GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works and Engineering

OPERATION AND MAINTENANCE
OF THE
TYNES BAY WATER TREATMENT FACILITY

SERVICE INFORMATION

FEBRUARY 2016

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SECTION 1: DESCRIPTION OF SERVICE

1.1 Scope of Work

A The scope of work shall be the overall operation, repair and maintenance of the Tynes Bay Water Treatment Facility. The *Affected Property* includes the main building and the adjacent ancillary buildings and associated plant (herein after referred to as the *Affected Property*) shall be operated and maintained in a manner that is in compliance with the terms of the Agreement, and that maintains the integrity of the *Affected Property*.

B The *Affected Property* shall be operated to provide potable water to meet the demand level as required by the *Employer*.

C The *Contractor* shall provide all services that are required to sustain full functionality of the *Affected Property* and shall include but not be limited to:

1. Operation, repair and maintenance of feed wells to the *Affected Property*, including the mains between the wells and *Affected Property*;
2. Operation, repair and maintenance of the mains connection between the *Affected Property* and the North Shore Truckers' Outlet water storage tank;
3. Operation, repair and maintenance of the *Affected Property* including all associated equipment; both internal and external;
4. Operation repair and maintenance of the containerized RO and ancillary equipment as part of the *Affected Property*. The unit is to be operated periodically to ensure it remains operational at all times
5. Operation, repair and maintenance of the backup generator adjacent to the *Affected Property*;
6. Sampling, testing and collection of data; and
7. Prepare and submit monthly and quarterly reports as defined in the Service Information.

D Repair and maintenance of the *Affected Property* shall mean fixing any sort of mechanical or electrical *Plant* should it be broken or not functioning (repair) as well as performing the routine actions which keep the *Plant* in working order (maintenance) or prevent trouble from arising (preventive maintenance). Repair shall also include the replacement of parts when it is not possible to fix an item of *Plant*.

E The *Affected Property* shall be operated and maintained for the Service

Period which is stated in Part One of the Contract Data.

F The Service shall be conducted under the NEC3 Term Service Conditions of Contract (June 2005) (with amendments dated June 2006).

1.2 Security of the Site

A The *Contractor* is responsible for maintaining the security of the site area.

1.3 Submittals

- *Contractor*'s Plan
- Copies of certification and where appropriate work permits for workforce
- Insurance Certificates
- Monthly and Quarterly Reports

SECTION 2: PLANT AND MATERIALS

2.1 Plant

A The *Affected Property* includes a 1,000,000 imperial gallon per day (igpd) seawater reverse osmosis plant. The plant consists of two trains which can be operated together or independently. The first train was completed in April 2009. The second train was completed in June 2011.

B The main components of the plant include:

- Two seawater wells including pumps (a third well is scheduled to be constructed during the first six months of the service period)
- Media filters
- Two individual Reverse Osmosis treatment trains
- Cartridge filters
- Scrubbers
- Energy Recovery systems
- Post-treatment system
- Backup generator
- Plant infrastructure
- Containerized RO and ancillary equipment

C The *Contractor* is responsible for providing all materials and equipment required for operation and maintenance of the *Affected Property*. This includes the provision of heavy lifting equipment as necessary.

D The plant shall be maintained as per the manufacturers recommendations which is included in the Equipment and Operations Manual for the *Affected Property*.

E Further details and information about the plant is located in the Equipment and Operations Manual for the *Affected Property*.

2.2 Materials

A The *Contractor* shall be responsible for all consumable materials required to operate and maintain the *Affected Property*.

2.3 Spares

A A supply of specific spares is available for the plant. The list of spares currently in inventory is included in Appendix A. The Contractor is

responsible for maintaining the inventory of spares and shall at his own cost purchase replacement items when spares are used within the plant. Replacement items shall be purchased in accordance with the policies given in Section 8 of the Service Information.

B The current contractor has a list of further spares and consumables available for purchase by the incoming Contractor. All costs associated with the purchase of such additional items are to be included in the Contractor's bid price.

2.4 Diesel Fuel

A The *Employer* shall be responsible for the purchase of fuel for the emergency generator. The *Contractor* shall ensure that adequate notice is given to the *Employer* when fuel levels are low.

2.5 Seawater Wells

A The seawater wells shall be cleaned every six months to maintain their performance and to ensure an adequate flow of raw water. The cleaning shall include the following;

1. Remove pump from the well.
2. Mix and pump a chlorine solution into the well.
3. Let stand for 24 hours.
4. Agitate the chlorine solution in the well using a drillers rig.
5. Reinstall pumps and pump wells to divert waste until there is no chlorine residual
6. Once the presence of chlorine is no longer detected in the raw water, the water can be redirected back to the plant.

B A crane and well drilling rig will be required to complete the cleaning work.

SECTION 3: PROPERTY AND FACILITIES

3.1 Affected Property

A The Affected Property is located at 56 North Shore, Devonshire. Infrastructure for the *Affected Property* also exists at 45 North Shore Road, Devonshire which is located directly north of the Affected Property.

B As-built drawings of the *Affected Property* are contained in the Equipment and Operations Manual.

3.2 Building

A The building is a 6300 sq ft, two-storey prefabricated structure located at the eastern side of the Affected Property.

B Electrical power is supplied via the Tynes Bay Waste-to-Energy Facility or BELCO. All power costs shall be paid by the *Employer*.

C The eastern portion of the building is air-conditioned. All other areas of the building are not air-conditioned.

D Water for the *Affected Property* is primarily provided from the cistern located at the southeast corner of the Affected Property.

3.3 Use Of Affected Property

A The *Contractor* shall have full use of *Affected Property* for the service during the Service Period of the Contract except as directed by the *Employer*.

B The *Contractor* shall arrange a site visit to the *Affected Property* to show the *Employer* how the plant is operating. These visits can be arranged around the Quarterly Performance Report submission.

3.4 *Employer*'s Access

A The *Affected Property* shall be accessible to the *Employer* or *Service Manager* at all times. The *Employer* shall have access whether by electronic or standard lock system. The *Employer* or *Service Manager* shall give notification to the *Contractor* when access is required.

3.5 Damages to Affected Property

A The *Contractor* shall make good any damages made to the *Affected Property* during the Service Period as a result of actions by the *Contractor*. The damages shall be repaired to match existing or as approved by the *Employer*.

B Normal maintenance and damages to the building and surrounding grounds shall be reported to the *Service Manager*.

3.6 Transfer of the *Affected Property*

A Transfer of the *Affected Property* shall be undertaken in an orderly manner at the commencement and completion of the Service Period.

B The actual time of day for transfer of the plant from the *Employer* to the *Contractor* shall be agreed prior to commencement of the Service Period.

C A list of all services shall be provided to the *Contractor* prior to commencement of the Service Period. This includes telephone and internet access. These services shall be transferred to the *Contractor* and all associated costs shall be borne by the *Contractor* during the Service Period.

D The *Service Manager* and *Contractor* shall complete an initial joint inspection of the *Affected Property* prior to commencement of the Service Period and agree and certify the condition and operational competency of the *Affected Property*. The following parameters shall be confirmed;

Parameter	**Value**
Calcite Concentration (ppm)	250 (maximum)
Conductivity (Microseimens)	700 (average)
PH	7 (minimum)
Residual Chlorine	0.6 (minimum)
Flow rate per train (US gallons per minute)	375 (minimum)

The product water shall conform to the parameters outlined in Appendix B.

E The *Affected Property* shall be shut down by the *Employer* once the condition and operational competency of the *Affected Property* is confirmed. The *Contractor* shall start the *Affected Property* and commence the Service Period.

F At the completion of the Service Period the *Affected Property* shall be transferred in the same manner as at the commencement of the Service Period.

G The *Service Manager* and *Contractor* shall complete an inspection at the end of the Service Period. The *Affected Property* shall be fully operational and the *Service Manager* shall certify condition and operational competency. The *Contractor* shall undertake any works required by the *Service Manager* in order to return the *Affected Property* in same condition and operational competency as when certified prior to commencement of the Service Period, except for reasonable wear and tear as determined by the *Service Manager*. The *Affected Property* shall be fully operational and conform to the operational parameters listed in 3.6 (D) of the Service Information.

H The *Employer* may elect to purchase the remaining consumables from the *Contractor* at the end of the Service Period. The *Employer* may also elect to purchase any tools or equipment from the Contractor at the end of the Service Period with a depreciation rate of 6% per annum. The *Contractor* shall provide evidence of original purchase price and date.

SECTION 4: *CONTRACTOR*'S PLAN

4.1 Plan Details

A The *Contractor* shall prepare a plan detailing how the service shall be undertaken. This should include a management plan which entails:

1. The Management Structure;
2. Contingencies for problem solving;
3. Coverage for staff absences;
4. Financial Control;
5. Health and Safety Program (HSP);
6. Communications plan with Employer which includes contact information for key personnel;
7. Hurricane preparedness and emergency plan; and
8. Blackout operations plan (i.e. loss of electrical power).

4.2 Programme of Works

A The *Contractor* shall plan to operate both trains to ensure that both are available if necessary. The operation shall be rotated periodically and agreed with the Service Manager when only half of the *Affected Property's* capacity is required.

B The *Contractor* shall include a programme of the maintenance works coordinating all tasks and activities and based on the maintenance schedule in Appendix A.

C The *Contractor* shall include the maintenance of the generator (including the tank and screens) in the programme of works. The generator shall be operated on full load (one RO train only) for a minimum of one day (24 hours) per month.

4.3 Warning Notices

A The *Contractor* must issue a warning notice to the Service Manager any time it is required to take corrective actions that will impact on the delivery of the service to the *Employer*.

B The *Contractor* shall provide details in the plan which indicates how notification shall be accomplished.

4.4 Hurricanes and Emergency Preparations

A The Contractor shall coordinate with the Employer during tropical storms, hurricanes or other extreme weather conditions.

B In the event of a hurricane, the *Contractor* shall operate the *Affected Property* as follows:

- When a Hurricane Watch is issued by the Bermuda Weather Service, the generator shall be inspected and prepared for operation. Fuel levels, battery condition etc shall be checked.
- The *Affected Property* shall be operated until a Hurricane Warning is issued from the Bermuda Weather Service or at the end of the work day; whichever occurs first. The *Affected Property* shall be shut down to protect it from any damage for the duration of the storm. If the Prospect reservoirs are already full, the *Contractor* will be notified by the *Service Manager* to cease operations until after the storm. The *Affected Property* shall be made secure to minimise any damage from the storm.

C The *Contractor* shall have personnel available to attend the *Affected Property* after a storm. The *Contractor* shall report to the *Affected Property* as soon as is practicable, to assess any potential damage and prepare to restart the *Affected Property*. No water should be sent to the Prospect Reservoirs before notifying and coordinating operations with the *Service Manager*.

SECTION 5: SAFETY AND HEALTH

5.1 Legislation

A The *Contractor* shall comply with all current Health and Safety Legislation.

5.2 Health and Safety Program

A The *Contractor* shall prepare a Health and Safety Program as per Section 4, Clause 4.1 (A) of the Service Information.

5.2 Notification

A The *Contractor* shall, immediately on occurrence of any accident at or about the Affected Property, or in connection with the execution of the Works, report such accident to the *Service Manager*. The *Contractor* shall also report such accident to the appropriate Authority whenever such report is required by Law.

B The *Contractor* shall post notices to inform the workers of their conditions of work in conspicuous places at the establishments and work places concerned.

5.3 Safety During Tours

A The *Employer* occasionally conducts tours of the *Affected Property* to Government employees and members of the public. If the *Affected Property* is in operation, no member of the public shall enter the main plant floor.

B No tours shall be undertaken by the *Contractor* without written permission of the *Employer*.

SECTION 6: TESTS AND INSPECTIONS

6.1 Water Quality Standards

A The quality of the water produced by the *Affected Property* shall conform to the Drinking Water Standards contained in Appendix B. This standard is the minimum requirements as established by the Department of Health.

6.2 Measurement Requirements

A In addition to activities that the *Contractor* must perform to satisfy obligations under other sections of this Contract, the *Contractor* is required to provide the sampling and analytical services. All analysis is to be performed in accordance with the protocols and procedures specified in the product water criteria.

6.3 Measurement of Volumes

A The measurement of the volumes of treated water, and basis for payment will be at the point where the treated water exits the *Affected Property* after the pumping unit. The volume of raw water entering the *Affected Property* shall be measured and included with the monthly reports.

All measurements are to be continuous and recorded electronically using SCADA system.

6.4 Measurement of Physical and Chemical Parameters

A Weekly bacteriological testing samples can be delivered to the Central Government Laboratory located at Building 332, 11 Waller's Point Road, St George's Parish. Arrangements will need to be made with the laboratory for an appropriate delivery time. There is a charge per sample (as per current Government Tariff Schedule) all costs to be included by the *Contractor*. The requirements below are the minimum required by the *Employer*. The *Contractor* may require more frequent sampling and analysis for process control.

Raw sea water

- ***Continuous*** - pressure, flowrate
- ***Quarterly*** - TDS, SDI, Iron, H_2S

Product water

- ***Continuous*** – TDS, residual chlorine, flowrate, conductivity, reservoir level at Prospect Reservoir
- ***Weekly*** - Total Coliform, fecal coliform, E. Coli

- ***Quarterly –*** All parameters in the EPA National Primary Drinking Water Standards.
- ***Annual –*** All parameters in the EPA National Primary and Secondary Drinking Water Standards

SECTION 7: RECORD KEEPING

7.1 Reporting

A The *Contractor* shall develop and maintain a system for documenting the operation of the *Affected Property* and other components of the affected property, and preparing monthly reports to the *Employer*. The information includes, but is not limited to that required for calculation of payments due. The *Employer* may require additional information that the *Contractor* would normally be expected to compile as complete documentation of the service.

B The report shall be submitted to the *Service Manager* each month and shall be used as a basis for payment when invoice is received. The *Contractor* shall meet with the *Service Manager* to review the report. No payment shall be made until the report is received.

7.2 Monthly Performance Report

A The following details shall be contained in the monthly performance report.

- Summary of daily operations.
- Report of all days when water was not treated and/or the *Affected Property* was not available for treating such water.
- Identify length of time the *Affected Property* was not in operation at a materially low level. Report reason for such failures.
- Summary of all maintenance performed at the *Affected Property*.

Detailed daily and continuous measurements to be retained by the *Contractor* and summarized for the *Employer* in the Monthly Report. This shall include:

- Plant totaliser meter readings to Prospect reservoirs
- Each RO train totaliser meter readings
- Average flow rate from *Affected Property*
- Average conductivity of product water
- Number of productions days
- Number of unscheduled downtime days or any part thereof
- Daily production rate of each train including percentage run times of each train
- Total volume of water produced in a month at *Affected Property*
- Monthly production for each train
- Chemical usage per month
- Media filter inlet pressure and differential pressure
- Total run time, in hours, of the emergency generator
- Total diesel fuel consumption

- Results of bacteriological and chemical tests

B A log shall be kept of all maintenance performed on site as per the maintenance schedule in Appendix A. The log shall be available for review by the *Employer* at all times.

7.3 Quarterly Performance Report

A The Quarterly Report shall contain a summary of overall operations. Results of analysis of the quarterly parameters measured shall be presented.

7.4 Statutory Reporting

A The *Contractor* shall maintain all records and reports as required by law.

SECTION 8: MAJOR EQUIPMENT PROCUREMENT

8.1 Objectives

A The *Contractor* shall have a consistent approach to purchasing to achieve the following objectives:

- Value for money,
- Fairness, i.e. quotations and/or tenders will be treated equally,
- Conduct of business openly and without restrictive practice,
- A variety of suppliers are given the opportunity to quote,

8.2 Initiation of Procurement Process

The *Contractor* must issue a warning notice to the Service Manager any time it is required to take corrective actions arising from the failure of a major piece of equipment that will impact on the delivery of the service to the *Employer*.

The *Contractor* shall provide a justification with the notice detailing why the equipment is to be replaced in preference to being repaired.

Within 3 days the Employer will give written confirmation to initiate the Procurement Process.

Where it is considered that the need for replacement arises from the failure of the contractor to properly maintain the equipment or has operated the equipment negligently the Contractor will be required to bear the full cost of replacement.

8.3 Procurement Process

A

(1) All goods shall be obtained on the basis of at least 3 quotations.

(2) The range of suppliers requested to provide quotations must be as wide as practicable.

(3) Company Officers responsible for ensuring that these procedures are followed may be called upon to justify the tendering process.

(4) The Contractor shall clearly state all the relevant information necessary to secure an accurate price for the replacement equipment.

(5) The Contractor must obtain Quotations in writing and retain all documentation for the duration of the Service Period and hand over the documentation at the end of the contract.

(6) A closing date/time for submission of quotations must be stated and strictly observed.

(7) The lowest price must be accepted or reasons for not accepting the lowest price must be documented.

(8) Unsuccessful suppliers should not be allowed to re-submit a lower quotation price - the first quotation must be accepted.

(9) Successful and unsuccessful suppliers should be notified in writing.

(10) When requesting quotations from foreign suppliers, ensure that total landed cost is used to compare to local quotations. Landed cost should include purchase price, exchange, freight, duty and all handling costs.

8.4 Payment

A Prior to the acceptance of any quote for Major Equipment the Contractor shall submit a recommendation to the Employer for approval. Within 7 days the Employer will give written confirmation to proceed with the purchase of the recommended goods.

B Upon receipt of the goods at the plant and a confirmed transfer of title to the Employer the Contractor shall submit an invoice for payment. The invoice shall include all fees and services associated with the installation of the major equipment.

C As part of the Contractors' bid a fee for the procurement service under this Section shall be included in the Annex A: Price Schedule submitted with the Contractors bid.

SECTION 9: SECONDMENT OF MINISTRY PERSONNEL

9.1 Objectives

A The *Contractor* shall enter into a separate agreement for the secondment of selected *Ministry* Staff to work under the Contractor's direction and management for an agreed period. The proposed Agreement is given in Appendix C. The secondment is intended to achieve the following objectives:

- Provide direct work experience for *Ministry* Staff at a seawater desalination plant,
- Seconded Staff will acquire working knowledge of the processes and equipment at the Tyne's Bay Desalination Plant,
- The secondment will cover an agreed continuous period of work at the plant to be up to six months duration,
- The seconded staff will work under the direct management of the Contractor,

9.2 Initiation of the Secondment

The *Ministry* will put forward the name of the person to be seconded. The person will then be asked to attend a joint interview with both the *Contractor* and the Service Manager to clearly set out the terms of the secondment as outlined in the Agreement given in Appendix C. Following the interview the *Contractor* will have the option to accept or reject the member of staff offered for secondment.

9.3 Secondment Process

Following a completion of the secondment Agreement by all parties the Ministry Staff member will be directed to report directly to the *Contractor* and will undertake duties as directed by the *Contractor* until the completion date given in the Agreement. In the event of any dispute arising between the *Ministry* staff member and the *Contractor* during the secondment period the *Contractor* shall immediately notify the Service Manager and the person will then be asked by the *Ministry* to attend a joint interview with both the *Contractor* and the Service Manager to clearly determine the cause of the dispute and determine what possible remedies can be found. In the event that no remedy can be determined the Secondment Agreement will be terminated and the *Ministry* staff member will return to their duties at the *Ministry*.

SECTION 10: INSTALLATION OF THIRD WELL

10.1 Objectives

A The *Contractor* shall install and commission a third abstraction well as detailed in Appendix D within the first six months of the term of the contract

objectives:

- Provide a third abstraction well to increase the feed water to the plant,
- Integrate the operation control of the third well with the existing control systems of the desalination plant

10.2 Provision of Work Plan

Prior to initiating the work the *Contractor* shall provide to the Service Manager a detailed work plan for the installation of the well together with a schedule for the installation works. All integration of the new well feed water into the existing feed lines is to be undertaken with minimal disruption to the desalination plant operation.

10.3 Payment

Upon receipt of the goods at the plant and a confirmed transfer of title to the Employer the Contractor shall submit an invoice for payment for material supply. Upon the successful commissioning of the third well to the satisfaction of the Service Manager the Contractor shall submit an invoice for the balance of monies as given in the Contract Data Price Schedule and shall include all fees and services associated with the installation of the third well.

As part of the Contractors' bid a fee for the installation of the third well under this Section shall be included in the Annex A: Price Schedule submitted with the Contractors bid.

APPENDIX A

SPARE PARTS LIST

Parts and Spares

Item #	Item Description			Stated Qty
1	22.5°- Fitting Sch 80	8"	PVC	2
2	111 Valve Lubricant in tubes	53 Oz.		19
3	6" -Fitting Sch 80	6"	PVC	3
4	305 MTR (BLK) - 1000' Belden shielded circuit cable 2 wire	1000'		1
5	45°-Fitting Sch 80	12"	PVC	1
6	90°-elbow 5 segments	14"	HDPE	3
7	Elbow 90° Sch 80 Slip x Slip	10"	PVC	1
8	Elbow 90° Sch 80 Slip x Slip	12"	PVC	2
9	Elbow 90°	3"	HDPE	2
10	Elbow 90° Sch 80 Slip x Slip	3"	PVC	4
11	Elbow 90°	8"	HDPE	4
15	Baldor motor - divert valve actuator			1
16	Blank Flange 150#	10"	PVC	4
17	Blank Flange 150#	2"	PVC	3
18	Blank Flange 150#	3"	PVC	5
19	Blank Flange 150#	4"	PVC	2
20	Blank Flange 150#	8"	PVC	3
21	Bolt 1" Hex head w/ Nut & Washer		SS	11
22	Bolt 1"x 3" Hex head full thread		SS	6
24	Bolt 1/2"x 3-1/2" Hex head		SS	172
25	Bolt 5/8"x 3-3/4" Hex head		SS	66
26	Burst Disk	4"		2
27	Burst Disk	6"		9
28	Cap Sch 80	3"	PVC	1
29	Cap Sch80	6"	PVC	1
30	Certa Lok Casing (20')	16"		60
31	Certa Lok Connector (Coupling)	16"		3
33	Check Valve	8"	SS	1
34	Chemical Rigid Dosing Line - Suction pipe w/ sensor PVC			1
35	Connector w/ Backing Flange	4"	Rubber	1
36	Coupling Sch 80	10"	PVC	1
37	Coupling Sch 80	12"	PVC	3
38	Deaeration Valve (Dosing Pump Acessories)			1
39	DFT Spring (Hasseloy)	4"		1

40	Emergency Light			2
42	Exit Light			2
43	Expansion Joint	6"	Rubber	1
44	Extension cord (100')			1
45	Van Stone Flange 150# Slip	10"	PVC	1
46	Van Stone Flange 150# Slip	12"	PVC	2
47	Van Stone Flange 150# Slip	2"	PVC	4
48	Van Stone Flange 150# Slip	3"	PVC	4
49	HDPE Flange adapter w collar	4"	Ductile	4
50	Van Stone Flange 150# Slip	4"	PVC	2
51	Van Stone Flange 150# Slip	8"	PVC	7
53	Flange End	8"	SS	1
54	Flange Gasket	1"	Red Rubber	12
56	Flange Gasket	12"	Red Rubber	10
57	Flange Gasket	2"	Red Rubber	6
58	Flange Gasket	3"	Red Rubber	5
59	Flange Gasket	4"	Blue	2
60	Flange Gasket	4"	Red Rubber	4
61	Flange Gasket	6"	Red Rubber	16
62	Flange Gasket	8"	Red Rubber	16
63	Flanged Adapter with Coated Ductile Iron Collar	8"	HDPE	4
70	Flow Monitor Kit			2
72	Gate Valve, cast Iron with hand wheel (Non rising stem)	8"	Cast Iron	5 (Used)
73	Gauge 4" Face 1/2" connection	4"	SS	2
75	Gould Solenoid Valve	1/2"		2
76	Pump 120v 60Hz DME8-10 AR-PV/V/C-F-21RRB		Grundfos	2
79	Hose (Tubing)	1"	Nylon	100'
80	Injection Valve Kit (Dosing Pump accessory)			2
82	LLDP2 - 500' reel	1/4"		5
83	Magnehelic Pressure Gauge			1
84	Filmtec Membrane - 40" x 8" SW30HRLE400			7
85	Nipple Sch 80	2"	PVC	1
86	Nut	1/2"	SS	41
90	Pipe Sch 80 length (20')	10"	PVC	40
91	Pipe Sch 80 length (20')	6"	PVC	40

92	Pipe length (20')	8"	HDPE	120
93	Pipe length (20')	14"	HDPE	90
94	Pipe length (40')	14"	HDPE	200
96	Plastomatic Relief Valve			2
97	PVC Glue	Quart		21
98	PVC Primer	Quart		15
100	Concentric Reducer Sch 80	12" x 8"	PVC	1
101	Bushing Sch 80	8" x 4"	PVC	2
102	Bushing Sch 80	8" x 6"	PVC	3
103	Reducing Flange	8" x 6"	PVC	3
104	Reducing T	3" x 1"	PVC	1
105	Reducing T	6" x 1"	PVC	1
106	Reducing T	6" x 3"	PVC	2
107	Reducing T	6" x 4"	PVC	2
108	Ring Gasket 150#	2"	Blue	5
109	Ring Gasket 150#	4"	Blue	5
110	Ring Gasket 150#	6"	Blue	9
111	Ring Gasket 300#	1"	Blue	10
112	Ring Gasket 300#	4"	Blue	4
113	Ring Gasket 600#	4"	Blue	6
114	Saddle	10"	Teflon	3
115	Saddle	12"	Teflon	19
116	Saddle	4"	Teflon	2
117	Saddle	6"	Teflon	9
118	Saddle	8"	Teflon	5
120	SH, Seal CR Kit			1
121	Siemens Level Sensor			1
122	Simtar 200A Coal Tar Epoxy			1
123	Simtar 200B Hardener			1
124	Solinst Bladder Pump			1
125	Spacer	8"	HDPE	2
126	Stud	1" X 12"	SS	43
127	Stud	3/4" X 15"	SS	10
128	Stud	3/4" X 17"	SS	15
129	Stud	3/4" X 5"	SS	38
130	Stud	3/4" X 6"	SS	5
131	Stud	3/4" X 7"	SS	43

132	Tee Sch 80 Slip x Slip x Slip	12"	PVC	1
133	Tee Sch 80 Slip x Slip x Slip	4"	PVC	6
134	Tee Sch 80 Slip x Slip x Slip	6"	PVC	4
135	Tee Sch 80 Slip x Slip x Slip	8"	PVC	6
136	Time Delay Fuse	100 amp		5
137	Time Delay Fuse	20 amp		4
138	Time Delay Fuse	200 amp		6
139	Time Delay Fuse	30 amp		26
140	Time Delay Fuse	60 amp		10
141	Time Delay Fuse	600 amp		3
142	U-clamps	10 x 3/4"	SS	2
143	U-clamps	10" x 1/2"	SS	4
144	U-clamps	12" x 7/8"	SS	22
145	U-clamps	14" x 7/8"	SS	1
146	U-clamps	4" x 1/2"	SS	5
147	U-clamps	6" x 1/2"	SS	1
148	U-clamps	6" x 5/8"	SS	11
149	U-clamps	8" x 1/2"	SS	9
150	Vic Clamp and Seal	3"		8
151	Vic Clamp and Seal	4"		7
152	Vic Clamp and Seal	6"		2
153	Vic Clamp and Seal	8"		2
154	Watts Water Pressure Reducing Valve			1
156	1/8" Thick Neoprene Gasket (Black)	2"	Rubber	5
157	1/8" Thick Neoprene Gasket	3"	Rubber	10
158	1/8" Thick Neoprene Gasket	4"	Rubber	10
159	1/8" Thick Neoprene Gasket	6"	Rubber	2
160	1/8" Thick Neoprene Gasket	8"	Rubber	10
161	1/8" Thick Neoprene Gasket	10"	Rubber	10
162	1/8" Thick Neoprene Gasket	16"	Rubber	7
163	Signet Flow Meter Display Transmitter, Panel mounted			6
164	Signet Flow Sensor, Roto X Flow Sensor			2
165	Reducing Bush, SxS sch. 80	6"x2"	PVC	3
166	Reducing Bush, SxS sch.. 80	2"x1-1/2"	PVC	3
167	Ball Valve, Thru Union, sch. 80 SxS	1-1/2"	PVC	3
168	Vacuum Breaker, Female THD. shc. 80	1"	PVC	10
169	Vacuum Breaker , Female Thead shc. 80	2"	PVC	3

170	Pressure Relief Valve, 6" Body Diameter 2" inlet/outlet connection THD assembled with the following: 1 ea. 2" close nipple THDxTHD, Tee Equal SxS, Flange socket end and 2 ea. Female adapter FTxS. Maufacturer: RK Industries Model#:RKMRB	2"	PVC	6
171	90* Elbow PVC, sch.80	1-1/2"	PVC	4
172	Tee Equal, PVC Sch. 80	1-1/2"	PVC	1
174	End Cap Female Thd Sch.80	1-1/4"	PVC	6
178	PVC Cleaner (In Can)	Gallon		11
179	PVC glue (In Can)	Gallon		4
180	Metpro Drum Pump Motor			2
182	* 3/8" FNPT x 1/4" FNPT Reducer, Part # SS-6 HRCG-4			6
183	* 1/4" Ferrule, Part # SS-400-Set			20
184	* 1/4" T x 1/4" FNPT, Female Connector Part # SS-400-7-4			12
185	* 1/4" T x 1/4" MNPT Male Elbow Connector Part # SS-400-2-4			10
186	* 1/4" FNPT x 1/4" FNPT x 1/4" MNPT Tee Part # SS-4-ST			4
187	* 1/4" FNPT x 1/4" MNPT x 1/4" FNPTTee, Part # SS-4-BT			2
188	* 1/4" MNPT X 1/4" MNPT SS Short Hex Nipple			5
189	* 1/2" MNPT x 1/2" MNPT SS Short Hex Nipple			1
190	* 1" MNPT x 1" MNPT SS Short Hex Nipple			4
191	* 1/4" T x 1/4" MNPT Male Connector, Part # SS-400-1-4			12
192	* I/4" 1/2" FNPT x 1/4" MNPT Reducer			3
193	* 1/4" FNPT x !/2" MNPT Reducer SS.			2
194	* 3/8" T x 1/2" MNPT Female Connector SS.			2
195	* 1/4" MNPT x 1/4" MNPTx 1/4"MNPT Tee Equal, SS			1
196	* 1/4" FMPT x 1/4" FMPT SS Valve			2
197	Stainless Steel Springs (Cartridge filter acc)			7
198	Filter top Seat (Cartridge filter acc)			7
201	Cartridge Filters			108

TOOLS and Equipment			
Item #	**Item Description**		**Stated Qty**
1	Conductivity Meter (6 P Model use for operation)		1
2	Dewalt Cutting Disk	14"	3
3	ERI Toolkit		2
4	Tent (New) Canopy Ultra Compact		1
5	Pallet Jack 27"x48" Long, 5000lbs capacity Manufacturers: Titan and WESCO	27"x48"	2
6	Bottle Jack, 10 tons by American Forge and Foundry Inc. Model # 3508	cap.: 10 Tons	2
7	Chain Hoist 1 Ton, Manufacturer: Drapper, Part # CH1000	1 Ton	1
8	Mobile Hydraulic Floor Jack, Cap. 3 Tons.	3 Tons	1
9	Mobile Hydraulic Jack with Extension Boom, Heavy Duty.	4,400 Ton	1
10	Pressure Washer, Manufacturer:X-Treem, Model # PL3386 Engine: Honda, Part # GX2000		1
11	Portable Air Compressor, Manufacturer: Speeair by Dayton Mod. # 4B227E, 20Gal. SN. L10/22/2007-00061, Pump # 4B246B, 135 psi max., 120 V/15 Amps/60hz		1
12	Makita Battery Charger, Part #. DC18RA, Ni-Mh Li-ion 7.2-18V		4
13	Makita Batteries, rechargeable Lirthium Ion, Part# BL1830		7
14	Makita Cordless Drill, 1/2 chuck, Concrete/Steel Drill bit Part Number BHP452		1
15	Makita Cordless Drill, 1/2 chuck, Concrete/Steel Drill bit Part Number BHP451		1
16	Makita Cordless for Screws, Part # BTD 141		1
18	Makita Electric Drill, 1/2" Chuck, steel drill bit, Part # 6302H		1
19	Makita Cordless Grinder, 4" wheelx1/2" , Part# BGA452 18, Volts, 10000 RPM.		1
20	Makita Circular Saw, 6" Blade x 1/2" 18V Cordless, Part Number BSS610		1
21	1 Unit welding MIG Welding Machine, Century 250 GS Part #. 83260, MIG Wire Feed Welder, Input 230V/1 phase/ 1 phase, 35 Amp. Max 45V/60%, Output 24V/200Amps. Max. 270 Amps. with complete cord (Never Used… New)		1
22	Dewalt Bench Grinder, 2 wheel,,Model 756, 120V/60Hz/1 1 phase, 3450 RPM.		1
23	Dewalt Chop Saw, Model # D28715, Type 1, 14" Blade, 120 V/50/60 Hz/1 Phase/3450 RPM. SN. 200V 12-YL111		1

25	Digital Multi meter (Tester) Brand: Multipro TM, 530 RMS		1
26	Hand Trucks 700 lbs. Ref.-Mc Master "D" 26355T21		2
27	Flood light with Stand and 2 light each 250 watts / neon bulb		2
28	Aluminum Ladder 10 Ft. , 300 lbs.cap. 7957T17 by Mc Master		1
29	Aluminum Ladder 5 Ft. , 300 lbs.cap. 7957T13 by Mc Master		1
30	Aluminum Ladder 6 Ft., 300 lbs. cap. 7957T14 by Mc Master		1
31	Motor Byke, SYM, 125 cc complete with guard helmet		1
32	3/8 Drive Socket Sets (in one Box) by Mc Master ref. Part no. 7223A81 consist with the following sizes: Short Socket- 1", 15/16", 7/8",13/16",3/4",11/16",5/8",5/16",9/16", 7/16" and 11/32" Deep Socket- 7/8",13/16",3/4",11/16",9/16",1/2",3/8" 3/8" Drive Rachet - 1 ea.3/8" x 2-7/8" long, Female Drive Extension-1 ea.,3/8"x6" Long female Drive Extension- 1 ea. 3/8" Adapterx1/2" Drive - 2 ea., 3/8" Adapter x 3/8" Drive - 1 ea., 3/8' Drive Flex Handle - 1 ea., 3/8"x 3" Long female Drive Extension.		1
33	1/2 Drive Sockets Sets (in 1 Box) by Mc Master ref. Part no. 5565A1 consist with the following sizes: Short Socket- 1-11/4", 1-1/8",1-1/16",1", 15/16",7/8",13/16",3/4",11/16",5/8",9/16",1/2",7/16" Deep Socket- 1-1/4",1-1/8",1-1/16",1", 15/16",7/8",13/16,3/4",11/16",9/16",5/8",1/2", 7/16" 1/2" Drive Rachet- 2 ea., 1/2" Drive Flex Head Handle- 2 ea.,1/2" Female Drive Extension Standard - 2 ea. 		2
34	1/2" Drive x 10" Long Standard Square Drive Rachet Wrench By Mc Master ref. part no. 53155A23		1
35	1/4" Drive Socket Set (in one Box) by Mc Master ref.. Part # 58455A27 consist with the following sizes: Short Socket -1/2", 3/8",5/16",11/32",3/16" 1/4", 7/32",9/32". Deep socket- 1/2",7/16",3/8"11/32",9/32",5/16",1/4". --- 1/4" Adapter x 1/4" Drive- 1 ea., 1/4" Standard Female Drive Extension - 1 ea.		1
37	6 point 1/2" Deep Square Drive Impact Sockets on metal clip rail: Mc Master reference Part # 7221A16 consist with the following sizes: Short Socket - 7/8",13/16",3/4",11/16",5/8",9/16",1/2",7/16",3/8"		1
38	Square Drive Hex-Bit Socket 1/2" Short- By Mc Master Part # 5494A96 (Allen Key ref.) Consist of the following in metal clip rail. - 1/4",5/16",3/8",7/16",1/2",9/16" and 5/8"		1
39	6 point 1/2" Deep square drive impact socket on metal clip rail: Mc master ref. Part # 53105A75		1

	Consist of the following in metal clip rail. - 5/16",1-1/16",1-1/8",1-1/4",1-5/8",1-5/16",1-7/16" and 1-1/2"		
40	6 point 1/2" Standard square drive impact socket on metal clip rail: Mc master ref. Part # 7221A14		1
	Consist of the following. -3/8",1/2",5/8",11/16"3/4",13/16,7/8",15/16"		
41	6 points 1/2" Standard square drive inpact socket on metal clip rail Mc Master ref. Part #		1
	1",1-1/16,1-3/16",1-1/8",1-1/4",1-5/16",1-1/2" and 1-7/16"		
42	2" 6 points 3/4" Deep square drive inpact socket Mc Master ref. Part # 5552a22		1
	40 mm 3/4 Standard square drive impact socket. Mc Master ref. Part # 54175A71		1
43	1/2" Drive Micrometer-Adjustable Click Style Torque Wrench, Knurled grip. Mc Master ref. Part # 85555A315		1
44	3/8" Drive Micrometer-Adjustable Click Style Torque Wrench, Knurled grip. Mc Master ref. Part # 85555A311		1
45	3/8" drive Micrometer Adjustable Click Style Torque wrench, Knurled grip. Mc Master ref. Part # 85555A216		1
46	Premium Set, Inch-12points Box End Combination Wrench, Satin. Mc Master ref. Part # 5444A2		2
	Consist of the following Sizes. 5/16',3/8",7/16",9/16",1/2",5/8",11/16",3/4",13/16",7/8",15/16",1",1-1/8" and 1-1/4"		
47	24" Adjustable Wrench, Auto locking plain handle-Black. Mc master ref. Part # 5386A9		2
48	18" Adjustable Wrench, Auto locking plain handle - Black Mc Master ref. Part # 5386A7		2
49	6" Adjustable Wrench, Auto locking plain handle - Black Mc Master ref. Part # 5386A2		2
50	18" Long Pipe Wrench, Straigh Style Cast Iron - Rigid. Mc Master ref. # 5357A127		2
51	Vise grip Locking Plier 8" long, Stailess Stee 304l. Mc Master ref. Part # 54645A25		2
52	Vise grip Locking Plier 7" long, Stailess Steel 304. Mc Master ref. Part # 54645A24		1
53	Vise grip Curved, Locking Plier 5" long, Stainless Steel 304. Mc Master ref. Part #5369A7		1
55	Vise grip 5" long SS Type 304 Locking plier. Mc Master , Part # 5369A8		1
57	Wire gripping and cutting plier 7-1/4"" lon gwith cushion handle, Mc Master ref. Part # 5616A2		1
58	Wire cutting plier, 8" long with cushion grip handle, Mc Master ref. Part # 85522A12		2

59	CombinationJaw- Slip Join Plier, 8-1/4" long with cushion grip handle. Mc Master ref. Part # 5624A9		1
60	Adjustable self gripping flier (Chane Lock)Standard Curve Jaw 10" long with cushion grip handle.		2
61	Mc Master ref Part # 7453A41		
62	Pry Bar and Nail Puller 18" Long, MC master ref. Part # 5990A2		1
63	Pry Bar and Nail Puller 24" Long, MC master ref. Part # 5956A11		1
64	Quick Grip by Irwin Co., 15" long (Note: Carpenters Tools)		1
65	Quick Grip by Irwin Co., 19" long "		3
66	Quick Grip by Irwin Co., 21" long "		2
67	Quick Grip by Irwin Co., 24" long "		1
68	Quick Grip by Irwin Co., 25" long "		1
69	Premium Plastic Handle Screw drivers, Slotted and Philip Set. Mc Master ref. Part # 8551A31 Size: Slotted (Flat) - 3/8"x10",3/8"x8-1/8",3/8"x6",3/16x7-5/8", 3/16"x3",3/16"x2-5/8",1/4"x1-1/2",1/4"x4-3/16" Size: Round (Philip) - 3/8"x8",3/8x3",1/4"x9',1/4"x4", 1/4"x1-1/2"		1
70	Tee Handle Hex Ket 9" long packed in Venyl Pouch , Texture Grip, Mc Master ref. Part # 4973A73. Size: 3/8",1/4",7/32",3/16",5/32",9/64",1/8",7/64",3/32" and 5/64".		1
71	Ultra Grip Slotted Round Blade. Mc Master ref. Size Slotted (Flat) - 5/16"x12, 1/4"x12",3/16"x8",1/4"x5-7/8",5/16"x8" Size Round (Philip) - 7/16"x8",1/4"x8",3/8"x6,1/4"x4",3/16"x3",1/4"x1-1/2"		1
73	Dial Indicator with magnetic stand, Brand: Mitutoyo Corporation		1
74	Digital Vernier Caliper and Digital Micrometer (IP-54 Electronic Caliper by Fowler Metrology		1
75	Wood Chisel,4-1/2" long blade 4' long handle and Over all length 8-1/2" long by Great Neck USA. Width Size: 1 each. 1/4, 1/2",3/4",1-1/4",1-1/2"		1
76	Metal Files 10" long Size: 4 ea. 1" Flat fine grit; 2 ea. 1" Flat raft grit; 2, ea. 3/8" Triangular shape fine grit; 1 ea. 3/4"Flat fine grit, 2 ea. 1/2" Round file fine grit;2 ea. 1" half moon shape, fine grit and 19 ea. Wood handles.		1
77	AC Digital Clamp Meter wwith accessories , AC 75 Model, SN 07080599 by Amprobe		1
78	Fluke 561 IR Thermometer, ID # 99010070 (Laser type)		1
79	Acoustic Stehthoscop, Model # A-12 by Hunter Products Inc		2
	Office Equipment		
83	Nortel Netwok Phone- N78B26AANAE6		3 ea.

84	Modem by Comtrend ADSL2+Router		1 ea.
92	Desk Table with 4 Drawers		1 ea.
93	Desk Table with 4 Drawers		1 ea
94	Cork board 44" x 34.44"		2 ea.
95	Communication Cable 500 FT., No. 872534, Cat 5E 350Mhz PVC CMR Cable Gray (new)		1 ea.
96	Steel Drawer with two Drawers with key, Size: 4'-5" x 1.5' x 3'-3 1/2"		1 ea.
97	Steel Sheve with 6 open shelves, Size: 6'-7" H x 2.5'W x 1'-.5"Depth		1 ea.

APPENDIX B

DRINKING WATER STANDARDS

Chemical

		Maximum Acceptable Limit
Aresenic	…….	**0.05 mg/l**
Cadmium	…….	**0.005 mg/l**
Chromium	…….	**0.05 mg/l**
Cyanide (CN)	…….	**0.05 mg/l**
Flouride	…….	**1.5 mg/l**
Lead	…….	**0.015 mg/l**
Mercury	…….	**0.001 mg/l**
Nitrate (as N)	…….	**10.00 mg/l**
Nitrite (as N)	…….	**1.00 mg/l**
Selenium	…….	**0.01 mg/l**
Silver	…….	**0.05 mg/l**
Pesticides (total)	…….	**0.005 mg/l**
Phenols	…….	**0.002 mg/l**
Trihalomethanes	…….	**0.10 mg/l**
Asbestos fibres	…….	**7 x 10^6 fibres/l**

Aesthetic Quality

Aluminium	…….	**0.2 mg/l**
Chloride	…….	**300.0 mg/l**
Colour	…….	**15 (TCU)**
Copper	…….	**1.0 mg/l**
Anionic synthetic detergents	…….	**0.2 mg/l (no foaming, taste, no odour problem)**
Hardness	…….	**300.0 mg/l**
Total Dissolved Solids	…….	**800.0 mg/l**
Iron	…….	**0.3 mg/l**
Manganese	…….	**0.1 mg/l**
pH	…….	**6.5 – 8.5**
Sodium	…….	**200 mg/l**
Sulfate	…….	**250.0 mg/l**
Turbidity	…….	**1-5 (JTU)**
Zinc	…….	**5.0 mg/l**

Bacteriological

Treated Water Entering Distribution System		
Faecal coliforms	…….	**0/100 ml**
Coliform organisms	…….	**0/100 ml**

Unpiped Water Supplies

Faecal coliforms	**…….**	**0/100 ml**
Coliform organisms	**…….**	**5/100 ml (should not occur repeatedly)**
Chlorine residual	**…….**	**0.5 ppm**

Note: These standards are the requirements set forth by the Bermuda Government, Department of Health.

APPENDIX C

GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works and Engineering

Base Secondment Agreement

Between **Ministry of Public Works** ("the home"),

Contractor ("the host")

And **Ministry Employee** ("the secondee')

The **Contractor**, **Ministry of Public Works** and **Ministry Employee** agree to the following terms and conditions for the secondment of the **Ministry Employee** to **Contractor**.

1.0 Purpose of Secondment

1.1 **Ministry Employee** will be seconded to **Contractor** to carry out the duties and responsibilities, and to develop the competencies set out in the First Schedule to this Agreement.

1.2 At the conclusion of the secondment the **Ministry Employee** will return to his/her home position as [*title of home position*]. The Service Manager will debrief the **Ministry Employee** and discuss ongoing support and direction for **Ministry Employee**'s career development.

2.0 Terms of Secondment

2.1 The secondment begins on [*start date*]. The secondment will end:

i. On [*the completion date*], although we may mutually agree to vary the term of the secondment and change the end date; or

ii. On expiry of the notice period required under **Ministry Employee**'s employment agreement in the event that **Ministry Employee** resigns from the **Ministry of Public Works**; or

iii. On the giving of four weeks' written notice (or less if agreed by all parties) by any one of the parties to this Agreement to the others; or

iv. In the case of serious misconduct, upon such notice, if any, as **Contractor** considers appropriate.

2.2 **Ministry Employee** remains an employee of **Ministry of Public Works** throughout the secondment period subject to his/her employment agreement with **Ministry of Public Works**. Any variation to **Ministry Employee**'s agreement of employment will be negotiated between **Ministry Employee** and the **Ministry of Public Works**, as required under the terms of his/her

employment agreement. However, any variation to the employment agreement that is needed to provide for matters relating to the secondment will be agreed by all three parties to this Agreement.

3.0 Remuneration and cost recovery

3.1 The **Ministry of Public Works** will remain responsible at all times for the payment of **Ministry Employee**'s salary or wages.

4.0 Leave entitlements and notification

4.1 The **Ministry Employee** will continue to accrue annual leave on the terms and conditions set out in his/her employment agreement with **Ministry of Public Works**. The **Contractor** manager will be responsible for managing any leave taken by **Ministry Employee** and for informing **Ministry of Public Works** of any leave that **Ministry Employee** has taken.

4.2 Secondment, bereavement and any other leave arrangements will remain as set out in **Ministry Employee**'s employment agreement.

4.3 Leave will be reported on a monthly basis as convenient to the Service Manager.

5.0 Performance Management

5.1 The **Ministry Employee** is entitled to performance and remuneration reviews as set out in his/her employment agreement. Performance planning and appraisal is a shared responsibility between **Ministry Employee**'s home manager and his/her host manager. The home manager will arrange with the host manager to receive feedback as part of the review.

5.2 The input to this process will be based on the portion of time **Ministry Employee** spends in each organisation during the performance management reporting period ([*start date*] to [*end date*]).

6.0 Misconduct

6.1 The **Contractor** will involve **Ministry of Public Works** and establish an investigation/disciplinary process in the case of misconduct of the **Ministry Employee**.

7.0 Training and Development

7.1 The **Ministry Employee** and his/her host manager will address any training needs for him/her in relation to the seconded position. The **Ministry of Public Works** agrees to pay for any training that the **Ministry Employee** undertakes in relation to his/her seconded position.

8.0 Applying for positions

8.1 **Ministry of Public Works** recognises that the **Ministry Employee** is entitled to apply for advertised positions in either organisation or externally during the period of the secondment.

8.2 If **Ministry Employee** chooses to apply for any positions in **Contractor** during the period of secondment then he/she would do so as a **Ministry of Public Works** employee.

8.3 The **Ministry Employee** will inform both parties of his/her resignation in writing if he/she is a successful applicant for a position outside both organisations.

9.0 Codes of conduct, policies, procedures and practices

9.1 During the term of the secondment the **Ministry Employee** will abide by the requirements set out in the Codes of Conduct, policies, procedures and practices of both the **Ministry of Public Works** and the **Contractor**. If there are perceived differences in interpretation of the Codes and policies etc of the two organisations, they should be raised and discussed by all parties to the agreement.

9.2 Any actual or potential conflict of interest will be brought to the **Contractor**'s attention for discussion, which may also involve the **Ministry of Public Works** if required.

10.0 Confidentiality

10.1 The **Ministry Employee** will not discuss or disclose any information, processes, materials, documents, costs, or secrets, related to any aspect of the business of the **Ministry of Public Works** or the **Contractor** without the express agreement of the relevant organisation.

10.2 The only exception is where that discussion or disclosure of information is legitimately required as part of the **Ministry Employee**'s performance, duties and responsibilities in relation to his/her work for both organisations.

11.0 Copyright and Intellectual Property

11.1 Unless otherwise agreed in writing, all work produced by the **Ministry Employee** in the course of his/her secondment duties, and copyright in that work, shall belong to **Contractor** and will continue to do so after the termination of this secondment.

12.0 Dispute Resolution

12.1 In the event of a dispute, the parties will first try and resolve the dispute by negotiation. If negotiations fail, the parties will resolve the dispute by mediation.

13.0 Secondee' Responsibilities

13.1 The **Ministry Employee** will be responsible for:

- completing all work objectives and learning development goals specified in First Schedule
- taking appropriate steps to ensure the **Ministry Employee**'s safety and to avoid harm to others, including bringing any health and safety issues in the work place to the **Contractor**'s attention
- producing a weekly record of works undertaken for the contractor as well as keeping in touch with **Ministry of Public Works** on a regular basis
- Identifying changed expectations with [*home manager*] before returning to **Ministry of Public Works**.

14.0 Contractor's Responsibilities

14.1 The **Contractor** will be responsible for:

- the general induction of the **Ministry Employee** into the organisation's business and providing the **Ministry Employee** with the resources he/she needs to perform the tasks required
- agreeing with the **Ministry Employee** clear performance expectations and processes for performance feedback to the **Ministry Employee** and [*home manager*] and for recording and assessing his/her development
- providing regular briefings for **Ministry of Public Works** on the **Ministry Employee**'s performance and progress during the secondment
- identifying learning opportunities to develop individual development goals
- working with **Ministry of Public Works** to provide a supportive environment for the **Ministry Employee**
- discussing any concerns or difficulties related to the secondment with the **Ministry Employee** and the **Ministry of Public Works** as soon as they arise, in the first instance with the **Ministry Employee** and the home manager of **Ministry Employee**

Providing and maintaining a safe working environment that meets the requirements of the Bermuda Occupational Safety and Health Act Regulations of 2009.

15.0 Ministry of Public Works's Responsibilities

15.1 The **Ministry of Public Works** will be responsible for:

- keeping the **Ministry Employee** briefed on work-related activities and events occurring at the **Ministry of Public Works** during his/her secondment (e.g. by extending invitations to meetings, providing information on internal policies, business planning process and social events etc)
- maintaining contact with Contractor' Manager and the **Ministry Employee** by participating in review meetings
- nominating a manager to liaise with the **Ministry Employee** during the term of his/her secondment.

16.0 Review and Feedback Timetable

16.1 The secondment will be reviewed on [*insert agreed review dates e.g. halfway point or every second month etc*].

16.2 The Service Manager and the **Ministry Employee** agree to meet on [*insert timetable for feedback meetings*] and at other times as requested by **Ministry Employee** or Contractor's Manager].

17.0 Signatories

17.1 I have read and understand the agreement and accept the terms and conditions as stated.

*Employee Name*_____
Signature: …….…….. **)**

Date: …….…….. **)**

Contractor

Signature: …….…….. **)**

Date: …….…….. **)**

Ministry Service Manager

Signature: …….…….. **)**

Date: …….…….. **)**

FIRST SCHEDULE: Duties and Development Plan

During the secondment Ministry Employee agrees to carry out the following duties and responsibilities:

[insert duties/role description/workplan, etc, the due dates, and milestones]

During the secondment Ministry Employee agrees to develop the following competencies:

[insert competencies using an agreed competency framework1. Include personal development goals and identify the expected outcomes from goals or competencies, and how they will be measured.]

During the secondment the [*home or host organisation*] agrees to cover costs associated with Ministry Employee attending the following training courses, seminars or conferences:

[insert course name, date, travel and accommodation reservations, etc]

APPENDIX D

GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works and Engineering

WELL CONSTRUCTION AT THE TYNES BAY WATER TREATMENT FACILITY, DEVONSHIRE

Specification

JANUARY 2016

Table of Contents

SECTION 01010: SUMMARY OF WORK

PART 1 – GENERAL

1.1 Scope Of Work Covered By Contract Documents

A The Works, shall include the following:

- Demolish existing concrete slab and remove miscellaneous surface pipes. Drill a test borehole 4inch diameter to examine the underlying strata to a depth of 150ft.
- Upon a favorable review of the test borehole drill 26 inch diameter well to 95 foot depth. If the test borehole is unfavorable a variation will be issued to the contractor to install an alternative well design or drill another pilot hole at a different location.
- Case well with a 18 inch diameter Sch 80 well casing down to bottom of drilling.
- Grout the well casing from the top to the toe of the drilling.
- Upon the curing of the grout drill out the bottom of the casing to provide a minimum diameter hole of 17 ½ inches for a depth of 55ft.
- Construct well head and assembly to support pump.
- Connect well head assembly to existing raw water pipes for the Tynes Bay Water Treatment Facility.
- Connect communications and controls to Tynes Bay Water Treatment Facility (between well pump and VFD).
- Develop well and commission well assembly. This includes verifying that the communication between the well and water treatment facility functions correctly.
- Erect fence and signage to enclose the site as per the drawings.

B The Contractor will be responsible for the transport of all materials to storage on site or off site.

C The Works shall be constructed under the FIDIC Conditions of Short Form of Contract.

1.2 Security of the Site

A The Contractor is responsible for maintaining the security of the site area.

B The Contractor shall ensure that there is no access to the active work site by members of the public during the contract period.

1.3 Contract Method of Measurement

A The measure shall be lump sum excluding any disallowed costs.

B All work to complete the construction and commissioning of the sea water well as detailed in these Technical Specifications shall be covered within the price.

All prices shall be all-inclusive and include all preliminary set up costs, labour, equipment and materials to complete each task. If a specific task is not identified separately in the Form of Tender, the Contractor shall assume that it is included as part of another related listed item or items.

1.4 Project Programme of Works

A Contractor shall programme the works coordinating all tasks and activities.

B Work sequence shall take into account the operating hours of the Government waste disposal sites.

1.5 Use Of Premises

A The site is located adjacent to an active water truckers' outlet. The Contractor shall coordinate activities to reduce the impact of the Works on the operation of the outlet. The Contractor shall give adequate notice to the Employer's Representative of any potential disruption to the outlet.

1.6 Work Under Other Contracts

A The well pump and motor shall be provided by the Employer.

***** END OF SECTION 01010 *****

SECTION 01310 PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.1 Submittals

A Insurances.

B Method Statement.

1.2 General

A Provide to Employer’s Representative for review the submittals specified. Submit with reasonable promptness and in an orderly sequence so as to not cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

B Do not proceed with Work affected by any submittal until review is complete.

C Review submittals prior to submission to the Employer’s Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated

with the requirements of the Work and Contract Documents. Submittals not stamped, signed, dated and identified as to the specific project will be returned without being examined and will be considered rejected.

D Verify that field measurements and affected adjacent Work are coordinated.

E Contractor's responsibility for errors and omission in submission is not relieved by Employer's Representative review of submittals

F Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Employer's Representative review.

G Keep one review copy of each submission on Site.

1.3 Work Hours

A The Work shall be carried out during normal working hours (7.00 am until 6.00pm Monday to Friday) unless the Works are unavoidable or necessary for saving life or property or for the safety of the Works, or as per any instruction from an applicable governmental authority. In such cases the Contractor shall advise the Employer's Representative of the need to perform such extraordinary Works.

B The Employer will not accept claims for overtime unless the Works are as a result of an unforeseen condition.

1.4 Certificates

A Within 5 working days after award of Contract, submit certificates of insurances.

1.5 Utilities

A The Contractor shall contact representatives of all utilities to ascertain the location of all underground services. All such services positions shall be clearly marked at the surface PRIOR to any trenching works commencing.

B The Contractor shall be fully responsible for any damage to services that were clearly marked at the surface caused by the Contractors work and shall fully indemnifies the Employer from any liability arising from any such damages.

C The Contractor shall maintain such markings at the surface at all times.

D When approaching underground services, the Contractor shall cease mechanical digging when machinery is within three (3) feet of the service location or when digging indicates that a service is present. Hand digging shall be used when crossing and exposing utilities and mechanical digging shall

only be resumed once the utility service has been fully exposed and confirmed to be undamaged.

1.6 Daily Records

A The Contractor shall maintain accurate daily records of all works undertaken, all resources present on site, and of the progress.

B Records shall be submitted to the Employer at least weekly and the Contractor may inform the Employer's Representative at any time that it is recording pertinent information.

C Records of any Works that have or have not been carried out that may affect the Schedule shall be used to update the Schedule.

1.7 Inspections

A At all times the Employer's Representative shall be allowed to visit the Site to inspect the Works.

B Prior to closing in any part of the Works, the Contractor shall notify the Employer's Representative with at least 48 hours notice and afford him full opportunity to examine the Works before it becomes inaccessible.

C The Employer's Representative shall reasonably make himself available at the request of the Contractor.

1.8 Safety and Health

A All Works shall be conducted in accordance with the Health and Safety at Work Act 1982. The Contractor shall erect appropriate warning signs and safety barriers. Safe access must be maintained to all public and private properties at all times.

B All workers under the employ of the Contractor, including any sub contractors it may employ shall comply with the Health and Safety at Work Act 1982 and at a minimum wear at all times.

1. A hard hat
2. Metal toe safety boots
3. Reflective vests.

Any workers not wearing appropriate safety gear may be requested by the Employer's Representative to leave the Site, at which time they shall inform the Contractor that they have been requested to leave, and not return until they comply with the Applicable Law or regulations.

C All staff and sub-contractors, under the employ of the Contractor, shall be supplied with written health and safety instructions which they shall read, date and sign prior to commencing work. The signed instructions shall be held by the Contractor and copies shall be provided to the Employer.

D When the Site includes public property such as roads or parks the Site shall be protected from public access with temporary barriers and signs which shall provide appropriate warnings, the Contractors name and a contact telephone number.

E In completing the Works, the Contractor shall comply with all Health and Safety requirements of Applicable Law including all licenses issued by the Bermuda Government to permit the Works.

***** END OF SECTION 01300 *****

SECTION 01500: TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 Summary

A This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

1.2 Use Charges

A The Contractor will be responsible for all temporary works required and shall be required to test, repair/replace or enhance the utility services as necessary to facilitate the Works.

B The Contractor shall allow other entities to use temporary services and facilities without cost, including, but not limited to, Employer's Representative, testing and inspecting agencies and personnel of authorities having jurisdiction.

1.3 Temporary Utility Installation

A Electrical Service:

Where necessary, engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with utility company, Employer, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide alternate services.

B Sanitary Facilities:

Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.

Wash Facilities: Supply cleaning compounds appropriate for each type of material handled.

Drinking-Water Facilities: Provide bottled-water, drinking-water units. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7.2 to 12.7 deg C).

SECTION 01561: ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 Environmental Measures

A Meet or exceed the requirements of all Bermuda environmental legislation and regulations, including all amendments up to project date provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

B At all times during the Works the Contractor shall maintain the Site and surrounding areas in a clean and orderly manner.

PART 2 – PRODUCTS

A Not Applicable.

PART 3 - EXECUTION

3.1 Fires

A Fires and burning of rubbish on site will not be permitted.

3.2 Disposal Of Wastes

A Burying of rubbish and waste materials on site will not be permitted.

B Collect all rubbish and waste material and dispose of in accordance with the latest editions of the Ministry of Public Works, Waste Management Plan.

C Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

D When cleaning with needle scabblers, provide enclosures, screens and traps to confine and contain all material and paint debris and other extraneous material.

E Do not allow any paint debris or other foreign material to enter the water.

F Hazardous waste such as lead paint debris should be double-bagged (as asbestos would be) and sent to proper waste stations. Manifest will be required by the Employer's Representative.

3.3 Work In Or Adjacent To Water

A Not Applicable

3.4 Drainage

A Provide temporary drainage and pumping as necessary to keep site free from water.

B Do not pump water containing suspended materials into waterways, sewer or drainage systems.

C Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with Bermuda authority requirements.

3.5 Plant Protection

A When, in opinion of Employer's Representative, negligence of Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond work areas as shown on contract drawings, the Contractor shall be responsible, at his expense, for complete restoration including replacement of trees, shrubs, grass, etc. to satisfaction of Employer's Representative.

3.6 Pollution Control

A Maintain temporary erosion and pollution control features installed under contract.

B Control emissions from equipment and plant to Bermuda authorities' emission requirements.

C Prevent extraneous materials from contaminating air, land or water, by vacuum, temporary enclosures, screens, traps or other devices.

D Spills of deleterious substances should be immediately contained and cleaned up in accordance with provincial regulatory accordance with provincial regulatory requirements. Spills should be reported forthwith to the Employer's Representative.

E Noise levels emitted from construction activities are subject to Bermuda Government requirements.

3.7 Storage And Handling Of Fuels And Dangerous Fluids

A Locate fuel storage facility a minimum of 100 m from any waterbody in an area approved by the Employer's Representative and construct impermeable dykes so that any spillage is contained

B Prevent spillage of gasoline, diesel fuel and other oil products into the water and on land. Clean up spills promptly at own cost in accordance with Bermuda regulatory requirements. Report any fuel spills immediately to Employer's Representative

C Proper use of primers, grouts, bonding adhesives and other hazardous substances will be undertaken to prevent their entry into the water. Substances are to be stored and mixed on protected surfaces away from site to prevent their entry into waterways and contamination of soils.

D Collect and dispose of used oil filter cartridges and other products of equipment maintenance at industrial waste facility to satisfaction of Employer's Representative.

***** END OF SECTION 01561 *****

SECTION 01700: PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 Cleaning

A Use cleaning materials as recommended by product manufacturers and appropriate specification sections. Employ experienced workmen or professional cleaners.

B Before inspection for substantial completion, do all necessary cleaning, including the following:

1. Remove dust, dirt and debris from all surfaces
2. Remove, clean all surfaces of oils, stains, weld splatters, etc as required.
3. Refer to specification sections for additional requirements for particular surfaces.

1.2 Substantial Completion And Final Inspection

A Submit written certification that project, or designated portion of project, is substantially complete, and request, in writing, an inspection. The Employer's Representative will make an inspection within 10 days of receipt of request.

B Should the Employer's Representative determine that the work is substantially complete, he will prepare a punch list of deficiencies that need to be corrected before final inspection and issue a notice of substantial completion with the deficiencies noted.

C Should the Employer's Representative determine that the work is not substantially complete, he will immediately notify Contractor, in writing, stating reasons. After Contractor completes work, he shall re-submit certification and request for final inspection.

1.3 Close-Out Submittals

A The project shall be closed out when all items have been completed and accepted by the Employer's Representative.

B Refer to **EXECUTION** portion of each specification section for closeout requirements, including submission of certifications, test reports, etc.; provision of spare parts and maintenance materials, all of which shall be neatly wrapped or packaged in standard sizes and clearly labeled.

C Certificate of insurance for products and completed operations.

D Typed list of all major subcontractors and suppliers with addresses and telephone numbers.

1.4 Acceptance Of The Work

A After all deficiencies have been corrected and the work has undergone a final inspection with no deficiencies, a Taking-Over Certificate will be issued. If only designated portions of the project have been inspected and accepted, a Taking Over-Certificate will be issued for that portion of the Work.

B Until receipt of Taking-Over Certificate, Contractor shall be responsible for the work of this Contract.

PART 2 PRODUCTS

A Not Applicable

PART 3 EXECUTION

A Not Applicable

***** END OF SECTION 01700 *****

SECTION 02525 - SEAWATER SUPPLY WELL

PART 1 - GENERAL

1.1 Summary

A This Section includes the following:
1. One (1) rotary drilled seawater supply well.

1.2 Performance Requirements

A Minimum Tested Water Supply Well Performance Capacity: Minimum each well 1050 Igpm (79 L/s) for the Tynes Bay Water Treatment Facility.

1.3 Submittals

A Product Data: Not applicable.

B Shop Drawings: Shop Drawings shall be submitted to the Owner for review.
1. Show layout and connections for well pumps.

C Shop Drawings: Not applicable.

1.4 Quality Assurance

A Well Driller Qualifications: An experienced water supply well driller licensed in the jurisdiction where the Works are located.

B Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 Project Conditions

A Well Drilling Water: Provide temporary water and piping for drilling purposes. Provide necessary piping for water supply.

PART 2 - PRODUCTS

2.1 Well Casings

A PVC Casing: 95-ft of 18-inch, Certa-Lok ASTM F480 PVC, Schedule 80 pipe.

B Well Seals: Casing cap, with holes for piping and cables, that fits into top of casing and is removable, waterproof, and vermin proof.

2.2 Grout

A Cement: ASTM C150, Type ll.

B Aggregates: ASTM C33, fine and coarse grades.

C Water: Potable containing no more than 3 percent calcium chloride.

2.3 Filling Materials for Caved Borehole

A Upon approval of the Authority, the cavities due to collapsing after drilling may be filled with pack materials (drill cutting, gravel etc.).

2.4 Pack Materials

A Material: Clean gravel with minimum size of 1/2-inch and maximum size of 3/4-inch.

2.5 Submersible Well Pumps

A Product: INDAR Pump-set type UGP-1030-02-R ML-18S-3/085-N or similar (provided by Employer).

B Description: Submersible, vertical-turbine well pump complying with the following features:

1. Pump Material: Super austenitic stainless (AL6XN, 254SMO) or duplex steel.
2. Motor: INDAR ML-18S-3/085-N or similar (provided by Employer)
3. Column Pipe: AWWA C906 certified HDPE pipe DR 11 (160 psi).
4. Discharge Piping: AWWA C906 certified HDPE pipe DR 11 (160 psi).
    a. Fittings for PE Pipe: Fittings fabricated from the same pipe pressure class as the main pipe.
    b. HDPE pipe flanges assemblies shall meet the following requirements:
        i. Solid HDPE stub ends or flange adapters shall be made from the same resin grade (PE 3408) and shall be formed using extrusion or molding methods.
        ii. Flange rings shall be stainless steel 316 or plastic encapsulated, Class 150, ANSI 16.5.
        iii. Flange assembly gaskets shall be 1/8 inch (3 mm) thickness and made from material suitable for the seawater application.

2.7 Motors

A General requirements for motors

1. Motor Sizes: Submersible, vertical installation. Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: All electrical work shall conform to local building codes.

2.8 Electrical

A A waterproof cable connector shall be provided to the well head to stop the ingress of runoff water into the well through the power cable.

B The well head shall be provided with a lockable pump disconnect switch. The disconnect switch shall be mounted in NEMA 4X (fiberglass) box adjacent to the well head. All cable penetrations into the box shall be on the bottom. All cables shall be terminated at the box using watertight cable strain relief connectors.

2.9 Well Head Assembly

A A divert line shall be provided to the well head, capable of diverting the flow of the well to the ocean. The divert shall connect to an existing divert line on site.

B The well shall be fitted with a manual isolation valve to isolate the pump from the feed line and a manual isolation valve to isolate the pump from the divert line. A sample valve shall be provide between the pump and isolation valves to enable samples to be taken when the well is either delivering or diverting.

PART 3 - EXECUTION

3.1 Installation

A Construct well using rotary drilling method.

B Excavate for settlement pit or provide aboveground structure, acceptable to authorities having jurisdiction, to allow settlement of cuttings prior discharge back to the well or to the sea at an approved location.

C Enlarge pilot hole and install permanent casing and grout as per drawings.

D Set casing and liners round, plumb, and true to line.

E Join casing pipe as follows:

1. Ream ends of pipe and remove burrs.
2. Remove scale, slag, dirt, and debris from inside and outside casing before installation.
3. Clean and make solvent-cemented joints.

F Mix grout in proportions of 1 cu. ft. (0.03 m^3) or a 94-lb (42.6-kg) sack of cement with 5 to 6 gal. (19 to 23L) of water. Special additives may need to be used in the mix to prevent deterioration of the cement column in areas subjected to sea-water intrusion.

G Place grout continuously, from bottom to top surface, to ensure filling of annular space in one operation by using a tremie pipe. Do not perform other operations in well within 72 hours after grouting of casing. When quick-setting cement is used, this period may be reduced to 24 hours.

H Provide permanent casing with temporary well cap. Install with top of casing above finished grade to match the existing well mounting.

I Develop wells to maximum yield per foot (meter) of drawdown.

1. Extract maximum practical quantity of sand, drill fluid, and other fine materials from water-bearing formation.
2. Avoid settlement and disturbance of strata above water-bearing formation.
3. Do not disturb sealing around well casings.
4. Continue developing wells until water contains no more than 2 ppm of sand by weight when pumped at maximum testing rate.

J Install submersible well pumps and provide access for periodic maintenance.

1. Securely tighten discharge piping joints.
2. Connect motor to submersible pump and locate near the bottom of casing.
    a. Connect power cable while connection points are dry and undamaged.
    b. Do not damage power cable during installation; use cable clamps that do not have sharp edges.
    c. Install water-sealed surface plate that will support pump and piping.

K Drawings indicate general arrangement of piping, fittings, and specialties.

1. Connect piping between well pump and water piping.

3.2 Protection of Environment and Property

A Fluids and solids resulting from well construction operations shall be contained. They shall only be discharged to drains or to water bodies in a manner that has been approved by the Authority.

B Any damage to property shall be immediately repaired or paid for by the Contractor.

3.3 Well Abandonment

A Follow well-abandonment procedures of authorities having jurisdiction. Restore ground surface to finished grade.

3.4 Field Quality Control

A Test Preparation: Clean seawater supply wells of foreign substances. Swab casings using alkalis, if necessary, to remove foreign substances.

B Perform tests and inspections and prepare test reports.

C Tests and Inspections:

2. Plumbness and Alignment Testing: Comply with AWWA A100.
3. Prepare reports on static level of ground water, level of water for various pumping rates, and depth to water-bearing strata.
4. Performance Test Preparation: Start well pump and adjust controls and pressure setting. Replace damaged and malfunctioning controls and equipment.
5. Performance Testing: Conduct final pumping tests after wells have been constructed, cleaned, and tested for plumbness and alignment.
    a. Arrange to conduct tests, with seven days' advance notice, after test pump and auxiliary equipment have been installed. Note water-level elevations referred to for each assigned datum in wells.
    b. Provide discharge piping to conduct water to locations where disposal will not create a nuisance or endanger adjacent property. Comply with requirements of authorities having jurisdiction.
    c. Provide and maintain equipment of adequate size and type for measuring flow of water, such as weir box, orifice, or water meter.
    d. Measure elevation to water level in wells.
    e. Start and adjust pumps and equipment to required pumping rates.
    f. Record readings of water levels in wells and pumping rates at 60-minute maximum intervals throughout 24-hour minimum period.
    g. Record maximum yields when drawdown is 60 inches (1500 mm) above top of suction screens after designated times.
    h. Operate pumping units continuously for eight hours after maximum drawdown is reached.
    i. Record returning water levels in wells and plot curves of well recovery rates.
    j. Remove sand, stones, and other foreign materials that may become deposited in wells after completing final tests.

3.5 Cleaning

A Follow water supply well disinfection procedures required by authorities having jurisdiction before testing well pumps.

3.6 Protection

A Water Quality Protection: Prevent well contamination, including undesirable physical and chemical characteristics.

B Ensure that settlement pit/tank retains sufficient depth and retention time for fine cuttings to be settled prior to discharge of excess water back to the well or to the sea. When well is accepted, clear ground surface of cuttings and restore site to finished grade, compacting materials in the pit as necessary to prevent later settlement.

C Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.

D Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

***** END OF SECTION 02525 *****

SECTION 02821 - CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 Summary

A This Section includes the following:

1. Chain-Link Fences: Industrial.
2. Gates: Swing.

1.2 Submittals

A Not Applicable

1.3 Quality Assurance

A Not Applicable

PART 2 - PRODUCTS

2.1 Chain-Link Fence Fabric

A General: Height indicated on Drawings. Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:

1. Steel Wire Fabric: Metallic-coated wire with a diameter of 0.148 inch.
    a. Mesh Size: 2 inches.
    b. Metallic (Zinc) Coating: ASTM A 392, Type II.
2. Selvage: Twisted top and knuckled bottom.

2.2 Industrial Fence Framing

A Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:

1. Group: IA, round steel pipe, Schedule 40
2. Fence Height: 8 feet.
3. Strength Requirement: Light industrial according to ASTM F 1043.
4. Coating for Steel Framing:
    a. Metallic coating.

2.3 Tension Wire

A General: Provide horizontal tension wire at bottom of fence fabric.

B Metallic-Coated Steel Wire: 0.177-inch diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824.

1. Metallic Coating: Type III, Zn-5-Al-MM alloy.

2.4 Industrial Swing Gates

A General: Comply with ASTM F 900 for double swing gate types.

1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1083 and ASTM F 1043 for materials and protective coatings.

B Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 900 and the following:

1. Gate Fabric Height: As indicated.
2. Leaf Width: As indicated.
3. Frame Members:
    a. Tubular Steel: As indicated.

C Frame Corner Construction:

1. Assembled with corner fittings.

D Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame as indicated as required to attach barbed wire assemblies.

E Hardware: Latches permitting operation from both sides of gate, hinges, center gate stops and keepers for each gate leaf more than 5 feet wide. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.5 Fittings

A General: Comply with ASTM F 626.

B Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g /sq. m) zinc.

2.6 Barbed Wire

A Zinc-Coated Steel Barbed Wire: Comply with ASTM A 121; 2-point round barbs spaced not more than 4 inches o.c.

2.7 Cast-in-place Concrete

A Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33, and potable water.

1. Concrete Mixes: Normal-weight concrete with not less than 3000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

PART 3 - EXECUTION

3.1 Installation

A General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.

B Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

C Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

D Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment.

E Line Posts: Space line posts uniformly at 10 feet o.c..

F Post Bracing and Intermediate Rails: Install according to ASTM F 567. Install braces at end and gate posts and at both sides of corner and pull posts.

G Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing.

H Top Rail: Install according to ASTM F 567.

I Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage, unless otherwise indicated.

J Tie Wires: Attach wire per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

K Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

L Barbed Wire: Uniformly spaced , angled toward security side of fence. Pull wire taut and install securely to extension arms and secure to end post or terminal arms.

3.2 Gate Installation

A Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

***** END OF SECTION 02821 *****

SECTION 03300 - CONCRETE

PART 1 - GENERAL

1.1 Summary

A This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 Submittals

A Product Data: For each type of product indicated.

B Design Mixtures: For each concrete mixture.

C Shop Drawings: For steel reinforcement.

D Material test reports.

1.3 Quality Assurance

A Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," [Sections 1 through 5.]
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

C Preinstallation Conference: Conduct conference at Work site.

PART 2 - PRODUCTS

2.1 Form-Facing Materials

A Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 Steel Reinforcement

A Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated after fabrication and bending.

B Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 Concrete Materials

A Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I

B Normal-Weight Aggregates: ASTM C 33, graded, 1-1/2-inch (38-mm) nominal maximum coarse-aggregate size.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C Water: ASTM C 94/C 94M.

D Air-Entraining Admixture: ASTM C 260.

E Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 Vapour Retarders

A Plastic Vapor Retarder: ASTM E 1745, Class C, or polyethylene sheet, ASTM D 4397, not less than 6 mils (0.15 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

2.5 Curing Materials

A Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D Water: Potable.

2.6 Related Materials

A Not Applicable

2.7 Concrete Mixtures

A Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
4. Air Content: 5 percent, plus or minus 1 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.

2.8 Fabricating Reinforcement

A Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 Concrete Mixing

A Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 Formwork

A Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C Chamfer exterior corners and edges of permanently exposed concrete.

3.2 Embedded Items

A Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 Vapour Retarders

A Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 12 inches (300 mm) and seal with manufacturer's recommended tape.

3.4 Steel Reinforcement

A General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 Joints

A General: The plinth shall be constructed monolithically and shall have no joints.

3.6 Concrete Placement

A Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C Hot-Weather Placement: Comply with ACI 301.

3.7 Finishing Formed Surfaces

A Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

3.8 Finishing Floors and Slabs

A General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to all horizontal surfaces.

3.9 Concrete Protecting and Curing

A General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 301 for hot-weather protection during curing.

B Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.10 Concrete Surface Repairs

A Defective Concrete: Repair and patch defective areas when approved by Employer’s Representative. Remove and replace concrete that cannot be repaired and patched to Employer’s Representative’s approval.

3.11 Field Quality Control

A Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. Testing Services: Tests shall be performed according to ACI 301.

***** END OF SECTION 03300 *****