wire shall have make, type of insulation, size, and voltage rating clearly marked upon it.

2.03 SLEEVES/JUNCTION BOXES/ANCHORS:

The Subcontractor shall advise the Contractor of locations for all sleeves, openings, anchors, supports, conduits, and boxes, and shall provide same so that they may be built into the job wherever feasible.

2.04 ACCESS PANELS (if any):

Furnish, for installation by the General Contractor, all metal access panels required for access to services provided under this Section.

Coordinate locations and sizes of all such panels with the Contractor, subject to the Engineer's approval.

2.05 CONDUITS:

A. Exterior:

Direct buried conduit and conduit in concrete or below concrete floor slabs in earth shall be rigid galvanized steel or Schedule 40 PVC (only with prior written approval from PWD). Where steel is used, it shall be double coated with bitumastic dried at least 24 hours between coats before installation. Where PVC is used, all elbows and/or offsets shall be rigid galvanized steel. Rigid galvanized steel shall be used above grade also. Signal cable conduits shall be rigid galvanized steel only (per "C" below).

B. Interior, Dry Locations:

Interior conduits shall be rigid galvanized steel, or intermediate metallic conduit in dry locations, installed concealed in walls or above ceilings.

Fittings, boxes, and related items for interior work shall be manufactured by Steel City Electric Company, Appleton, Raco, or approved equal.

Minimum size conduit for light and power wiring, where required, shall be 3/4".

C. Exterior and Other Areas:

Rigid galvanized steel conduit.

D. General:

The use of nonmetallic conduit or raceway within a building is not permitted.

Rigid galvanized conduit shall be manufactured by Youngstown Sheet and Tube Company, Republic Steel, or equivalent.

Liquid-tight flexible metallic conduit shall be used to tie in all motors or similar equipment. Provide minimum 2 ft. diameter loop at all locations.

Aluminum or PVC conduit shall not be used on this project. PVC coated rigid galvanized steel conduit shall be Rob Roy Plasti-Bond Red or approved equal.

All terminations of conduits shall have smooth, rounded bushings. All conduit 1" and larger shall have insulation which may be integral with the bushing connector, or an insulated bushing may be added.

All rigid conduit joints shall be threaded. Do not use any type of clamp on fittings. All plastic joints shall be cemented or heat welded.

2.06 WIRE AND CABLE :

All cable and wire shall comply with the latest requirements and specifications of the NFPA and/or the Insulated Power Cable Engineers Association (IPCEA) and shall be as manufactured by General Cable, General Electric, Anaconda, Phelps Dodge, or approval equal, unless otherwise specified or indicated.

All conductors used in the wiring system shall be soft-drawn copper wire having a conductivity of not less than 98% of that of pure copper, unless otherwise indicated or specified. All conductors shall be stranded. Solid conductors are not acceptable. Aluminum conductors are not permitted.

All wire and cable shall be sampled approximately every two feet to indicate voltage, type, temperature rating, UL listing, manufacturers' name, size, etc.

All underground conductors shall be installed in concrete encased conduits. All underground conductors shall enter manholes, building walls, or termination points through a protective galvanized steel conduit sleeve of appropriate size.

All cable and wire shall be: 600 volt; installed in approved raceways or conduit; not less than No. 12 AWG (except that No. 14 AWG may be used for control wiring).

Insulation for cable and wire shall be as follows:

Wet or Moist Locations	XHHW
Feeders to panels, other	XHHW

All internal wiring to fixtures shall be minimum, No. 14 AWG, silicon rubber insulated (150°C) with minimum 300 volt insulation.

All branch circuit wiring from panel boards to any outlet on the circuit over 50' but under 100' shall be No. 10 AWG for the first half of the circuit, over 100' but under 175', use No. 8 AWG for the first half.

The following color code shall be used for all conductors. The colors must be fast, fadeless, and capable of withstanding cleaning.

**120/240 VOLT (1 PHASE)**

Phase A	Red
Phase B	Blue
Neutral	White
Grounding	Green

Multiconductor shielded cables shall be approved equal to GE SI-58760, #16 AWG, with individual grouping shielded (if any).

All circuit wires shall be tagged in cabinets, etc., with 1/16" thick tags securely fastened to the conductors with a heavy type of linen wrap at time wires are pulled in and tested. Circuit numbers shall be indicated on the tags. Tags shall not be removed for any reason.

At least 8" loops or ends shall be left at each outlet for the installation of devices or fixtures in the future. All wires in outlet boxes not for the connection to fixtures at that outlet shall be rolled up, connected together, and taped.

Wires and cables shall be carefully handled during installation.

When a lubricant is necessary for pulling wires, it must be listed by UL and be of such consistency that it will leave no obstruction or tackiness that will prevent pulling out old wires or pulling in new wires or additional wires. No soap flakes or vegetable soaps will be permitted.

Conductors shall be continuous from panel board to outlet and from outlet to outlet. No splices shall be made except within junction or outlet boxes.

Splices are not allowed. (See PWD specs in Appendix)

Type NM, NMC, AC, MC, or similar cables shall not be permitted on this project.

All conductors and connections shall be free of grounds, shorts, and opens.

**2.07 OUTLET BOXES:**

For concealed wiring to wall switches and duplex outlets in dry locations, use gaugeable steel boxes not less than 2-3/4" deep, such as Raco 560 to 568 Series. These may have

cable clamps or a connector added to them. Four-inch square or larger boxes with raised plaster rings are equally acceptable. These boxes may be directly nailed to a stud if they fall adjacent to one; otherwise, wood straps a minimum of 2½" x 3/4" between studs shall be added and mounting shall be by ears on the box. Solid or adjustable bar hangers are equally acceptable.

Flush ceiling and device outlet boxes shall be 4" octagonal by 2 1/8" deep or 4" square boxes with raised plaster rings.

Set all flush boxes to have edge precisely in the same plane as the finished wall surfaces.

All boxes shall be held to wood surfaces by wood screws. On metal surface, boxes shall be held by metal-to-metal screws or by machine bolts.

Any outside boxes or boxes mounted exposed in the buildings shall be cast metal type with integral threaded hubs (style similar to Crouse Hinds FS or FD).

#### 2.08 PULL BOXES AND JUNCTION BOXES:

Pull boxes, cabinet boxes and junction boxes shall be constructed of code gauge galvanized sheet metal of not less than the minimum size recommended by the National Electrical Code. Boxes shall be furnished with screw-fastening covers. Where several feeders pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number and panel designation. Where pull boxes must be used in finished areas, the Engineer shall be consulted for the location, style of cover, and finish of box. The location shall always be as inconspicuous as possible. Where shown on the drawings, sizes of pull boxes, terminal boxes and junction boxes shall be followed or next larger standard trade size shall be used. Add pull boxes when such are deemed advantageous. Where required due to length of exterior or underground conduit runs, underground cast concrete shall be provided, per details on Contract Drawings.

#### 2.09 PULLING CABLES:

All raceways are to be equipped with conductors. Swab all conduit before cable is drawn into them. Any crushed raceways shall be replaced before drawing in cable. Where cable pulling compounds are required, materials specifically intended for that purpose may be utilized.

#### 2.10 DISCONNECT:

Where shown on the Drawings, or when NEC required whether or not shown, install disconnect switches appropriate for the application. When serving motors, they shall be motor rated. Those for equipment (if any) outdoors shall be in rain-tight enclosures, or as otherwise indicated on Contract Drawings.

Switches shall be heavy duty, quick make and break type. They may be non-fused by a solid copper bar, silver plated, heavy duty on motors over 2 h.p. For small motors (1/8 h.p. and less), a toggle switch, motor rated, may be used; otherwise, they shall be similar to Square D Type HU. Manual starters with overload protection built in are approved when NEC acceptable.

#### 2.11 OVERCURRENT PROTECTION SERVICES:

Overcurrent protection for motors is to be in the starters. There is to be protection in each phase wire. Overcurrent protection of conductors is by thermal and magnetic molded case circuit breakers in the panel boards. Where combination starters are used, the breaker is to be a motor circuit protector with only magnetic trips. These must be supplied from a branch circuit protected by a thermal and magnetic trip breaker.

#### 2.12 WIRE CONNECTORS AND DEVICES:

All wire joints shall be made with a pressure squeezed connector such as T & G Stakon and Ideal, or bolted clamp such as made by Dessert. Twist-on type wire nuts are also permitted for general lighting and receptacle circuits, only. Make up to terminals shall be mechanical squeeze connector. Wherever only a screw connector is available, install a conductor terminal like T & G Stakon spade or donut and designed for the application and compression set to the conductor.

Cover all joints made with non-insulated clamp devices with Scotch brand plastic electrical tape. Type #88 may be used at any joint and shall be used whenever the temperature of joint or the room is below 50°F. In the summer, or when temperature is above 60°F, new type #33 plus may be used. Triple wrap joints, each wrap having a 50% overlay.

#### 2.13 SWITCHES AND PLATES:

Switches shall be specification grade, 20 amperes at 120/277 volts, with ivory handle, such as Bryant 4901-I, for SPST applications. For three-way use No. 4903-I, and for four-way use 4904-I. All switches shall have clamp type terminals screw set.

Mount all switches vertically, wall-flush, and at a height of 4' 0", unless otherwise specified.

All switches must have machine screw held wire and be back wired. Automatic grips will not be permitted. All switches must be classed as heavy duty.

All flush plates are to be smooth-line nylon, one piece construction for all grouped switches, or Mulberry equivalent. On surface boxes they shall match the box style for the device installed.

Switches and plates shall be a product of General Electric or Hubbell.

2.14 CONVENIENCE AND OTHER OUTLETS AND PLATES:

Convenience outlets shall be duplex, specification grade, ivory face, side wired binding screw type, two pole, three wire, rated 20 amperes at 120 volts, Bryant 5362-I, or equal. Use Bryant ivory nylon plates or equal. Mount all outlets a minimum of 24" AFF. Where single outlet unit is indicated, use Bryant #5361-I.

Where "GFI" receptacles are indicated on drawings, it is the intent that ground fault protection be provided by individual Class A, 20 ampere, 120 volt, GFI receptacles for each device shown, equal to Bryant GFR53FT-I.

Mount vertical outlets with grounding slot up. Outdoors and elsewhere as shown, use weatherproof covers, Hubbell 5206 or equal, with double covers, spring held gasketed. Mount the outlet horizontally.

Automatic grip set outlets are not permitted.

On flush mounted boxes for concealed wiring, use ivory nylon plates. On exposed FS and FD boxes, use cast ferrous covers matching the box or stainless steel as above, if styled for the box. Outdoor and in damp locations, use twin spring loaded weatherproof covers, Bryant 4500 FS or equal.

Outlets and plates shall be a product of Hubbell.



## 2.15 MOTORS:

These specifications relating to motors and motor control apply to all motors and controls furnished by this Section or any other section.

Each section supplying motor drive apparatus will be responsible for supplying an electric motor of sufficient size for the duty performed. These shall not be oversized beyond a normal safety factor, except that standard design ratings for next above motor size required will be used. Unless otherwise specified, all motors shall have open frames, Class A insulation and continuous duty classification based on a 40°F ambient temperature of reference.

Motor Control: Each motor, or group of motors, requiring a single control shall be provided with a suitable controller and devices which shall perform the functions as specified for the respective motors in other sections of these specifications. All controllers shall conform to the adopted standards and recommended practices of the Industrial Control Standards of the National Electrical Manufacturers Association and the Standards for Industrial Control Equipment of Underwriters' Laboratories, Inc.

Thermal Overload Protection. Each motor shall be provided with an overload protective device, integral with either the motor or controller. Unless otherwise specified, the protective device shall be of the manually reset type. Manual controllers for motors shall be specifically designed for the purpose, and shall have a h.p. rating adequate for the motor. Automatic control devices such as thermostats or floats are satisfactory, provided they are designed for that purpose and have an adequate h.p. rating.

## 2.16 SECONDARY SERVICE:

Secondary Service is to be new, see site plans for transformer location. A new 120/240 volt, 1 phase, 3 wire service is to be provided, underground.

## 2.17 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM:

The electric utility company shall provide the electrical service of the characteristics as shown on the drawings. The Subcontractor's work will begin where the utility company's work ends.

The Subcontractor shall furnish all labor, materials, etc. necessary for a complete approved electrical service as required by the structure, including inspection and approval by the utility and local inspection departments.

The Subcontractor shall notify the utility company in writing, with a copy to the Engineer, no later than ten days after signing construction contracts, as to when the building power service will be required.

## 2.18 UNDERGROUND ELECTRICAL SERVICES:

Underground service shall comply with all the requirements of the National Electrical Code, National Electrical Safety Code, local utility company, and local enforcing authority.

Furnish and install secondary lugs on transformer as required.

Secondary service shall be cable in rigid galvanized conduit riser to pole mounted transformer as directed by utility and rigid galvanized conduit to service entrance equipment.

It may be run in schedule 40 PVC plastic conduit (with prior written approval from PWD), rigid galvanized conduit and/or in PVC coated rigid galvanized conduit (as indicated on Contract Drawings) approved for electrical use. Conduit shall be 36" below grade and pitched to drain.

Install red plastic marking tape 12" above all buried distribution.

## 2.19 PRIMARY POWER SERVICE:

Primary power to site is existing.

## 2.20 METERING:

The Electrical Subcontractor shall furnish and install all equipment and meter trim for metering, in accordance with utility company requirements, except that the utility meter will be provided by the local utility. Any required meter transformer enclosure is to be provided by the Electrical Subcontractor, to local utility standards.

Where the local utility does not provide the meter sockets, the Electrical Subcontractor shall provide them to the local utility's specifications.

## 2.21 PANEL BOARDS:

Panel boards shall be provided with main lugs or main breakers and branch circuit breakers, according to the schedule on the Drawings.

The general requirements for the panels are shown on the drawings, including mounting and gutters. Mount the panels 6'-6" up to top of roughing cabinets. Gutters shall not be less than 5". Breaker frame size is shown on the drawings. Handle ties will not be permitted anywhere. Multi-pole breakers shall have common trip and one handle.

All breakers shall be trip-free, suitable for switching, and thermal magnetic. All breakers shall be bolted to bus type secured in place by holding bolt. "Space" means provisions for adding breakers. Breakers or busses shall contain terminations or tapping designed for these attachments. All points of contact between bus and sub-bus shall be of copper full silvered between all contact surfaces. All breakers shall have an interrupting capacity of 22,000 amperes at 240 volts AC (symmetrical RMS amperes).

Provide a typewritten tabulation indicating fixture outlets, devices, machines, or apparatus served by each breaker and their room location. This shall follow coding on the drawings with breakers numbered from top to bottom. Mount tabulation inside the door in a frame for the purpose, with a transparent plastic cover.

Where existing panels are indicated to be retained, provide breaker modifications indicated utilizing breakers UL listed for the panels.

All panelboards shall be manufactured by Square D, or approved equal.

## 2.22 BALANCING OF LOADS:

The Contractor shall balance all loads between phases in all panels, etc., around the neutral. Neutral conductors shall be the same size as phase conductors unless specifically noted otherwise. No common neutrals will be permitted.

All circuits shall be distributed among the phases so as to restrict any phase load imbalance to less than 10% at any panelboard.

After completion of the installation, record under full load conditions the current flow in each phase feeder. Submit four copies to the Engineer giving name and location of each panel, etc.

Circuit members assigned to home runs and devices on the Drawings are for purposes of indicating individual circuits and are intended to correspond with the circuit numbers in the panels. The panelboard directory shall designate each circuit and its associated load. If the numbers deviate from the Drawings, the as-built Drawings shall reflect this.

## 2.23 LIGHTING FIXTURES:

Wire directly to an outlet box for each fixture in and on the building. General building wire is to be used to these outlets, except recessed fixtures without self-contained outlet box shall be served via greenfield with silicon rubber insulated wire and ground. From outlet into fixture use silicone rubber, color coded to make up to fixture socket or ballast supply leads. Add a bond wire to ground all fixtures.

The lighting fixtures listed on the Drawings are to indicate quality, appearance, lamping and photometric characteristics acceptable. Alternative fixtures may be proposed for the project where they provide the equivalent characteristics, quality and appearance, and subject to Engineer approval.

2.24 LAMPS, BALLASTS AND ACCESSORIES:

Except as otherwise specified, all fluorescent ballasts are to be for rapid start lamps and power factor corrected to approximately 95% lagging. All ballasts shall carry E.T.L. approval, and where available in the type needed, shall carry an A sound rating. All ballasts shall be super premium, low energy type, Advance Mark III, or approved equal.

Fluorescent lamp ballasts shall be so mounted as to avoid amplifying hum, and any ballast which, within one year, develops a hum considered excessive by the Engineer, shall be replaced free of charge with another of a noise level considered satisfactory by the Engineer.

All lamps shall be color and type specified. Incandescent lamps shall be for 125 volt service. They shall be the product of General Electric, Sylvania or Westinghouse, and be so labeled. Fluorescent lamps shall be low energy type.

2.25 TELEMETRY WIRING:

Provide telemetry equipment and wiring as indicated in Appendix A. This includes wiring for all instrumentation and field devices (including PFU) connections. This includes analog and discrete signal wiring.

2.26 WIRING OF MECHANICAL AND OTHER EQUIPMENT

The Electrical Subcontractor shall wire all power to, providing and installing local disconnects for, all mechanical equipment and equipment by other trades or this section per Contract Drawings. This shall include, but not be limited to:

Pumps, motors, control panels, etc.

Note: Review plans and specifications for all sections providing equipment to be wired to determine special wiring, or control requirements to be provided for such under this specification section.

2.27 TRANSFORMERS (if any):

NEMA ST20, general-purpose, dry-type, self-cooled, ventilated. Provide transformers in a NEMA 1 enclosure. Transformer shall have 220°C insulation system with a temperature rise not exceeding 150°C under full rated load in a maximum ambient of 40°C.

Transformer shall be capable of carrying continuously 115% of the nameplate kVA without exceeding the insulation rating.

2.28 FUSES (if any):

- A. Provide a complete set of fuses for each fusible switch. Time-current characteristic curves of fuses serving motors or connected in series with circuit breakers or other circuit protective devices shall be coordinated for proper operation; submit coordination data for approval. Fuses shall have a voltage rating not less than circuit voltage.
- B. Cartridge Fuses, Current-limiting Type (Class R): UL 198E, Class RK-1 time-delay type. Associated fuse holders shall be Class R only.
- C. Cartridge Fuses, current-limiting Type (Classes J and L): UL 198C, Class J for 0 to 600 amps and Class L for 601 to 6000 amps.

2.29 INSTRUMENTATION (if any):

The subcontractor under this section shall provide all conduit for and install all signal cable for instrumentation provided under all sections of these Specifications, including provision of all required 120 volt power wiring and interconnections of signal cables.

2.30 BUILDING LOW TEMPERATURE THERMOSTATS:

Provide low temperature alarm thermostats for alarm purposes. Units shall have an adjustable range of 40° to 85° F SPST, equal to Emerson catalog #WR-65. Provide guard over unit to prevent tampering. Wire to alarm system/annunciator.

2.31 STAND-BY POWER PROVISIONS

Provide all electrical installation, including conduit and wiring, under this Specification section for equipment provided under Specification 16620.

2.32 MASTER FIRE ALARM SYSTEM:

Provide smoke detector for the building wire to alarm system/annunciator..

2.33 BUILDING SECURITY SYSTEM:

Provide door contacts for all building wire to alarm system/annunciator.

2.34 NAMEPLATES:

Provide black lamaloid nameplates with white letters to identify all panelboards, starters, disconnects, equipment panels, push buttons, etc. Plates shall be secured to outdoor equipment with epoxy glue and to indoor equipment with epoxy glue or self-tapping stainless steel fasteners. Minimum letter height shall be 3/8".

2.35 MAIN SERVICE BREAKER:

Provide main service breaker, NEMA 1 enclosed, with interrupting capacity as required by fault current available from serving utility, but in no case less than 22000 amperes RMS symmetrical at 240 volts. Breaker must have instantaneous trip and be of make and model to provide UL listing protection of transfer switch provided under Specification 16620.

2.36 DELIVERY, STORAGE AND PROTECTION:

The Subcontractor shall be responsible for the work and equipment until finally inspected, tested and accepted. Carefully store materials and equipment which are not immediately installed after delivery to the site. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material.

Each Subcontractor shall protect work and material of other trades from damage that might be caused by that Subcontractor's work or workers and shall make good all damage thus caused.

2.37 PROPANE TANK PRESSURE TRANSMITTER

Provide propane tank pressure transmitter wire to alarm panel/annunciator.

PART 3 - INSTALLATION

3.01 GENERAL:

The entire work provided in this Specification shall be constructed and finished in every respect in a workmanlike and substantial manner.

The Subcontractor shall obtain detailed information from the manufacturer of apparatus as to the proper method of installing and connecting same. The Subcontractor shall also obtain all information from the Contractor and other Subcontractors that may be necessary to facilitate the work and the completion of the whole project.

Before installing any of the work, the Subcontractor shall see that it does not interfere with the clearances required for finished columns, pilasters, partitions, walls, and ceilings, as shown on the Contract Drawings and details.

Work installed by the Subcontractor which interferes with or modifies the design as shown on the Contract Drawings shall be changed as directed by the Engineer, and all costs incidental to such changes shall be paid by the Subcontractor.

In any and all cases of discrepancy in figures, plans or specifications, the matter shall be immediately submitted to the Engineer for decision.

3.02 SITE VISITS:

The Subcontractor will be required to visit the site as the work progresses and to carefully investigate the structural and finished conditions affecting all details of the work, and shall arrange such work required to meet such conditions.

3.03 CUTTING AND PATCHING:

It is the duty of the Subcontractor to furnish and install all sleeves required in the performance of this Contract and to furnish to the Contractor the size and location of all openings required on the performance of this contract; and it shall be the duty of the Contractor to provide the required openings during building construction.

If this Subcontractor fails to provide for all sleeves and openings as required in the performance of this Contract, the Subcontractor shall instruct the Contractor, who shall do such cutting, drilling, patching and grouting and so forth necessary for the proper installation of this Subcontractor's work. The Contractor is to charge this Subcontractor for this work and it shall be done at no additional expense to the Owner.

Should the Contractor, after having been fully advised by the Subcontractor, fail to arrange for this work, the Subcontractor shall promptly notify the Engineer in writing of such failure. In the event of any disagreement between the Electrical Subcontractor and the Contractor over the foregoing, and in the absence of any written requests or agreements between the two, the decision of the Engineer shall be final.

3.04 ALUMINUM CONDUITS:

Aluminum conduits shall not be installed.

3.05 INTERIOR CONDUIT SYSTEMS:

Electrical Subcontractor shall coordinate with Engineer as to locations, sizes and number of conduit sleeves to be installed through cast concrete.

Exposed runs of conduit shall have supports not more than 6'-0" apart and shall be installed with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings with right angle turns consisting of cast metal fittings or symmetrical bends. Conduit bends and offsets shall be avoided where possible, but where necessary, shall be made with an approved hickey or conduit bending machine. Conduit which has been crushed or deformed in any way shall not be installed. Expansion fittings shall be used to provide for expansion joints. Wooden plugs inserted in masonry or concrete shall not be used to secure conduits or boxes. Conduits shall be supported on approved types of stainless steel wall brackets, ceiling trapeze, strap hangers or pipe straps, secured by means of toggle bolts in hollow masonry units, expansion bolts in concrete or brick, machine screws on metal surfaces, and wood screws on wood construction. Provide stainless steel hardware for stainless steel support systems. Conduit shall be installed in such a manner as to insure against trouble from the collection of condensation, and all runs of conduit shall be so arranged as to be devoid of traps wherever possible. The Contractor shall exercise the necessary precautions to prevent the lodgment of dirt, trash, or plaster in conduits, fittings, or boxes during the course of installation. A run of conduit which has become clogged shall be entirely freed of the accumulation, or shall be replaced.

Conduits shall be securely fastened to all sheet metal outlets, junction boxes, pull boxes, and panelboards with galvanized locknuts and bushings, care being taken to establish a firm mechanical and electrical contact between the box and the conduit.

Flexible conduit shall be installed only where necessary to overcome vibration at motor connection, and shall be as short as possible between the motor terminal box and the junction box on the branch circuit rigid conduit. All flexible conduit shall be of the liquid-tight type similar to "Sealtite", with proper fittings. Provide minimum 2 ft. diameter loop.

All rigid metallic conduit shall utilize threaded fittings.

Pull boxes, junction boxes and cabinet boxes shall be constructed of code gauge galvanized sheet steel of not less than the minimum size recommended by the National Electrical Code. Boxes shall be furnished with screw fastened covers. Where pull boxes are used in finished areas, the Engineer shall be consulted as to the location, type of cover, and finish of box and cover. Locations shall be as inconspicuous as possible.

### 3.06 CONDUCTORS:

A complete system of conductors shall be installed in the raceway system, except where otherwise noted. Conductors shall be continuous from outlet to outlet, and no splices shall be made except within outlet or junction boxes. Compression type connectors properly taped shall be utilized for all splices.



### 3.07 OUTLETS:

Outlets shall be installed in locations as indicated on the Contract Drawings. The Subcontractor shall study the general building plans in relation to the spaces surrounding each outlet in order that the work may fit the other work required by these specifications. Where necessary, the Subcontractor shall relocate outlets so that installed fixtures are symmetrically located according to room layout and will not interfere with other work or equipment.

### 3.08 DEVICE PLATES:

Device plates shall be installed on each outlet to suit the device installed therein. Plates shall normally be installed vertically, with an alignment tolerance of 1/16".

### 3.09 GROUNDING:

The conduit system and the neutral conductor of the wiring system shall be grounded. The grounded connection between the electric system neutral and the conduit system shall be made at the main electrical service panel. A bare copper conductor sized per NEC shall be installed in non-metallic conduit from the breaker enclosure to copperweld ground rods, 3/4" diameter by 10 feet long. Provide certified test of recognized testing agency that ground resistance does not exceed 25 ohms. All connections shall be exothermic, approved equal to "Cadweld".

Ground wires shall be grouped and bonded to panel boxes, not to system neutrals. The ground terminal or receptacles shall be bonded to outlet boxes with No. 12 AWG bare or green insulated wire, or other suitable means per the National Electrical Code.

All electric heating equipment shall be grounded.

Conduit and/or raceway shall not be utilized as the bonding conductor.

### 3.10 EXPLOSION PROOF REQUIREMENTS:

If encountered, equipment shall be Class I, Division I, Group D rated.

### 3.11 PULLING CABLES:

Cable shall be installed utilizing pulling equipment designed for the type of wireways or conduits installed. Where lubricating material is required, it shall be a material manufactured for and designated by UL label as suitable for the types of insulation involved on the conductors. Care shall be taken during cable pulling not to cause kinks or sharp bends in the conductors. If insulation on conductors is cut or nicked during

pulling, the conductors involved shall be removed and replaced at no added cost to the Owner. During pulling, the maximum strain applied to the conductors shall not exceed 50% of the ultimate strength of the conductors.

3.12 EXAMINATION AND APPROVAL OF WORK:

No work shall be covered before examination and approval by the Engineer and by all inspectors and authorities having jurisdiction. Replace any imperfect or condemned work with work conforming to requirements and satisfactory to the Engineer, without extra cost to the Owner. If work is covered before due inspection and approval, the Subcontractor shall pay all costs of uncovering and reinstating work.

3.13 CLEAN UP AND REPAIR:

At the completion of the work, the work area shall be left clean. Any damage caused to work of other trades by electrical installation shall be repaired at the expense of the Electrical Subcontractor.

*END OF SECTION*

## SECTION 16231

### SPECIFICATIONS: GENERATOR SET

#### 1) **Submittal**

- a) The submittal shall include prototype test certification and specification sheets showing all standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number, each required interconnection between the generator set, the transfer switch, and the remote annunciator panel if it is included elsewhere in these specifications.

#### 2) **Codes and Standards**

- a) The generator set shall conform to the requirements of the following codes and standards:
  - i) CSA C22.2, No. 14 – M91 Industrial Control Equipment.
  - ii) EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.
  - iii) EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
  - iv) IEC8528 part 4. Control Systems for Generator Sets
  - v) IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
  - vi) IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
  - vii) Mil Std 461D –1993. Military Standard, Electromagnetic Interference Characteristics.
  - viii) Mil Std 462D - 1993. Military Standard, Measurement of Electromagnetic Interference Characteristics.
  - ix) NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
  - x) NFPA99 – Essential Electrical Systems for Health Care Facilities
  - xi) NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.
  - xii) UL2200. The genset shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed

### 3) Testing

- a) To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and/or local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.
  - i) Design Prototype Tests: Components of the emergency system such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and preproduction models, which will not be sold, shall have been used for the following tests.
    - (1) Maximum power (kW).
    - (2) Maximum motor starting (kVA) at 35% instantaneous voltage dip.
    - (3) Alternator temperature rise by embedded thermocouple and/or by resistance method per NEMA MG1-22.40 and 16.40.
    - (4) Governor speed regulation under steady-state and transient conditions.
    - (5) Voltage regulation and generator transient response.
    - (6) Fuel consumption at 1/4, 1/2, 3/4, and full load.
    - (7) Harmonic analysis, voltage waveform deviation, and telephone influence factor.
    - (8) Three-phase short circuit tests.
    - (9) Alternator cooling air flow.
    - (10) Torsional analysis to verify that the generator set is free of harmful torsional stresses.
    - (11) Endurance testing.
  - b) **Production Tests**
    - i) Final Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:
    - ii) Single-step load pickup.
    - iii) Transient and steady—state governing.
    - iv) Safety shutdown device testing.
    - v) Voltage regulation.

- vi) Rated Power @ 0.8 PF
- vii) Maximum Power.
- viii) Upon request, arrangements to either witness this test will be made, or a certified test record will be sent prior to shipment.

**c) Site Tests**

- i) Site Tests: An installation check, start-up, and building load test shall be performed by the manufacturer's local representative. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:
- ii) Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.
- iii) Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery charger, generator strip heaters, remote annunciator, etc.
- iv) Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and frequency, and phase rotation.
- v) Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the test. An external load bank shall be connected to the system if sufficient building load is unavailable to load the generator to the nameplate kW rating.

**4) Warranty & Maintenance**

- a) A one year warranty for the generator set shall be included to guarantee against defective material and workmanship in accordance with the manufacturer's published warranty from date of start-up. Optional warranties shall be available upon request.
- b) The generator set manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall be regularly engaged in a maintenance contract program to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions, adjustment to the generator, transfer switch, and switchgear controls as required, and certification in the owner's maintenance log of repairs made and proper

functioning of all systems.

#### 5) **Equipment**

- a) The generator set shall be a Kohler model 30REZG or approved equal. It shall provide 30 kW, when operating at 120/240 volts, .8 power factor.
- b) Vibration isolators shall be provided between the engine-generator and heavy-duty steel base

#### 6) **Engine**

- a) The engine shall be equipped with the following:
  - i) An electronic isochronous governor capable of +0.5% steady-state frequency regulation.
  - ii) 12 Volt positive engagement solenoid shift-starting motor.
  - iii) 70-Ampere minimum automatic battery charging alternator with solid-state voltage regulation.
  - iv) Positive displacement, full pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.
  - v) Dry-type replaceable air cleaner elements for normal applications.
- b) The naturally aspirated engine shall be fueled with natural gas and be supplied with a unit-mounted electric solenoid fuel shut-off valve, flexible fuel line, and secondary fuel pressure regulator.
- c) The engine shall have a minimum of 8 cylinders, and be liquid-cooled by a unit-mounted radiator, blower fan, water pump, and thermostats. This system shall properly cool the engine with up to 0.5 inches H<sub>2</sub>O static pressure on the fan in an ambient temperature up to 122F/50C.

#### 7) **Generator**

- a) The alternator shall be salient-pole, brushless, 12-lead reconnectable, self-ventilated of drip-proof construction with amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the NEMA standard (MG1-22.40 and 16.40) for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Temperature rise of the rotor and stator shall be limited to 130°C. The excitation system shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within +/- 2% at any constant load from 0% to 100% of rating. The regulator must be isolated to prevent tracking when connected to SCR loads, and provide individual adjustments for voltage range, stability and volts-per-hertz operations; and be protected from the environment by conformal coating.

- b) The generator set shall meet the transient performance requirements of ISO 8528-5, level G-2.
- c) The alternator excitation shall be of a permanent magnet exciter design.
- d) The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current support devices.
- e) The generator, having a single maintenance-free bearing, shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

## **8) Controller**

- a) Set-mounted controller capable of facing right, left, or rear, shall be vibration isolated on the generator enclosure. The controller shall be capable of being remote-mounted. The microprocessor control board shall be moisture proof and capable of operation from -40°C to 85°C. Relays will only be acceptable in high-current circuits.
- b) Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include the following features:
  - i) Fused DC circuit.
  - ii) Complete 2-wire start/stop control, which shall operate on closure of a remote contact.
  - iii) Speed sensing and a second independent starter motor disengagement systems shall protect against starter engagement with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.
  - iv) The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then re-engage the starter.
  - v) Cranking cyler with 15-second ON and OFF cranking periods.
  - vi) Overcrank protection designed to open the cranking circuit after 75 seconds if the engine fails to start.
  - vii) Circuitry to shut down the engine when signal for high coolant temperature, low oil pressure, or overspeed are received.
  - viii) Engine cooldown timer factory set at 5 minutes to permit unloaded running of the standby set after transfer of the load to normal.

- ix) 3-position (Automatic-OFF-TEST) selector switch. In the TEST position, the engine shall start and run regardless of the position of the remote starting contacts. In the Automatic position, the engine shall start when contacts in the remote control circuit close and stop 5 minutes after those contacts open. In the OFF position, the engine shall not start even though the remote start contacts close. This position shall also provide for immediate shutdown in case of an emergency. Reset of any fault shall also be accomplished by putting the switch to the OFF position.
- x) Alarm horn with silencer switch per NFPA 110.
- c) Standard indicating lights to signal the following shall be included:
  - i) Not-in-Auto (flashing red)
  - ii) Overcrank (red)
  - iii) Emergency Stop (red)
  - iv) High Engine Temperature (red)
  - v) Overspeed (red)
  - vi) Low Oil Pressure (red)
  - vii) Battery Charger Malfunction (red)
  - viii) Low Battery Voltage (red)
  - ix) Low Fuel (red)
  - x) Auxiliary Prealarm (yellow)
  - xi) Auxiliary Fault (red)
  - xii) System Ready (green)
- d) Test button for indicating lights.
- e) Terminals shall be provided for each indicating light above, plus additional terminals for common fault and common prealarm.

## **9) Instrument Panel**

- a) The instrument panel shall include the following:
  - i) Dual range voltmeter 3 1/2-inch, +/- 2% accuracy
  - ii) Dual range ammeter 3 1/2-inch, +/- 2% accuracy.
  - iii) Voltmeter-ammeter phase selector switch.
  - iv) Lights to indicate high or low meter scale.
  - v) Direct reading pointer-type frequency meter 3 1/2-inch, 0.5% accuracy, 45 to 65 Hz scale.
  - vi) Panel-illuminating lights.
  - vii) Battery charging voltmeter.
  - viii) Coolant temperature gauge.



- ix) Oil pressure gauge.
- x) Running-time meter.
- xi) Voltage-adjust rheostat

#### 10) Accessories

- a) Line circuit breaker of 200 amperes, 200 amps sensor, molded case type, generator mounted.
- b) Engine block heater. Thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA-99 and NFPA-110, Level 1.
- c) Battery rack, and battery cables, capable of holding the manufacturer's recommended batteries, shall be supplied.
- d) 12-volt lead-antimony battery(ies) capable of delivering the manufacturer's recommended minimum cold-cranking Amps required at 0°F, per SAE Standard J-537, shall be supplied.
- e) 10-Ampere automatic float and equalize battery charger with +/- 1% constant voltage regulation from no load to full load over +/-10% AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated for ambient temperatures from -40°C to +60°C, 5% accurate voltmeter and ammeter, fused, reverse polarity and transient protected.
- f) The engine exhaust silencer shall be coated to be temperature and rust resistant and rated for critical grade applications. The silencer will reduce total engine exhaust noise by 25-35 dB(A).
- g) Gas-proof, seamless, stainless steel, flexible exhaust bellows with threaded NPT connection.
- h) Two flexible fuel lines rated 300°F and 100 psi ending in pipe thread.
- i) Air cleaner restriction indicator to indicate the need for maintenance of the air cleaners.
- j) The single relay dry contact kit provides normally open and normally closed contacts in a form C configuration to activate warning devices and other customer provided accessories allowing remote monitoring of the generator set. Typically, lamps, audible alarms, or other devices signal faults or status conditions.
- k) Run Relay to provide a three-pole, double-throw relay with 10 amps at 250 VAC contacts for indicating that the generator is running.

- l) A radiator duct flange to provide a convenient connection to duct work for the radiator discharge air.

END SECTION GENERATOR SET

## SECTION 16415

### SPECIFICATIONS: TRANSFER SWITCH

#### 1) **Submittal**

- a) The submittal shall include prototype test certification and specification sheets showing all standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number, each required interconnection between the generator set and the transfer switch if it is included elsewhere in these specifications.

#### 2) **Testing**

- a) To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and/or local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.
  - i) **Design Prototype Tests:** Components of the emergency system such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and preproduction models, which will not be sold, shall have been used for the following tests.

#### b) **Production Tests**

- i) **Final Production Tests:** Each transfer switch shall be tested under load with all guards in place. Tests shall include:
  - (1) The complete automatic transfer switch shall be tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency, and time delay settings are in compliance with the specification requirements.
  - (2) The complete automatic transfer switch shall be subjected to a dielectric strength test per NEMA Standard ICS 1-109.05.
  - (3) The control panel shall meet or exceed the voltage surge withstand capability in accordance with ANSI C37.90a-2978 and the impulse withstand voltage test in accordance with NEMA Standard ICS 1-109.
- ii) Upon request, arrangements to either witness this test will be made, or a certified test record will be sent prior to shipment.

#### c) **Site Tests**

- i) **Site Tests:** The manufacturer's local representative shall perform an installation check, start-up, and building load test. The engineer, regular

operators, and the maintenance staff shall be notified of the time and date of the site test.

### 3) **Warranty & Maintenance**

- a) A one year warranty for the automatic transfer switch shall be included to guaranteed against defective material and workmanship in accordance with the manufacturer's published warranty from date of start-up. Optional warranties shall be available upon request.
- b) The automatic transfer switch manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall be regularly engaged in a maintenance contract program to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions, adjustment to the generator, transfer switch, and switchgear controls as required, and certification in the owner's maintenance log of repairs made and proper functioning of all systems.

### 4) **Compliance With Codes and Standards**

- a) The ATS shall conform to the requirements of:
  - i) UL 1008--Standard for Automatic Transfer Switches
  - ii) NFPA 70--National Electrical Code, including use in emergency and standby systems in accordance with Articles 517, 700
  - iii) NFPA 99--Essential Electrical Systems for Health Care Facilities
  - iv) NFPA 110--Standard for Emergency and Standby Power Systems
  - v) IEEE Standard 446--Recommended Practice for Emergency and Standby Power Systems (Orange Book)
  - vi) IEEE Standard 241--Recommended Practice for Electric Power Systems in Commercial Buildings (Gray Book)
  - vii) NEMA Standard IC10 (formerly ICS 2-447) Automatic Transfer Switches.
  - viii) UL 508 – Standard for industrial Control Equipment
  - ix) EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)
  - x) EN61000-4-4 Fast Transient Immunity Severity Level 4
  - xi) IEC Specifications for EMI/EMC Immunity as follows:
    - (1) CISPR 1 Radiated Emissions
    - (2) IEC 1000-4-2, Electrostatic Discharge

- (3) IEC 1000-4-3, Radiated Electromagnetic Fields
- (4) IEC 1000-4-4, Electrical Fast Transient (Bursts)
- (5) IEC 1000-4-5, Surge Voltage
- (6) IEC 1000-4-6, Conducted RF Disturbances
- (7) IEC 1000-4-8, Magnetic Fields
- (8) IEC 1000-4-11, Voltage Variations and Interruptions

## 5) Electrical Requirements

- a) Automatic transfer switches not intended for continuous duty or repetitive load transfer switching are not acceptable.
- b) The automatic transfer switch shall be rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric heating, and tungsten-filament lamp load. Switches rated 400 amperes and below shall be suitable for 100% tungsten-filament lamp load. Switches rated above 400 amperes shall be suitable for 30% tungsten-filament load.
- c) The automatic transfer switch shall be rated to withstand the rms symmetrical short circuit current available at the automatic transfer switch terminals, with the type of overcurrent protection shown on the plans.

## 6) Equipment

- a) The automatic transfer switch shall be a ZENITH-200A ATS.
- b) The transfer switch shall have the following characteristics:
  - i) 200 amp current rating
  - ii) 2 Pole
  - iii) 3 wire, 1 phase
  - iv) 240 Volt-60Hz
  - v) Solid Neutral
  - vi) The withstand and closing ratings with a current-limiting fuse shall be 100,000 Amps
  - vii) The withstand and closing ratings with any overcurrent protective device shall be 35,000 Amps
- c) The ATS shall be furnished in a NEMA 1 enclosure.
- d) The switch shall be a 600 volt class.

## 7) Mechanical Requirements

- a) All main contacts shall be of silver composition. The main contacts shall be protected by arcing contacts in sizes 400 amperes and above. The main contacts shall be of the blow-on configuration and of segmented construction in ratings 600 amperes and above.
- b) All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors.
- c) The contact transfer time shall not exceed one-sixth of a second.
- d) All moveable parts of the operating mechanism shall remain in positive mechanical contact with the main contacts during the transfer operation without the use of separate mechanical interlocks.
- e) All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors.
- f) The neutral conductor shall be solidly connected as shown on the plans, a neutral conductor terminal plate with fully rated AL-CU pressure connectors shall be provided.

## 8) Transfer Switch Control System

- a) The control module shall direct the operation of the transfer switch. The module's sensing and logic shall be a built-in microprocessor-based system for maximum reliability, minimum maintenance, and inherent digital communications capability. The control settings shall be stored in nonvolatile EEPROM. The module shall contain an integral battery-backed programmable clock and calendar. The control module shall have a keyed disconnect plug to enable the control module to be disconnected from the transfer mechanism for routine maintenance.
- b) The control module shall be mounted separately from the transfer mechanism unit for safety and ease of maintenance. Interfacing relays shall be industrial control grade plug-in type with dust cover.
- c) The control module shall include a user interface keypad with tactile feedback pushbuttons and light-emitting diode status indication. These features shall be user accessible when the enclosure door is closed:
  - i) Keypad pushbuttons:
    - (1) Start/end system test
    - (2) Set/end exercise
    - (3) End time delay
    - (4) Lamp test/service reset

- ii) Light-emitting diode status indicators:
  - (1) Contactor Position: Normal, Off, Emergency
  - (2) Source Available: Normal, Emergency
  - (3) Service required: immediate, maintenance
  - (4) Not in automatic mode
  - (5) Four stage time delay remaining
  - (6) Exercise: load, no load, set/disabled
  - (7) Test: load, no load
  - (8) Load control active: peak shave, load shed, pre/post-transfer signal
  - (9) In-phase monitor active
  
- d) Outputs:
  - i) Generator engine start gold flashed contact rated 2 amps @ 30 VDC/250VAC.
  - ii) Pre-transfer load control, one normally open contact rated 10 amps @ 30 VDC/250 VAC
  - iii) One Programmable output, factory-set to load bank control rated 2 amps @ 30 VDC/250 VAC.
  
- e) Dry Contacts:
  - i) provide auxiliary contacts for the “normal” and “emergency” position indication contacts inputs into the PLC.

## 9) Operation

- a) All phases of normal and all phases of emergency shall be monitored for over and under voltage and single phase of normal and emergency for over- and under-frequency. In addition, the controller shall use anti-single phasing protection that detects regenerative voltage (using the phase angle of the source) to determine a failed source condition.
  
- b) Voltage and frequency sensing:
  - i) Undervoltage pick-up set at 90% of nominal voltage, adjustable 85% - 100% of nominal voltage.
  - ii) Undervoltage dropout set at 90% of pickup voltage, adjustable 75% - 98% of pickup voltage.
  - iii) Overvoltage dropout set at 110% of nominal voltage, adjustable 105% - 135% of nominal voltage.
  - iv) Overvoltage pick-up set at 95% of dropout voltage, adjustable 85% - 100% of nominal voltage.
  - v) Voltage dropout time set at 0.5 seconds adjustable 0.1 – 9.9 seconds.
  - vi) Voltage accuracy: 2%.

- vii) Under frequency pick-up set at 90% of nominal frequency, adjustable 85% - 95% of nominal frequency.
  - viii) Under frequency dropout set at 99% of pick-up frequency, adjustable 95% - 99% of pick-up frequency.
  - ix) Over frequency dropout set at 101% of pick-up frequency, adjustable 101% - 105% of nominal frequency.
  - x) Over frequency pick-up set at 110% of nominal frequency, adjustable 105% - 120% of nominal frequency.
  - xi) Frequency accuracy: 1%
- c) Time Delays:
- i) Time delay for engine start to delay initiation of transfer for momentary source outages: Range 0-6 seconds. Factory set at 3 seconds.
  - ii) Time delay for transfer to standby: Range 0-60 minutes. Factory set at 1 second.
  - iii) Time delay for transfer back to normal: Range 0-60 minutes. Factory set at 15 minutes.
  - iv) Time delay for engine cool down: Range 0-60 minutes. Factory set at 0 minutes.
  - v) Failure to acquire standby source: Range 0-60 minutes. Factory set at 1 minute.
  - vi) Pre-transfer to normal signal: Range 0-60 minutes. Factory set at 3 second.
  - vii) Pre-transfer to standby signal: Range 0-60 minutes. Factory set at 3 second.
  - viii) Post-transfer to normal signal: Range 0-60 minutes. Factory set at 0 minute.
  - ix) Post-transfer to standby signal: Range 0-60 minutes. Factory set at 0 minute.
- d) User terminals shall be available to connect a normally open contact that, when closed, signals the control module to start and transfer load to the engine-generator. Opening these contacts shall initiate a retransfer and engine cool down sequence. The load shall be transferred to an available utility source immediately if the generator source should fail.
- e) The following features shall be built into the control module logic. These features shall be enabled at the factory or in the field.
- i) Phase rotation sensing programmable ABC or CBA.



- ii) In-phase monitoring shall continuously monitor the contactor transfer times, source voltage, frequency and phase angle to provide a self-adjusting, zero crossing contactor transfer signal. A flashing LED on the user interface panel shall indicate active in-phase monitoring.
- iii) Plant Exerciser: Programmable seven-day or fourteen-day exerciser with user selectable load or no-load operation. An LED, on the user interface, shall indicate the type of exercise (load or no load). The time remaining on the exercise shall be indicated. The exercise time may be reset at any time with a single keystroke. The engine shall be allowed to run when the exercise period is terminated. The exerciser may be disabled for maintenance purposes. An amber LED shall flash on the user interface if the exerciser has been disabled.  
The exerciser shall have the capability of being programmed, using up to twenty-one (21) event for a calendar mode.  
The controller shall have provisions for disconnecting a load bank (during exercise) if there is a loss of normal power.

**10) Monitoring, Programming and Communications:**

- a) Modbus® link:
  - i) Industry standard Modbus® RTU communication shall be available with network and setup connections.
  - ii) A Modbus® master will be able to monitor controller data.
  - iii) A Modbus® master will be able to alter parameters.
  - iv) The Modbus® master must be capable of starting and stopping the generator.
  - v) The manufacturer shall provide a Modbus® communications protocol manual to facilitate communications with a Modbus® master by a third party developer.
  - vi) The Modbus® network shall communicate to the controller using a twisted pair of wire.
- b) Personal Computer Set-up/monitoring Software
  - i) The controller must have the capability to communicate to a personal computer running Windows 7 or XP through an RS-232 communication format (in addition to the Modbus® connection).
  - ii) The software shall be Windows® based
  - iii) The programming capability shall be password protected
- c) It shall be possible to start the generator and transfer the loads to the generator.

- d) Event monitoring shall be accessible using either a personal computer with the personal computer software or Modbus® link to view the following:
  - i) Historical data (total and resettable)
    - (1) Days in operation
    - (2) Hours in standby
    - (3) Hours not in preferred
    - (4) Switch transfers
    - (5) Failure to transfer
    - (6) Transfers due to loss of preferred
    - (7) Start up date
    - (8) Last maintenance date
    - (9) Switch transfer count since last maintenance
  - ii) Transfer switch information
    - (1) ATS serial number
    - (2) Controller serial number
    - (3) Contactor serial number
    - (4) Load description
    - (5) Location
    - (6) Branch
    - (7) Network connection ID
    - (8) Baud rate
    - (9) Parity bit
  - iii) System events (time and date stamped) of the last 100 events which include all failures of the sources, transfer switch and all functions of the controller and contactor:
  - iv) Line to line voltage
  - v) System frequency
  - vi) Time delay active
  - vii) Time delay remaining
  - viii) System status
  - ix) Source available
  - x) Contactor position
  - xi) Exerciser schedule, mode and time remaining on active exercise.
- e) Programmable features may be viewed, selected or adjusted as follows:
  - i) System voltage
  - ii) System frequency

- iii) Single/three-phase operation
  - iv) Open/closed-transition operation
  - v) ABC or CBA phase rotation
  - vi) In-phase monitor
  - vii) Commit/no commit transfer mode
  - viii) User defined password
- f) Programmable inputs shall be defined using either a personal computer with the personal computer software or Modbus® link:
- i) End time delay input
  - ii) Inhibit transfer
  - iii) Low external battery fault
  - iv) Peak shave/area protection input
  - v) Remote common fault
  - vi) Remote test
- g) Programmable outputs shall be defined using either a personal computer with the personal computer software or Modbus® link:
- i) Auxiliary switch fault
  - ii) Common fault
  - iii) Contactor position
  - iv) Exercise active
  - v) Failure to acquire standby source
  - vi) Failure to transfer fault
  - vii) Generator engine start
  - viii) Load bank control
  - ix) Los of phase fault
  - x) Low backup battery
  - xi) No in automatic mode
  - xii) Non-emergency transfer
  - xiii) Over and undervoltage faults
  - xiv) Over and under frequency faults
  - xv) Peak shave/area protection active
  - xvi) Phase rotation error
  - xvii) Modbus®-controlled relay outputs
  - xviii) Source available
  - xix) Test active

END SECTION ATS

**APPENDIX 1**

**PROBE LOGS/GEOTECHNICAL INFORMATION**















# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Clayey Silt some Fine Sand
								5'	Bottom of Exploration @ 3.1' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	









# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.7'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Sand and Gravel Some Silt
							10'	Grey Clayey Silt and Sand
								Bottom of Exploration @ 11.1' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2" pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Bottom of Exploration @ 3.7' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

















# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Bottom of Exploration @ 1.9' (Auger Refusal)
								5'	
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No free water observed
Size				Start Date:                  Finish Date:
Hammer Wt.				10/10/12                          10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
					5'	Bottom of Exploration @ 4.0' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Silty Fine Sand
							5'		Weathered Bedrock
									Bottom of Exploration @ 5.7' (Auger Refusal)
							10'		
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				4.9'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Silty Fine Sand
					5'	
						Bottom of Exploration @ 5.2' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				5.3'
Size				Start Date:                  Finish Date:
Hammer Wt.				10/10/12                      10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
					5'	Brown Silty Fine Sand
						Bottom of Exploration @ 6.8' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.5'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Fine Sand
								Bottom of Exploration @ 7.9' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
							5'	Brown Silty Fine Sand	
								Bottom of Exploration @ 6.9' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		







# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.5'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Silty Fine Sand
							5'		
									Brown Clayey Silt
							10'		Grey Silty Fine Sand and Gravel
									Bottom of Exploration @ 11.8' (Auger Refusal)
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
								5'	Brown Sandy Silt
									Bottom of Exploration @ 6.4' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.9'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Silty Fine Sand
							5'		Brown Clayey Silt
							10'		Grey Sandy Silt and Clay
							15'		Bottom of Exploration @ 12.6' (Auger Refusal)
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.5'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Fine Sand	
							5'	Brown Clayey Silt	
							10'	Grey Sandy Silt and Clay	
							15'	Bottom of Exploration @ 12.4' (Auger Refusal)	
							20'		
							25'		
							30'		





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

Type	Casing	Sample	Core	Ground Water Observation	
				6.9'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Fine Sand	
							5'	Brown Clayey Silt	
							10'	Grey Sandy Silt and Clay	
							15'	Bottom of Exploration @ 12.4' (Auger Refusal)	
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.5'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Fine Sand	
							5'	Brown Clayey Silt	
							10'	Grey Sandy Silt and Clay	
							15'	Bottom of Exploration @ 15.0' (No Refusal)	
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.3'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Sandy Silt and Clay Some Gravel
								5'	
									Weathered Bedrock
								10'	
									Bottom of Exploration @ 10.6' (Auger Refusal)
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Sandy Silt Some Gravel
							5'	Weathered Bedrock
								Bottom of Exploration @ 5.8' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								1.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Sandy Silt Some Gravel
							5'	
								Weathered Bedrock
								Bottom of Exploration @ 7.6' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								1.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Sandy Silt Some Gravel
							5'	
								Bottom of Exploration @ 6.4' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No free water observed
Size				Start Date:                  Finish Date:
Hammer Wt.				10/10/12                          10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Sandy Silt Some Gravel
						Weathered Bedrock
					5'	
						Bottom of Exploration @ 4.5' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
								5'	Brown Sandy Silt Some Gravel
								10'	Bottom of Exploration @ 9.1' (Auger Refusal)
								15'	
								20'	
								25'	
								30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
								5'	Brown Sandy Silt
									Bottom of Exploration @ 6.3' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Clayey Silt	
							5'	Weathered Bedrock	
								Bottom of Exploration @ 5.3' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Clayey Silt
							5'		Weathered Bedrock
									Bottom of Exploration @ 4.8' (Auger Refusal)
							10'		
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No free water observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Sand and Gravel Some Cobbles
								5'	
									Bottom of Exploration @ 5.0' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No free water observed
Size				Start Date:            Finish Date:
Hammer Wt.				10/10/12                    10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Sand and Gravel Some Cobbles
					5'	Bottom of Exploration @ 3.4' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Sand and Gravel Some Cobbles	
							5'		
								Brown Clayey Silt	
							10'		
								Grey Silty Clay	
							15'		
								Bottom of Exploration @ 15.0' (No Refusal)	
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.4'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Sand and Gravel Some Cobbles	
							5'		
								Brown Clayey Silt	
							10'		
								Grey Silty Clay	
							15'		
								Bottom of Exploration @ 15.0' (No Refusal)	
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				6.1'
Size				Start Date:            Finish Date:
Hammer Wt.				10/10/12                    10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Clayey Silt
					5'	
						Bottom of Exploration @ 6.8' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Bottom of Exploration @ 1.8' (Auger Refusal)
								5'	
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Sand	
							5'	Weathered Rock	
								Bottom of Exploration @ 4.8' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Weathered Rock
									Bottom of Exploration @ 3.5' (Auger Refusal)
								5'	
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Bottom of Exploration @ 0.9' (Auger Refusal)	
							5'		
							10'		
							15'		
							20'		
							25'		
							30'		





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Clayey Silt
								5'	
									Weathered Rock
									Bottom of Exploration @ 5.5' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed	
Type				Start Date:	Finish Date:
Size				10/10/12	10/10/12
Hammer Wt.					
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt
								Weathered Bedrock
							5'	Bottom of Exploration @ 4.5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:                  Finish Date:
Hammer Wt.				10/10/12                      10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Weathered Bedrock
					5'	Bottom of Exploration @ 4.1' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:                  Finish Date:
Hammer Wt.				10/10/12                          10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
					5'	Bottom of Exploration @ 2.4' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand some Gravel
							10'	Bottom of Exploration @ 8.9' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:      Finish Date:
Hammer Wt.				10/10/12      10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	
								Brown Silty Sand some Gravel
							10'	
							15'	
								Bottom of Exploration @ 15.0' (No Refusal)
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								3" Pavement	
								Brown Fine-Medium Sand and Gravel Trace Silt	
							5'		
								Brown Silty Sand some Gravel	
							10'		
							15'		
								Bottom of Exploration @ 15.0' (No Refusal)	
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand some Gravel
							10'	Bottom of Exploration @ 8.0' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel
							5'	
								Brown Clayey Silt
							10'	
							15'	
								Bottom of Exploration @ 15.0' (No Refusal)
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:                      Finish Date:
Hammer Wt.				10/10/12                              10/10/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						3.5" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						_____
						Brown Silty Sand some Gravel
						_____
					5'	
						Brown Clayey Silt
					10'	
					15'	
						Bottom of Exploration @ 15.0' (No Refusal)
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

Type	Casing	Sample	Core	Ground Water Observation	
				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel
							5'	
								Brown Clayey Silt
							10'	
							15'	
								Bottom of Exploration @ 15.0' (No Refusal)
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel
							5'	
								Brown Clayey Silt
							10'	
							15'	
								Bottom of Exploration @ 15.0' (No Refusal)
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/10/12	10/10/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel
							5'	
								Brown Clayey Silt
							10'	
							15'	
								Bottom of Exploration @ 15.0' (No Refusal)
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date: 10/11/12      Finish Date: 10/11/12
Hammer Wt.				
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						4" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						_____
						Brown Silty Sand some Gravel
					5'	_____
						Brown Clayey Silt
					10'	
					15'	_____
						Bottom of Exploration @ 15.0' (No Refusal)
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:                  Finish Date:
Hammer Wt.				10/11/12                          10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						3.5" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Silty Sand some Gravel
					5'	
						Brown Clayey Silt
					10'	
					15'	
						Bottom of Exploration @ 15.0' (No Refusal)
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel
							5'	
								Brown Clayey Silt
							10'	
								Bottom of Exploration @ 11.3' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:                      Finish Date:
Hammer Wt.				10/11/12                              10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						3" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						_____
						Brown Silty Sand some Gravel
						_____
					5'	Brown Clayey Silt
						_____
						Weathered Bedrock
						_____
					10'	Bottom of Exploration @ 9.5' (Auger Refusal)
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel
							5'	Brown Clayey Silt
								Weathered Bedrock
							10'	Bottom of Exploration @ 9.4' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel/Cobbles
								Brown Clayey Silt
							5'	Bottom of Exploration @ 4.2' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.75" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel/Cobbles
								Brown Clayey Silt
							5'	Weathered Bedrock
								Bottom of Exploration @ 6.3' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

Casing	Sample	Core	Ground Water Observation
			No Free Water Observed
Type			
Size			Start Date:                  Finish Date:
Hammer Wt.			10/11/12                      10/11/12
Hammer Fall			

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						4" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Clayey Silt
						Weathered Bedrock
					5'	Bottom of Exploration @ 4.3' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.25" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Weathered Bedrock
							5'	Bottom of Exploration @ 3.5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:              Finish Date:
Hammer Wt.				10/11/12                  10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						4" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						Weathered Bedrock
						Bottom of Exploration @ 3.0' (Auger Refusal)
					5'	
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4.25" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Weathered Bedrock
								Bottom of Exploration @ 3.3' (Auger Refusal)
							5'	
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.25" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Clayey Silt
							5'	Weathered Bedrock
								Bottom of Exploration @ 5.7' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								4" Pavement	
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Clayey Silt	
							5'		
								Weathered Bedrock	
								Bottom of Exploration @ 6.9' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Clayey Silt
							5'	Weathered Bedrock
								Bottom of Exploration @ 5.8' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				4.8'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Weathered Bedrock
								Bottom of Exploration @ 5.4' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				5.9'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.75" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	
								Weathered Bedrock
								Bottom of Exploration @ 8.6' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.3'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	
								Weathered Bedrock
							10'	Bottom of Exploration @ 8.8' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.4'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								1.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	
								Weathered Bedrock
							10'	Bottom of Exploration @ 8.0' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.7'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								1" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Brown Clayey Silt
							10'	Weathered Bedrock
								Bottom of Exploration @ 11.7' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	









# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Brown Clayey Silt
							10'	Weathered Bedrock
								Bottom of Exploration @ 10.5' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Brown Clayey Silt
								Weathered Bedrock
							10'	Bottom of Exploration @ 10.7' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Brown Clayey Silt
							10'	Weathered Bedrock
								Bottom of Exploration @ 11.2' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Brown Clayey Silt
							10'	Weathered Bedrock
								Bottom of Exploration @ 11.2' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:                  Finish Date:
Hammer Wt.				10/11/12                      10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						2.5" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Silty Sand
					5'	Brown Clayey Silt
						Weathered Bedrock
					10'	Bottom of Exploration @9.3' (Auger Refusal)
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.75" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Brown Clayey Silt
								Weathered Bedrock
								Bottom of Exploration @ 7.7' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:            Finish Date:
Hammer Wt.				10/11/12                10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						2" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
					5'	Brown Silty Sand
						Weathered Bedrock
						Bottom of Exploration @ 8.6' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				7.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								1.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand
							10'	Grey Clayey Silt
								Bottom of Exploration @ 10.6' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	
								Weathered Bedrock
								Bottom of Exploration @ 6.1' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand
							10'	Bottom of Exploration @ 8.5' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	
								Bottom of Exploration @ 5.7' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	
								Bottom of Exploration @ 6.1' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:                  Finish Date:
Hammer Wt.				10/11/12                      10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						2.5" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
					5'	Brown Silty Sand
						Bottom of Exploration @ 7.5' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.75" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	
								Bottom of Exploration @ 5.0' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:                  Finish Date:
Hammer Wt.				10/11/12                          10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						2.5" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						<hr/>
						Brown Silty Sand
					5'	<hr/>
						Weathered Rock
						<hr/>
						Bottom of Exploration @ 5.2' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Weathered Rock
								Bottom of Exploration @ 5.0' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Weathered Rock
								Bottom of Exploration @ 4.5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand some Gravel
							5'	
								Weathered Rock
								Bottom of Exploration @ 8.4' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								2.75" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
							5'	Bottom of Exploration @ 4.4' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				9.1'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								3" Pavement	
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Fine Sand	
							5'		
								Brown Sandy Silt and Gravel	
							10'		
								Bottom of Exploration @ 12.5' (Auger Refusal)	
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date: 10/11/12      Finish Date: 10/11/12
Hammer Wt.				
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						3" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Fine Sand
					5'	Brown Sandy Silt and Gravel
						Bottom of Exploration @ 6.9' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				9.3'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Fine Sand
							5'	
								Brown Sandy Silt and Gravel
							10'	
								Bottom of Exploration @ 10.3' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand and Gravel
								Bottom of Exploration @ 7.5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.75" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand and Gravel
								Bottom of Exploration @ 5.9' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand and Gravel
								Bottom of Exploration @ 6.5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand and Gravel
							10'	Bottom of Exploration @ 8.4' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								4" Pavement	
								Brown Fine-Medium Sand and Gravel Trace Silt	
							5'	Brown Silty Sand and Gravel	
								Bottom of Exploration @ 7.2' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:                      Finish Date:
Hammer Wt.				10/11/12                              10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						3.25" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
					5'	Brown Silty Sand and Gravel
					10'	Bottom of Exploration @ 8.1' (Auger Refusal)
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:                      Finish Date:
Hammer Wt.				10/11/12                              10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						3.25" Pavement
						Brown Fine-Medium Sand and Gravel Trace Silt
						_____
					5'	Brown Silty Sand and Gravel
						_____
						Bottom of Exploration @ 5.9' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand and Gravel
								Bottom of Exploration @ 7.5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand and Gravel
								Bottom of Exploration @ 7.3' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.5" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	Brown Silty Sand and Gravel
								Bottom of Exploration @ 5.3' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.25" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	
								Brown Silty Sand and Gravel
							10'	
								Bottom of Exploration @ 11.4' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	
								Brown Silty Sand and Gravel
								Weathered Bedrock
							10'	Bottom of Exploration @ 8.9' (Auger Refusal)
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:                  Finish Date:
Hammer Wt.				10/11/12                      10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								3.75" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand and Gravel
							5'	Weathered Bedrock
								Bottom of Exploration @ 5.1' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								4" Pavement
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand and Gravel
							5'	
								Weathered Bedrock
								Bottom of Exploration @ 6.6' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

Casing	Sample	Core	Ground Water Observation
Type			7.1'
Size			Start Date: <span style="float: right;">Finish Date:</span>
Hammer Wt.			10/11/12 <span style="float: right;">10/11/12</span>
Hammer Fall			

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Fine-Medium Sand Some Silt	
							5'		
							10'	Grey Clayey Silt	
							15'		
								Bottom of Exploration @ 15' (No Refusal)	
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				7.5'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Fine-Medium Sand Some Silt	
							5'		
								Grey Clayey Silt	
							10'		
								Bottom of Exploration @ 10.8' (Auger Refusal)	
							15'		
							20'		
							25'		
							30'		



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				6.6'
Size				Start Date:          Finish Date:
Hammer Wt.				10/11/12          10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Fine-Medium Sand Some Silt
					5'	
						Brown Clayey Silt
					10'	
						Bottom of Exploration @ 12.4' (Auger Refusal)
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				6.4'
Size				Start Date:                  Finish Date:
Hammer Wt.				10/11/12                      10/11/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						-----
						Brown Fine-Medium Sand Some Silt
					5'	
						-----
						Bottom of Exploration @ 7' (No Refusal)
						Stopped Boring after drill penetrated buried insulation.
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Clayey Silt
							5'	Bottom of Exploration @ 5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/11/12	10/11/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
								5'	Brown Clayey Silt
								10'	Bottom of Exploration @ 8.1' (Auger Refusal)
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Silty Sand
								5'	Brown Clayey Silt
								10'	Bottom of Exploration @ 9.0' (Auger Refusal)
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Sand	
							5'	Brown Clayey Silt	
							10'	Bottom of Exploration @ 8.9' (Auger Refusal)	
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Sand	
							5'	Brown Clayey Silt	
								Bottom of Exploration @ 6.6' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Sand	
							5'	Brown Clayey Silt	
								Bottom of Exploration @ 6.8' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand and Gravel
							5'	Bottom of Exploration @ 3.4' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Clayey Silt
								5'	
									Bottom of Exploration @ 5.4' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Clayey Silt
							5'	Weathered Bedrock
								Bottom of Exploration @ 4.5' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Clayey Silt
								5'	Weathered Bedrock
									Bottom of Exploration @ 4.2' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Clayey Silt
								5'	
									Weathered Bedrock
									Bottom of Exploration @ 5.3' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Clayey Silt	
							5'	Weathered Bedrock	
								Bottom of Exploration @ 6.2' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Sand with Brick pieces	
							5'	Bottom of Exploration @ 4.5' (No Refusal) Stopped boring once drill penetrated buried brick	
							10'		
							15'		
							20'		
							25'		
							30'		



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Clayey Silt
							5'		Weathered Bedrock
									Bottom of Exploration @ 4.9' (Auger Refusal)
							10'		
							15'		
							20'		
							25'		
							30'		





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:                  Finish Date:
Hammer Wt.				10/12/12                          10/12/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Clayey Silt
					5'	
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:      Finish Date:
Hammer Wt.				10/12/12                  10/12/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Bottom of Exploration @ 1.4' (Auger Refusal)
					5'	
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Clayey Silt	
							5'	Bottom of Exploration @ 4.6' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Bottom of Exploration @ 2.1' (Auger Refusal)	
							5'		
							10'		
							15'		
							20'		
							25'		
							30'		



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation No Free Water Observed
Type				
Size				Start Date:          Finish Date:
Hammer Wt.				10/12/12                  10/12/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Bottom of Exploration @ 1.2' (Auger Refusal)
					5'	
					10'	
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				7.2'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Fine Sand	
							5'		
								Brown Clayey Silt	
							10'		
							15'	Weathered Bedrock	
								Bottom of Exploration @ 15.0' (Auger Refusal)	
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				6.8'
Size				Start Date: 10/12/12      Finish Date: 10/12/12
Hammer Wt.				
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Silty Fine Sand
					5'	Brown Clayey Silt
						Weathered Bedrock
					10'	Bottom of Exploration @ 9.0' (Auger Refusal)
					15'	
					20'	
					25'	
					30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				6.9'	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Fine Sand	
							5'	Brown Clayey Silt	
								Weathered Bedrock	
							10'	Bottom of Exploration @ 9.1' (Auger Refusal)	
							15'		
							20'		
							25'		
							30'		

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Fine Sand	
							5'	Brown Clayey Silt	
								Weathered Bedrock	
								Bottom of Exploration @ 7.8' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt Bottom of Exploration @ 2.0' (Auger Refusal)
								5'	
								10'	
								15'	
								20'	
								25'	
								30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt	
								Brown Silty Sand	
								Weathered Bedrock	
							5'	Bottom of Exploration @ 3.7' (Auger Refusal)	
							10'		
							15'		
							20'		
							25'		
							30'		





# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation
Type				No Free Water Observed
Size				Start Date:                  Finish Date:
Hammer Wt.				10/12/12                          10/12/12
Hammer Fall				

No.	Pen	Rec	Sample Depth	Sample Blow Counts	Depth	Stratum Description
						Brown Fine-Medium Sand and Gravel Trace Silt
						Brown Silty Sand
						Weathered Bedrock
					5'	Bottom of Exploration @ 3.9' (Auger Refusal)
					10'	
					15'	
					20'	
					25'	
					30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt
							5'	
							10'	
							15'	
							20'	
							25'	
							30'	



# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Silty Sand
								5'	
									Weathered Bedrock
									Bottom of Exploration @ 6.0' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts				Depth	Stratum Description
									Brown Fine-Medium Sand and Gravel Trace Silt
									Brown Silty Sand
								5'	
									Weathered Bedrock
									Bottom of Exploration @ 5.3' (Auger Refusal)
								10'	
								15'	
								20'	
								25'	
								30'	

# Northern Test Boring, Inc. Boring Log

Client: City of Portland	Project Name: Peaks Island Sewer Expansion
Location: Peaks Island, Me	Driller: Mike Nadeau

	Casing	Sample	Core	Ground Water Observation	
Type				No Free Water Observed	
Size				Start Date:	Finish Date:
Hammer Wt.				10/12/12	10/12/12
Hammer Fall					

No.	Pen	Rec	Sample Depth	Sample Blow Counts			Depth	Stratum Description
								Brown Fine-Medium Sand and Gravel Trace Silt
								Brown Silty Sand
								Weathered Bedrock
							5'	Bottom of Exploration @ 4.4' (Auger Refusal)
							10'	
							15'	
							20'	
							25'	
							30'	