



Water Authority of the Cayman Islands

**WEST BAY BEACH SEWERAGE SYSTEM
PIPELINE INSTALLATION ALONG HELEN DRIVE**

PLEASE READ THIS IMPORTANT NOTE

The Tender Documents for the above project can be obtained from the Engineering Services Department, Water Authority, 13G Red Gate Road, George Town.

The Tender Documents can also be downloaded directly from the Water Authority's website at www.waterauthority.ky

All companies who obtain a set of the Tender Documents from the above website must immediately acknowledge receipt of these documents by sending an e-mail to ContractReview@waterauthority.ky and include the company name, company physical address and contact e-mail address.

This acknowledgement is essential in order to be able to provide potential tenderers with Tender Addenda when issued.

For additional information contact us at ContractReview@waterauthority.ky.



Water Authority of the Cayman Islands

**West Bay Beach Sewerage System
Sewer Force Main Installation along Helen Drive**

Tender Documents

26 October 2017

Introduction

This document is the standard document for the construction of building works, used by the Water Authority of the Cayman Islands in connection with the installation of a pressure sewer pipeline on Grand Cayman.

It is based on, and should be read in conjunction with the "Short Form of Contract, First Edition (1999)", as prepared by the Federation Internationale Des Ingenieurs Conseils (FIDIC), modified and added to as indicated. A copy of these conditions is attached to this document.

Brief Description of the Works

The Works comprise the installation of approximately 800 linear feet of 6" nominal diameter High Density Polyethylene (HDPE) pipe, using the traditional open-cut method, between the sewage pumping station at the end of Watler's Drive and the existing sewer manhole in Helen Drive.

The Contractor must provide all materials (e.g., (HDPE and Ductile Iron) pipes, bends, fittings, and ancillary materials, bedding and backfill materials, and concrete for thrust blocks, etc.) and carry out the specified pressure tests.

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Instructions for Tendering

Introduction

1. These Instructions are to be used as a guide to Tendering for this project. Failure to comply with these Instructions may result in the rejection of the Tender.

Eligibility Criteria

2. Tenderers shall meet the following eligibility criteria in order to be considered and evaluated:
 - a. Companies must satisfy all insurance, financial, and bonding requirements as specified in the Contract Documents.
 - b. Companies must comply with all applicable Cayman Islands laws relating to employment including the Labour Law (latest revision) and the Immigration Law (latest revision).
 - c. Companies must provide references that will confirm the company's (or its sub-contractor's) performance and quality on three (3) separate, completed projects of a size or sizes similar to that required for this project.
 - d. Companies must provide documents showing that personnel that operate pipe fusion equipment have successfully completed the training as per PPI TN-42.
 - e. The superintendent/foreman shall have at least five (5) years of documented experience installing butt-fused HDPE pipelines of a size similar to that required for this project. Companies must provide a minimum of three (3) references that will confirm the individual's performance on previously completed projects.

Relevant Documents

3. Tenderers shall study all the "Tender Documents" comprising the Conditions of Contract, Specifications, Tender Drawings, Agreement (comprising Offer, Acceptance and Appendix) and Schedule (including Schedule of Rates). The whole of the Tender Documents shall be read and their true intent and meaning ascertained before the Schedule of Rates is priced.
4. No unauthorised alteration or addition is to be made to the Specifications, Tender Drawings, Agreement and Schedule of Rates. Any qualification made to a Tender may result in the Tender being rejected.
5. Except in so far as may be directed by the Water Authority in writing neither the Water Authority, nor any agent or servant in their employment has any authority to make any representation or explanation to Tenderers as to the meaning of these Tender Documents, or as to anything to be done or not to be done, or as to these instructions, or as to any other thing or matter, so as to bind the Water Authority as to the execution of these proposals.
6. Should any alteration or addition to the Tender Documents be deemed necessary prior to the date for submission of Tenders, these shall be issued by facsimile or e-mail by the Director of the Water Authority to Tenderers in the form of a Tender Addendum.

If a Tenderer is in doubt about the meaning of any item in the Tender Documents, or if a Tenderer discovers any discrepancy between the Work as shown on the Drawings and the Schedule of Rates he shall notify the Water Authority by e-mail not later than 14 days before the due date for tender submission (sent to ContractReview@waterauthority.ky).

The Director of the Water Authority shall then issue to **all** Tenderers an **explanation and/or a correction** in the form of a Tender Addendum.

Each Tender Addendum shall have a serial number and Tenderers shall acknowledge receipt of each Tender Addendum by e-mail to ContractReview@waterauthority.ky. Failure to

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acknowledge may result in a Tender being rejected. All Tender Addenda so issued become a part of the Tender Documents.

7. The Contract shall be carried out on a Fixed Rate basis and no adjustment shall be made to any amounts payable by the Water Authority to the Contractor as a consequence of any variations in the cost of labour, plant, materials or transport.

The amount of the awarded Contract shall be a price obtained by applying fixed unit rates to estimated quantities, which are subject to adjustment at completion of the work to reflect actual quantities involved. The estimates of quantities of work to be done are tabulated in the Schedule of Rates and, although stated with as much accuracy as possible, are approximate only.

8. Tenders shall only be accepted for the whole of the Works.
9. Tenderers shall treat the Tender Documents and all details contained therein as private and confidential.

Measurement

10. The lengths of the pipeline shall be measured along the centreline of the pipe and shall include the length of all fittings.

Rates to be Entered

11. All items in the Schedule of Rates shall either be priced or alternatively the word "included" shall be entered in the rate or price column, whether quantities are stated or not. If neither of these two alternatives are adopted the Tenderer shall be held to have included for any such item left blank in his other prices or rates in the Schedule of Rates, and, although the quantity may be increased, such work will not be measured or paid for.
12. All rates submitted shall be in United States dollars (US\$).

Rates to be Inclusive

13. The prices to be inserted in the Schedule of Rates are to be the full inclusive value of the work described in the Specification and under the several items, including all costs and expenses which may be required in and for the construction of the work described, together with all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based, and including all allowances for overhead and profit.
14. To avoid unnecessary length, item descriptions in the Schedule of Rates shall generally identify the component of the Works and not the tasks to be carried out by the Contractor. The exact nature and extent of the work is to be ascertained from the Tender Drawings, Specifications and Form of Contract.
15. Persons tendering are cautioned that no variations or extras whatsoever shall be acknowledged or paid for by the Employer unless an order in writing signed by the Employer's Representative and specifying the nature, extent and character of each particular item or items to be paid for as an extra has been obtained by the Contractor before such work has been carried out.

Time for Completion

16. Attention is directed to the fact that if the Contractor shall fail or neglect to complete the works within the time specified in the Appendix he shall pay to the Employer as liquidated and ascertained damages and not by way of penalty a sum detailed in the Appendix for each day during which any part of the work shall, by the Contractor's default, remain unfinished after the

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expiration of the period for completion. If in the opinion of the Water Authority the work has been delayed owing to abnormal bad weather, the Water Authority may extend the time for completion of the work as they may consider fair and reasonable.

Preparing Tender

17. Contractors who submit a Tender shall be held to have by their own independent observations and enquiries fully informed and satisfied themselves as to the nature, extent and practicability of the Works, the means of access to the Works, the places where materials can be obtained and disposed of, the levels of the ground water and seasonal/tidal variation thereof, the character of soil and strata in or on which the Works are to be constructed, and all other points which can in any way affect the rates inserted in the Schedule of Rates.

It is strongly recommended that Contractors arrange a visit to the site to familiarize themselves regarding the site conditions, the extent of the work etc. Please make any request for a site visit by e-mail (ContractReview@waterauthority.ky).

18. The Water Authority shall not be responsible for any costs or expenses incurred in the preparation and submission of the Tender.
19. The Water Authority shall not be responsible for the omission, by the Contractor, of any items where such omission would be detrimental to the successful completion of the Works.

Return of Tenders

20. Tenderers shall be supplied with an electronic copy of the following documents: the Tender Documents; the Specification; the FIDIC Short Form of Contract; and the Tender Drawings.

One copy of the Tender Documents, which for the purpose of identification shall have each page signed by the Contractor, shall be duly completed, and sealed in an envelope. On the outside of the envelope or courier box the tender # and title ("**West Bay Beach Sewerage System - Pipeline Installation along Helen Drive**") shall be clearly written as the first lines of the address.

The sealed envelope or package shall be delivered, no later than 12:00 p.m. on Friday 24 November 2017, to:

Deputy Director
Water Authority - Cayman
PO Box 1104
13G Red Gate Road, George Town
Grand Cayman KY1-1102

21. Only tenders received on time will be accepted. No Tenderer shall withdraw his tender after the opening time unless a period of 60 days has elapsed without any tender being accepted. Faxed summaries of tenders shall not be accepted as a substitute. Tenders may be delivered by courier service but the Water Authority shall not be responsible for the failure of any courier service to deliver on time and any such late tender shall not be accepted.
22. The opening of the sealed offers will take place on on Friday 24 November 2017.
23. All entries and signatures shall be in indelible ink. No tender may be altered or amended after having been opened other than those alterations necessary to correct any arithmetic errors. Rates shall prevail where there is an arithmetic error in extension. Discrepancies in the quantity multiplied by unit price and the extended total amount will be resolved in favour of the quantity

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multiplied by unit price. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favour of the correct sum.

Information to be submitted by the Tenderer

24. The Tenderer shall submit with his tender the following information:

- a) A detailed Schedule (Programme) indicating the proposed start and end dates of the principal construction tasks required for completion of the Works.
- b) Description of company's personnel (e.g., number of expatriate staff, qualifications, experience, etc.) and details on the constructional plant that the Tenderer intends to use for the various components of the Works (e.g., trench excavation, backfill, and compaction, pipeline jointing and testing).
- c) A list of Sub-Contractors that the Tenderer proposes to use on the Works and the activities that each of the Sub-Contractors is to carry out. Tenderer shall submit with the Tender an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Sub-Contractor.
 - i. Any Sub-Contractor listed and to whom the Employer makes written objection prior to the giving of the Letter of Acceptance will be deemed unacceptable to the Employer and shall be substituted with a Sub-Contractor acceptable to the Employer. If the Successful Tenderer declines to make a substitution of Sub-Contractor acceptable to the Employer, the Employer may award the contract to the next highest assessed responsible Tenderer that proposes to use acceptable Sub-Contractors.

25. The Water Authority shall not be seen to have approved all or any part of the information submitted by the Tenderer unless the Tenderer is so notified in writing.

Award of Contract

26. Tender Evaluation Criteria: Certain elements of the Tender are mandatory, the submission of these will determine whether a Tender is "compliant or not", failure to submit any mandatory items will result in a "failed" Tender and will not be assessed further.

a. Mandatory items (Pass or Fail):

1. Completed Agreement and Offer (see page 12)
2. Cost proposal (completed Schedule of Rates (see pages 21 and 22))
3. Acknowledgement of receipt of Tender Addenda (if any).
4. Company and Sub-Contractor Information (i.e., experience, references, etc.).
5. Other required information (see Item 24 of these Instructions).
6. A copy of the e-mail sent to ContractReview@waterauthority.ky acknowledging receipt of the Tender Documents in order to be a registered potential Tenderer (*).

Note*: This only applies to those Tenderers who downloaded the Tender Documents directly from the Water Authority's website or the Cayman Islands Central Tender Committee's website.

b. Costing Analysis

27. In the event of failure of the Successful Tenderer to provide any required documents (e.g., insurance certificate(s), information of Sub-Contractors), the Employer may award the Contract to the next highest assessed responsive Tenderer.

28. The Water Authority shall not be bound to accept the lowest or any of the Tenders. The Water Authority reserves its right to reject any or all Tenders, including without limitation the right to

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reject any or all non-conforming, non-responsive, unbalanced or conditional Tenders, and to reject the Tender of any Tenderer if the Employer believes that it would not be in the best interest of the Employer to make an award to that Tenderer, whether because the Tender is not responsive or fails to meet any other pertinent standard or criteria established by Employer.

29. The award will be made on the basis of that Tender from the lowest responsive, responsible Tenderer which, in the Employer's sole and absolute judgment, will best serve the interest of the Employer.
30. The Employer will give the Successful Tenderer a Letter of Acceptance within sixty (60) days after the Tender Opening.
31. The following names and addresses are given for information only, and there is no obligation for any Tenderer to use any of the following:

CONTRACTORS

Information regarding general contractors on the island can be obtained from:

Cayman Contractors Association
P.O. Box 294
Grand Cayman KY1-1104
Tel.: (345)-946-3343
Fax: (345)-946-0762

SHIPPING COMPANIES

Horizon International Shipping, Inc.
8401 NW 90th St.
Medley, FL 33166

Tel: 305 884 8600
Fax: 305 884 6595
Attn: Vicky Arbelaez
Email: vicky@southportcfs.com

Tropical Shipping/Thompson Shipping
9505 NW 108th Avenue,
Medley, FL 33178

Tel: 305 805 6639
Fax: 305 805 6630
Attn: Yoandra Nodarse
Email: YNodarse@tropical.com

Hyde Shipping Corporation
10025 NW 116th Way Ste 2
Medley, Florida 33178

Tel: 305 913 4933
Attn: Cynthia Cedeno
Email: ccedeno@hydeshipping.com

Seaboard Marine
8001 NW 79th Avenue
Miami, FL 33166-2154

Tel: 305 863 4444
Attn: Elizabeth Sale-Chin
Email: elizabeth_salechin@seaboardmarine.com

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CONTRACTOR'S EQUIPMENT RENTALS (Cranes etc.)**A-I Rentals**

P.O. Box 10747
Grand Cayman KY1-1007

Tel.: (345)-949-4935
www.ai-rentals.com

Moxam Industries

P.O. Box 349
Grand Cayman KY1-1106

Tel.: (345)-947-4611 or
(345)-916-2896

Massive Equipment Rental & Sales Ltd.

P.O. Box 10313
Grand Cayman KY1-1003
Tel.: (345)-949-7990
Fax: (345)-949-7074
www.massivegroup.com

Contact information on other local companies can be obtained from the yellow pages for the Cayman Islands at www.caymanislandsyp.com.

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Conditions of Contract

The Conditions of Contract shall be Clauses 1 through 15 of "Short Form of Contract, First Edition (1999)", as prepared by the Federation Internationale Des Ingenieurs Conseils (FIDIC), modified and added to as shown below. A copy of the Conditions of Contract is attached to this Document.

Modifications and additions to Clauses

Add Sub-Clause 1.6.a: Labour

- i. The Contractor shall comply with all applicable Cayman Islands laws relating to employment including the Labour Law (latest revision) and the Immigration Law (latest revision).
- ii. The Contractor shall pay rates of wages and observe conditions of labour not less favourable than those established by the Labour Law (latest revision).
- iii. The Contractor shall be responsible for the cost of return of all expatriate personnel employed, contracted or otherwise retained for completion of or in connection with the Contract and their respective family members (if applicable), to the place from where they were recruited, or to their country of domicile.
- iv. The Contractor shall provide suitable housing in the Cayman Islands for all expatriate personnel and their respective family members residing in the Cayman Islands, until their repatriation in accordance with the above.
- v. For the purposes of this Sub-Clause, the term "expatriate personnel" shall not include any person with Caymanian nationality or holding legal residence status in the Cayman Islands.

Clause 7 Time for Completion

Add the following at the end of sub-clause 7.2

"The Contractor shall maintain adequate staff and plant to comply with the approved Programme for the Works.

Add Sub-Clause 7.5 Restriction on Working Hours

Subject to any provision to the contrary contained in the Contract, none of the Works shall, save as hereinafter provided, be carried out during the night or on locally recognized days of rest without the consent of the Engineer, except when work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer.

Clause 11 Contract Price and Payment

Add the following at the end of sub-clause 11.2:

"For the purposes of this sub-clause, staged payments shall be made for pipelines:

- (i) On completion of pipelaying, inclusive of backfill, at 60% of the pipeline installation rate;
- (ii) On completion of satisfactory testing, at 100% of the pipeline installation rate."

Add the following at the end of sub-clause 11.3:

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"The Employer may withhold interim payments until he has received and approved a current and valid programme for the Works, as per sub-clause 7.2."

Delete sub-clause 11.8 and substitute with:

"In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor interest upon all sums unpaid at a rate per annum equivalent to the interest rate at which the Cayman National Bank and Trust Company Limited would pay for such a deposit on the date upon which such payment first becomes overdue. In the event of any variation in the said Bank Rate being announced whilst such payment remains overdue the interest payable to the Contractor for the period that such payment remains overdue shall be correspondingly varied from the date of each such variation."

Clause 15 Resolution of Disputes

Delete the entire clause and replace with the following:

"Unless settled amicably, any dispute or difference which arises between the Contractor and the Employer out of or in connection with the Contract shall be settled by arbitration in accordance with the Cayman Islands Arbitration Law, 2012.

Note: The "Engineer" as referred to in the various sections of the Specifications shall be deemed to mean the "Employer's Representative", as defined in the Contract.

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AGREEMENT

The Employer is The Water Authority of the Cayman Islands, P.O. Box 1104, 13G Red Gate Road, Grand Cayman KY1-1102, Cayman Islands.

The Contractor is _____ of

The Employer desires the execution of certain Works known as **West Bay Beach Sewerage System – Pipeline Installation along Helen Drive.**

OFFER

The Contractor has examined the documents listed in the Appendix, which forms part of this Agreement, and offers to execute the Works in conformity with the Contract for the sum of

_____ United States Dollars (in words)

_____ US\$ (in figures)

or such other sum as may be ascertained under the Contract.

This offer may be accepted by the Employer by returning one completed copy of this document (i.e., with signed Acceptance page) to the Contractor on or before **Friday 19 January 2018.**

The Contractor understands that the Employer is not bound to accept the lowest or any offer received for the Works.

Signature: _____

Date: _____

Name: _____

Authorized to sign on behalf of: (organization name)

Capacity: _____

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ACCEPTANCE

The Employer has, by signing below, accepted the Contractor's offer and agrees that in consideration for the execution of the Works by the Contractor, the Employer shall pay the Contractor in accordance with the Contract. This Agreement comes into effect on the date when the Contractor receives one original of this document signed by the Employer.

Signature: _____

Date: _____

Name: _____

Authorized to sign on behalf of:

Capacity: _____

Water Authority of the Cayman Islands

In the presence of:

Name: _____

Capacity: _____

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APPENDIX

This Appendix forms part of the Agreement.

<u>Item</u>	<u>Sub-Clause</u>	<u>Data</u>
Documents forming the Contract listed in the order of priority	1.1.1	
(a) The Agreement		
(b) Conditions of Contract		
(c) The Specification		
(d) The Drawings		See Attached List
(e) The Contractor's design		
(f) The Schedule of Rates		
Time for Completion	1.1.9	84 days
Law of the Contract	1.4	Cayman Islands Law
Language	1.5	English
Provision of Site	2.1	28 days after the Commencement Date
Authorized person	3.1	Director of the Water Authority
Name and address of Employer's representative	3.2	Tom van Zanten, Deputy Director PO Box 1104, Grand Cayman KY1-1102
Performance security	4.4	None
Requirements for Contractor's design	5.1	None
Programme:		
Time for submission	7.2	Within 14 days of the Commencement Date
Form of programme	7.2	Gantt Chart with (as a minimum) detailed information on the activities identified in the Schedule of Rates
Amount payable due to failure to complete	7.4	US\$ 500.00 per day up to a maximum of 10% of the sum stated in the Agreement
Period for notifying defects	9.1 & 11.5	365 days calculated from the date stated in the notice under Sub-Clause 8.2

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<u>Item</u>	<u>Sub-Clause</u>	<u>Data</u>
Valuation of the Works		
Lump sum price with schedule of rates	11.1	As per completed Schedule of Rates
Percentage of value of materials and Plant	11.2	Not Applicable
Percentage of retention	11.3	10% of work done
Currency of payment	11.7	United States Dollars (US\$)
Insurances	14.1	
<u>Type of Cover</u>	<u>Amount of Cover</u>	
The Works, Materials, Plant and fees	14.1.a	The sum stated in the Agreement plus 15%
Third Party injury to persons and damage to property	14.1.b	US\$ 500,000 for any one incident, and unlimited number of incidents
Workers	14.1.c	US\$ 500,000 for any one incident, and unlimited number of incidents

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SCHEDULE OF RATES

Brief Description of the Works

The Works comprise the installation of approximately 800 linear feet of 6" nominal diameter and High Density Polyethylene (HDPE) pipe, using the traditional open-cut method, together with the installation of all associated appurtenances (e.g., bends, valves, tees, end caps and test saddles), between the sewage pumping station at the end of Watler's Drive and the existing sewer manhole in Helen Drive.

The Contractor shall construct the Works in strict compliance with the Specifications.

The Contractor must provide all materials (e.g., HDPE pipes, bends, fittings, and ancillary materials, bedding and backfill materials, and concrete for thrust blocks, etc.) and carry out the specified pressure tests. The cost of all materials shall be included in the Contractor's rates. The Contractor shall satisfy himself about the materials he is to supply.

Programme of Works

The Contract shall be completed in 84 days (i.e., 12 weeks).

This estimate is based on the following break-down:

Order and Delivery of Materials	4 weeks
Mobilization	2 weeks
Installation of pipework, including testing	3 weeks
Connecting New Works to Existing	2 weeks
Site Clean-up and Demobilization	1 week
Total time allowed:	12 weeks

Preamble to Schedule of Rates

Introduction

This Preamble has been provided to clarify the intent which the Water Authority of the Cayman Islands had in the preparation of the Schedule of Rates and to clarify the method of measurement and the work that each billed item covers. The intent is to provide clearly such information to enable Tenderers to submit bids, which are readily comparable.

The unit of measurement for each item shall be that stated for that item.

Items in the Bill of Quantities shall be measured as set forth herein.

To avoid unnecessary length, item descriptions in the Schedule of Rates generally identify the component of the Works and not the tasks to be carried out by the Contractor. The exact nature and extent of the work is to be ascertained from the Drawings, Specifications and Conditions of Contract.

The Contractor shall provide all necessary materials, labour, equipment and services required to properly and satisfactorily install the pipeline, unless explicitly stated otherwise.

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All items required to complete the Works specified or shown on the Drawings but not included in the Schedule of Rates shall be considered incidental to those set forth in the Schedule of Rates.

The Schedule of Rates shall be used for the preparation of interim payment certificates. The Contractor shall submit with each interim payment request, a revised Schedule of Rates that shows the amount (or percentage) of each item completed as of the submission date.

All materials and plant to be incorporated into the Works shall be imported without the payment of any import duty. (Note: All shipments must be consigned to the Water Authority in order to be exempt from payment of any import duty).

No payment shall be made for any goods or materials delivered on the Site, and not yet incorporated in the Works.

Preliminaries

Insurances

This item is to cover all the costs of providing and maintaining all the insurances required by the Contract (see Clause 14 of the Conditions of Contract).

Mobilization/ Demobilization

This item is to cover all of the costs associated with the Contractor providing all staff, equipment, plant and other resources that may be required to satisfactorily carry out the Works from his normal place of work to Grand Cayman. The Contractor shall include in his price the cost of freight, brokerage fees, Port Authority fees, inland transportation and any other cost that he may rightfully incur in this matter except that any import duties, if any, will be payable by the Employer. There are no special duties or licenses for equipment that is temporarily imported. Nor is it likely that a Customs Bond will be required for equipment that is to be re-exported upon completion of work. (The Contractor is encouraged to use as much local labour and equipment as possible).

This item is also to cover the cost of removing all staff, equipment, plant and any other resources, which the Contractor may require to satisfactorily carry out the Works, from Grand Cayman back to its place of origin.

The Mobilization/Demobilization item shall not exceed ten percent (10%) of the total tender amount for this project. Seventy percent (70%) of this item shall be included in the first Monthly Statement after the Contractor has fully mobilized his equipment and work force as set out in his approved method. The remaining thirty percent (30%) shall be paid once all field activities have been successfully completed and approved by the Engineer.

Work Permits

The Employer will obtain the necessary temporary work permits for the Contractor's expatriate staff, at no cost to the Contractor.

Accommodation and transportation

This item is to cover all costs of providing adequate accommodation and transportation for the Contractor's expatriate staff. Any costs of providing expatriate staff with subsistence, and any other cost considered necessary as a result of expatriate staff being away from their home country, will be deemed to have been included by the Contractor in his rates.

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Payment of the lump sum for this item shall be pro-rated over the Time for Completion, but no payment shall be due until the Contractor has fully mobilized his equipment and work force and has actually started.

Road Signs and Traffic Management

This item is to cover all the costs of providing, operating and maintaining all road signs, barriers, warning lights and any other safety equipment or materials that are necessary to maintain a safe and secure site throughout the project duration.

Payment of the lump sum for this item shall be pro-rated over the Time for Completion, but no payment shall be due until the Contractor has fully mobilized his equipment and work force and has actually started.

Pipeline Construction

The sums entered in the Schedule of Rates against the items shall include for the provision of materials, the installation of the materials, and for all the work involved in the satisfactory completion of the item in compliance with the Drawings and Specifications, and shall include, but shall not be limited to, the following:

1. Providing pipes, fittings (e.g., bends, tees, valves, joint restraints) and all jointing material, cutting pipes, preparing ends, and supplying all equipment and labour required to install the pipes and fittings.
2. Providing a safe working environment in accordance with Cayman Islands Labour Law (latest revision) and industry standard practice.
3. Delivering all materials to and storing them within the Working Areas. Uplifting and transporting all materials to the position where they are to be incorporated in the Works. Providing facilities for loading and unloading vehicles.
4. Excavation, including all over-excavation required, and backfilling. The stockpiling of excavated materials.
5. Working between trench supports (if necessary), and the cost of providing, maintaining and removing supports to trench sides to excavations close to existing properties, features etc. to avoid damage caused by ground movement.
6. Keeping of excavations free from water at all stages of the work, including the backfilling stage, to enable the work to be carried out in the dry and to remove any risk of flotation of the work and the proper disposal of the water.
7. Providing and installing geotextile, where necessary.
8. Providing, transporting, filling and compacting of suitable (surplus or imported) material (e.g., trench stabilization, pipe zone and backfill material).
9. Removing from Site all surplus excavated material unsuitable for backfill, to a location to be specified by the Engineer. (Note: Distance not to exceed 10 miles).
10. Hand digging when working in areas inaccessible for machines and for all extras required for working in confined spaces.
11. All work in laying, cutting, jointing and closing pipe, including the cost of all work arising out of the leaving or closing of temporary gaps.
12. Working close to and alongside existing services and active roadways.
13. Working underneath fences or, where necessary, for removal of the fences and, if required, rebuilding or reinstating it to its original condition.
14. Testing of the pipelines and the expense of all work involved in carrying out remedial measures and of all temporary work including the use of plugs and other materials and equipment and supply of water. No payment shall be made in respect of losses or delays occasioned by the application of the test or the carrying out of remedial works.

All work shall be paid for on a per linear foot basis and shall be measured along the centre line of the pipeline installed, and shall include the length of all fittings.

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Pipeline Ancillaries

Underground Service Crossings

The sum entered in the Schedule of Rates against this item shall be held to cover all the work involved with piloting for and locating existing underground services (by hand or otherwise), all additional work, double handling, movement of mechanical plant etc., required to construct the pipe line under existing pipes or cables, and all tunneling, strutting, slinging, lagging, underpinning or similar works required by the various utility companies or by the Engineer, for the protection of these services.

Measurement and payment shall be per type of service crossing, irrespective of width or depth of service crossing.

Note: Crossing a bundle of conduits will be considered one service crossing;

Trench stabilization material

The sum entered in the Schedule of Rates against this item shall be held to cover all the work involved with removing the unacceptable material, as directed by the Engineer, providing all the materials (e.g., trench stabilization material, geotextile fabric) and backfilling the trench to specified trench depth with trench stabilization material within an envelope of geotextile fabric, as per the Specifications and Tender Drawings.

Trench stabilization material shall be measured and paid for on the basis of the in-situ volume of unacceptable material removed from the trench below the required trench depth (i.e., additional depth x minimum trench width x length). The Contractor's rate shall be deemed to include allowances for wastage, compaction of trench stabilization material etc.

Reinstatement of paved roads

The sum entered in the Schedule of Rates against this item shall be held to cover all the work involved in:

1. Preparing of subgrade.
2. Providing and installing base course and surface course.
3. Quality control testing (including any retests required due to failure to meet the minimum requirements).
4. Rectifying any settlement occurring within the Defects Liability Period.

Reinstatement of paved roads shall be measured and paid for on the basis of the actual area paved.

Connecting New Works To Existing

The sum entered in the Schedule of Rates against this item shall include for the following:

1. Removal of materials and features no longer required, and disposing of all materials offsite, and for all the work involved in restoring the site and any adjacent facilities affected by the Works to a condition acceptable to the Engineer
2. The provision of all materials, the installation of the materials, and for all the work involved in the satisfactory completion of the item in compliance with the Drawings and Specifications.

Contractor's Initials or Stamp :

List of Tender Drawings and Specifications

<u>Drawing. No.</u>	<u>Drawing Title</u>
PS12-01	SITE LOCATION PLAN
PS12-02	PROPOSED HDPE FORCE MAIN PIPELINE ROUTE
PS12-03	PUMP STATION VALVE CHAMBER - EXISTING & PROPOSED
PS12-04	PUMP STATION VALVE CHAMBER - PIPEWORK DETAILS

Specifications

SECTION 01030	COORDINATION AND SITE CONDITIONS
SECTION 01040	SITE SAFETY AND TRAFFIC CONTROL
SECTION 01300	SUBMITTALS
SECTION 02100	SITE PREPARATION
SECTION 02220	TRENCH EXCAVATION AND BACKFILL
SECTION 02500	PAVING
SECTION 15060	DUCTILE IRON PIPE AND FITTINGS
SECTION 15105	HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS
SECTION 15992	PIPELINE TESTING

Contractor's Initials or Stamp :

SCHEDULE OF RATES

Item	Description	Unit	Quantity	Rate	Total
				(US\$)	(US\$)
1. Preliminaries					
1.1	Provide all insurances as required	Sum	1	_____	_____
1.2	Mobilization and demobilization	Sum	1	_____	_____
1.3	Work permits for expatriate staff	Sum	1	N/A	N/A
1.4	Accommodation and transportation	Sum	1	_____	_____
1.5	Road Signs and Traffic Management	Sum	1	_____	_____
2. Pipeline Construction					
	Provide and install HDPE pipeline, complete as specified				
2.1	Nominal diameter 6"	lin. ft.	800	_____	_____
3. Pipeline Ancillaries (extra over items 2.1 pipeline construction)					
3.1	Underground Service Crossings				
3.1.1	Water Services (Water Authority)	No.	3	_____	_____
3.1.2	Water Mains (Water Authority)	No.	2	_____	_____
3.1.3	Telecommunications Ducts (FLOW, LOGIC etc.)	No.	3	_____	_____
3.1.4	Sewer Pipe (Private) 4" typical	No.	2	_____	_____
SUB-TOTAL (CARRIED TO PAGE 22):					_____

Contractor's Initials or Stamp :

Item	Description	Unit	Quantity	Rate	Total
				(US\$)	(US\$)
3. Pipeline Ancillaries (continued) (extra over items 2.1 pipeline construction)					
3.2	Trench Stabilization Material: Excavate unsuitable material from below the specified pipe grade, <u>as and when instructed by the Engineer</u> , and backfill to specified pipe grade with approved material	cu. yd.	400	_____	_____
3.3	Reinstatement of paved roads				
3.3a	Hot Mix Asphalt	sq. ft.	2,000	_____	_____
3.3b	Spray and Chip	sq. ft.	2,000	_____	_____
4. Connecting New Works to Existing					
4.1	Connect 6" HDPE pipeline to existing sewer manhole, complete as specified	Sum	1	_____	_____
4.2	Remove concrete top slab; Remove existing pipework; Install new valve chamber pipework, fittings and ancillaries; Connect 6" HDPE pipeline to sewage pump station, complete as specified	Sum	1	_____	_____
	SUB-TOTAL THIS PAGE:				_____
	SUB-TOTAL (CARRIED FROM PAGE 21):				_____
	GRAND TOTAL (CARRIED TO AGREEMENT ON PAGE 12):				_____

Contractor's Initials or Stamp :

SECTION 01030
COORDINATION AND SITE CONDITIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements for coordinating and sequencing the work under the Contract, and requirements regarding existing site conditions
- B. Requirements for cutting and patching of new and existing work

1.2 SITE CONDITIONS

A. Information on Site Conditions:

- 1. General: Information obtained by the Employer regarding site conditions, topography, groundwater elevations, and similar data have been included in these Documents.
- 2. Subsurface Explorations: No test holes and borings have been made.

B. Existing Utilities and Facilities:

1. Location:

- a. Known underground utilities within the work area are shown on the Drawings. The locations shown are taken from existing records and the best information available from existing utility plans; No warranty is given as to the accuracy or completeness of the recorded position of these services. It is therefore expected that there may be some discrepancies in the locations shown.
- b. The Contractor shall thoroughly check immediate and adjacent areas subject to excavation by visual examination (and by electronic metal and pipe detection equipment, as necessary) for indications of subsurface structures and underground utilities.
- c. The Contractor shall make exploratory excavations where existing underground utilities may potentially conflict with proposed Work. Conduct exploratory excavations in presence of the Engineer and prior to construction to avoid possible delays.

2. Contractor's Responsibilities:

- a. Consult all service owners before commencing any excavations, regarding the exact position of existing services which may affect or be affected by the construction of the Works.
- b. Notify utility offices that are affected by construction operations at least 48 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for the utilities.
- c. Should any service be found to exist which is not indicated on the Contract Drawings, give immediate written notification to the Engineer and the service owner.

- d. Where Contractor's operations could cause damage or inconvenience to telephone, power, water or sewer systems, make arrangements necessary for the protection of these utilities and services. Replace existing utilities removed or damaged during construction, unless otherwise provided for in these Contract Documents.
 - e. Repair all damage to private and/or public property. Repair shall meet the requirements of the property owners.
3. Contact Numbers for Utilities
- a. Caribbean Utilities Company, 457 North Sound Road, P.O. Box 38 GT, Grand Cayman, KY1-1102. Tel. (345)-949-5200
 - b. Cayman Water Company, Regatta Office Park, Windward 3, West Bay Road, P.O. Box 1114 GT, Grand Cayman, KY1-1104. Tel: (345)-945-4277
 - c. FLOW, One Technology Square, P.O. Box 293 GT, Grand Cayman, KY1-1104. Tel. (345)-949-7800.
 - d. Logic Communications Ltd., Governor's Square, West Bay Road, PO Box 31112, Grand Cayman KY1-1205, Tel. (345)-743-4300
 - e. Weststar (see d. above)

C Interfering Structures:

- 1. Take necessary precautions to prevent damage to existing structures whether above ground or underground. Major structures are shown on the Drawings, but this information may not be complete.
- 2. Protect existing structures from damage. Where existing fences, gates, sheds, or other structures must be removed to properly carry out work, or are damaged during work, restore them to original condition and to the satisfaction of the Engineer, unless otherwise directed by the Engineer.

D Field Relocation:

- 1. It is expected that minor changes in the trench alignment may be necessary. After construction has started make such changes only by direction of the Engineer. If existing structures are encountered that prevent construction as shown, notify the Engineer before continuing with work.

1.3 WORKING AREAS

- A. The Contractor shall for the purposes of the Contract have free and temporary use of working areas and accesses thereto. The typical working area shall be 12 feet wide centered on the proposed pipelines. However in the event this would encroach on the paved portions of publicly accessible roads, this working area may be offset, as directed by the Engineer, to minimize impact on traffic. Should the Contractor require any further working areas or accesses during the progress of the Works he may arrange for the use of these, subject to the approval of the Engineer.
- B. No arrangements have been made with private landowners for any use of private land for working areas.
- C. Prior to the commencement of the works all owners of (potentially) affected private properties shall have been served Notice pursuant to Section 7 of the Water Authority

Law. Such notice shall not negate the Contractor's responsibility to notify the Engineer and relevant occupiers.

- D. Any subsidence over the line of the track, whether on undeveloped land, roads, footpaths, shall be made good, to the Engineer's satisfaction, during the "Period for notifying defects" at no additional cost to the Employer.
- E. The Contractor shall attend promptly to any complaints intimated by landowners or tenants.
- F. The Contractor shall not obstruct access to any underground utility service.

1.4 PROJECT MEETINGS

- A. A Preconstruction Conference shall be held before work is started. The conference will be held at a location selected by the Employer. The conference will be attended by the Contractor's Representative, the Engineer's Representative, and others as appropriate.
- B. At the Preconstruction Conference, the Contractor shall be prepared to discuss the following subjects, as a minimum:
 - 1. Required schedules.
 - 2. Status of insurance.
 - 3. Programme of Works.
 - 4. Project changes and clarification procedures.
 - 5. Submittal procedures.
 - 6. Use of site.
 - 7. Project lines of communications.
 - 8. Contractor's safety plan and representative.
 - 9. Progress payment procedures.
- C. Progress Meetings: Engineer will schedule regular progress meetings to review work progress, schedules, and other matters needing discussion and resolution.

1.5 ADJACENT FACILITIES AND PROPERTIES

- A. Examination:
 - 1. Before Work at site is started, Contractor, Engineer, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in the vicinity of Work, as applicable, which could be damaged by construction operations.
 - 2. Periodic re-examination shall be made jointly by the Engineer and Contractor to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.
- B. Documentation:
 - 1. The Contractor shall record and submit in duplicate a report of the observations made in a format agreed by Engineer.
 - 2. Upon receipt, Engineer will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.

3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Employer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01040

SITE SAFETY AND TRAFFIC CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements for establishing traffic control and maintaining safe, convenient use of public roads and rights-of-way.

1.2 TRAFFIC AND ACCESS

- A. Contractor's operations shall cause no unnecessary inconvenience to the public.
- B. Before any work in or affecting the use of any roadway is commenced, obtain the requirements of the National Roads Authority (NRA) and/or the Royal Cayman Islands Police Service (RCIPS) regarding traffic safety and control.
- C. Open trenches shall not exceed 300 feet in length or such length as required by the NRA or the RCIPS, whichever is the most stringent.
- D. Provide, deploy and maintain, and upon completion of the work promptly remove, appropriate traffic warning signs near any works obstructing the roadway or adjacent to road edge. Signs shall be well lit at night to warn traffic coming from both directions.
- E. Maintain a minimum of a half road width for vehicle flow at all times. At no time shall total road closure be permitted. Two-way traffic shall be maintained at all times.
- F. All traffic diversions shall be subject to the requirements of the NRA and the RCIPS.
- G. Provide barricades, lights, signs as necessary to prevent inadvertent access by the general public to work site.
- H. Comply with additional public safety requirements that may arise during construction.
- I. Do not store construction materials and/or park equipment on roads, unless otherwise approved by the Engineer
- J. Provide acceptable traffic diversions during any material or equipment loading and/or unloading activities that may temporarily interfere with traffic.
- K. Remove all excess and unsuitable material from the work site as soon as possible. Any spillage shall be removed from roadways prior to use by the public.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements and procedures necessary for scheduling, preparation and submission of submittals.
- B. Requirements for preparation of progress schedules.

1.2 SUBMITTAL PROCEDURES - GENERAL

- A. The Contractor shall schedule and make submissions in accordance with the requirements of individual Specification Sections and in such sequence as to cause no delay in the work.
- B. Review, acceptance, or approval of substitutions, schedules, and procedures submitted or requested by Contractor shall not add to the Contract price, and additional costs which may result therefrom shall be solely the obligation of Contractor.
- C. Engineer is not responsible to provide engineering or other services to protect Contractor from additional costs accruing from submittals.
- D. Submittals processed by Engineer do not become part of the Contract Documents and are not Variation Orders; the purpose of submittal review is to establish a reporting procedure and is intended for Contractor's convenience in organizing the work and to permit Engineer to monitor Contractor's progress, and to ensure compliance with the Contract Documents.
- E. Delays caused by the need for resubmittal or multiple resubmittals shall not constitute basis for claim.
- F. Engineer's review will be only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents not extending to means, methods, techniques, sequences, or procedures of construction (except where a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents) nor to safety precautions or programs incident thereto.
- G. Engineer's review of submittals shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to each such variation at the time of submission, and Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the shop drawing or sample approval; nor will any approval by Engineer relieve Contractor from responsibility for errors or omissions in the shop drawing or from responsibility for having complied with the provisions herein.

1.4 ADMINISTRATIVE SUBMITTALS

- A. Administrative Submittals are submittals that are not Shop Drawings or Samples, or that do not reflect quality or product or method of construction. They may include, but are not limited to, the Monthly Statement.

1.5 PROGRAMME

- A. General
 - 1. Prepare and submit to the Engineer a Programme for the Works.

2. The Programme shall be comprised of construction operations covering all work to be done in connection with the Contract. The Programme shall be of sufficient detail and shall indicate the minimum of individual work activities to perform the work of this Contract. A work activity is defined as an activity for which manpower is required and must be performed before the project is considered complete.
3. The Programme shall indicate the sequence of work and the time of starting and completion of each part. It shall include, but not be limited to, the following items:
 - a. Submittals, with review time: Shop drawing receipt from Contractor, submitted to the Engineer, review and return to Contractor.
 - b. Material order, manufacture, delivery, installation, and check-out.
 - c. Initial site work.
 - d. Specified Work sequences and construction constraints.
 - e. Final cleaning.
4. The Programme shall be submitted in the form of a Gantt chart. The chart shall show the sequence and interdependence of activities required or complete performance of all items of work.
 - a. Chart shall include Title Block showing: name of Project: Pipeline Installation along Helen Drive, Employer: Water Authority - Cayman, date submitted, revision or update number. Provide a legend to describe standard and special symbols used.
 - b. Schedule shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.

B. Progress Reports:

1. On a monthly basis the current and updated Programme will be reviewed. The Contractor shall obtain the necessary information to update the Programme to reflect progress to date:
 - a. To identify those activities started and completed during the previous period.
 - b. From the date of update, the period required to complete each activity started, but not completed.
 - c. From the date of update, a review of remaining durations for selected activities not yet started.
2. Conditions under which a revision to the Programme will be required, are as follows:
 - a. When a delay in completion of any work item or sequence of work items results in an indicated extension of the project completion by 28 days or more.
 - b. When delays in submittals or deliveries or work stoppages are encountered which make replanning or rescheduling of the work necessary.
 - c. When the schedule does not represent the actual sequence and/or progress of the Works.
3. Whenever revised scheduling documents are submitted to the Engineer, they shall be accompanied by a written narrative report. The narrative report shall include a description of the amount of progress during the last month in terms of completed activities in the plan

currently in effect, a description of problem areas, current and anticipated delay factors and their estimated impact on performance of other activities and completion dates and an explanation of corrective action taken or proposed.

4. The Contractor shall make requested corrections to the scheduling documents and resubmit them within 14 days.
5. If at any time during the project, the Contractor fails to complete any activity by its latest completion date, he will be required, within 7 days, to submit to the Engineer a written statement as to how he plans to reorganize his work force to return to the acceptable current Programme.
6. The Engineer may require the Contractor, at the Contractor's expense, to add to his plant, equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule at any time during the construction period.

C. Schedule of Submittals:

1. Submit one electronic copy of the Programme and each subsequent revision. The latest revised Programme shall reflect the actual progress of the project to within 7 days prior to submittal. Failure to submit the Programme as well as revisions will be considered cause for withholding of any Interim Payments otherwise due under the Contract.

1.6 SAMPLES AND TEST SPECIMENS

- A. Where required in the Specifications, or as determined necessary by Engineer, submit test specimens or samples of materials, to be used or offered for use in connection with the work. Include information as to their sources, prepay cartage charges, and submit such quantities and size for proper examination and tests to establish the quality or equality thereof, as applicable.
- B. Submit samples and test specimens in ample time to enable Engineer to make tests or examinations necessary, without delay to the work.
- C. Submit additional samples as required by Engineer to ensure equality with the original approved sample and/or for determination of Specification compliance.
- D. Tests required by the Specifications to be performed by an independent laboratory shall be made by a laboratory approved by the Engineer. Certified test results of specified tests shall be submitted in duplicate by the laboratory directly to Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02100
SITE PREPARATION

PART 1 GENERAL

1.1 DEFINITIONS

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Stripping: Removal of vegetation and other organic matter including stumps, buried logs, and roots to a depth no more than 3 inches below grade.
- D. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.2 QUALITY ASSURANCE

- A. Obtain Engineer's approval of staked clearing and stripping limits, prior to commencing clearing and stripping.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. Clear and strip areas actually needed for Works.
- B. Do not injure or deface vegetation that is not designated for removal.

3.2 DISPOSAL

- A. Clearing of Objectionable Material:
 - 1. The Contractor shall bear all costs of disposing of trees, stumps, brush, roots, limbs, and other waste materials from the clearing operation.
 - 2. No waste material shall be left on the site, shoved onto abutting private properties, or be buried in embankments or trenches on the site.
 - 3. Burning of any material onsite will not be allowed.
 - 4. Objectionable material shall be disposed of in such a manner as to meet all requirements of the regulations regarding health, safety and public welfare and at locations that are approved by local authorities.
- B. Strippings:
 - 1. Dispose of strappings off site.

END OF SECTION

SECTION 02220

TRENCH EXCAVATION AND BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section covers the work necessary for trench excavation and backfill.

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American National Standards Institute (ANSI): Z53.1, Safety Color Code.
 2. American Public Works Association (APWA): Uniform Color Code for Temporary Marking of Underground Utility Locations.
 3. American Society for Testing and Materials (ASTM):
 - a. C136, Sieve Analysis of Fine and Coarse Aggregates
 - b. D422, Method for Particle-Size Analysis of Soils.
 - c. D1140, Amount of Material in Soils Finer than the No.200 (75 micrometer) Sieve.
 - d. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/cubic ft)(2,700 kN-mm/cubic m).
 - e. D4253, Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
 - f. D4254, Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.
 - g. D4318, Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - h. D5199, Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
 - i. D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles

1.3 DEFINITIONS

- A. Bedding Material: Granular material upon which pipes are placed.
- B. Imported Material: Material obtained by the Contractor from sources offsite.
- C. Lift: Loose (uncompacted) layer of material.
- D. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe.
- E. Prepared Trench Bottom: Graded trench bottom after stabilization and installation of bedding material.
- F. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557.
- G. Relative Density: As defined by ASTM D4253 and ASTM D4254.
- H. Selected Backfill Material: Material available onsite that the Engineer determines to be suitable for a specific use.
- I. Suitable Material: All material which, in the opinion of the Engineer, is acceptable for use in the Works.

- J. Unsuitable Material: All material other than suitable material and which shall include, but not be limited to, material from swamps; peat, logs, stumps and perishable material.
 - K. Well-Graded: A mixture of particle sizes that has no specific concentration of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Well graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
- 1.4 TRENCH EXCAVATION
- A. Complete all excavation regardless of the type, nature or condition of materials encountered. The Contractor shall make his own estimate of the kind and extent of the various materials which will be encountered in the excavation. If unsuitable material is encountered excavate to surface acceptable to the Engineer.
- 1.5 GRADING
- A. Perform placement of fill material and all other work required to attain the final grades and elevations shown on the Drawings.
- 1.6 SUBMITTALS
- A. Shop Drawings: Manufacturer's descriptive literature for marking tapes.
 - B. Samples
 - 1. Trench stabilization material.
 - 2. Bedding and pipe zone material.
 - 3. Backfill.
 - 4. Geotextile fabric.
 - C. Quality Control Submittals:
 - 1. Catalog and manufacturer's data sheets for compaction equipment.
 - 2. Certified Gradation Analysis:
 - a. Imported materials, including trench stabilization material: Submit not less than 28 days prior to delivery to site.
 - b. Excavated materials: Selected Backfill Material, Submit not less than 7 days prior to use.
- 1.7 SEQUENCING AND SCHEDULING
- A. Clearing and Stripping: Complete applicable Work specified in Section 02100, SITE PREPARATION, prior to excavating.
 - B. Excavation Safety: The Contractor shall be solely responsible for making all excavations in a safe manner. Provide appropriate measures to retain excavation side slopes to ensure that persons working in or near the excavation are protected.

PART 2 PRODUCTS

2.1 TRENCH STABILIZATION MATERIAL

- A. Trench stabilization material shall be 2-inch minus crushed rock or gravel, graded from coarse to fine with no more than 5 percent fines passing the No. 4 sieve, free from organic materials, or as otherwise approved by Engineer.

2.2 BEDDING MATERIAL

- A. Crushed rock or gravel, uniform size (1/2-inch), washed (no fines).
- B. Notwithstanding the above, no bedding material shall be used that does not conform to pipe manufacturer's recommendations.

2.3 PIPE ZONE MATERIAL

- A. Crushed rock or gravel, free from organic materials and well graded from coarse to fine, with no more than 20% fines passing a No. 200 sieve and maximum size one (1) inch.

2.4 TRENCH BACKFILL AND GENERAL FILL

- A. Granular fill: Granular fill shall be clean gravel or crushed rock, well graded from coarse to fine. The maximum size shall be two (2) inches. Granular backfill having more than 20 percent of its weight passing a No. 200 sieve shall not be used for backfill.
- B. Excavated Material: Excavated material may be used if it meets the criteria of Granular Fill, or approved by the Engineer. It must be free from roots or organic matter, or other deleterious materials.

2.5 GEOTEXTILE

- A. The geotextile shall be a non-woven, needle-punched, continuous-filament fabric and shall be made from 100% polyester or polypropylene.
 - 1. Thickness (as per ASTM D5199): no less than 100mil.
 - 2. Weight (As per ASTM D5261): no less than 10 oz/sq.yd.

2.6 WATER FOR TRENCH BACKFILL

- A. The Contractor shall make all arrangements for a source of water and bear all costs for the delivery of the water to the trench side.

2.7 COMPACTION EQUIPMENT

- A. Compaction equipment shall be of suitable type and adequate to obtain specified compaction. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort.
- B. The Contractor shall demonstrate by on site testing that a state of compaction is achieved equivalent to that specified.

2.8 MARKING TAPE

- A. Plastic:
 - 1. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.
 - 2. Thickness: Minimum 4 mils.
 - 3. Width: 3 inches (minimum).
 - 4. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted "CAUTION BURIED SEWER PIPELINE BELOW" (or similar approved) continuously over entire length.
 - 5. Marking tape shall be magnetically detectable.
 - 6. Colour: Green (In accordance with APWA Uniform Color Code for Temporary Marking of Underground Facilities).

2.9 TURBIDITY CURTAIN

- A. A flexible barrier used to trap silt and sediment during construction comprising a fabric curtain with bottom ballast and flotation, in compliance with DOT 1 Floating Turbidity Curtain Requirements.
 - 1. Skirt (curtain) height to be 20 percent greater than the depth of the canal (to allow for water level fluctuations (due to tidal movement)

2.10 SOURCE QUALITY CONTROL

- A. Perform gradation analysis in accordance with ASTM C136 for:
 - 1. Backfill material.
 - 2. Trench stabilization material.
 - 3. Bedding and pipe zone material.
 - 4. Fill material.

PART 3 EXECUTION

3.1 GENERAL

- A. Remove and stockpile all topsoil from the areas affected by any excavation or filling work. The use of top soil as a fill material shall be restricted to surface layers in positions not subject to loading, as directed by the Engineer.
- B. Compact all material as soon as is practicable after being delivered. Compaction shall be undertaken by approved plant.

3.2 OBSTRUCTIONS

- A. This item refers to obstructions which may be removed and do not require replacement.
- B. Remove obstructions within the trench area or adjacent thereto such as tree roots, stumps, concrete structures, logs, and debris of all types without additional compensation. The Engineer may, if requested, make changes in the trench alignment to avoid major obstructions.
- C. Dispose of obstructions removed from the excavation in accordance with Section 02100, SITE PREPARATION.

3.3 PAVEMENT REMOVAL

- A. Cut all bituminous pavements prior to excavation of the trenches with an approved pavement saw. Width of the pavement cut shall be at least equal to the required width of the trench at ground surface. Pavement materials removed shall not be used for trench backfill or general fill.

3.4 EXCAVATION - GENERAL

- A. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Allow for forms, necessary working space, granular base, and similar items, wherever applicable.
- B. If the excavation is excavated below the required grade, correct any part of the excavation below the grade with trench stabilization material specified in Paragraph TRENCH STABILIZATION MATERIAL, at no additional cost to the Employer. Place the material over the full extent of the over-excavation in 6-inch lifts to the established grade. Compact each lift so as to provide a firm, unyielding support prior to placing succeeding lifts.

- C. Where trench stabilization material is inappropriate, as determined by the Engineer, the over-excavation shall be filled with material specified by the Engineer.

3.5 TRENCH WIDTH

- A. The minimum trench width is that width between the faces of the soil required to ensure the correct placing and compaction of bedding and backfill materials equally on either side of the pipe. All sheeting and supports are to be outside this width.
- B. Minimum width of unsheeted trenches in which pipe is to be laid shall be as indicated on the Drawings, or as specified by the Engineer.
- C. Maximum trench width: Unlimited, unless otherwise specified, or unless excess width will cause damage to existing facilities, adjacent property, or completed Works.

3.6 TRENCH DEPTH

- A. Excavate the trench to the lines and grades shown or as established by the Engineer with proper allowance for pipe thickness and or pipe base or special bedding when required.
- B. Cover is defined as the amount of backfill material over the pipe, from the top of the pipe to the finished ground level.
- C. All pipes shall be laid with a minimum of thirty (30) inches cover, unless otherwise noted on the Drawings or directed by the Engineer. The actual depth may be more in some areas to avoid major obstructions, at no additional cost to the Employer.

3.7 OPEN TRENCH LENGTH

- A. The length of open trench required for fused pipe sections shall be such that bending and lowering of the pipe into the trench will be in accordance with the manufacturer's minimum recommended bend radius and will not result in kinking

3.8 SHORING, SHEETING, AND BRACING OF TRENCHES

- A. Sheet, brace and/or slope the trench when necessary to prevent caving during excavation, or to protect adjacent structures, utilities and workers. Increase trench widths accordingly by the thickness of the sheeting. Maintain sheeting in place until the pipe has been placed and backfilled at the pipe zone. Shoring and sheeting shall be removed, as the backfilling is done, in a manner that will not damage the pipe or permit voids in the backfill. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the local agency having jurisdiction. The most stringent of these requirements shall apply.
- B. No sheeting, shoring, bracing, or other excavation supports shall be left in excavations without consent by the Engineer.

3.9 STOCKPILING EXCAVATED MATERIALS

- A. During trench construction, place the excavated material in such a manner that public roads, private access roads or entrances to private properties are not obstructed.
- B. Do not stockpile excavated material adjacent to trenches.

- C. Stockpile all excavated material that is suitable for use as fill or backfill until material is needed.
- D. Stockpile excavated materials which are not suitable for fill or backfill as determined by Engineer in a separate spoil heap on the site or as detailed in the Contract.
- E. Post signs indicating proposed use of material stockpiled. Signs should be clearly worded and easily read by equipment operators.
- F. Do not deposit excavated material in canals, or in a position close enough thereto, to be washed away by runoff.
- G. Do not remove any excavated material from the site except when directed or permitted by the Engineer. Should the Contractor be permitted to remove suitable material from the site to suit his operational procedure, he shall make good at his own expense any consequent deficit of filling arising therefrom.

3.10 REMOVAL OF WATER

- A. Provide, operate and maintain dewatering systems of sufficient size and capacity to promptly remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying; during the laying of the pipe; and until the backfill has been completed. These provisions shall apply throughout the day as well as overnight.
- B. Dispose of the water in a manner that minimizes soil erosion from trench sides and bottom, and prevents damage to adjacent property. Remedy any deterioration of from trench sides and bottom by removing the deteriorated material and replacing it with suitable material, as instructed by the Engineer, and at the expense of the Contractor.
- C. Dispose of water in a manner that prevents damage to adjacent property.
- D. Drainage of trench water through the pipeline under construction is prohibited.
- E. Install and properly secure turbidity curtain in MRCU canal near construction area as per manufacturer's recommendations.
 - 1. Inspect turbidity curtain daily for damage or accumulated debris, and to ensure adequate anchorage.
 - a. Immediately repair or replace the curtain when damaged.
 - b. Immediately remove any floating construction of natural debris to prevent damage to the curtain.
 - 2. Upon completion carefully remove curtain to minimize release of attached sediment.

3.11 TRENCH BOTTOM

- A. Excavate the trench bottom to a constant, even grade free from high or low spots that could cause the pipe to be supported unevenly. Surface irregularities greater than one inch (1") shall be trimmed level by hand and the bottom of the trench shall be raked smooth to remove any large stones or other unacceptable material to ensure even support to the pipe along its full length.
- B. When, in the opinion of the Engineer, the existing material in the bottom of the trench is unsuitable for supporting the pipe and pipe bedding, remove this unacceptable material, as directed by the Engineer. Backfill the trench to specified pipe grade with TRENCH STABILIZATION MATERIAL within an envelope of geotextile fabric which shall extend to the top of the pipezone and shall be anchored, as shown on the Drawings. Place the trench stabilization material over full width of trench in 9-inch lifts

to required grade, providing allowance for bedding thickness. Compact each lift so as to provide a firm, unyielding support prior to placing succeeding lifts.

- C. If the trench is excavated below grade, as instructed by the Engineer, the Contractor shall be reimbursed for this additional work at the rate entered in the Schedule of Rates.

3.12 PIPE BEDDING

- A. Bedding material shall be placed by hand in the excavation below the level of the pipe and shall be tamped and rammed by hand to provide a dense, unyielding bed free from soft spots throughout the length of the pipeline and the full width of the prepared trench bottom. All hard spots that would prevent a uniform bearing shall be removed.
- B. Where trench stabilization material has been used, bedding material shall be separated from the trench stabilization material by means of a geotextile fabric.
- C. Pipe bedding shall extend from 6 inches below the pipe up to the centerline of the pipe ("springline").
- D. Tamp area under haunches with handheld tamping bars supplemented by "walking in" and slicing material under haunches with a shovel to ensure that voids are completely filled before placing any succeeding material.
- E. Check grade and correct irregularities in bedding material. Loosen top 1 to 2 inches of compacted bedding material with a rake or by other means to provide a continuous and uniform cushion before laying each section of pipe.
- F. Bell or Coupling Holes: Excavate in bedding at each joint to provide uniform bearing along barrel of pipe.

3.13 PIPE ZONE BACKFILL

- A. Upper limit of pipe zone shall not be less than 12 inches above the pipe, unless shown otherwise.
- B. Restrain pipe as necessary to prevent its movement during backfill operations.
- C. Place material simultaneously in lifts not exceeding 9 inches of uncompacted height on both sides of pipe.
- D. Thoroughly tamp each lift.
- E. The backfill shall be compacted taking care to compact the material on both sides as well as on top of the pipe to ensure that firm support is obtained to prevent any lateral movement of the pipe during the final backfill.
- F. After the full depth of the pipe zone material has been placed as specified, compact the material by a minimum of three passes with a vibratory plate compactor only over the area between the sides of the pipe and the trench walls and NOT directly over the buried pipe.
- G. Do not use power-driven impact compactors to compact pipe zone material.
- H. Proper care shall be taken not to place any stones, sticks or other rubbish on or near the pipe.

3.14 MARKING TAPE INSTALLATION

- A. Install marking tape continuously along the centerline of all buried pipe, at top of pipe zone (approximately twelve (12) inches above the top of the pipe).
- B. Join the tape by tying ends tied together in a tight knot. The tape shall be continuous at junctions, valves or other in-line equipment.

3.15 BACKFILL ABOVE PIPE ZONE

- A. After backfilling of the pipe zone has been completed, the remainder of the trench can be filled using backfill material.
- B. When backfill is placed mechanically, push the backfill onto the slope of the backfill previously placed and allow to slide down into the trench. Do not push backfill into the trench in such a way as to permit free fall of the material until at least 2 feet of cover is provided over the top of the pipe. Under no circumstances allow sharp, heavy pieces of material to drop directly onto the pipe or the tamped material around the pipe.
- C. Do not use power driven impact type compactors for compaction until at least 12 inches of cover is placed over the top of the pipe.
- D. Backfill above the pipe zone with approved backfill materials in lifts not exceeding 9 inches or as recommended by the manufacturer of the compaction equipment used, whichever is the least thickness. Each layer shall be compacted to a minimum of 90 percent of maximum density as determined by ASTM D1557, with mechanical vibrating or impact tampers. Adjust moisture content as necessary to obtain the specified compaction.
- E. Backfill to required grade with proper allowances for topsoil, crushed rock surfacing, and pavement thickness, wherever applicable.
- F. Trench Backfill shall be tested for compaction on an average of every 500 feet of pipe installed as directed by the Engineer. Failure of any one test may result in an increase of the testing frequency.

3.16 MAINTENANCE OF TRENCH BACKFILL

- A. After each section of trench is backfilled, maintain the surface of the backfilled trench even with the adjacent ground surface, and grade and compact as necessary to keep the surface of backfilled trenches smooth, free from ruts and potholes, and, if located in access road, suitable for normal traffic flow.

3.17 AREAS OF FILL - GENERAL

- A. Compact material in layers of thickness appropriate to the compaction plant, and approved by the Engineer.
- B. Build up areas of fill evenly over the full width and maintain at all times a sufficient camber and a surface sufficiently even to enable surface water to drain readily from them.
- C. Compact each lift to a minimum of 90 percent of maximum density as determined by ASTM D1557. Adjust moisture content as necessary to obtain specified compaction.
- D. Control and direct constructional traffic uniformly over the full width of the area of fill throughout the construction thereof. Damage to compacted layers by constructional traffic shall be made good by the Contractor, at no cost to the Employer.
- E. If the material deposited as fill subsequently reaches a condition such that it cannot be compacted in accordance with the requirements of the Contract the Contractor shall either:
 - 1. make good by removing the material off the fill until it is in a suitable physical condition for re-use, and replacing it with suitable material; or
 - 2. make good the material by mechanical means, or
 - 3. cease work on the material until its physical condition is again such that it can be compacted as described in the Contract.

- F. Areas of fill shall be tested for compaction on an average of once every 1,000 square feet as directed by the Engineer. Failure of any one test may result in an increase of the testing frequency.
- 3.18 SETTLEMENT
- A. Any settlement noted in backfilled sections of pipe trench or general fill will be considered to be as a result of improper compaction and shall be corrected at no cost to the Employer.

END OF SECTION

SECTION 02500

PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section covers the work necessary to complete the items of work for paving (reinstatement) wherever the work has disturbed the existing paved road surfaces.

1.2 DEFINITIONS

- A. Prepared Ground Surface: Ground surface after completion of trench excavation and compaction of Subgrade.
- B. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557.
- A. Subgrade: Layer of soil after completion of trench excavation prior to placement of surface course

1.3 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Complete data on asphaltic concrete mix, including aggregate gradations and admixtures.

PART 2 PRODUCTS

2.1 BASE COURSE

- A. Material used in the base course shall be clean, bank- or pit-run gravel or crushed rock, well graded from coarse to fine. The maximum size shall be 1-inch, with no more than 10 percent of its weight passing a No. 100 sieve. Excavated material shall not be used as base course material.

2.2 SURFACE COURSE

- A. Chips used in spray and chip surface course shall be clean, dry, single sized (3/8"), washed crushed rock aggregate.
- B. Asphalt emulsion shall be AE 200H tack oil, or equal.
- C. Asphaltic concrete shall be an approved mixture of heated aggregate, mineral filler and asphalt cement.

PART 3 EXECUTION

3.1 GENERAL

- A. Keep Subgrade free of water, debris, and foreign matter during compaction.
- B. Bring Subgrade to proper grade and cross-section and uniformly compact surface.
 - 1. Subgrade shall be 6 inches wider than the trench on both sides.
 - 2. The thickness of the base course shall be a minimum of 8 inches as detailed on the Drawings.
- C. Protect prepared Subgrade from traffic.
- D. Before paving, machine cut existing pavements to neat lines, wider than the

disturbed base by 3 inches on both sides.

- E. Maintain Prepared Ground Surface in finished condition until surface course is placed.

3.2 COMPACTION

- A. Compact the base course to a minimum of 98 percent Relative Compaction as determined in accordance with ASTM D1557.

3.3 SURFACE COURSE

- A. Asphaltic concrete

1. Apply asphalt emulsion (prime coat) to surface of base course and any vertical contact surfaces.
2. Install asphaltic concrete surface course to a thickness of two (2) inches after compaction.

- B. Spray and chip

1. Apply asphalt emulsion at a rate of no less than 0.35 US gallons per square yard, at a temperature of 150-180 degree Fahrenheit, covered immediately with a layer of 3/8 inch washed chips.
2. Spread chips at a rate to produce a uniformly closed surface one layer of aggregate thick. Minimum rate of application shall be 25 pounds of aggregate per square yard.
3. Roll chips to an even surface.

3.4 QUALITY CONTROL

- A. Notify Engineer when Subgrade is ready for compaction or whenever compaction is resumed after a period of extended inactivity.
- B. Density testing shall be performed no less than once every 500 feet of trench. All testing shall be taken along the center line of the trench.
 1. Coordinate with an independent testing laboratory, approved by the Engineer, for all testing and re-testing to ensure that all paving-related work has been performed in strict compliance with these Specifications.
 2. Additional testing may be required if deemed necessary by the Engineer.
- C. Paved surfaces shall not vary more than 1/8 inch in 10 feet parallel to the centre line, nor more than 1/4 inch in 10 feet at right angles to the centre line when checked with a 10 feet long straight edge.

END OF SECTION

SECTION 15060
DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section covers the work necessary to furnish and install, complete, Ductile Iron pipes, fittings and piping specialty items.
- B. No attempt has been made to show all required fittings and piping specialty items on the Drawings. The absence of piping specialties on the Drawings shall not relieve the Contractor of the responsibility for furnishing and installing them throughout as required by applicable codes and good practice.

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American National Standard Institute (ANSI):
 - a. B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
 - b. B16.5, Pipe Flanges and Flanged Fittings.

1.3 SUBMITTALS

- A. In accordance with Section 01300 SUBMITTALS
- B. Quality Control Submittals:
 - 1. Nondestructive inspection and testing procedures.
 - 2. Manufacturer's Certification of compliance:
 - a. Pipe and fittings.
 - b. Factory applied resins and coatings.
 - 3. Test logs.
 - 4. Pipe coating applicator certification.

1.4 QUALIFICATIONS

- A. Independent Inspection and Testing Agency, as approved by Engineer:

PART 2 PRODUCTS

2.1 GENERAL

- A. Flanged pipe and fittings shall be fabricated in the shop, not in the field and delivered to the site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened on matching threaded pipe by the manufacturer.
- B. Provide required piping specialty items, whether shown or not shown on the Drawings, as required by applicable codes and standard industry practice.

2.2 PIPE

- A. Exposed Pipe Using Flanged Joints: AWWA C115/A21.15 and AWWA C151/A21.51, thickness Class 53 minimum conforming to Table 51.7, 250 psi minimum working pressure.

B. Diameters Shown: Standardized Products: Nominal size.

2.2 LINING

A. Cement-Mortar: AWWA C104/A21.4.

B. Fusion Bonded Epoxy: ANSI/AWWA C213

2.3 FITTINGS

A. Lined and coated same as pipe.

B. Flange: AWWA C110/A21.10 ductile iron, faced and drilled, 125-pound flat face. Gray cast iron will not be allowed.

2.4 JOINTS

A. Flange: 125-pound flat face, ductile iron, threaded conforming to AWWA C115/A21.15. Gray cast iron will not be allowed.

2.5 BOLTING

A. 125-Pound Flat-Faced Flange: ASTM A320, stainless steel hex head bolts and stainless steel hex head nuts.

2.6 GASKETS

A. Flanged, Water and Sewage Service: 1/8 inch thick, red rubber (SBR), hardness 80 (Shore A), rated to 200 degrees F, conforming to ANSI B16.1, AWWA C207 and ASTM D1330, Grades 1 and 2.

B. Full face for 125-pound flat-faced flanges.

C. Gasket pressure rating to equal or exceed the system hydrostatic test pressure.

2.7 POLYETHYLENE WRAPPING MATERIAL

A. 8-mil thick polyethylene tube or sheet material, applied in strict accordance with pipe manufacturer's and Cast Iron Pipe Research Association's recommended procedures.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify size, material, joint types, elevation, horizontal location and pipe service of existing pipelines to be connected to new pipelines.

B. Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves and other openings.

C. All buried metal piping specialties and flanges shall be protected against the corrosive effects of groundwater by either wrapping in Denso profiling mastic and/or Densyl tape, or an approved equivalent.

3.2 PREPARATION

A. Inspect pipe and fittings before installation, clean thoroughly and remove foreign matter and dirt from inside.

B. Damaged Coatings and Linings: Repair using original coating and lining materials in accordance with manufacturer's instructions.

3.3 INSTALLATION-GENERAL

A. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.

- B. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after assembly and installation.
- C. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop pipe under any circumstances.
- D. Cut pipe with milling type cutter, rolling pipe cutter or abrasive saw cutter. Do not flame cut.
- E. Bolted joints: Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness, using torque-limiting wrenches only.
- F. Flanged Joints:
 - 1. Install perpendicular to pipe centerline.
 - 2. Bolt Holes: Straddle vertical centerlines, aligned with connecting equipment flanges or as shown.
 - 3. Use torque-limiting wrenches to ensure uniform bearing and proper bolt tightness.
 - 4. Raised-Face Flanges: Use flat-face flange gasket when joining with flat-faced ductile or cast iron flange.
 - 5. Verify compatibility of mating flange to adapter flange gasket prior to selecting grooved adapter flanging.

3.4 PIPING FLEXIBILITY PROVISIONS

- A. Flexible Joints at concrete Structures: Install 18 inches or less from the face of structures;.

3.5 INSTALLATION-EXPOSED PIPING

- A. Piping Runs: Parallel to building and perpendicular to floor, unless shown otherwise.
- B. Flanges: Provide at each piping connection to equipment to facilitate installation and removal.
- C. Install piping to allow for contraction and expansion without stressing pipe, joints or connected equipment.
- D. Piping clearance: Do not route piping in front of, or to interfere with, access ways, ladders, openings, or doors.

3.6 THRUST RESTRAINT

- A. Location:
 - 1. Buried Piping: Where shown and where required to restrain force developed at pipeline bends and other locations where unbalanced forces exist due to hydrostatic testing and normal operating pressure.
 - 2. Exposed Piping: At all joints in piping.
- B. Mechanical joint restraints shall be Megalug Series 1100 or Megaflange Series 2100 produced by EBAA Iron Inc. or approved equivalent.

END OF SECTION

SECTION 15105

HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. DESCRIPTION: The work in this section consists of providing and installing High Density Polyethylene (HDPE) pipe and fittings.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

Section 02220 TRENCH EXCAVATION AND BACKFILL.

Section 15992, PIPELINE TESTING.

1.3 DESIGN REQUIREMENTS

- A. Where pipe thickness, pressure class, pressure rating or thrust restraint is not shown or specified, design buried piping system in accordance with H20-S16 traffic load with 1.5 impact factor, AASHTO Standard Specification for Highway Bridges, as applicable.

1.4 QUALITY ASSURANCE:

- B. References, American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), International Standards Organization (ISO), and manufacturer's printed recommendations.

Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the bid date of the project.

ANSI/AWWA C906-07: Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.

AWWA M55 Manual of Water Supply Practices, PE Pipe – Design and Installation
Plastics Pipe Institute, PPI (www.plasticpipe.org)

PPI Handbook of Polyethylene Pipe –2009 (2nd Edition)

PPI TR-33 Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe Edition)

PPI TN-42 Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects (2009).

ASTM F 714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR)
Based on Outside Diameter.

1.5 SUBMITTALS:

A. Shop Drawings:

1. Shop Fabricated Piping:

Detailed pipe fabrication drawings showing special fittings and bends, dimensions and other pertinent information.

2. Hydraulic Thrust Restraint for Restrained Joints: Details including materials, sizes, assembly ratings and pipe attachment methods.

3. Dissimilar Buried Pipe Joints: Joint types and assembly drawings.

B. Quality Control Submittals:

1. Nondestructive inspection and testing procedures.

2. Manufacturer's Certification of compliance: Pipe and fittings.
3. Test logs.

1.6 QUALIFICATIONS

- A. Independent Inspection and Testing Agency, as approved by Engineer.

PART 2 PRODUCTS

2.1 PIPE

- A. HDPE Pipe shall be DR-11, Class 160 IPS size (pressure rating 160 psi @ 73°F) conforming to AWWA C906 and NSF 61, unless otherwise specified on the drawings. Polyethylene pipe shall be manufactured in accordance with ASTM F714, Polyethylene (PE) Plastic Pipe (SDR-PR) shall be based on controlled Outside Diameter and shall be so marked.
- B. Pipe shall be manufactured from a PE 3408/3608 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D 3350-05 with a minimum cell classification of 345464C. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All HDPE pipe shall be in straight lengths. The pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

2.2 FITTINGS:

- A. BUTT FUSION FITTINGS: Butt fusion fittings shall be PE3408/3608 HDPE, Cell Classification of PE 345464C as determined by ASTM D3350-05. Fittings shall be in accordance with ASTM D 3261 and shall be manufactured by injection molding, a combination of extrusion and machining, or fabricated from HDPE pipe conforming to this specification. All fittings shall have at least the pressure rating of the pipe unless otherwise specified on the plans: a DR equal to or less than the pipe shall be used. Fabricated fittings shall be manufactured using a Datalogger to record fusion pressure and temperature. A graphic representation of the temperature and pressure data for all fusion joints made producing fittings shall be maintained as part of the quality control. The fitting shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.
- B. FLANGED AND MECHANICAL JOINT ADAPTERS: Flanged and mechanical Joint Adapters shall be PE3408/3608 HDPE. Minimum cell classification of 345464C as determined by ASTM D 3350 and be the same base resin as the pipe. Flanged and mechanical joint adapters shall have a manufacturing standard of ASTM D 3261. All adapters shall be pressure rated to provide a working pressure rating no less than that of the pipe.

Mechanical connections of high density polyethylene pipe to auxiliary equipment such as valves, pumps, tanks and other piping systems shall be through flanged connections consisting of the following:

1. A polyethylene stub end thermally butt-fused to end of pipe.
2. ASTM A240, Type 304 stainless steel backing flange, 125-pound, ANSI B16.1 standard. Insulating flanges shall be used where shown.
3. Bolts and nuts of sufficient length to show a minimum of three complete threads when the joint is made and tightened to manufacturer's standard. Retorque nuts after 4 hours.
4. Gaskets as specified on Data Sheet.

- C. **MECHANICAL RESTRAINT:** Mechanical restraint for HDPE may be provided by mechanical means separate from the mechanical joint gasket sealing gland. The restrainer shall provide wide, supportive contact around the full circumference of the pipe and be equal to the listed widths. Means of restraint shall be machined serrations on the inside surface of the restrainer. Loading of the restrainer shall be by a ductile iron follower that provides even circumferential loading over the entire restrainer. Design shall be such that restraint shall be increased with increases in line pressure. Serrated restrainer shall be ductile iron ASTM A536 with a ductile iron follower; bolts and nuts shall be corrosive resistant, high strength alloy steel. The restrainer shall have a pressure rating at least equal to that of the pipe on which it is used.

Pipe stiffeners shall be used in conjunction with restrainers. The pipe stiffeners shall be designed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless steel to the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE.

D. **THRUST RESTRAINT**

1. Location: Where shown and/or where required to restrain force developed at pipelines tees, plugs, caps, bends and other locations where unbalanced forces exist due to hydrostatic testing and normal operating pressure.
2. Design for 100 psi test pressure.

E. **VENTS AND DRAINS**

1. Vents at high points in piping required for completed system may or may not be shown. Install vents on high points of pipelines at all high point locations.

PART 3: EXECUTION

3.1 **GENERAL:**

- A. **PIPE & FITTINGS:** Size as indicated on the plans. Install as shown in accordance with manufacturer's recommendations.

3.2 **QUALITY AND WORKMANSHIP:**

- A. The pipe and/or fitting manufacturer's production facility shall be open for inspection by the owner or his designated agents with a reasonable advance notice. During inspection, the manufacturer shall demonstrate that it has facilities capable of manufacturing and testing the pipe and/or fittings to the standards required by this specification.

3.3 **PIPE PACKAGING, HANDLING & STORAGE:**

- A. The manufacturer shall package the pipe in a manner designed to deliver the pipe to the project neatly, intact and without physical damage. The transportation carriers shall use appropriate methods and intermittent checks to insure the pipe is properly supported, stacked and restrained during transportation such that the pipe is not nicked, gouged, or physically damaged.
- B. During loading, transportation and unloading, every precaution shall be taken to prevent injury to the pipe. No pipe shall be dropped from cars or trucks, or allowed to roll down slides without proper retaining ropes. During transportation each pipe shall rest on suitable pads, strips, skids or blocks securely wedged or tied in place. Any pipe damaged shall be replaced.

- C. Pipe shall be stored on clean, level ground to prevent undue scratching or gouging. If the pipe must be stacked for storage, such stacking shall be done in accordance with the pipe manufacturer's recommendations. The pipe shall be handled in such a manner that it is not pulled over sharp objects or cut by chokers or lifting equipment.
- D. Sections of pipe having been discovered with cuts or gouges in excess of 10% of the pipe wall thickness shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the heat fusion joining method.
- E. Fused segments of the pipe shall be handled so as to avoid damage to the pipe. Chains or cable type chokers must be avoided when lifting fused sections of pipe. Nylon slings are preferred. Spreader bars are recommended when lifting long fused sections.

3.4 INSTALLATION - GENERAL

- A. Inspect the pipe and fittings for defects before installation and fusion. Defective, damaged or unsound pipe and fittings shall be rejected.
- B. Each pipe and fitting shall be carefully inspected before it is installed or lowered into the trench. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and fittings and keep clean during and after assembly and installation.
- C. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.
- D. Do not lay pipe when trenches or weather conditions are not suitable for such work.
- E. Excavate trench bottom and sides of ample dimensions to permit visual inspection and testing of entire flange, valve or connection.
- F. Close and block open end of last laid pipe section when placements operations are not in progress and at close of day's work.
- G. Accommodate horizontal or vertical curves in alignment with appropriate fittings.
- H. After joint has been made, check pipe alignment and grade.
- I. Place sufficient pipe zone material to secure pipe from movement before next joint is installed.
- J. Take all precautions to prevent uplift and floating of pipe prior to backfilling.

3.5 JOINING

- A. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.
- B. Do not encase joints or pipe in concrete unless specifically shown or approved by Engineer.
- C. BUTT FUSION: Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method outlined in ASTM F 2620 or PPI TR-33, and shall be performed in strict accordance with the pipe manufacturer's recommendations. Fusion joints shall be made by qualified fusion technicians per PPI TN-42. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements, alignment, and interfacial fusion pressure. Butt fusion joining will produce a joint with weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records.

- D. **MECHANICAL:** Bolted joining may be used where the butt fusion method cannot be used. Mechanical connection of HDPE to auxiliary equipment such as valves, pumps, and fittings shall use mechanical joint adapters and other devices in conformance with the PPI Handbook of Polyethylene Pipe, Chapter 9 and AWWA Manual of Practice M55, Chapter 6. Mechanical joining will be accomplished by either using a HDPE flange adapter with a ductile iron back-up ring, or HDPE Mechanical Joint adapter with a ductile iron back-up ring.

All saddles, tapping saddles, couplings, clamps etc. shall be recommended by the manufacturer as being designed specifically for use with HDPE pipe at the pressure class listed in this section.

Unless specified by the fitting manufacturer, a restraint harness or concrete anchor is recommended with mechanical couplings to prevent pullout.

Mechanical coupling shall be made by qualified technicians. Qualification of the field technician shall be demonstrated by evidence of mechanical coupling training within the past year. This training shall be on the equipment and pipe components to be utilized for this project.

Bolted Joints:

1. Install perpendicular to pipe centerline.
2. Align bolt holes with connecting equipment flanges or as shown.
3. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time, using torque-limiting wrenches only, to ensure uniform bearing and proper bolt tightness.
4. Raised-Face Flanges: Use flat-face flange gasket when joining with flat-faced ductile or cast iron flange.

E. THRUST RESTRAINT:

1. Mechanical Joint Valve Restraint in Proprietary Restrained Joint Piping: Install pipe joint manufacturer's adapter gland follower and pipe end retainer or thrust tie-rods and socket clamps.

- F. **OTHER:** Socket fusion, hot gas fusion, threading, solvents, and epoxies shall not be used to join HDPE pipe.

G. CLEANING

1. Following assembly and testing and prior to final acceptance, flush pipelines (except as stated below) with water at 2.5 fps minimum flushing velocity until foreign matter is removed.
2. If impractical to flush larger diameter pipe at 2.5 fps, clean in-place from inside by brushing and sweeping, then flush line at lower velocity.
3. Remove accumulated debris by removing spools and valves from piping.

END OF SECTION

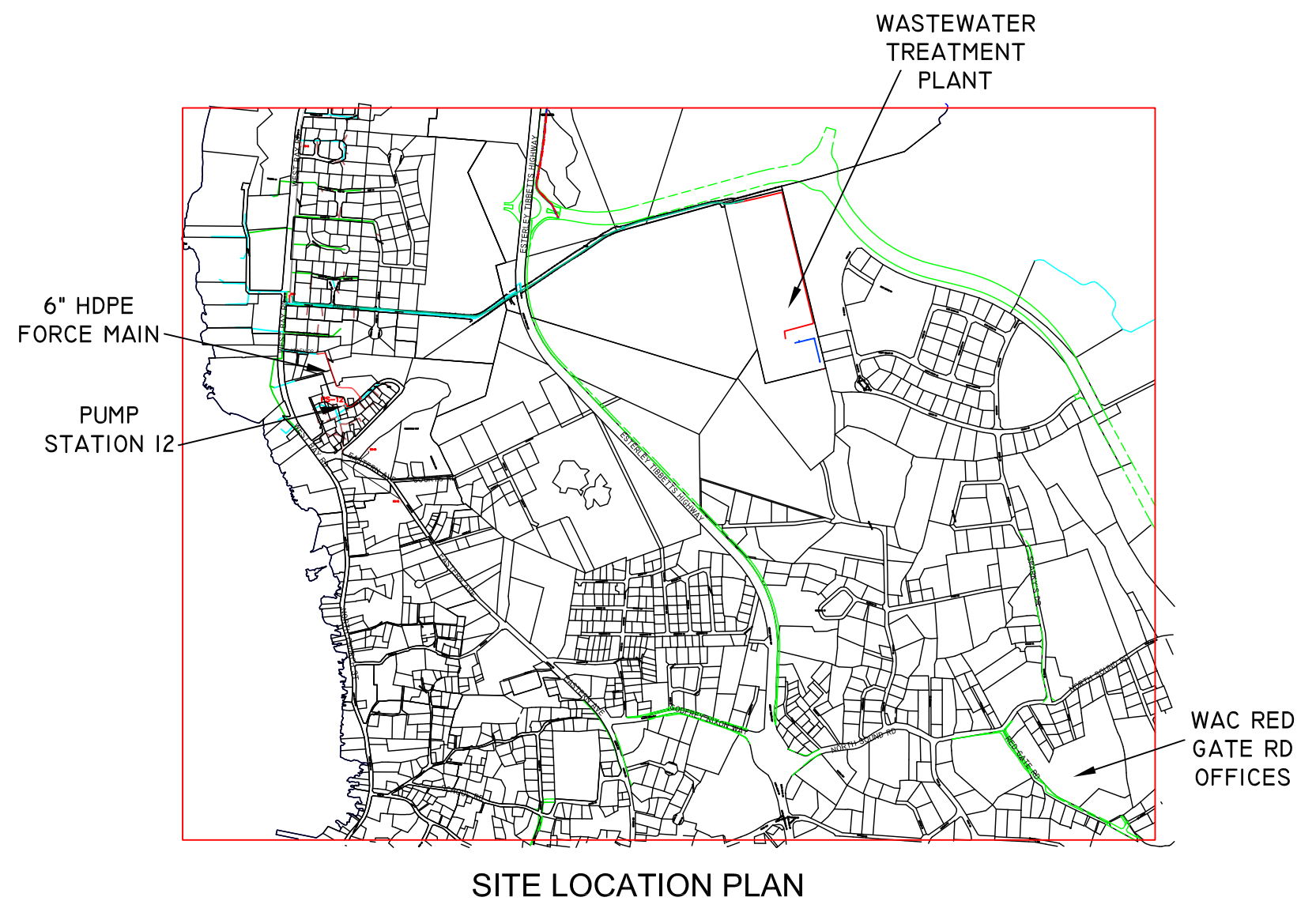
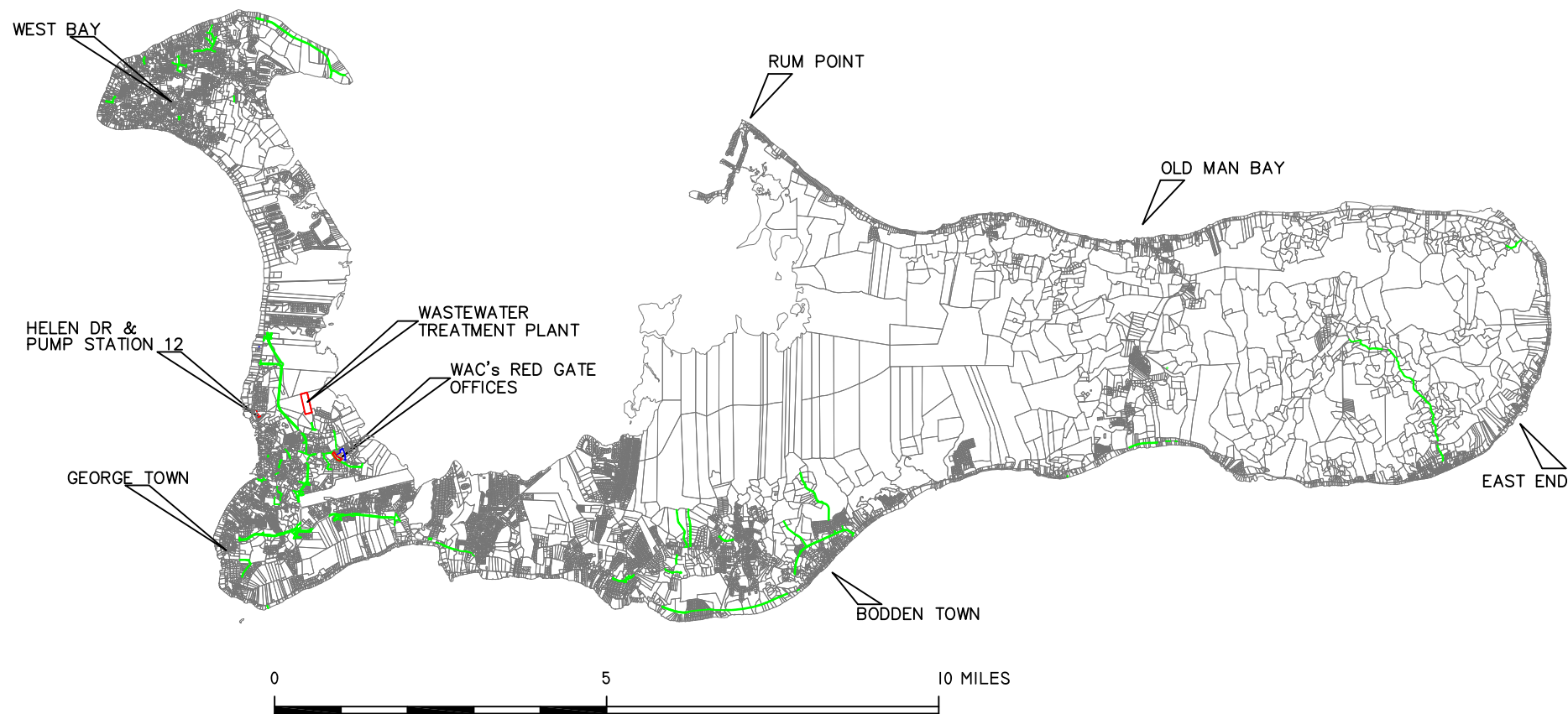
WEST BAY BEACH SEWERAGE SYSTEM

SEWER FORCE MAIN INSTALLATION ALONG HELEN DR

TENDER DRAWINGS:

DWG.

PS12 - 01	SITE LOCATION PLAN
PS12 - 02	PROPOSED HDPE FORCE MAIN PIPELINE ROUTE
PS12 - 03	PUMP STATION VALVE CHAMBER EXISTING & PROPOSED
PS12 - 03	PUMP STATION VALVE CHAMBER PIPEWORK DETAILS



DATE:	17/10/17
DRAWN BY:	CJG
CHECKED:	TvZ
PROJECT NO.	XXXXX

REV	DATE	BY	DESCRIPTION
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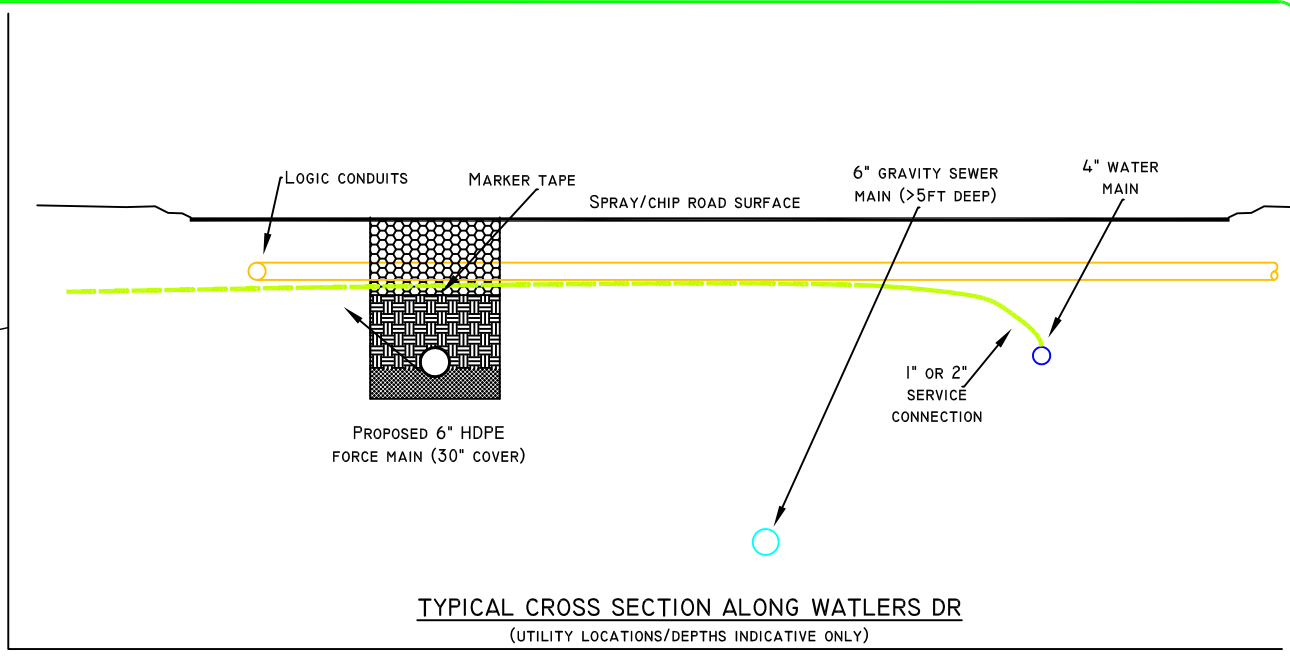
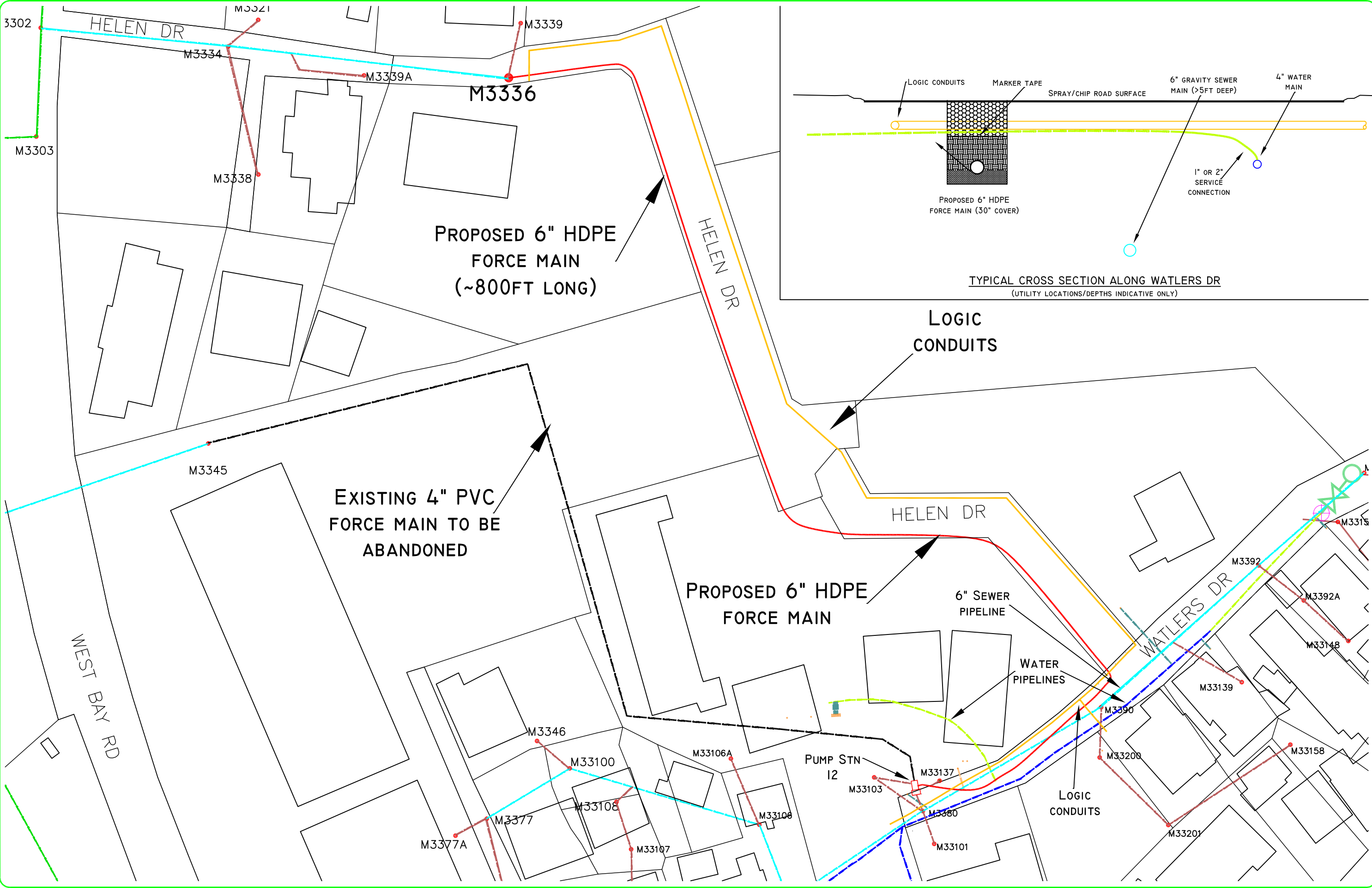


WATER AUTHORITY – CAYMAN
P.O. BOX 1104
GRAND CAYMAN, KYI-1102
345-949-2837

**WBSS – SEWER FORCE
MAIN INSTALLATION ALONG
HELEN DR**

SITE LOCATION PLAN

WAC PROJECT NO.	
p**	
DRAWING NO.	
PS12-01	
SCALE	VIEW
As Shown	
SHEET	REV
1 of 1	0



DATE: 17/10/17
DRAWN BY: CJG
CHECKED: TVZ
PROJECT NO. XXXXX

REV	DATE	BY	DESCRIPTION
0	17/10/17	XXX	ORIGINAL RELEASE - ISSUE FOR TENDER

WATER AUTHORITY - CAYMAN
P.O. BOX 1104
GRAND CAYMAN, KY1-1102
345-949-2837

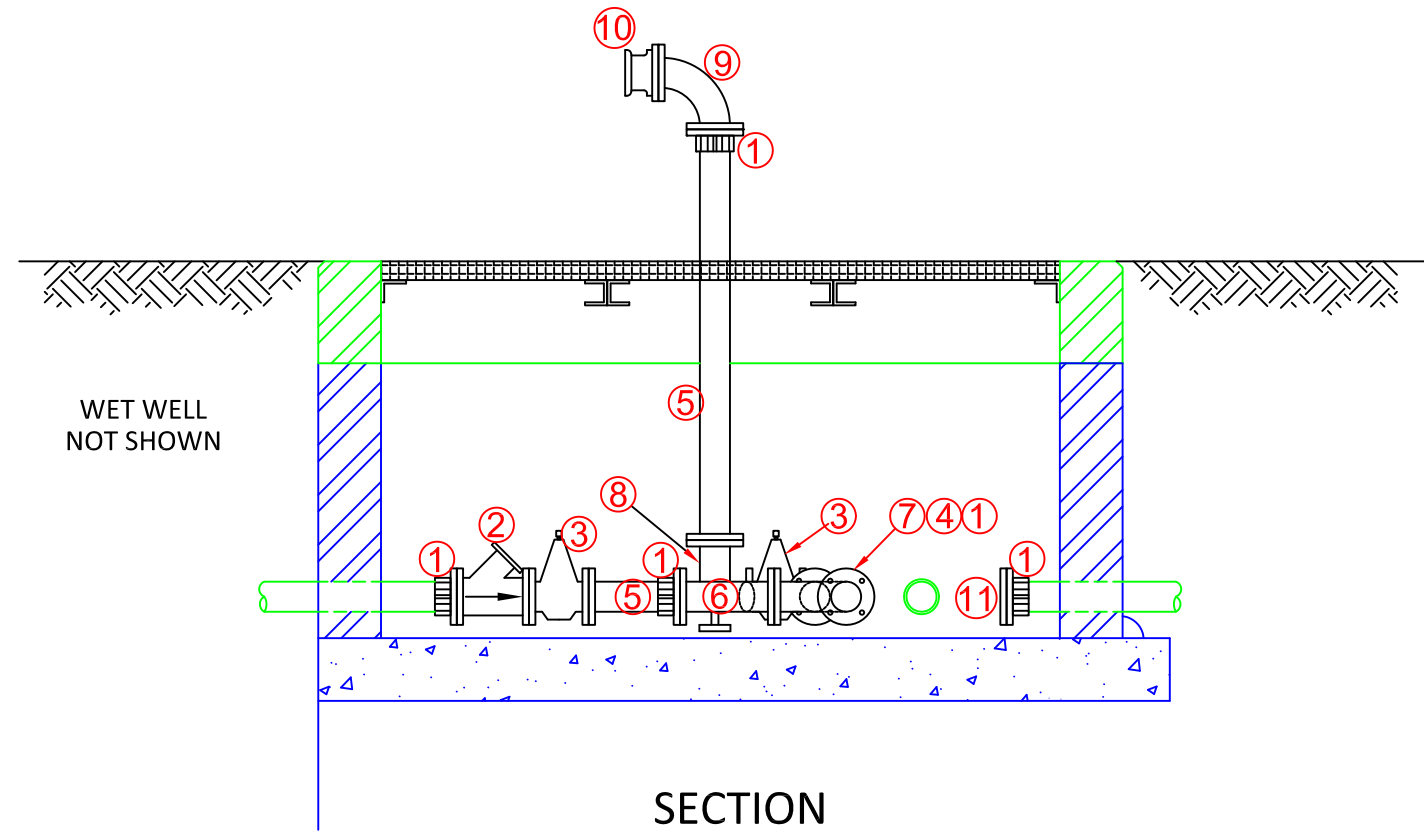
WBSS - SEWER FORCE MAIN INSTALLATION ALONG HELEN DR

PROPOSED HDPE FORCE MAIN PIPELINE ROUTE

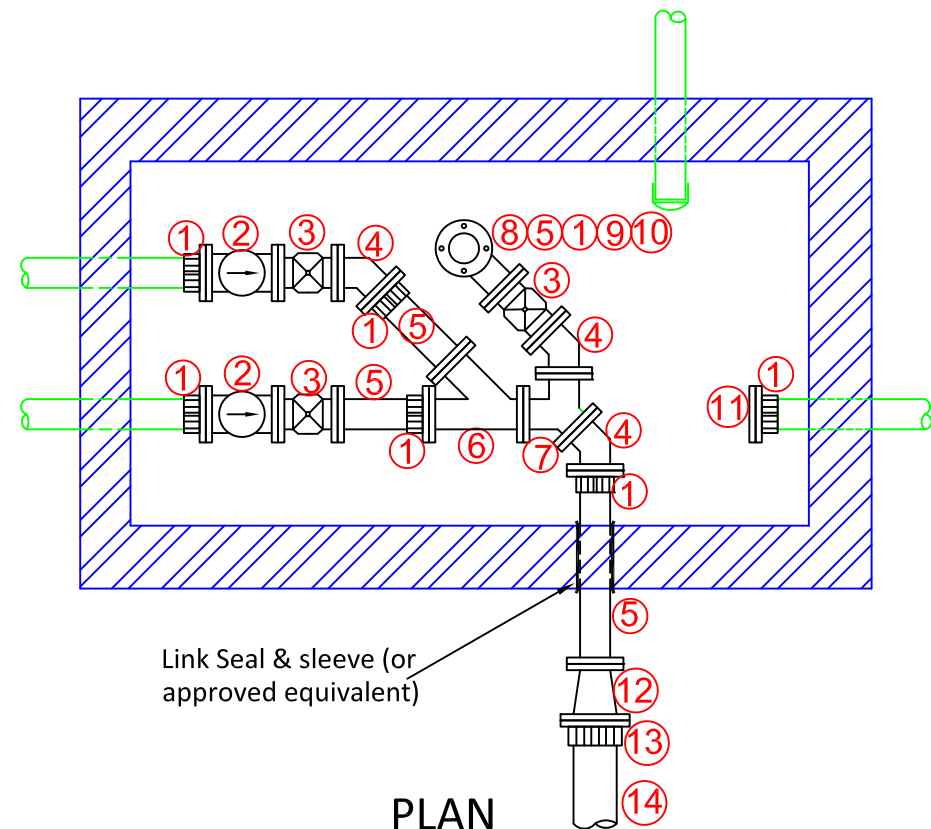
WAC PROJECT NO. p**

DRAWING NO. PS12-02

SCALE	VIEW
NONE	VIEW
SHEET	REV
1 of 1	0



SECTION



PLAN

PROPOSED PIPEWORK

PUMP STATION 12 DUCTILE IRON PIPE FITTINGS

Ref.	Nom. Dia.	Description	Quant
1.	4"	EBAA Megaflange Series 2104 flange adaptor to fit D.I pipe	7 No.
2.	4"	Flygt Type 5087 flanged ball check valve (or equivalent)	2 No.
3.	4"	Milliken Millcentric flanged plug valve (or equivalent)	3 No.
4.	4"	D.I. flanged 45° bend	2 No.
5.	4"	D.I. pipe, flange x plain end, various lengths	4 No.
6.	4"	D.I. all flanged wye branch	1 No.
7.	4"	D.I. all flanged true wye	1 No.
8.	4"	D.I. all flanged 90° duckfoot bend	1 No.
9.	4"	D.I. flanged 90° long radius bend	1 No.
10.	4"	Flange x male camlock hose connector	1 No.
11.	4"	D.I. blank flange	1 No.
12.	6"/4"	D.I. flanged reducer	1 No.
13.	6"	D.I. flange adaptor to fit HDPE force main	1 No.
14.	6"	HDPE force main	

NOTES

All flanges shall conform to the facing and drilling of ANSI B16.1 Class 125 flanges

DATE: 17/10/17
DRAWN BY: CJG
CHECKED: TvZ
PROJECT NO. XXXXX

REV	DATE	BY	DESCRIPTION
0	17/10/17	XXX	ORIGINAL RELEASE - ISSUE FOR TENDER



WATER AUTHORITY - CAYMAN
P.O. BOX 1104
GRAND CAYMAN, KY1-1102
345-949-2837

WBBSS - SEWER FORCE
MAIN INSTALLATION ALONG
HELEN DR
PUMP STATION VALVE CHAMBER
PIPEWORK DETAILS

WAC PROJECT NO.
P**

DRAWING NO.
PS12-04

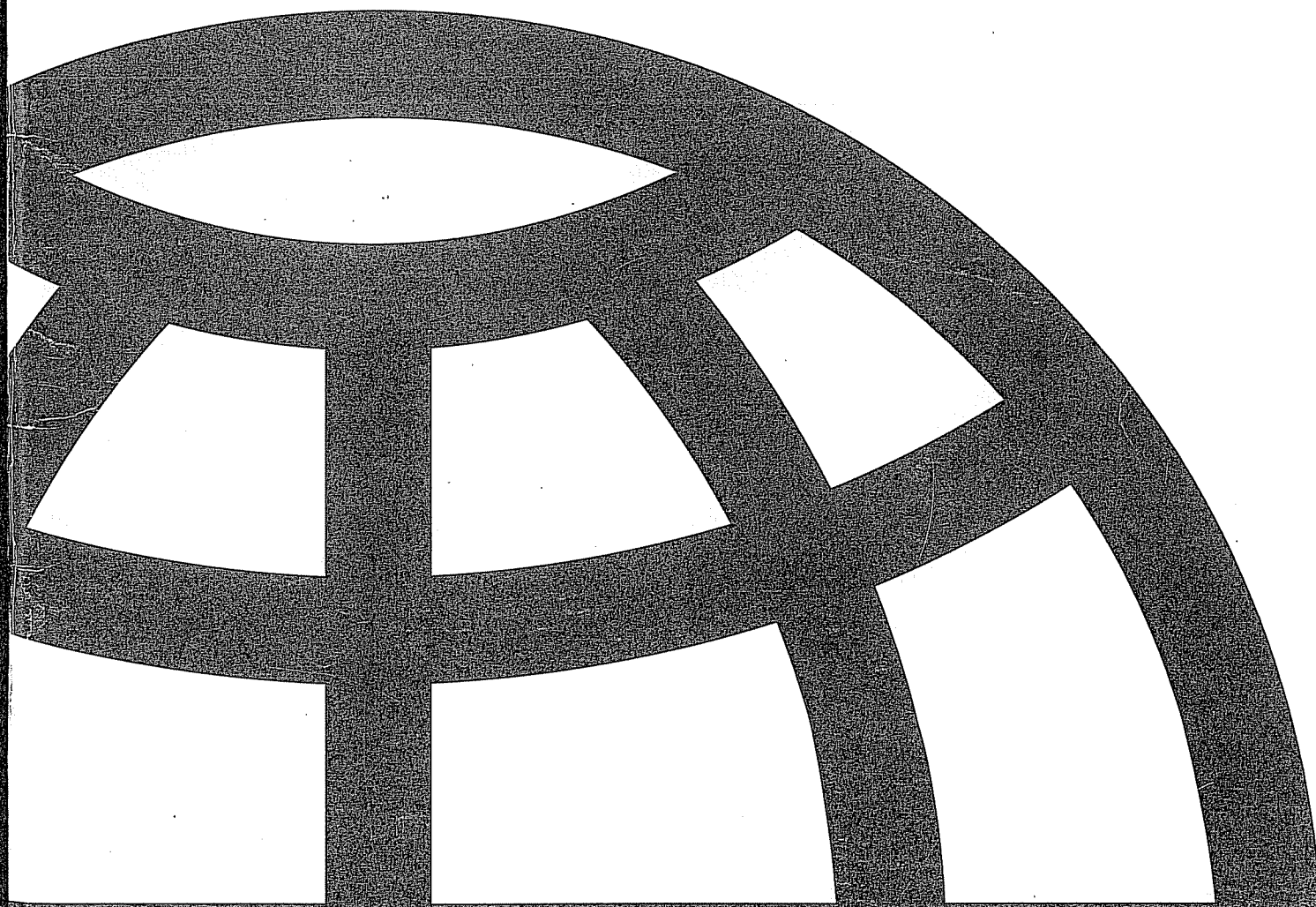
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Fédération Internationale des Ingénieurs-Conseils
International Federation of Consulting Engineers
Internationale Vereinigung Beratender Ingenieure
Federación Internacional de Ingenieros Consultores

Short Form of Contract

AGREEMENT
GENERAL CONDITIONS
RULES FOR ADJUDICATION
NOTES FOR GUIDANCE



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Offer

Acceptance

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General Conditions

1 General Provisions

1.1

Definitions

In the Contract as defined below, the words and expressions defined shall have the following meanings assigned to them, except where the context requires otherwise:

The Contract

- 1.1.1 **"Contract"** means the Agreement and the other documents listed in the Appendix.
- 1.1.2 **"Specification"** means the document as listed in the Appendix, including Employer's requirements in respect of design to be carried out by the Contractor, if any, and any Variation to such document.
- 1.1.3 **"Drawings"** means the Employer's drawings of the Works as listed in the Appendix, and any Variation to such drawings.

Persons

- 1.1.4 **"Employer"** means the person named in the Agreement and the legal successors in title to this person, but not (except with the consent of the Contractor) any assignee.
- 1.1.5 **"Contractor"** means the person named in the Agreement and the legal successors in title to this person, but not (except with the consent of the Employer) any assignee.
- 1.1.6 **"Party"** means either the Employer or the Contractor.

Dates, Times and Periods

- 1.1.7 **"Commencement Date"** means the date 14 days after the date the Agreement comes into effect or any other date agreed between the Parties.
- 1.1.8 **"day"** means a calendar day.
- 1.1.9 **"Time for Completion"** means the time for completing the Works as stated in the Appendix (or as extended under Sub-Clause 7.3), calculated from the Commencement Date.

Money and Payments

- 1.1.10 **"Cost"** means all expenditure properly incurred (or to be incurred) by the Contractor, whether on or off the Site, including overheads and similar charges, but does not include profit.

Other Definitions

- 1.1.11 **"Contractor's Equipment"** means all apparatus, machinery, vehicles, facilities and other things required for the execution of the Works but does not include Materials or Plant.
- 1.1.12 **"Country"** means the country in which the Site is located.
- 1.1.13 **"Employer's Liabilities"** means those matters listed in Sub-Clause 6.1.
- 1.1.14 **"Force Majeure"** means an exceptional event or circumstance: which is beyond a Party's control; which such Party could not reasonably have

provided against before entering into the Contract; which, having arisen, such Party could not reasonably have avoided or overcome; and, which is not substantially attributable to the other Party.

- 1.1.15 **"Materials"** means things of all kinds (other than Plant) intended to form or forming part of the permanent work.
- 1.1.16 **"Plant"** means the machinery and apparatus intended to form or forming part of the permanent work.
- 1.1.17 **"Site"** means the places provided by the Employer where the Works are to be executed, and any other places specified in the Contract as forming part of the Site.
- 1.1.18 **"Variation"** means a change to the Specification and /or Drawings (if any) which is instructed by the Employer under Sub-Clause 10.1.
- 1.1.19 **"Works"** means all the work and design (if any) to be performed by the Contractor including temporary work and any Variation

1.2

Interpretation

Words importing persons or parties shall include firms and organisations. Words importing singular or one gender shall include plural or the other gender where the context requires.

1.3

Priority of Documents

The documents forming the Contract are to be taken as mutually explanatory of one another. If an ambiguity or discrepancy is found in the documents, the Employer shall issue any necessary instructions to the Contractor, and the priority of the documents shall be in accordance with the order as listed in the Appendix.

1.4

Law

The law of the Contract is stated in the Appendix.

1.5

Communications

Wherever provision is made for the giving or issue of any notice, instruction, or other communication by any person, unless otherwise specified such communication shall be written in the language stated in the Appendix and shall not be unreasonably withheld or delayed.

1.6

Statutory Obligations

The Contractor shall comply with the laws of the countries where activities are performed. The Contractor shall give all notices and pay all fees and other charges in respect of the Works.

2

The Employer

2.1

Provision of Site

The Employer shall provide the Site and right of access thereto at the times stated in the Appendix.

2.2

Permits and Licences

The Employer shall, if requested by the Contractor, assist him in applying for permits, licences or approvals which are required for the Works.

- 2.3 **Employer's Instructions** The Contractor shall comply with all instructions given by the Employer in respect of the Works including the suspension of all or part of the Works.
- 2.4 **Approvals** No approval or consent or absence of comment by the Employer or the Employer's representative shall affect the Contractor's obligations.
-

3 Employer's Representatives

- 3.1 **Authorised Person** One of the Employer's personnel shall have authority to act for him. This authorised person shall be as stated in the Appendix, or as otherwise notified by the Employer to the Contractor.
- 3.2 **Employer's Representative** The Employer may also appoint a firm or individual to carry out certain duties. The appointee may be named in the Appendix, or notified by the Employer to the Contractor from time to time. The Employer shall notify the Contractor of the delegated duties and authority of this Employer's representative.
-

4 The Contractor

- 4.1 **General Obligations** The Contractor shall carry out the Works properly and in accordance with the Contract. The Contractor shall provide all supervision, labour, Materials, Plant and Contractor's Equipment which may be required. All Materials and Plant on Site shall be deemed to be the property of the Employer.
- 4.2 **Contractor's Representative** The Contractor shall submit to the Employer for consent the name and particulars of the person authorised to receive instructions on behalf of the Contractor.
- 4.3 **Subcontracting** The Contractor shall not subcontract the whole of the Works. The Contractor shall not subcontract any part of the Works without the consent of the Employer.
- 4.4 **Performance Security** If stated in the Appendix, the Contractor shall deliver to the Employer within 14 days of the Commencement Date a performance security in a form and from a third party approved by the Employer.
-

5 Design by Contractor

- 5.1 **Contractor's Design** The Contractor shall carry out design to the extent specified, as referred to in the Appendix. The Contractor shall promptly submit to the Employer all designs prepared by him. Within 14 days of receipt the Employer shall notify any comments or, if the design submitted is not in accordance with the Contract, shall reject it stating the reasons. The Contractor shall not construct any element of the permanent work designed by him within 14 days after the design has been

submitted to the Employer or where the design for that element has been rejected. Design that has been rejected shall be promptly amended and resubmitted. The Contractor shall resubmit all designs commented on taking these comments into account as necessary.

5.2

Responsibility for Design

The Contractor shall remain responsible for his tendered design and the design under this Clause, both of which shall be fit for the intended purposes defined in the Contract and he shall also remain responsible for any infringement of any patent or copyright in respect of the same. The Employer shall be responsible for the Specification and Drawings.

6

Employer's Liabilities

6.1

Employer's Liabilities

In this Contract, Employer's Liabilities mean :

- a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies, within the Country,
- b) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country,
- c) riot, commotion or disorder by persons other than the Contractor's personnel and other employees, affecting the Site and/or the Works,
- d) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component of such an assembly, except to the extent to which the Contractor may be responsible for the use of any radio-active material,
- e) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
- f) use or occupation by the Employer of any part of the Works, except as may be specified in the Contract,
- g) design of any part of the Works by the Employer's personnel or by others for whom the Employer is responsible, and
- h) any operation of the forces of nature affecting the Site and/or the Works, which was unforeseeable or against which an experienced contractor could not reasonably have been expected to take precautions.
- i) Force Majeure,
- j) a suspension under Sub-Clause 2.3 unless it is attributable to the Contractor's failure,
- k) any failure of the Employer,
- l) physical obstructions or physical conditions other than climatic conditions, encountered on the Site during the performance of the Works, which obstructions or conditions were not reasonably foreseeable by an experienced contractor and which the Contractor immediately notified to the Employer,
- m) any delay or disruption caused by any Variation,
- n) any change to the law of the Contract after the date of the Contractor's offer as stated in the Agreement,
- o) losses arising out of the Employer's right to have the permanent work executed on, over, under, in or through any land, and to occupy this land for the permanent work, and
- p) damage which is an unavoidable result of the Contractor's obligations to execute the Works and to remedy any defects.

7 Time for Completion

7.1

Execution of the Works

The Contractor shall commence the Works on the Commencement Date and shall proceed expeditiously and without delay and shall complete the Works within the Time for Completion.

7.2

Programme

Within the time stated in the Appendix, the Contractor shall submit to the Employer a programme for the Works in the form stated in the Appendix.

7.3

Extension of Time

Subject to Sub-Clause 10.3, the Contractor shall be entitled to an extension to the Time for Completion if he is or will be delayed by any of the Employer's Liabilities.

On receipt of an application from the Contractor, the Employer shall consider all supporting details provided by the Contractor and shall extend the Time for Completion as appropriate.

7.4

Late Completion

If the Contractor fails to complete the Works within the Time for Completion, the Contractor's only liability to the Employer for such failure shall be to pay the amount stated in the Appendix for each day for which he fails to complete the Works.

8 Taking-Over

8.1

Completion

The Contractor may notify the Employer when he considers that the Works are complete.

8.2

Taking-Over Notice

The Employer shall notify the Contractor when he considers that the Contractor has completed the Works stating the date accordingly. Alternatively, the Employer may notify the Contractor that the Works, although not fully complete, are ready for taking over, stating the date accordingly.

The Employer shall take over the Works upon the issue of this notice. The Contractor shall promptly complete any outstanding work and, subject to Clause 9, clear the Site.

9 Remedying Defects

9.1

Remedying Defects

The Employer may at any time prior to the expiry of the period stated in the Appendix, notify the Contractor of any defects or outstanding work. The Contractor shall remedy at no cost to the Employer any defects due to the Contractor's design, Materials, Plant or workmanship not being in accordance with the Contract.

The cost of remedying defects attributable to any other cause shall be valued as a Variation. Failure to remedy any defects or complete outstanding work within a reasonable time of the Employer's notice shall entitle the Employer to carry out all necessary work at the Contractor's cost.

9.2

Uncovering and Testing

The Employer may give instruction as to the uncovering and/or testing of any work. Unless as a result of any uncovering and/or testing it is established that the Contractor's design, Materials, Plant or workmanship are not in accordance with the Contract, the Contractor shall be paid for such uncovering and/or testing as a Variation in accordance with Sub-Clause 10.2.

10

Variations and Claims

10.1

Right to Vary

The Employer may instruct Variations.

10.2

Valuation of Variations

Variations shall be valued as follows:

- a) at a lump sum price agreed between the Parties, or
- b) where appropriate, at rates in the Contract, or
- c) in the absence of appropriate rates, the rates in the Contract shall be used as the basis for valuation, or failing which
- d) at appropriate new rates, as may be agreed or which the Employer considers appropriate, or
- e) if the Employer so instructs, at daywork rates set out in the Appendix for which the Contractor shall keep records of hours of labour and Contractor's Equipment, and of Materials used.

10.3

Early Warning

A Party shall notify the other as soon as he is aware of any circumstance which may delay or disrupt the Works, or which may give rise to a claim for additional payment. The Contractor shall take all reasonable steps to minimise these effects.

The Contractor's entitlement to extension to the Time for Completion or additional payment shall be limited to the time and payment which would have been due if he had given prompt notice and had taken all reasonable steps.

10.4

Right to Claim

If the Contractor incurs Cost as a result of any of the Employer's Liabilities, the Contractor shall be entitled to the amount of such Cost. If as a result of any of the Employer's Liabilities, it is necessary to change the Works, this shall be dealt with as a Variation.

10.5

Variation and Claim Procedure

The Contractor shall submit to the Employer an itemised make-up of the value of Variations and claims within 28 days of the instruction or of the event giving rise to the claim. The Employer shall check and if possible agree the value. In the absence of agreement, the Employer shall determine the value.

11

Contract Price and Payment

11.1

Valuation of the Works The Works shall be valued as provided for in the Appendix, subject to Clause 10.

11.2

Monthly Statements The Contractor shall be entitled to be paid at monthly intervals:

- a) the value of the Works executed,
- b) the percentage stated in the Appendix of the value of Materials and Plant delivered to the Site at a reasonable time,

subject to any additions or deductions which may be due.

The Contractor shall submit each month to the Employer a statement showing the amounts to which he considers himself entitled.

11.3

Interim Payments

Within 28 days of delivery of each statement, the Employer shall pay to the Contractor the amount shown in the Contractor's statement less retention at the rate stated in the Appendix, and less any amount for which the Employer has specified his reasons for disagreement. The Employer shall not be bound by any sum previously considered by him to be due to the Contractor.

The Employer may withhold interim payments until he receives the performance security under Sub-Clause 4.4 (if any).

11.4

Payment of First Half of Retention

One half of the retention shall be paid by the Employer to the Contractor within 14 days after issuing the notice under Sub-Clause 8.2.

11.5

Payment of Second Half of Retention

The remainder of the retention shall be paid by the Employer to the Contractor within 14 days after either the expiry of the period stated in the Appendix, or the remedying of notified defects or the completion of outstanding work, all as referred to in Sub-Clause 9.1, whichever is the later.

11.6

Final Payment

Within 42 days of the latest of the events listed in Sub-Clause 11.5 above, the Contractor shall submit a final account to the Employer together with any documentation reasonably required to enable the Employer to ascertain the final contract value.

Within 28 days after the submission of this final account, the Employer shall pay to the Contractor any amount due. If the Employer disagrees with any part of the Contractor's final account, he shall specify his reasons for disagreement when making payment.

11.7

Currency

Payment shall be in the currency stated in the Appendix.

11.8

Delayed Payment

The Contractor shall be entitled to interest at the rate stated in the Appendix for each day the Employer fails to pay beyond the prescribed payment period.

12

Default

AGREEMENT

GENERAL
CONDITIONS

ADJUDICATION

GUIDANCE

12.1

Default by Contractor

If the Contractor abandons the Works, refuses or fails to comply with a valid instruction of the Employer or fails to proceed expeditiously and without delay, or is, despite a written complaint, in breach of the Contract, the Employer may give notice referring to this Sub-Clause and stating the default.

If the Contractor has not taken all practicable steps to remedy the default within 14 days after the Contractor's receipt of the Employer's notice, the Employer may by a second notice given within a further 21 days, terminate the Contract. The Contractor shall then demobilise from the Site leaving behind Materials and Plant and any Contractor's Equipment which the Employer instructs in the second notice is to be used until the completion of the Works.

12.2

Default by Employer

If the Employer fails to pay in accordance with the Contract, or is, despite a written complaint, in breach of the Contract, the Contractor may give notice referring to this Sub-Clause and stating the default. If the default is not remedied within 7 days after the Employer's receipt of this notice, the Contractor may suspend the execution of all or parts of the Works.

If the default is not remedied within 28 days after the Employer's receipt of the Contractor's notice, the Contractor may by a second notice given within a further 21 days, terminate the Contract. The Contractor shall then demobilise from the Site.

12.3

Insolvency

If a Party is declared insolvent under any applicable law, the other Party may by notice terminate the Contract immediately. The Contractor shall then demobilise from the Site leaving behind, in the case of the Contractor's insolvency, any Contractor's Equipment which the Employer instructs in the notice is to be used until the completion of the Works.

12.4

Payment upon Termination

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably delivered to the Site, adjusted by the following:

- a) any sums to which the Contractor is entitled under Sub-Clause 10.4,
- b) any sums to which the Employer is entitled,
- c) if the Employer has terminated under Sub-Clause 12.1 or 12.3, the Employer shall be entitled to a sum equivalent to 20% of the value of those parts of the Works not executed at the date of the termination,
- d) if the Contractor has terminated under Sub-Clause 12.2 or 12.3, the Contractor shall be entitled to the Cost of his suspension and demobilisation together with a sum equivalent to 10% of the value of those parts of the Works not executed at the date of termination.

The net balance due shall be paid or repaid within 28 days of the notice of termination.

13

Risk and Responsibility

13.1

Contractor's Care of the Works

The Contractor shall take full responsibility for the care of the Works from the Commencement Date until the date of the Employer's notice under Sub-Clause 8.2. Responsibility shall then pass to the Employer. If any loss or damage happens to the Works during the above period, the Contractor shall rectify such loss or damage so that the Works conform with the Contract.

Unless the loss or damage happens as a result of an Employer's Liability, the Contractor shall indemnify the Employer, the Employer's contractors, agents and employees against all loss or damage happening to the Works and against all claims or expense arising out of the Works caused by a breach of the Contract, by negligence or by other default of the Contractor, his agents or employees.

13.2

Force Majeure

If a Party is or will be prevented from performing any of its obligations by Force Majeure, the Party affected shall notify the other Party immediately. If necessary, the Contractor shall suspend the execution of the Works and, to the extent agreed with the Employer, demobilise the Contractor's Equipment.

If the event continues for a period of 84 days, either Party may then give notice of termination which shall take effect 28 days after the giving of the notice.

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably delivered to the Site, adjusted by the following:

- a) any sums to which the Contractor is entitled under Sub-Clause 10.4,
- b) the Cost of his suspension and demobilisation,
- c) any sums to which the Employer is entitled.

The net balance due shall be paid or repaid within 28 days of the notice of termination.

14

Insurance

14.1

Extent of Cover

The Contractor shall, prior to commencing the Works, effect and thereafter maintain insurances in the joint names of the Parties:

- a) for loss and damage to the Works, Materials, Plant and the Contractor's Equipment,
- b) for liability of both Parties for loss, damage, death or injury to third parties or their property arising out of the Contractor's performance of the Contract, including the Contractor's liability for damage to the Employer's property other than the Works, and
- c) for liability of both Parties and of any Employer's representative for death or injury to the Contractor's personnel except to the extent that liability arises from the negligence of the Employer, any Employer's representative or their employees.

14.2 Arrangements

All insurances shall conform with any requirements detailed in the Appendix. The policies shall be issued by insurers and in terms approved by the Employer. The Contractor shall provide the Employer with evidence that any required policy is in force and that the premiums have been paid.

All payments received from insurers relating to loss or damage to the Works shall be held jointly by the Parties and used for the repair of the loss or damage or as compensation for loss or damage that is not to be repaired.

14.3 Failure to Insure

If the Contractor fails to effect or keep in force any of the insurances referred to in the previous Sub-Clauses, or fails to provide satisfactory evidence, policies or receipts, the Employer may, without prejudice to any other right or remedy, effect insurance for the cover relevant to such default and pay the premiums due and recover the same as a deduction from any other monies due to the Contractor.

15 Resolution of Disputes

15.1 Adjudication

Unless settled amicably, any dispute or difference which arises between the Contractor and the Employer out of or in connection with the Contract, including any valuation or other decision of the Employer, shall be referred by either Party to adjudication in accordance with the attached Rules for Adjudication ("the Rules"). The adjudicator shall be any person agreed by the Parties. In the event of disagreement, the adjudicator shall be appointed in accordance with the Rules.

15.2 Notice of Dissatisfaction

If a Party is dissatisfied with the decision of the adjudicator or if no decision is given within the time set out in the Rules, the Party may give notice of dissatisfaction referring to this Sub-Clause within 28 days of receipt of the decision or the expiry of the time for the decision. If no notice of dissatisfaction is given within the specified time, the decision shall be final and binding on the Parties. If notice of dissatisfaction is given within the specified time, the decision shall be binding on the Parties who shall give effect to it without delay unless and until the decision of the adjudicator is revised by an arbitrator.

15.3 Arbitration

A dispute which has been the subject of a notice of dissatisfaction shall be finally settled by a single arbitrator under the rules specified in the Appendix. In the absence of agreement, the arbitrator shall be designated by the appointing authority specified in the Appendix. Any hearing shall be held at the place specified in the Appendix and in the language referred to in Sub-Clause 1.5.

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Particular Conditions

Note

It is intended that the Short Form of Contract will work satisfactorily without any Particular Conditions. However, if the requirement of the project makes it desirable to amend any Clause or to add provisions to the Contract, the amendments and additions should be set out on pages headed Particular Conditions. Care should be taken with the drafting of such Clauses especially in view of the high priority given to the Particular Conditions by Sub-Clause 1.3.
