



CORNWALL TREATMENT LAGOON IMPROVEMENTS

TOWN OF CORNWALL

**TENDER DOCUMENTS
AND SPECIFICATIONS**

MAY 2022

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**CORNWALL TREATMENT
LAGOON UPGRADES**

**SPECIAL PROVISIONS
May 2022**

1. Prices quoted are to include all applicable taxes, excluding HST, which is to be added in the provided space on the Schedule of Unit Prices. **FINAL BID PRICE MUST INCLUDE HST.**
2. The Owner has applied to the Prince Edward Island Department of Environment, Energy and Climate Action for a “Permit to Construct” for the project. Any changes required in the Permit will be incorporated into the project. No work will be allowed to proceed until a “Permit to Construct” has been received.
3. Bidders are advised that the Provincial Department of Transportation and Infrastructure have distributed a document titled “Environment Protection Plan.” The Contractor will be required to follow all items included in the latest version of the above document in the course of the work.

At a minimum the Contractor will be required to utilize the following Environmental Controls for all areas disturbed adjacent to existing ditches.

- Straw Check Dams
 - Dry Seeding
 - Hay Mulch
4. All work is to be carried out within the Town of Cornwall property. Absolutely no activity will be permitted on private property unless written consent is received from the Owner. Any damage done to the property outside the property or provided easement will be the Contractor’s responsibility.
 5. Bidders are advised that due to budgetary constraints, the scope of the project may have to be diminished in total cost to meet available funding. All unit prices, therefore, should be balanced and will be considered valid for up to a 50% variance in total quantity. The Owner reserves the right to reduce or omit any item as deemed necessary in order to meet budgetary restraints.
 6. Bidders are advised that project drawings are to be considered as a reasonable reflection of existing surface conditions only, and that underground conditions will vary and that non-detected or unforeseen items are to be expected (i.e., unexpected buried pipes, excessive groundwater or rock, utilities lines, etc.). Existing underground conditions shown have been taken from several sources of record information and are not guaranteed to be complete or accurate. If existing conditions vary in such a manner as to severely impede progress or cause a complete halt to construction activities, notify the Site Engineer immediately for further direction. Under no circumstances will the Contractor be paid for loss of productivity; delays will be compensated with an extension to the schedule.

If it is deemed by the Site Engineer that alterations to existing features or revisions to the design are required, then the appropriate direction will be given to the Contractor and the required Change Orders are to be signed. The above process is expected to be completed within a time of 48 hours, per occurrence, after notification to the Site Engineer (excluding weekends). The Contractor will be required to continue construction activities in other areas of the project site, to avoid any down time. Costs related to down time will not be considered as an extra to the project under any circumstances. If construction activity is legitimately delayed, the Contractor's construction schedule will be extended to reflect the appropriate time.

7. a) The Tenderer shall fill in their own schedule showing the number of weeks of construction activity planned. Tenderers are advised that upon receipt of submissions, the authority will estimate construction costs based upon each Tenderer's submission dates. These costs, plus estimated owner's construction costs, based on the Tenderer's construction time estimate, will be considered in the award of tender. Construction costs for evaluation only will be \$5,000.00 per week.

- b) Extension of Time - An extension of time may be granted in writing by the Owner in the event of the work being delayed due to a change of scope in the work, a significant unit quantity increase, loss of production due to weather conditions, delays in material supplied by others and any other causes beyond the Contractor's control. Such extensions shall be for such time as the Owner may prescribe, and the Owner shall fix the terms on which the said extension may be granted. An application by the Contractor for an extension of time as herein provided shall be made to the Owner in writing at least two weeks prior to the end of the specified contract time. Where applicable, all bonds or other surety furnished to the Owner by the Contractor shall be amended where necessary at the expense of the Contractor to provide coverage beyond the date of any extension of time granted, and the Contractor shall furnish the Owner with evidence of such amendment of the bonds or other surety.

Any extension of time that may be granted and accepted without prejudice to any rights of the Owner whatsoever under the Contract. All such rights shall continue to be in full force and in effect after the specified construction period.

- c) Liquidated Damages - The Contractor shall pay liquidated damages for each working day beyond the number of working days as specified in the Contract or beyond any extension of time that may be granted in accordance with 7(B) above.

The liquidated damages shall be equivalent to the costs incurred by the owner for each day beyond the scheduled time of completion (i.e., consultant fee, supervisor salaries, overhead vehicle cost, etc.). All above monies shall be deducted from progress claims.

8. The Contractor will become the owner of all excavated material that is considered excess (ie., topsoil, common borrow) or unsuitable for construction. All material that is considered excess or unsuitable for construction is to be hauled off site, at the Contractor's expense.

9. Bidders are advised that operation of the WWTP shall continue during the course of the sludge removal work. The Contractor shall not operate any WWTP equipment including the opening and closing of valves. Any bypass pumping or sewage disposal trucks required will be the responsibility of the Contractor. Pumping arrangements shall be approved by the Owner and Engineer prior to installation and operation. No extra will be allowed.
10. Lowering of the lagoon cells will be the responsibility of the contractor. All work associated with lagoon lowering is to be approved by the WWTP operator. The Contractor will be responsible for following the recommended procedure for the lagoon lowering which has been submitted to PEI Department of Environment, Energy and Climate Action. No lowering will be permitted until approval is received.
11. Bidders are advised that all grassed areas outside of the dewatering cells disturbed during construction, must be reinstated to original condition and to the Engineer's approval. All work required to be done in accordance with Section 32 92 23 - Topsoil, Seeding and Sodding. All grassed areas are to be hydroseeded as required. All costs associated with reinstatement is considered incidental to the work. No pay item has been detailed and no extra will be allowed.
12. Bidders are advised that invoices for work performed must be received within one (1) month of receiving the Certificate of Substantial Completion. No invoices will be accepted beyond the above one-month period.
13. Bidders are advised that a Certificate of Substantial Completion will only be issued following the Contractor successfully completing all required testing and reinstatement.
14. Dewatering bags are to be installed and filled according to manufacturer's specifications. Geobag GT500, or equivalent, must be supplied and if an alternative is proposed, it must be approved by the Engineer. All sludge to be screened prior to being placed in dewatering bags. Contractor to submit screening equipment specifications to Engineer as part of submittals. Effluent from dewatering bags is to be diverted back into the existing lagoon system. The containment area is to be graded to manufacturer's recommendation towards the lagoon to allow drainage from the dewatering bag. Effluent can also be directed towards a sump pit and piped or pumped back into the lagoon.
15. The contractor will be responsible for testing density, percent solids, flow measurement, real-time control, polymer type, injection system, location, flocculation monitoring and filling method. Biosolids removal, conditioning, and dewatering of biosolids must follow the manufacturer's removal instructions, pumping flow rates, connecting layout, and filling port details. Dewatering bags are to be filled no more than 80% of maximum fill volume. All costs to be included in Bone Dry Metric Ton (BDMT) payment for lagoon cleaning. No extras will be considered.
16. Contractor to submit at a minimum a list of all equipment intended to be used in the sludge removal work including pumps, guards, instrumentation, controls and ancillary equipment. The Engineer may request additional operational data regarding any of the equipment.

17. The Contractor shall supply a sample readout of at least one day's worth of sampling data from a previous sludge removal project that contains sludge pumping, and conditioning operational data such as pumping rate, measured solids content, applied coagulant dose.
18. Land application of bio-solids from dewatering bags is not part of the scope of this project.
19. Bidders are advised it is the intention of the Town of Cornwall to complete the work during the 2022 construction season.
20. Sludge samples have been taken from the Cornwall WWTP and analysis has been completed by AGAT (see appendices). Sample results are to be considered approximate only. It is the contractor's responsibility to confirm sludge concentrations prior to lagoon cleaning.
21. Upon completion of lagoon cleaning, it will be the Contractor's responsibility to collect sludge depth measurements from the lagoon cells for the purpose of updating the sludge inventory maps. The Engineer's representative is to be present for sludge depth measurements.
22. The existing aeration system is mounted to concrete blocks at the bottom of the lagoon and are interconnected with submerged aeration lines as per the drawings. It will be required for the Contractor to exercise caution while cleaning around aeration system to avoid damaging the equipment.
23. The existing curtain wall in cell #2 is to remain in place during sludge removal.
24. Upon final inspection and testing, if any part of any component of the project does not meet project specifications, then the following shall occur:
 - a) The Contractor shall immediately remove all components that do not meet project specifications and replace them with materials that do meet project specifications at no additional cost to the Owner; or,
 - b) The Contractor shall make arrangements with the Owner so as to satisfy the Owner that no short- or long-term negative consequences will occur as a result of the components not meeting specifications. If the Contractor cannot satisfy the Owner of these requirements, then all components that do not meet project specifications shall be removed and replaced by the Contractor at no additional costs to the Owner.
 - c) All costs associated with non-compliance with specifications, including testing materials, labour, and engineering will be the Contractor's responsibility.
25. No in-lagoon work will be permitted until after July 15th due to local fishery regulations. All in-lagoon work must be completed prior to October 31st.
26. To keep in compliance with public health guidelines during the COVID-19 pandemic, Bidders are advised that the tender closing will happen as follows:
 - i. Tenders can be dropped off at the Town office until 1:00 pm on the date advertised in the tender ad.

- ii. A tender box will be set up in the main lobby area of the Town's office and all tenders will be placed in the box by the Tenderer.
- iii. After placing tender in the tender box, you are asked to exit the building until it is time to open tenders.
- iv. At 1:00:00 pm tenders will be retrieved from the tender box and taken into the boardroom where they will be publicly opened.
- v. Only one (1) representative per bidder will be allowed to attend the opening, to the maximum of the room's capabilities based upon social distancing as recommended by the PEI Chief Medical Doctor. The Town of Cornwall reserves the right to open the bids in private where they will be witnessed and video recorded.

1 GENERAL

Sealed tenders for the work proposed shall be addressed to the Town of Cornwall and plainly marked:

Cornwall Treatment Lagoon Improvements

Tenders will be received by the Town of Cornwall on the date and time specified in the tender ad, at the Town Office located at 15 Mercedes Drive, Cornwall, PEI.

2 TENDER DEPOSIT

Every Tender received shall be accompanied by a certified cheque, bank draft or bid bond payable to the Town of Cornwall in the amount of at least Ten Percent (10%) of the tender price. The deposit of the three lowest Tenders will be retained until a contract has been signed and any necessary bonds/cheques furnished to the satisfaction of the Engineer and Owner. No interest will be paid on any tender deposit.

If a bid bond is issued it must be accompanied by a letter of surety from a recognized Canadian Surety Company outlining that a Fifty Percent (50%) Performance Bond and a Fifty Percent (50%) Labour and Materials Bond will be presented if awarded the project.

All other deposits shall be returned by mail unless otherwise requested by the Bidder.

**3 INTERPRETATION OF
CONTRACT DOCUMENTS**

Should any person contemplating submitting a tender for the proposed Contract find discrepancies in or omissions from the drawings, specifications, or other parts of the contract documents, or should he be in doubt as to their true meaning, or if he requires additional information concerning the scope of work or the manner in which it must be carried out, he may submit a written request to the Engineer for interpretation a minimum of two clear days prior to tender closing. Any conflict between drawings, specifications and authoritative requirements, the most stringent interpretation will apply.

These design documents are prepared solely for the use by the party with whom the design professional has entered into a contract and there are no representations of any kind made by the design professional to any party with whom the design professional has not entered into a contract.

4 WITHDRAWAL OR QUALIFY- ING OF TENDERS

A Bidder who has already submitted a tender may submit a further tender at any time up to the official closing time. The last tender received shall supersede and invalidate all tenders previously submitted by that Bidder for this Contract. Any Bidder may withdraw or qualify his tender at any time up to the official closing time by submitting a letter bearing his signature and seal as in his tender to the Owner the time and date of receipt will be marked thereon and the letter will be placed in the tender box. The new tender shall be marked on the sealed envelope by the Bidder as "Resubmission #" along with the name of the Bidder and to the attention of the Controller. Tenders may be withdrawn at any time prior to opening upon written request from the Bidder. Negligence on the part of the Bidder in preparing his/her tender shall not constitute a right to withdraw a tender subsequent to the tender opening

No fax or email submission will be considered. All entries in the Form of Tender shall be made in ink or by typewriter. Entries and changes made in pencil shall, unless otherwise decided by the Owner, be invalid or informal.

5 INFORMAL OR UNBAL- ANCED TENDERS

Tenders that contain prices which appear to be so unbalanced as likely to affect adversely the interests of the Owner may be rejected. Wherever, in a tender that amount tendered for an item does not agree with the extension of the estimated quantity and the tendered unit price, the unit price shall govern and the amount shall be corrected accordingly. If a Bidder has not entered a price for an item or work set out in the Form of Tender, he shall, unless he has specifically stated otherwise in his tender, be deemed to have allowed elsewhere in the Form of Tender for the cost of carrying out the said item or work, unless agreed by the Owner no increase shall be made in the Total Tender Price on account of such omission.

6 EXAMINATION OF SITE

Each Bidder shall personally examine the location of the proposed work, and shall satisfy himself by such other means as he may prefer as to the actual conditions and requirements under which the work shall be carried out.

Contractors wishing to visit the site shall contact the following to acknowledge their intent to attend the site meeting.

Doug Longmoore
Manager of Infrastructure
Email: dlongmoore@cornwallpe.ca
Tel: 902-566-3234

No plea for ignorance of conditions that exist or that may hereafter exist or of conditions or difficulties that may be encountered in the execution of the work under this Contract as a result of failure to make the necessary examinations and investigations shall be accepted as an excuse for any failure or omission on the part of the Contractor to fulfil in every detail all the requirements of said Contract Documents or shall be accepted as a basis for any claim whatsoever for extra compensation or an extension of time.

The Bidder shall also make all the investigations necessary to thoroughly inform himself regarding all facilities for access to the site that he may require for storage and construction operation.

7 TENDER FORM

All submissions shall be upon the blank Form of Tender enclosed, and be signed by the Bidder with his business address and place of residence. All blank spaces which pertain to the Tender submitted shall be filled in by typewriter, or legible printing in ink except signatures, which must be handwritten.

8 PRICE SUBMITTED

The amounts stated in the Tender Form shall include the furnishing of all materials, supplies and equipment and the providing of all labour, construction tools and equipment, utility and transportation services necessary to complete all the work required under this Contract whether specifically included in the Contract Documents or not. It is the intention of the Drawings and specifications to provide finished work. Any items omitted therefrom which are clearly necessary for the completion of the work or its appurtenances shall be considered a portion of the work though not directly and/or shown or called for on the Drawings.

9 SUB-CONTRACTORS

The Bidders shall give in the Form of Tender the name and address of each proposed sub-contractor used in making up his tender as set out in the Tender Form. Only one sub-contractor shall be named for each part of the work to be sublet. The Town reserves the right to accept or reject sub-contractors.

10 RIGHT TO ACCEPT OR REJECT TENDERS

Bidders are advised that:

The lowest or any particular bid will not necessarily be accepted.

The criteria to be considered by the Owner in awarding the contract will include a combination of price, scheduling, expertise, qualifications and such other conditions as may be determined by the Owner to be in its own best interests.

Additions, alterations, deletions or other irregularities in the bid form may, but will not necessarily, result in the Owner's rejection of the bid.

The bidder acknowledges that it shall have no claim against, or entitlement to damages from, the owner by reason of the Owner's rejection of its bid or of all bids.

11 CANCELLATION OF TENDER

The Owner reserves the right to cancel any request for tender at any time, without recourse by the Contractor. The Owner has the right to not award this work for any reason, including choosing to complete the work with the Owner's [sic] own forces.

12 CONTRACT DEPOSITS

The Contractor must provide the following performance deposit: Certified cheque(s), or bank draft payable to the Town of Cornwall in the amount of Ten Percent (10%) of the contract price or a Performance Bond **and** a Materials and Labour Bond both in the amount of Fifty Percent (50%) of the contract price payable to the Town of Cornwall. Deposit(s) shall be required during the contract period until the issuance of the Final Certificate of Completion. Certified cheques and bank drafts will be held, uncashed, by the Owner and no interest will be paid. Performance deposit will be released upon Final Completion of the work to the Engineer's approval. A Fifteen Percent (15%) Holdback will be retained during construction and for Sixty (60) days following substantial completion as the Owner's protection during the standard lien period.

13 SCHEDULE

A detailed schedule of the work may be provided with the tender package and will be reviewed in conjunction to the tendered price and completion time during tender evaluation. If a detailed schedule is not submitted with the tender package, one must be provided prior to award.

14 SALES TAX

Contractor is to include all applicable Harmonized Sales Taxes (HST). It is the intention of the Owner to claim a credit for these taxes. Therefore, all information pertaining to taxes required by the Owner will be made available by the Contractor.

The HST shall be shown separately in the Schedule of Unit Prices in the provided space. This amount must be added to the subtotal to result in a total tender amount.

**15 GUARANTEED
MAINTENANCE PERIOD**

A guaranteed maintenance period shall be effective for a total of twelve (12) months, specified from the day following substantial completion. Five Percent (5%) of all monies shall be retained by the owner during construction and for twelve (12) months following substantial completion. This 5% shall be retained as security for the owner to be utilized by the owner if the contractor fails to provide adequate service during the maintenance period.

All engineering costs incurred by the Owner resulting from inadequate service by the Contractor (ie., non-responsive to deficient items requiring repair or repeated repairs to the same item), will be deducted from the Guaranteed Maintenance Holdback.

NOTE: Guaranteed Maintenance Holdback is in addition to the Fifteen Percent (15%) Mechanic's Lien Holdback.

16 ADDENDA

1. The Town reserves the right at any time prior to the award of the Contract, to make changes and/or revisions that are considered altering the intent of this Tender. Any changes and/or revisions will be issued as an Addendum.
2. The Town, in consultation with the Consultant, will review all questions and issue written instructions in the form of an Addendum, which will become part of the Contract documents. All Addenda must be acknowledged on the Form of Tender.
3. The closing date of the Request for Tender may be extended as deemed appropriate by the Town.
4. It is a Bidder's sole responsibility to ensure that it has accounted for all Addenda or other notices of change or alteration of the Tender in their submission and in any price proposed therein. All Addenda will be posted at:
<https://www.princeedwardisland.ca/en/tenders>.
5. The Town shall not be liable for any expense, cost, loss or damage incurred or suffered by any Bidder as a result of the publication of an Addendum or other notice.

17 ASSIGNMENT

This tender, and any resulting contract, may not be assigned by either party without the prior written consent and approval of the other party, which consent may not be unreasonably withheld; provided, however, either party, without such consent, may assign or sell the same in connection with the transfer or sale of substantially its entire business to which this contract pertains or in the event of its merger or consolidation with another company. Any permitted assignee shall assume all obligations of its assignor under this contract. No assignment shall relive any part of responsibility for the performance of any accrued obligation that such party then has hereunder.

TENDER FORM FOR

**CORNWALL
TREATMENT LAGOON
IMPROVEMENTS**

TOWN OF CORNWALL, PEI

TO: TOWN OF CORNWALL
15 MERCEDES DRIVE
CORNWALL, PE
C0A 1H0

_____(Name of Tenderer)

having carefully examined the site of the proposed works and all documents relating thereto, including the Form of Tender, Information for Tenderers, General Conditions, Specifications, Drawings, accept and agree to the same as forming part and parcel of the Contract for the work described in these documents, and we the undersigned:

hereby tender and offer, in accordance with the said documents, to enter into a Contract with the Town of Cornwall, defined as the Owner, within the time prescribed, to furnish all materials, labour, equipment, matters and things, and to do all work necessary to construct, complete and ready for use within the time stated, in strict accordance with the documents pertaining to the said Contract for the total sum of _____

_____ Dollars

(\$_____) or such other sum as may be ascertained in accordance with the Contract. The aforesaid sum is made up as stated in appended Tender Price Breakdown forming part of this Tender and includes all costs, including but not limited to, Harmonized Sales Tax on materials to be incorporated into the work.

WE ENCLOSE HERewith: A deposit of Ten Percent (10%) of the tendered amount in the form of a certified bid deposit issued by a Company licensed to carry on such business in Canada.

In the event of this tender being accepted within 60 days of the time stated for the closing of receipt of tenders, and our failing or declining to enter into a contract in the form hereinafter mentioned for the amount of our tender, the said security may be forfeited in lieu of damages to which the Owner may be entitled by reason of our failure or refusal to enter into a contract.

IN SUBMITTING THIS TENDER, we recognize the right to the Owner to accept any tender at the prices submitted, or to reject all tenders.

WE SUBMIT HERewith a list of trades we propose to execute ourselves:

WE SUBMIT HERewith a list of sub-contractors we propose to use on this contract, reserving to us, however, the right to substitute other sub-contractors for any trades in the event of any sub-contractor withdrawing his tender or becoming bankrupt after the date hereof. Any such substitution shall be subject to the approval of the Owner.

IF WE ARE NOTIFIED OF THE ACCEPTANCE OF THIS TENDER WITHIN THE
TIME ABOVE SPECIFIED, WE WILL:

- a) Execute the most recent edition of the "Standard Construction Document" CCDC-4 (Unit Price Contract).
- b) Furnish a Ten Percent (10%) Certified Cheque as Performance Deposit or a Fifty Percent (50%) Performance Bond and a Fifty Percent (50%) Labour and Materials Bond.
- c) To commence work on _____ and
(Month) (Day) (Year)

complete the entire work included in the contract on or before

_____.
(Month) (Day) (Year)

Resulting in a total number of construction weeks of _____.

Yours truly,

Signature

Date

Signature

Date

Schedule of Unit Prices
Cornwall Treatment Lagoon Improvements
May 2022
Town of Cornwall

Item #	Description	Quantity	Unit Price	Total Price
1.	Mobilization and Demobilization	1 L.S.	\$_____	\$_____
2.	Dewatering Bags: supply and installation (80% fill capacity) (Geobag GT500 or equivalent).	1 L.S.	\$_____	\$_____
3.	Construction of levelled dewatering cell, including removal of any existing fence, excavation, grading, compaction, placement of Type 7 drainage gravel, geotextile, catchbasin and piping for collection and disposal of liquid collected from dewatering bag, etc.	1 L.S.	\$_____	\$_____
4.	Chain-Link Security Fence, supplied and installed including but not limited to excavation, concrete footings, 1.8m high fence complete with access gates, reinstatement, etc.	90 m	\$_____	\$_____
5.	Lagoon Cleaning, including biosolids removal, conditioning and dewatering of biosolids, pumping, monitoring and all related work.			
	a) Cornwall WWTP Lagoon Cell #1	360 BDMT	\$_____	\$_____
	b) Cornwall WWTP Lagoon Cell #2	140 BDMT	\$_____	\$_____
6.	Lagoon Lowering, including but not limited to all labor, equipment, materials, environmental controls, etc.	1 L.S.	\$_____	\$_____
7.	Cash Allowance	1 L.S.		\$ 20,000.00
Subtotal =				\$_____
HST (15%) =				\$_____
Total Tender Amount = (supplied and installed)				\$_____

BDMT = Bone Dry Metric Ton (1,000 kg)

Contractor

Signature

Date

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|----|--|----|--|
| 1. | <u>General Description
of the Work</u> | .1 | The project consists of biosolids removal at the Cornwall WWTF. The work includes the construction of placement areas for dewatering bags, installation of fencing, supply and installation of dewatering bags, dredging of lagoon cells #1 and #2 to remove sludge to be placed in dewatering bags. |
| 2. | <u>Documents
Required</u> | .1 | <p>Maintain at job site, one copy of each of the following:</p> <ul style="list-style-type: none"> .1 Contract Drawings .2 Specifications .3 Addenda .4 Change Orders .5 Other Modifications to Contract .6 Copy of approved Work Schedule .7 Manufacturers' Installation and Application Instructions. .8 Copy of OH&S Regulations for P.E.I. .9 Regulatory Approvals. |
| 3. | <u>Work Schedule</u> | .1 | Prior to contract award, provide a schedule showing anticipated progress stages and completion of work within time period required by Contract documents. |
| | | .2 | Interim reviews of work progress based on work schedule will be conducted as decided by Engineer and Schedule updated by Contractor in conjunction with and to approval of Engineer. |
| | | .3 | All costs incurred by the Owner as a result of delays and schedule overruns caused by the Contractor and not previously approved will be at the Contractor's expense (ie., consultant fee, supervisor salaries, overhead vehicle cost, etc.). |
| 4. | <u>Measurement
for Payment</u> | .1 | Notify Engineer sufficiently in advance of operations to permit estimates of percent completion for payment. |

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| 5. | <u>Contractor's
Use of Site</u> | .1 | Do not unreasonably encumber site with materials or equipment. |
| | | .2 | Move stored products or equipment which interfere with operations of Engineer or other contractors. |
| | | .3 | Obtain and pay for use of additional storage or work areas needed for operations. Ensure these areas are cleaned up and left in a state equal to or better than the existing conditions, when the project is complete. |
| | | .4 | The treatment facilities are to remain in service while the sludge removal work is being completed. At treatment plant shall be operated only by Town of Cornwall operators. Any operation drawdowns required or recommended by the Contractor shall be requested two full weeks in advance and shall be approved by the Owner and Engineer. |
| 6. | | | |
| | <u>Codes and
Standards</u> | .1 | Perform work in accordance with National Building Code of Canada (NBC) (latest edition) and any other code of provincial or local application provided that in any case of conflict or discrepancy, more stringent requirements shall apply. |
| | | .2 | Meet or exceed requirements of specified standards, codes and referenced documents. |
| 7. | | | |
| | <u>Setting Out
Work</u> | .1 | Set grades and lay out work in detail from control points and grades established by the Engineer. |
| | | .2 | Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated. |
| | | .3 | Supply such devices as straight edges and templates required to facilitate Engineer's inspection of work. |
| | | .4 | Provide devices needed to layout and construct work. |
| | | .5 | Supply stakes and other survey markers required for laying out work. |
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| 8. | <u>Location of Equipment and Fixtures</u> | .1 | Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate. |
| | | .2 | Inform Engineer of impending installation and obtain his approval for actual location. |
| | | .3 | Submit field drawings to indicate relative position of various services and equipment when required by Engineer. |
| 9. | <u>Existing Services</u> | .1 | Where work involves breaking into, or connecting to existing services, coordinate with the Water & Sewer Utility. |
| | | .2 | Before commencing work, establish location and extent of service lines in area of work and notify Engineer of findings. |
| | | .3 | Submit schedule to and obtain approval from Engineer for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties. |
| | | .4 | Where unknown services are encountered, immediately advise Engineer. |
| | | .5 | All existing utilities damaged during construction shall be repaired by the Contractor, or the utility Owner, at the Contractor's expense, and to the satisfaction of the Engineer. |
| | | .6 | Where watermain or sewer main or storm line is near existing electric and telephone poles, these poles must be maintained while construction is proceeding. All costs associated with this work should be incorporated into Contractor's price. No extra will be allowed. |
| 10. | <u>Existing Surface Conditions</u> | .1 | Where construction may impact any existing surface conditions such as fencing, trees, signs, etc., the Contractor is responsible to replace and/or reinstate to the original condition as approved by the Engineer, at the Contractor's expense. |
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11. Inspection/
Takeover
Procedures

- .1 Prior to application for Certificate of Substantial Completion, carefully inspect the work and ensure it is complete, that major and minor construction deficiencies are complete, defects are corrected. Notify Engineer in writing, of satisfactory completion of the work and request an inspection.
- .2 During Engineer's inspection, a list of deficiencies and defects will be tabulated. Correct same at the Contractor's expense.
- .3 Upon final inspection and testing, if any part of any component of the project does not meet project specifications, then the following shall occur:
 - (a) The Contractor shall immediately remove all components that do not meet project specifications and replace them with materials that do meet project specifications at no additional cost to the Owner; or,
 - (b) The Contractor shall decide with the Owner so as to satisfy the Owner that no short- or long-term negative consequences will occur as a result of the components not meeting specifications. If the Contractor cannot satisfy the Owner of these requirements, then all components that do not meet project specifications shall be removed and replaced by the Contractor at no additional costs to the Owner.
 - (c) All costs associated with non-compliance with specifications, including testing materials, labour, and engineering will be the Contractor's responsibility.
- .4 When Engineer considers deficiencies and defects have been corrected and it appears requirements of contract have been performed, make application for Certificate of Substantial Completion.

12. Cleaning

- .1 General:
 - .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

- .2 Store volatile wastes in covered metal containers and remove from premises daily.
 - .3 Prevent accumulation of wastes which create hazardous conditions.
 - .4 Provide adequate ventilation during use of volatile or noxious substances.
 - .2 Materials:
 - .1 Use only cleaning materials recommended by manufacturer or surface to be cleaned, and as recommended by cleaning material manufacturer.
 - .3 Cleaning During Construction:
 - .1 On a daily basis, maintain premises free from debris and waste material.
 - .2 Maintain project site and public properties free from accumulations of waste materials and rubbish.
 - .3 Provide on-site containers for collection of waste materials and rubbish.
 - .4 Remove waste materials and rubbish from site.
 - .4 Final Cleaning:
 - .1 Leave site in clean and neat condition removing all rubbish, excess materials and any items used on site, but designated to remain in the work.
 - 13. Materials
 - .1 All materials to be incorporated into the work will be new and shall comply with the required acceptable materials list unless stated otherwise or agreed to by the Engineer
 - 14. Change Orders
 - .1 No extra will be allowed to proceed without the execution of a Change Order signed by the Owner or the Owner's Representative and the Contractor, specifying the work to be conducted and a fixed cost for said work.
 - 15. Asphalt/Concrete Surfaces
 - .1 Bidders are advised that all equipment shall be properly equipped to not damage asphalt or concrete surfaces during the project. All outriggers must have rubber pads. Any
-

damage to existing surfaces will be reinstated to original condition at the Contractor's expense.

- .2 All asphalt/concrete surfaces which require excavation are to be sawcut prior to excavation.

16. Site Maintenance
and Clean-Up

- .1 The Contractor is advised that extra care must be taken during construction, at the end of every day worked and over weekend or shut-down periods, to maintain dust control and site clean-up. Bidders are advised that the minimum daily clean-up requirements will be that all areas affected will be wet down as required and hand swept or equivalent method as approved by the Engineer.
- .2 As each area is 100% completed, a high-pressure water washing of all affected areas will be required at the Contractor's expense.
- .3 These clean-up items will be strictly enforced. No effort or costs will be incurred by the Owner.

17. Limitation
of Operation

- 1. Except for such work as may be required to maintain the travelled roadway in a safe and satisfactory condition for traffic and as noted in .2 below, the Contractor shall not carry out operations under the contract between a ½ hour before sunset and a ½ hour after sunrise, or from 7:00 PM to 7:00 AM on any working day, or at any time on Saturday, Sunday, Thanksgiving Day or statutory holidays. The most stringent will apply. This includes the start-up and moving of equipment on the site as well as at the marshaling yard.
- .2 The Engineer may require the Contractor to work on Saturdays, Sundays or statutory holidays to assure the safety of the travelling public. In addition, the Engineer may require the Contractor to work on Saturdays to complete the work.
- .3 The Engineer may in writing require the Contractor to cease or limit operations under the Contract, on any working day or days, if the operations are of such nature, or if the work is so located, or if the traffic is of such volume that the Engineer deems it necessary or expedient to do so.

18. Assistance to the
Consultant and
the Consultant's
Representative

- .1 During the performance of the work, provide necessary labour and tools to assist the Engineer and the Engineer's Representative in measuring, checking, testing and examining the Contractor's work. The cost of all such being deemed to be incidental to the performance of the contract.

19. Insurance

- .1 The Contractor must furnish the following insurance policies to the satisfaction of the Town of Cornwall prior to commencement of any work.

The Contractor shall, without limiting its obligations or liabilities herein and at its own expense, provide and maintain the following insurances in forms and amounts acceptable to the Owner.

- .1 Comprehensive General Liability in an amount not less than \$5,000,000. inclusive per occurrence against bodily injury, death and property damage, with a property damage deductible not exceeding two thousand, five hundred dollars (\$2,500.00). The Town of Cornwall, WSP Canada Inc., and the Government of Prince Edward Island are to be added as an additional insured under this policy. Such insurance shall include, but not be limited to the following:
- i. Products and Completed Operations Liability;
 - ii. Owner's and Contractor's Protective Liability;
 - iii. Blanket Written Contractual Liability;
 - iv. Contingent Employer's Liability;
 - v. Personal Injury Liability;
 - vi. Non-owned Automobile Liability;
 - vii. Cross Liability;
 - viii. Employees as Additional Insureds;
 - ix. Broad Form Property Damage;
 - x. Operation of Attached Machinery;
 - xi. Sudden and Accidental Pollution Liability;
 - xii. Fire Fighting Expense Liability.

- .2 Automobile Liability on all vehicles owned, leased, operated, or licensed in the name of the Contractor in an amount not less than \$2,000,000.00.
- .3 All the foregoing insurance shall be primary and not require the sharing of any loss by any insurer of the Town of Cornwall, WSP Canada Inc., and the Government of Prince Edward Island shall preclude subrogation by the insurer against the aforementioned parties.
- .4 Proof of Insurance; certified copies of the required insurance, as mentioned, must be presented to the Town of Cornwall at the time of signing of the contract and shall be subject to their approval for adequacy of protection. Approval by The Town of Cornwall of any policy filed by the Contractor shall in no way relieve the Contractor of its obligations to provide the insurance referred to in the contract, nor shall it imply that the policies are in accord with the terms of this agreement.
- i. All required insurance shall be endorsed to provide the Town of Cornwall 30 days advance written notice of cancellation or material change.
 - ii. All insurances shall be in effect until issuance of the "Certificate of Final Acceptance" and for the duration of the Warranty Period.
 - iii. Claims made to policies must have a 3-year extended reporting option on their policy. The Contractor hereby waives all rights of recourse against the Town of Cornwall, WSP Canada Inc., and the Government of Prince Edward Island about damage to the Contractor's property. The Contractor shall require and ensure that each subcontractor maintain liability insurances comparable to that required above.
 - iv. The Contractor agrees to indemnify and save harmless the Owner and the Owner's Representative from all costs, charges or expenses howsoever arising out of any breaches in the insurance coverages or part thereof.
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20. Occupational

Health and Safety .1

This contract will comply with the regulations of the Occupational Health and Safety Act and any other regulations pertaining to the construction and maintenance of the work. The company awarded this contract will be required to provide proof that their Company complies with all the provision of the PEI Occupational Health and Safety Act, as well as, the PEI Workers Compensation Act regulations. During the process of the quoted work, companies will be required, at the request of the Town of Cornwall, to provide written verification that their work is in compliance.

.2 All Contractors must have an identified Safety Representative for the project. This safety representative will be the person to which WSP and/or the Town of Cornwall will give notice of any perceived safety issues and if the issue(s) is not rectified in a timely fashion, then the Provincial Occupational Health and Safety will be notified.

.3 Please note, WSP and the Town of Cornwall are not acting as the Contractor's Safety Representative, and do not accept responsibility of any safety issues that go unnoticed or unreported by WSP and/or the Town of Cornwall. The responsibility remains with the Contractor and it is the Contractor's responsibility to have knowledge of the safe working practices required by OH&S and their company safety policy where one exists.

PART 1.0 - GENERAL

1.1 Cash
Allowance

- .1 The cash allowance shall be utilized for unforeseen items that may arise during construction, or other items that the Owner may require included in the work.
- .2 The cash allowance shall not be used for items for which an established unit rate has been given during tendering.
- .3 An amount of Twenty Thousand Dollars (\$20,000) shall be allocated to this item and has been shown as a separate item within the schedule of unit prices.

1.2 Unused
Allowance

- .1 Any portion of the allowance amount remaining upon completion of the contract shall be credited to the Owner.

PART 2.0 - EXECUTION

2.1 General

- .1 The Contractor shall be allowed a ten percent (10%) mark-up for overhead and profit above actual costs for work done by the Contractor's own forces.
- .2 For work performed by primary sub-contractor, the General Contractor shall be allowed five percent (5%) mark-up for overhead and profit above approved sub-contractors invoices.
- .3 The primary sub-contractor shall be allowed ten percent (10%) mark-up for overhead and profit above actual costs for work done by the primary sub-contractor's own forces.
- .4 For work performed by the primary sub-contractor's sub-contractors, the primary sub-contractor will be allowed five percent (5%) mark-up for each subsequent sub-contractor working under the sub-contractor's control.

- .5 The maximum total mark-up for any Change Order or Change Directive shall be thirty percent (30%).
- .6 No mark-up will be allowed for the cost of construction equipment when such costs are based on rates which already include contractor's overhead and profit.
- .7 No amount of the cash allowance is to be released unless accomplished by a detailed Change Order signed by the Engineer and/or the Owner.
- .8 Note that the above does not preclude the option of the Contractor Administrator and Contractor negotiating a lump sum item of unit price payment for change in the Work, Extra Work and Additional Work.

PART 1 – GENERAL

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|-----|--------------------------------|----|---|
| 1.1 | <u>Description</u> | .1 | Mobilization and Demobilization consists of preparatory work and operations related to transporting materials, equipment and personnel to and from site. Day to day operations, boarding, meals, etc., are to be included in the individual pay items for related work. |
| | | .2 | For those purposes of mobilization and demobilization, “project site” means the location. |
| | | | |
| 1.2 | <u>Related Work</u> | .1 | Section 31 32 19 – Dewatering Bags |
| | | .2 | Section 35 20 24 – Lagoon Dredging |
| | | | |
| 1.3 | <u>Measurement and Payment</u> | .1 | Mobilization/Demobilization will be paid in two equal installments; the first installment being payable upon arrival of materials and equipment on site, the second being payable upon all equipment and remaining construction material being removed from site. This payment will be identified in the bid form as a lump sum amount. |

PART 2 – PRODUCTS

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|-----|-----------------|----|-----------|
| 2.1 | <u>Not Used</u> | .1 | Not used. |
|-----|-----------------|----|-----------|

PART 3 – EXECUTION

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|-----|-----------------|----|-----------|
| 3.1 | <u>Not Used</u> | .1 | Not used. |
|-----|-----------------|----|-----------|

1. Construction Safety Measures .1 Observe and enforce construction safety measures as required by the National Building Code (latest edition) Part 8, the laws of the Province of Prince Edward, the laws of the Dominion of Canada, Prince Edward Island Worker's Compensation Board and all Municipal By-laws, Policies and Authorities

 2. Safety Requirements .1 Construction Safety Measures:
 - .1 The work performed by any Contractor or subcontractor must comply with the Occupational Health and Safety Act and its Regulations. This Act and the Regulations are available from:

Island Information Service
P.O. Box 2000
Charlottetown, P.E.I.
C1A 7N8
Telephone: 902-368-4000
 - .2 The Contractor will be required to provide proof that their company complies with all provisions of the PEI Occupational Health and Safety Act, as well as the PEI Workers Compensation Act and Regulations.
 - .3 During the process of the quoted work, companies will be required, at the request of the Owner, to provide written verification that their work complies.
 - .4 Contractor must have personnel trained and certified for work in confined spaces.
 - .5 The Owner or the Owner's Representative reserves the right to order changes in construction methods or stoppages of work if work does not comply with the Act. Any cost due to these changes or stoppages shall be the responsibility of the Contractor.
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- .6 The Contractor agrees to indemnify and save harmless the Owner and the Owner's representative from all costs, charges or expenses howsoever arising out of any breaches in the Occupational Health and Safety Act and its Regulations.
- .2 All Contractors must have an identified Safety Representative for the project. This safety representative will be the person to which WSP and/or the Town will give notice of any perceived safety issues and if the issue(s) is not rectified in a timely fashion, then the Provincial Occupational Health and Safety will be notified.
- .3 WSP and the Town of Cornwall are not acting as the Contractor's Safety Representative, and do not accept responsibility of any safety issues that go unnoticed or unreported by WSP and/or the Town. The responsibility remains with the Contractor and it is the Contractor's responsibility to have knowledge of the safe working practices required by OH&S and their company safety policy where one exists.

PART 1 – GENERAL

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|-----|-------------------------------|----|--|
| 1.1 | <u>Description</u> | .1 | The Contractor shall comply with the Environmental Protection Act and its Regulations. To not limit the generality of the foregoing, the contractor agrees as follows: |
| 1.2 | <u>Fires</u> | .1 | Fires and burning of rubbish on site will not be permitted. |
| 1.3 | <u>Disposal
of Wastes</u> | .1 | Dispose of rubbish and waste materials at authorized site in accordance with local solid waste requirements. |
| | | .2 | Remove and dispose containers and waste fluids associated with vehicle maintenance in waste disposal site approved by Engineer outside site boundaries. |
| | | .3 | Disposal of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers is prohibited. Dispose of all waste materials at waste disposal site approved by Engineer outside boundary. Littering is prohibited. |
| | | .4 | Do not bury rubbish and waste material on site. |
| 1.4 | <u>Drainage</u> | .1 | Provide temporary drainage and pumping as necessary to keep excavations and site free from water. |
| | | .2 | Do not pump water containing silt in suspension into waterways, or drainage systems. Any water requiring pumping to a waterway or drainage system shall be tested at a minimum for TSS. The cost of testing shall be borne by the Owner. |
| | | .3 | Dispose of water containing silt in suspension in accordance with local authority requirements. Water from work areas must be pumped a minimum of 50 m from the waterways into sediment traps or into tank trucks. |
| | | .4 | Construct temporary silt fences with sufficient surface areas as directed by Engineer, prior to commencing excavation of any nature, near waterways. |

1.5 Pollution
Control

- .1 Maintain temporary erosion and pollution control features installed under this contract or as directed by the engineer on site.
- .2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control as required.

1.6 Erosion
Controls

- .1 Contractor is required to install, inspect and maintain in proper working order temporary erosion, siltation and pollution control features as directed and approved by Engineer. These devices are to be removed in the proper manner.
- .2 Cuts and fills carried out by Contractor adjacent to waterways are to be properly stabilized using hand seeding, hydroseeding, sodding or other approved methods to prevent entry of silt into waterway. Short-term erosion control devices approved by Engineer must be utilized in interim until long-term stabilization is established.
- .3 To minimize runoff, work on slopes adjacent to water bodies will be curtailed during periods of heavy rainfall, as directed by the Engineer.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.7 Vehicular
Movements

- .1 Restrict movement of vehicles and equipment to existing disturbed areas (access roads, borrow pits, disposal areas, and future right-of-ways).

1.8 Disposal
of Wastes

- .1 Dispose of all waste materials (including hazardous materials), containers and waste fluids associated with vehicle maintenance off site to the Engineers approval.

- .2 All garbage must be stored and handled in conformance with local authority requirements. Maintain site in a tidy condition, free from accumulation of waste products, debris and litter.
 - .3 Should unsuitable excavated material be suspected of being contaminated this material must be tested by a materials testing firm and if confirmed, disposed of properly in accordance to local authorities having jurisdiction.
 - 1.9 Storage and Handling of Fuels and Dangerous Chemicals
 - .1 Fuel storage facilities will not be permitted on site.
 - .2 Exercise care in handling of fuels or dangerous materials to minimize potential for spills. Report immediately any spills to Engineer. Contractor is responsible for clean-up, repair or rehabilitation resulting from spills to satisfaction of Engineer.
 - .3 Equipment use will be restricted to the existing travelling right-of-way or contract limits. Use in other areas to be approved by the Engineer.
 - 1.10 Relics and Antiquities
 - .1 Give immediate notice to Engineer if evidence of historical or archaeological finds are encountered during construction and await written instructions from Engineer before proceeding with the work.
 - .2 Relics, antiquities and items of historical interest found on site shall remain the property of the Province of Prince Edward Island.
 - 1.11 Sanitary Facilities
 - .1 Temporary sanitary facilities will be required and permitted in designated areas only.
 - .2 Hours for servicing or cleaning of temporary sanitary facilities will be restricted, and timing for such activities must be approved by the Engineer.
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- 1.12 Indemnity .1 The contractor agrees to indemnify and save harmless the Owner and the Owner's representative from all costs, charges or expenses, however so arising out of any breaches of the Environmental Protection Act and its Regulations.
- 1.13 Pollution Control .1 Control emissions from equipment and plant to local authority's emission requirements.
- 1.14 Protection of Exposed Areas .1 The Contractor **must** protect all exposed areas within the project limits as follows (at a minimum):
- .1 Supply and place Geotextile Silt Fence around entire perimeter or as shown on drawings.
- 1.15 On-Site Stabilization .1 At the end of each working day, stabilize exposed areas as required.
- 1.16 Measurement and Payment .1 Items under Section 01 35 43 will not to be paid for separately but shall be considered incidental to the work required for the project.

PART 1.0 – GENERAL

- 1.1 Related Work .1 Section 31 23 33 – Excavation, Trenching and Backfilling
- 1.2 Scope of Work .1 This section specifies requirements for providing materials testing and report presentation by an accredited Materials Testing Firm for the entire project work as specified herein.
- .2 All materials testing is to be provided by the Contractor's Materials Testing Firm.
- 1.3 Method of Measurement .1 Materials testing shall not be measured.
- 1.4 Measurement and Payment .1 Materials testing shall not be paid for separately. All costs to be incorporated into unit price pay items.

PART 2.0 – MATERIALS TESTING REQUIREMENTS

- 2.1 Sandstone (Premium Borrow & Select Borrow)
- .1 Test requirements are as follows:

Test	Procedure	Frequency
Determination of % passing 75µm Sieve	ASTM C-117	One per material type as delivered to the job
Standard Proctor Density	ASTM D-698	Same as above.
Optimum Moisture	ASTM D-698	Same as above.
Field Density Determination	ASTM D-2922	One per excavation/street
Thickness Determination		Same as above.

- .2 A Compaction Control Report for Sandstone (Premium Borrow & Select Borrow) showing, as a minimum, the following:

- Date tested
- Test location (chainage and offset)
- Material thickness
- Field moisture
- Optimum moisture
- % compaction

All Sandstone (Premium Borrow & Select Borrow) shall be compacted to 100% Standard Proctor Density.

2.2 Gravel

- .1 Provide placement control which includes the following:

Test	Procedure	Frequency
Washed Sieve Analysis	ASTM C-136 & C-117	Three per material type as delivered to the job
Standard Proctor Density	AASHTO T-99 & T-224	Same as above.
Optimum Moisture	AASHTO T-99 & T-224	Same as above.
Field Density Determination	ASTM D-2922	One per lift excavation/street
Thickness Determination		Same as above.
Los Angeles Abrasion	ASTM C-131	One per pit source

- .2 A Compaction Control Report for gravel showing, as a minimum, the following:

- Date tested
- Test location (chainage and offset)
- Material thickness
- Field moisture
- Optimum moisture
- % compaction

All gravel shall be compacted to 100% Standard Proctor Density.

2.3 Hot Mix Asphaltic
Concrete

- .1 The Contractor shall provide production and placement control which includes, but is not limited to, the following tests:

Test	Procedure	Frequency
Bulk Density	ASTM D2726*	At a frequency of one per 250 tonnes of each mix type (with a minimum of 2 per contract per mix type)
Marshall Stability	ASTM D-1559	Same as above.
Marshall Flow	ASTM D-1559	Same as above.
Maximum Theoretical Specific Gravity	ASTM D-2041	Same as above.
Air Voids	MARSHALL	Same as above.
Voids in Mineral Aggregate	MARSHALL	Same as above.
Voids Filled with Asphalt	MARSHALL	Same as above.
% Asphalt Metered		Same as above.
% Asphalt Extracted	ASTM D-4125 or ASTM D-2172	Same as above.
Extracted Gradation (Washed)	ASTM C-136 & C-117	Same as above.
Combined Aggregate Specific Gravity	MARSHALL	Same as above.

* For specimens that contain moisture

- .2 The Contractor's documentation of production control shall include, as a minimum, the following:
- Contractor (paving)
 - Contract
 - Date
 - Mix type
 - Job mix formula percentages
 - Sample times

- Sample temperatures
- Sample compaction temperatures

.3 The Contractor's documentation of placement control shall include, as a minimum, the following:

- Mix temperature (minimum of two)
- Mix thickness

.4 A Compaction Control Report showing, as a minimum, the following:

- Date cored
- Core location (station & offset)
- Lift
- Bulk Relative Density
- Maximum Theoretical Relative Density
- % Compaction
- Lot Average % Compaction (based on a mean maximum theoretical relative density)
- Core thickness
- Average thickness
- Specified thickness
- T-test

2.4 Trench Compaction (Native Backfill)

.1 The Contractor shall provide placement control which includes:

Test	Procedure	Frequency
Standard Proctor Density	ASTM D-698	One per material type
Optimum Moisture	ASTM D-698	Same as above.
Field Density Determination	ASTM D-2922	One per street / lift

.2 A Compaction Control Report for Native Backfill showing, as a minimum, the following:

- Date tested
- Test location (chainage)
- Field moisture
- Optimum moisture
- % compaction

Compaction for all locations shall be 100% Standard Proctor Density.

PART 3.0 – EXECUTION

- 3.1 Submission of
Test Results
- .1 All test results and compaction results shall be grouped by item and 3 copies forwarded to the Owner within 48 hours of completion of the item.
 - .2 The Contractor shall also submit upon project completion a bound report outlining all test results. Three copies of the final report shall be required.
 - .3 The final report as prepared by a recognized Materials Testing Firm shall include an executive summary stating that all materials as tested and used on the project meet project specifications.
 - .4 If all materials as tested do not meet project specifications, then the following shall occur:
 - .1 The Contractor shall immediately remove all materials that do not meet project specifications and replace them with materials that do meet project specifications at no additional costs to the Owner.
 - or
 - .2 The Contractor shall make arrangements with the Owner so as to satisfy the Owner that no short or long-term negative consequences will occur as a result of the materials not meeting specifications. If

the Contractor cannot satisfy the Owner of these requirements, then all materials that do not meet project specifications shall be removed and replaced by the Contractor at no additional costs to the Owner.

- .3 All costs associated with non-compliance with specifications, including testing materials, labour and engineering, will be the Contractor's responsibility.

1. General
 - .1 Use new material and equipment unless otherwise specified.
 - .2 Within seven (7) days of written request by Engineer, submit the following information for any or all materials and products proposed for supply:
 - .1 Name and address of manufacturer.
 - .2 Trade name, model and catalogue number.
 - .3 Performance, descriptive and test data.
 - .4 Manufacturer's installation or application instructions.
 - .5 Evidence of arrangements to procure.
 - .3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
 2. Manufacturer's Instructions
 - .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
 - .2 Notify engineer in writing of any conflict between these specifications and manufacturer's instructions. Engineer will designate which document is to be followed.
 - .3 Provide Operation and Maintenance manuals for all materials and products that require such.
 3. Delivery and Storage
 - .1 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
 - .2 Prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.
 - .3 Store material and equipment in accordance with supplier's instructions.
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|----|---|----|---|
| 4. | <u>Conformance</u> | .1 | When material or equipment is specified by standard or performance specifications, upon request of Engineer, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements. |
| | | | |
| 5. | <u>Substitution</u> | .1 | Proposals for substitution may be submitted only after award of contract. Such requests must include statements of respective costs of items originally specified and proposed substitutions. |
| | | | |
| | | .2 | Proposals will be considered by Engineer if: |
| | | | |
| | | .1 | Products selected by tenderer from those specified are not available, or |
| | | .2 | Delivery date of products selected from those specified would unduly delay completion of contract, or |
| | | .3 | Alternative products to those specified, which are brought to the attention of, and considered by Engineer as equivalent to those specified and will result in a credit to the contract amount. |
| | | | |
| | | .3 | Should proposed substitution be accepted either in part or in whole, assume responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as a result of substitution. |
| | | | |
| | | .4 | Amounts of all credits arising from approval of substitutions will be determined by Engineer and contract price will be reduced accordingly. No substitutions will be permitted without prior written approval of Engineer. |
| | | | |
| 6. | <u>Construction Equipment and Plant</u> | .1 | On request, prove to the satisfaction of the Engineer that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed. |
| | | | |
| | | .2 | Maintain construction equipment and plant in good operating order. |

PART 1 - GENERAL

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|------|--|----|---|
| 1.1 | <u>Related Work</u> | .1 | Section 01 45 00 – Materials Testing |
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 | | | |
| 1.2 | <u>Definitions</u> | .1 | Rock excavation: is defined as limestone, sandstone, granite or similar rocks in solid beds or masses in original or stratified position, which can be removed only by continuous drilling, blasting or use of pneumatic tools, and all boulders of one cubic meter in volume or larger. All rock excavation must be assessed by the Engineer. |
| | | .2 | Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including asphalt, dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and/or excavated with heavy construction equipment. Material which can be excavated with a 35-tonne hydraulic excavator equipped with a 1.0-meter wide bucket with rock teeth or ripper shall be classified as common excavation. |
|
 | | | |
| 1.3 | <u>Protection of Existing Features</u> | .1 | Existing buried utilities and structures: |
| | | .1 | Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed. |
| | | .2 | Prior to commencing any excavation work, notify applicable owner or authorities, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work. |
| | | .3 | Confirm locations of buried utilities by careful test excavations. |
| | | .4 | Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated. Obtain direction of Engineer before moving or otherwise disturbing utilities or structures. Any damage to |

such utilities must be repaired to the Engineer's approval, at the Contractor's expense.

- .5 Advise utility company of requirement to re-route existing lines in area of excavation, if required. All costs for such work will be incorporated into the unit price for each specific item. No extra will be allowed.

1.4 Measurement
and Payment

- .1 Common excavation will be considered incidental to work performed in the related sections.

PART 2 - PRODUCTS

2.1 Materials

.1 Type 1 Fill:

- .1 Hand selected, hand placed, excavated material approved by the Engineer, free from shale, clay, friable materials, organic matter and other deleterious substances.

.2 Type 2 Fill:

- .1 Selected material from excavation or other sources, approved by Engineer for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.3 Type 3 Fill (Granular Bedding):

- .1 Granular bedding shall have a maximum particle size of 28 mm and consist of a well-graded, hard, durable, crushed or pit run, coarse sand or gravel that is free of organic matter, chemicals and other impurities.
- .2 Following are suggested gradations for granular bedding (the selected gradation(s) should conform to the pipe manufacturer's requirements):

<u>Sieve Size, mm</u>	<u>% Passing, by mass</u>
28	100
20	85 - 100
14	60 - 90
10	25 - 60
5	0 - 10
2.5	0 - 5
1.25	---

.4 Type 4 Fill (Bedding Sand):

- .1 Bedding sand shall meet the requirements of Section 402 of Department of Transportation and Infrastructure "General Provisions and Contract Specifications for Highway Construction."

.5 Type 5 Fill:

- .1 Common Term: Class "B" Gravel.
- .2 Aggregate Quality: sound, hard durable material free from soft thin, elongated particles, organic material or other deleterious substances.
- .3 Flat and elongated particles are those whose greatest dimension exceeds five times their least dimension.
- .4 Class "B" gravel shall meet the following requirements:
- .1 Gradation to be within the following limits when tested to ASTM C136 and giving a smooth curve without sharp breaks and when plotted on a semi-log grading chart.

<u>Sieve Size, mm</u>	<u>% Passing, by Mass</u>
31.5 mm	100
25.0 mm	95 - 100
12.5 mm	50 - 83
4.75 mm	30 - 60
1.18 mm	15 - 43
0.6 um	10 - 35
0.3 um	5 - 26
0.075 um	3 - 7

- .5 Los Angeles Abrasion to ASTM C131 maximum percent loss by mass: 50.
- .6 The percent of crushed material will be determined on the fraction of particles by mass retained on the 4.75 mm sieve having one mechanically fractured face.
- .7 Flat and elongated: max. 20%.
- .8 A minimum of 13 percent retained between the 4.75 mm and 0.6 mm sieves.

.6 Type 6 Fill:

- .1 Common term: Class “A” Gravel. (Imported)
- .2 Aggregate Quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material or other deleterious substances.
- .3 Flat and elongated particles are those whose greatest dimension exceeds five times their least dimension.
- .4 Type 6 Fill shall meet the following requirements:
 - .1 Gradation to be within the following limits when tested to ASTM C136 and giving a smooth curve without sharp breaks and when plotted on a semi-log grading chart.

<u>Sieve Size, mm</u>		<u>% Passing by Mass</u>
31.5	mm	100
25.0	mm	95 - 100
12.5	mm	50 - 83
4.75	mm	30 - 60
1.18	mm	15 - 40
0.6	um	10 - 32
0.3	um	5 - 22
0.075	um	3 - 9

- .2 Los Angeles Abrasion to ASTM C131 maximum percent loss by mass: 35.

- .3 The crushed material shall be a minimum of 75 percent by mass retained on a 4.75 mm sieve having 2 or more mechanically fractured faces.
- .4 Petrographic number (max.): 150 (as per PEI Dept. of Transportation, Infrastructure & Energy Standards).
- .5 A minimum of 13 percent retained between the 4.75 mm and 0.6 mm sieves.
- .7 Type 7 Drainage Gravel:
 - .1 Common Term: Class “E” Gravel
 - .2 Crushed and screened, hard durable stone, free from clay and organic material, graded to have 100% passing the 31.5 mm sieve, and approved by the Engineer.
- .8 Filter Fabric:
 - .1 Geotube Filtration Fabric (GFF) or sufficient washed crushed stone as per manufacturer’s specifications.

PART 3 - EXECUTION

- 3.1 Site Preparation
 - .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
 - .2 Strip topsoil from within limits of excavation and stockpile as directed by Engineer for re-spreading after backfilling.
 - 3.2 Stockpiling
 - .1 Stockpile fill materials in areas designated by Engineer. Stockpile granular materials in manner to prevent segregation.
 - .2 Protect fill materials from contamination.
-

- 3.3 Dewatering
- .1 Keep excavations free of water while work is in progress.
 - .2 Protect open excavations against flooding and damage due to surface run-off.
 - .3 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.
 - .4 Submit for Engineer's review details of proposed dewatering methods.
- 3.4 Excavation
- .1 Advise Engineer in advance of excavation operations to enable original cross sections to be taken.
 - .2 Excavate to lines, grades, elevations and dimensions indicated.
 - .3 Remove concrete masonry paving walks, demolished foundations, rubble and other obstructions encountered during excavation.
 - .4 Excavation must not interfere with normal 45-degree splay of bearing from bottom of any footing.
 - .5 For trench excavation, unless otherwise authorized by Engineer in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open at end of day's operation.
 - .6 Dispose of surplus and unsuitable excavated material off site.
 - .7 Do not obstruct flow of surface drainage or natural watercourses.
 - .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
 - .9 Notify Engineer when soil at bottom of excavation appears unsuitable and proceed as directed by Engineer.
 - .10 Obtain Engineer approval of completed excavation.
-

- .11 Remove unsuitable material from trench bottom to extent and depth directed by Engineer.
- .12 Where required due to unauthorized over-excavation, correct as follows:
 - .1 Fill under bearing surfaces and footings with gravel approved by the Engineer.
 - .2 Fill under other areas with Type 2 fill compacted to minimum of 100% maximum dry density to ASTM D698.
- .13 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.5 Mass Excavation
and Embankment

- .1 Mass Excavation:
 - .1 Maintain crowns and cross slopes to provide good surface drainage.
 - .2 Construct ditches to profiles indicated.
 - .3 Notify Consultant whenever unsuitable materials are encountered. Remove materials unsuitable for fill, grading, or landscaping to depth and extent directed.
 - .4 Perform all excavation within plus or minus 75 mm of the lines, grades and dimensions shown on the drawings or as established by the consultant. During the progress of the work, the consultant may vary the lines, grades and dimensions of the excavations from those specified in this section. Any increase or decrease of quantities excavated as a result of such changes will be considered incidental.
 - .5 Take necessary precautions to preserve the material below and beyond the lines of all excavation in the soundest possible condition.
 - .6 Excess excavation for the convenience of the Contractor or over-excavation performed by the Contractor for any purpose or reason, except as may be ordered in writing by the consultant, shall be at the expense of the contractor. Where required to complete the work, all such excess excavation and

over-excavation shall be refilled with materials furnished, placed and compacted at the expense of and by the contractor.

- .7 Separate approved embankment material from excavated material. Do not mix or contaminate embankment material with unsuitable material.

.2 Embankments:

- .1 Do not place material which is frozen or place material on frozen surfaces.
- .2 Maintain a crowned surface during construction to ensure ready run-off of surface water.
- .3 Place embankment material to full width in uniform lifts not exceeding 300 mm loose thickness. Consultant may authorize thicker lifts if specified compaction can be achieved.
- .4 Compact to a density of not less than 100% Standard proctor Maximum Dry Density.
- .5 Compact each lift with a vibrating drum roller. Compact each lift prior to end of work day to prevent deterioration.
- .6 If excessive pore pressures develop in embankment, delay subsequent lifts as directed by the consultant.

.3 Finishing:

- .1 Remove soft or other unstable material that will not compact properly and fill resulting depressions with approved material.
- .2 Shape and compact entire subgrade to within 25 mm of design elevations by not uniformly high or low.
- .3 Do scarifying, blading, compacting or other methods of work as necessary to provide a thoroughly compacted roadbed and control building site, shaped to grades and cross sections indicated or directed.
- .4 Finish side slopes of access road to a neat condition, true to lines and grades indicated.
 - .1 Remove boulders encountered and fill resulting cavities.
 - .2 Hand finish slopes that cannot be finished satisfactorily by use of machine.

3.6 Fill Types

and Compaction

- .1 Use fill of types as indicated or specified below. Unless otherwise specified, compact to following densities:
 - .1 Type 1: 100% maximum dry density.
 - .2 Type 2: 100% maximum dry density.
 - .3 Type 3 (Granular Bedding): 100% maximum dry density.
 - .4 Type 4 (Bedding Sand): 100% maximum dry density
- .2 Contractor must meet the compaction requirements for the type of fill used. Should settlement occur in the trench during the maintenance period, Contractor will be required to repair settled area and give an additional year of maintenance for that area.

3.7 Backfilling

- .1 Do not proceed with backfilling operations until Engineer has inspected and approved installations and approved all material to be used in backfilling operations.
- .2 Areas to be backfilled to be free from debris, snow, ice, water or frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Backfilling around installations:
 - .1 Place pipe bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing.
 - .3 Place layers simultaneously on both sides of installed work to equalize loading.
 - .4 Place material by hand under, around and over pipe installations until 300 mm of cover is provided. Dumping material directly on installations will not be permitted.
- .5 Place backfill material in uniform layers not exceeding 150mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

- .6
 - a) All pipe to be imbedded in a Type 4 bedding sand to 300mm above the top of pipe and the remainder of the material to be Type 2.
 - b) Use additional Type 7 drainage material in place of Type 4 as required when water is present in the trench and pumping is not adequate to control inflow.
- .7 Place GFF over top of all Type 3 and Type 7 drainage material.

3.8 Restoration

- .1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects noted by Engineer.
- .2 Reinstall pavement, curbs and sidewalks to condition and elevation which existed before excavation.
- .3 Clean and reinstall areas affected by work as directed by Engineer.
- .4 All roadways and asphalt mixes to meet Prince Edward Island Department of Transportation and Infrastructure specifications.

PART 1 - GENERAL

1.1 Related Work

- .1 Section 01 61 00 – Material and Equipment
- .2 Section 35 20 24 – Lagoon Dredging

1.2 Definitions

- .1 Rapid Dewatering Test – A test used to pre-determine how a particular geo-synthetic textile dewaterers a bio-solid (sludge) sample. The test involves evaluating the efficiency of the dewatering polymer used, measuring the water volume filtered from the bio-solids sample, filtration time, and analysis of filtrate water quality.
 - .2 Bone-dry Metric Ton (BDMT) – The amount of bio-solids having a mass/weight of 1 000 Kilograms (Kg) or 1 tonne, absent of all moisture content.
 - .3 Dewatering Bag – A high-strength geo-synthetic textile dewatering container that is typically constructed in a tubular shape with sewn-closed ends. Also referred to as a geo-tubes and geo-bags, dewatering bags are used in wastewater applications for bio-solids dewatering.
 - .4 Injection or Fill Port – A small diameter point of entry into a dewatering bag, typically sewn to the dewatering bag. The port is typically constructed with a PVC flange arrangement for attachment of a flexible hose through which bio-solids are pumped. Pumped bio-solids enter through the injection port into the geo-bag for dewatering purposes.
 - .5 Polymer - Chemical substances consisting of polyacrylamides in non-ionic, anionic, or cationic formulations. In wastewater applications, polymers are typically blended with waste bio-solids to assist with unbinding water from the solid fraction to permit easier water-solids separation in the dewatering process.
 - .6 Polymer System – An integrated component assembly generally consisting of a dry or emulsified polymer storage container, static mixer, polymer dosing (metering) pump, dosing pump calibration, flow control valve, back-pressure valve, isolation valves, flow meter, suspended solids (density) meter and piping.
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- .7 Flow and Suspended Solids Meters – These devices provide measurement of the pumped bio-solids flow rate (i.e., L/s) from the dredging equipment to the dewatering bags and suspended solids concentration (i.e., mg/L) of the pumped flow stream. Flow rate and solids concentration measurements are used to quantify the total solids mass (i.e., flow rate x SS conc.) pumped into the dewatering bags for payment purposes.
- 1.3 Measurement and Payment
- .1 Dewatering bags are to be included in the lump sum amount tendered for Supply and Installation of Dewatering bags.
- .2 All work required for constructing placement area for dewatering bags to be included in the lump sum price for construction of levelled cell.
- 1.4 Dewatering Bag Plan of Construction
- .1 The Contractor shall submit a written plan of the proposed dewatering bag placement on site, including a description of the proposed construction of dewatering bag placement areas, dewatering bag manufacturer specifications, the size and number of dewatering bags required, a listing of the specific equipment to be used to fill the dewatering bags, a site layout of the dewatering bag filling operations, and a proposed site preparation schedule. The plan shall also describe and detail the Contractor's proposed equipment and approach for monitoring, measuring and calculating the daily quantity of bio-solids pumped into the dewatering bags.
- .2 The Plan of Construction shall be submitted to the Consultant for approval prior to the Contractor undertaking Construction of dewatering bag placement areas. The Consultant may direct the Contractor to alter the Plan of Construction as needed.

PART 2 - PRODUCTS

- 2.1 Geotextile Containers
- .1 The geo-synthetic textile dewatering container (dewatering bag) material shall be fabricated from material suitable for this application. The dewatering container material shall be inert to biological degradation and resistant to chemicals typically encountered in municipal wastewater.
-

- .2 Dewatering bags shall be fabricated by sewing together mill widths of woven engineered textile to form an elongated tubular shape.
- .3 An injection (or fill) port located on the dewatering bag shall be provided for direct attachment of a dredging unit pump discharge line. Fill ports shall be located at intervals of no more than 30 m, or as recommended by the dewatering bag manufacturer. Fill ports shall be either 100 or 200 mm (4 or 8") in diameter, c/w a 750 mm (30 inch) long, flexible non-woven geotextile sleeve. Fill ports shall be PVC, c/w inner and outer port bodies, each comprised of surface areas capable of distributing a force caused by the clamping of the inner and outer port bodies together with stainless steel bolts and nuts.
4. Dewatering bag geo-synthetic textile materials and factory-sewn seaming shall meet or exceed the specifications provided below in Table 1.

Table 1 - Geo-synthetic Textile Material Specifications for Dewatering Bags

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Wide Width Tensile Strength (at ultimate)	ASTM 04595	kN/m (lbs./in)	78.8 (450)	109.4 (625)
Wide Width Tensile Elongation	ASTM 04595	%	20 (max.)	20 (max.)
Factory Seam Strength	ASTM 04884	kN/m (lbs./in)	70 (400)	
CBR Puncture Strength	ASTM 06241	N (lbs.)	8900 (2000)	
Apparent Opening Size (AOS)		mm (US Sieve)	0.43 (40)	
Water Flow Rate	ASTM 04751	L/min./m ² (gpm/ft ²)	813 (20)	
UV Resistance (% strength retained after 500 hours)	ASTM 04355	%	80	

Filtration Properties	Test Method	Unit	Typical Value
Pore Size Distribution (O50)	ASTM D6767	Micron	80
Pore Size Distribution (O95)	ASTM D6767	Micron	195

Physical Properties	Test Method	Unit	Typical Value
Mass/Unit Area	ASTM D5261	g/m ² (oz/yd ²)	585 (17.3)
Thickness	ASTM D5199	Mm (mils)	1.8 (70)

PART 3 - EXECUTION

3.1 Site Preparation

- .1 Areas in which dewatering bags are to be placed shall be constructed within the limits specified on the Drawings. All obstructions that could damage the dewatering bags, such as roots and projecting stones, shall be removed. The site surface is best if it can be designed with a level grade 0° slope across the width of the dewatering bag and a maximum slope positioning it on a prepared surface that is level across the width of the dewatering bag with a maximum slope of 0.5% in the overall length direction of the dewatering bag. This will require a drainage system such as an aggregate system on a sloped cover that drains to a sump or lower outlet, or a three-dimensional filtration fabric with a ditch system around the perimeter that allows the filtrate to flow unobstructed. The perimeter of the dewatering cell to be complete with a 2 ft. high containment berm with 1:1 side slopes and have an impervious surface or membrane covering the berm and keyed in the exterior subgrade for stability.
- .2 The site must have an impervious surface or membrane placed on the prepared surface to underlay the entire dewatering bag dewatering site and to cover the perimeter containment berms.
- .3 A drainage medium shall be required on top of the impervious membrane and under the dewatering bags. Acceptable materials for creating a void area beneath the dewatering bags for free drainage purposes include: three-dimensional geotextile filtration fabric (3D-GFF), or sufficient washed crush stone. If used, 3D-GFF fabric shall be installed prior to placement of the dewatering bag. The GFF fabric shall be installed between dewatering bags if bag stacking is used.
- .4 3D-GFF material shall meet specifications provided in Table 2 and shall be provided by TenCate Geosynthetics, as represented in Canada by Bishop Water Technologies, 220 Carswell St., PO Box 669, Renfrew, Ontario, K7V 2G4, or an acceptable approved equivalent
- .5 The underlying impervious membrane shall have a minimum thickness of 17 mils.

- .6 The Contractor shall notify the Consultant prior to placing the dewatering bags containers so that the Consultant can inspect and approve the dewatering bag prepared area prior to dewatering bag placement.

Table 2 – Three-Dimensional Geotextile Filtration Fabric

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	N (lbs)	1891.3 (425)	1557.5 (350)
Trapezoid Tear Strength	ASTM D4533	N (lbs)	934.5 (210)	689.8 (155))
Puncture Strength	ASTM D4833	N (lbs)	734.3 (165)	
Mullen Burst Strength	ASTM D3786	kPa (psi)	5511.1 (800)	
Air Flow	ASTM D737	cfm	1300	
Thickness	ASTM D5199	mm (mils)	4.8 (190)	

Physical Properties	Test Methods	Unit	Typical Value
Weight	ASTM 5261	g/m ² (oz/y ²)	342.4 (10.1)
Fiber Content			100% PP
Construction		EPI x PPI	26 x 18

- 3.2 Filling Process .1 Following the dewatering bag placement, filling with materials from the source shall be accomplished in accordance with the approved Plan of Construction. The discharge line of the dredge or pump shall be fitted with a valve or manifold system to allow for control of the rate of filling or which dewatering bag will be filled. The manifold system shall be fitted with an internal mechanism such as a pinch valve to allow the contractor to regulate the filling rate and pressure into the dewatering bag. The manifold must also be fitted with a sampling port installed close to the first point of connection to the first dewatering bag to enable the contractor to sample the material being pumped to insure the proper flocculation if conditioner and or polymer are being used. Any excess discharge shall be directed away from the tubes into a designated area. Before filling, the fill ports not being used for filling shall be closed according to the manufacturer's recommendations to prevent loss of material during filling of the dewatering bags.

- .2 The dredge or pump discharge pipe shall be free of protrusions that could tear the dewatering bag surface. The dredge or pump discharge pipe shall be supported in a manner which reduces stress on the PVC fill port. Excessive movement of the dredge or pump discharge pipe during filling can result in damage to the dewatering bag or to the PVC fill port. The dredge or pump discharge flow rate shall not change abruptly causing hydraulic pulse action in the tube that would temporarily exceed fabric maximum tensile force design.
- .3 Dewatering bags shall be initially filled as evenly as possible until the dewatering bag manufacturer's recommended design height has been achieved. Effluent water shall be allowed to adequately drain away from the dewatering bags.
- .4 After the initial fill cycle, allow dewatering bags to adequately dewater before adding additional bio-solids to the recommended design height. This fill-dewater process can be repeated until the geotextile dewatering process is completed. Upon completion of filling the dewatering bag, the fill port sleeves shall be closed by rolling the sleeve down to the top of the port flange and closing with a clamp.
- .5 Dewatering bag recommended filling heights shall be supplied by the dewatering bag manufacturer.
- .6 Strict compliance with the dewatering bag manufacturer's installation instructions is required.

3.3 Manufacturer's
Representative

- .1 A dewatering bag manufacturer's representative shall be present for the installation of the first geotextile dewatering container, unless the bidder can provide adequate and successful experience with this technology.

3.4 Equipment

- .1 The use of the Town of Cornwall's equipment or service will not be permitted.
- .2 All electrical devices and wiring used shall carry appropriate CSA approval. All lighting and wiring shall be made secure from damage or falling. All electrical installation and equipment shall comply with the latest Canadian Electrical Code.
- .3 All electrical tools used within the confines of the WWTF, or in other areas, shall carry the appropriate CSA approval.
- .4 In hazardous areas, provide intrinsically safe mechanical devices and equipment for fans, pneumatic operators for dampers and aluminum clappers for check valves on pipelines conveying gaseous fuels.
- .5 Equipment must be kept clean so that no debris is deposited on the WWTF access roads or on any public roadway. Debris must be contained in a designated area within the working limits. Any debris created as a result of the geo-bag dewatering operations shall be disposed of off-site at an approved facility.

PART 1 - GENERAL

- | | | | |
|-----|--------------------------------|----|--|
| 1.1 | <u>Work Included</u> | .1 | This section specifies requirements for constructing chain-link fence. Work includes excavation, supply and installation of concrete footings, chain-link fence, gates and accessories, and reinstatement. |
| 1.2 | <u>Related Sections</u> | .1 | Excavation, Trenching and Backfilling - Section 31 23 33 |
| | | .2 | Topsoiling, Seeding, and Sodding - Section 32 92 00 |
| | | .3 | Cast-in-Place Concrete - Section 03 30 00 |
| 1.3 | <u>Reference Standards</u> | .1 | CAN/CGSB-138.1-M Fabric for Chain-link Fence |
| | | .2 | CAN/CGSB-138.2-M Steel Framework for Chain-link Fence |
| | | .3 | CAN/CGSB-138.3-M Installation of Chain-link Fence |
| | | .4 | CAN/CGSB-138.4-M Gates for Chain-link Fence |
| 1.4 | <u>Certificates</u> | .1 | Submit manufacturer's test data and certification that products and materials meet requirements of this Section. |
| 1.5 | <u>Handling and Storage</u> | .1 | Handle and store fence materials in such a manner as to avoid damage. Do not damage coatings. |
| 1.6 | <u>Measurement for Payment</u> | .1 | Chain-link fence will be measured horizontally in meters, along top of fence fabric through posts. |

PART 2 - PRODUCTS

2.1 General .1 Height, fabric type and style, class and grade of coating: as indicated.

2.2 Materials .1 Concrete: to Section 03 30 00, minimum compressive strength 20 MPa.

.2 Fabric and Coating: to CAN2-138.1-M.

.3 Posts, Rails and Fittings: to CAN2-138.2-M, schedule 40, galvanized steel. Dimensions in accordance with the following table.

FENCE HEIGHT (Meters)

1.0 1.2 1.5 1.8

LINE POSTS

O.D. (mm) 48.3 48.3 48.3 60.3

Length (m) 1.8 2.0 2.3 2.6

END, GATES &

CORNER POSTS

O.D. (mm) 73.0 73.0 73.0 88.9

Length (m) 2.1 2.3 2.6 2.9

RAILS

O.D. (mm) 33.4 33.4 33.4 33.4

FENCE HEIGHT (Meters)

2.1 2.4 3.0 3.6

LINE POSTS

O.D. (mm) 60.3 60.3 73.0 73.0

Length (m) 2.9 3.8 4.4 5.0

END, GATES &

CORNER POSTS

O.D. (mm) 88.9 88.9 114.3 114.3

Length (m) 3.2 4.1 4.7 5.3

RAILS

O.D. (mm) 42.2 42.2 42.2 42.2

.4 Where driving of line posts directly into the ground is permitted, the length of the line post shall be increased to allow for 1.2 m embedment into the ground.

- .5 Gates and Accessories: to CAN2-138.4-M, type as indicated. Framing dimensions in accordance with the following table:

<u>GATE TYPE</u>	<u>OPENING</u> (meters)	<u>FRAMING O.D.</u> (mm)	<u>FRAMING WALL</u> (mm thk.)
Single Swing	3.0	42.9	2.5
Double Swing	6.0	42.9	2.5
Single Swing	4.5	48.3	2.5
Double Swing	9.0	48.3	2.5

- .1 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock.
- .2 Furnish double gates with chain hook to hold gates open and center rest with drop bolt for closed position.

PART 3 - EXECUTION

3.1 Grading

- .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

3.2 Erection of Fence

- .1 Erect fence along lines as indicated and in accordance with CAN/CGSB-138.3.
- .2 Excavate post holes to dimensions indicated by methods approved by Engineer.
- .3 Space line posts 3 m apart, measured parallel to ground surface.
- .4 Space straining posts at equal intervals not exceeding 100 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade is greater than 100 m.
- .5 Install additional straining posts at sharp changes in grade and where directed by Engineer.
-

- .6 Install corner post where change in alignment exceeds 10°.
 - .7 Install end posts at end of fence and at buildings. Install gate posts on both sides of gate openings.
 - .8 Install Sono tubes complete depth of hole and extend above ground. Sono tube to be the same diameter as augered hole.
 - .9 Place concrete in post holes then embed posts into concrete to depths indicated. Extend concrete 50 mm above ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
 - .10 Do not install fence fabric until concrete has cured a minimum of 5 days.
 - .11 Install brace between end and gate posts and nearest line post, at inclination as indicated. Install braces on both sides of corner and straining posts in similar manner.
 - .12 Install overhang tops and caps.
 - .13 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
 - .14 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
 - .15 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals. Knuckled selvedge at bottom. Twisted selvedge at top.
 - .16 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals. Give tie wires minimum two twists.
-

3.3 Installation
of Gates

- .1 Install gates in locations as indicated.
- .2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.
- .3 Determine position of center gate rest of a double gate. Cast gate rest in concrete as directed.
- .4 Install gate stops where indicated.

3.4 Touch Up

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas. Pre-treat damaged surfaces according to manufacturer's instructions for zinc-rich paint.

3.5 Cleaning

- .1 Clean and trim areas disturbed by operations. Dispose of surplus material and repair damaged turf as directed by Engineer.

PART 1 - GENERAL

- | | | | |
|-----|--------------------------------|----|--|
| 1.1 | <u>Work Included</u> | .1 | This section specifies requirements for topsoil and sodding. Work includes finish grading, supply and placing of topsoil, sod and all appurtenances required to complete the work to the satisfaction of the Engineer. |
| 1.2 | <u>Related Sections</u> | .1 | Section 01 35 43 – Environmental Protection |
| | | .2 | Section 31 23 33 – Excavating, Trenching and Backfilling |
| 1.3 | <u>Reference Standards</u> | .1 | CAN/CGSB-16.2-M Emulsified Asphalts, Anionic Type, for Road Purposes. |
| | | .2 | Canadian Nursery Trades Association; Canadian Standards for Nursery Stock. |
| 1.4 | <u>Delivery and Storage</u> | .1 | Schedule deliveries to minimize storage at job site without causing delays. |
| | | .2 | Deliver, unload and store sod on pallets. |
| | | .3 | Schedule sod delivery to coincide with topsoil operations. |
| 1.5 | <u>Measurement and Payment</u> | .1 | There will be no measurement for payment under this section. Topsoil, seeding and sodding required will be considered incidental to the project. |

PART 2 - PRODUCTS

- | | | | |
|-----|----------------|----|---|
| 2.1 | <u>Topsoil</u> | .1 | Friable loam containing minimum of 4% organic matter for clay loams and 2% for sandy loams to maximum of 20% by volume, and having a pH of 5.5 to 7.5. Topsoil containing subsoil, roots and stones larger than 50 mm, weeds, couch grass, crabgrass, foreign objects or toxic materials is not acceptable. |
|-----|----------------|----|---|
-

- 2.2 Fertilizer .1 Complete commercial, specially blended for promoting root development of newly seeded or sodded areas.
- .1 Formulation ratio: 1:2:2 spring seeding
1:4:4 fall seeding
- 2.3 Lime .1 Agricultural grade ground limestone containing total 85% carbonates and graded as follows:
- | <u>Sieve Designation</u> | <u>Cum. % Passing</u> |
|--------------------------|-----------------------|
| 14 000 | 90 |
| 160 | 50 |
- 2.4 Seed .1 Canada #1 lawn grass mixture to Government of Canada Seeds Regulations where applicable having minimum germination of 80% and minimum purity of 85%. Seed mixture: 40% Kentucky Blue Grass; 40% Creeping Red Fescue; 20% Perennial Rye Grass.
- 2.5 Hydraulic Seed Mulch .1 Wood or wood cellulose fibre, free of germination or growth-inhibiting ingredients and forming blotter-like ground cover allowing absorption and percolation of water.
- 2.6 Water .1 Clean, fresh, and free from impurities that inhibit plant growth.
- 2.7 Sod .1 Cultivated turf grass containing not less than 40% Kentucky Bluegrass, free of weeds, and with no surface soil visible when mowed to height of 50 mm; soil portion of uniform thickness, not more than 15 mm and to Section 17 of the Canadian Standards for Nursery Stock. All sod must be nursery sod.
- 2.8 Accessories .1 Pegs: wood, 25 mm x 25 mm x 200 mm nominal size.
- .2 Mesh: 37 mm chicken wire or plastic.

PART 3 - EXECUTION

- | | | | |
|-----|---|----|--|
| 3.1 | <u>Field Conditions</u> | .1 | Do not perform work under adverse field conditions, such as frozen ground or ground covered with snow, ice or standing water, without prior approval. |
| 3.2 | <u>Preparation</u> | .1 | Grade subgrade to eliminate uneven areas and rough spots, and to ensure positive drainage. Remove all debris, roots, branches, stones in excess of 50 mm diameter, and other deleterious materials. Remove any subsoil that has been contaminated with toxic materials. Dispose of contaminated material off site. |
| | | .2 | Cultivate area to depth of 100 mm prior to placing topsoil. |
| | | .3 | Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil. |
| 3.3 | <u>Placing Topsoil</u> | .1 | Do not spread topsoil until subgrade has been inspected by Engineer. |
| | | .2 | Spread topsoil in uniform layer over dry subgrade where seeding or sodding is indicated. Do not place topsoil on frozen subgrade. |
| | | .3 | Keep topsoil 15 mm below finished grade for sodded areas. |
| | | .4 | Apply topsoil to depth of 100 mm unless otherwise indicated. |
| | | .5 | Fine grade topsoil to lines and elevations indicated, leaving surface smooth and uniform with a fine loose texture. Obtain approval of topsoil grade and depth before proceeding with seeding or sodding. |
| 3.4 | <u>Application of Lime and Fertilizer</u> | .1 | Apply lime at a rate of 50 kg per 100 square meters or at a rate determined by soil analysis. Mix lime thoroughly into full depth of topsoil prior to application of fertilizer. |
| | | .2 | For dry seeding and sodding apply fertilizer with mechanical spreaders over entire area of topsoil at nitrogen |

rate of 500 g/100 m² or at a rate determined by soil analysis.

3.5 Dry Seeding

- .1 Seed during local growing season when natural moisture is available to ensure germination and growth.
- .2 Apply seed with mechanical spreader at a rate of 2 kg/100 m² or as recommended by seed manufacturer. Cover and roll with a roller having a mass of 50 kg/m of width.

3.6 Sodding

- .1 Lay sod as soon as possible after lifting to ensure proper establishment.
- .2 Place sod in rows perpendicular to slopes, smooth and even with adjoining areas, and with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections.
- .3 Roll sod with a roller having a mass of 50 kg/m of width. Repeated rolling to correct irregularities in grade is not permitted.
- .4 Water within 4 hours of placing to obtain moisture penetration through sod into top 100 mm of topsoil.
- .5 For slopes steeper than 1:2, place mesh over topsoil. Secure mesh in place with pegs and cover mesh lightly with topsoil. Lay sod and secure with pegs. Place pegs 100 mm below top edges using 3 pegs per meter. Drive pegs flush with surface of root mat.

3.7 Hydraulic Seeding

- .1 Seed during local growing season when natural moisture is available to ensure germination and growth.
 - .2 Measure all quantities of material by weight or by weight-calibrated volume measurement.
 - .3 Charge seeder with water, and while agitating, slowly add mulch, seed, fertilizer and lime until all components are thoroughly mixed.
 - .4 When required, add erosion control agent to seeder and mix thoroughly to complete seeding slurry.
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- .5 Slurry application per 100 m2:
 - .1 Seed – 2.0 kg or as recommended by seed manufacturer.
 - .2 Fertilizer – 500 g of nitrogen.
 - .3 Mulch = 10 kg.
 - .4 Erosion Control Agent – as recommended by manufacturer.
 - .5 Water – minimum 100 litres.
 - .6 Lime – as determined by soil analysis.
- .6 Apply slurry uniformly, blending into grassed areas.
- .7 Remove slurry from items and areas not designated to be sprayed.

3.6 Maintenance

- .1 Water adequately to assure continued growth. Control water to prevent washouts.
- .2 Mow grass to height of 60 mm when it first reaches a height of 80 mm. Maintain at height of 50-70 mm for two more mowings. Remove clippings which could smother grass.
- .3 Fertilize grassed areas after first mowing.
- .4 If grass is damaged for any reason (i.e., road salt), the Contractor will be required to replace and fertilize for one year after initial sodding.

3.7 Acceptance

- .1 Grassed areas will be accepted upon completion of third mowing provided that:
 - .1 Growth is properly established.
 - .2 Area is free of bare and dead spots and without weeds.
 - .3 No surface soil is visible when grass has been cut to a height of 60 mm.
- .2 Area sodded or seeded in the fall will be accepted the following spring one month after start of growing season providing that acceptance conditions are fulfilled.
- .3 Continue maintenance and mowing until acceptance.

PART 1 - GENERAL

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|-----|--------------------------------|----|---|
| 1.1 | <u>Work Included</u> | .1 | This section specifies requirements for the construction of precast concrete manholes and catchbasins. Work includes supply and installation of concrete bases, precast sections, metal castings and testing. |
| 1.2 | <u>Related Work</u> | .1 | Section 31 23 33 – Excavating, Trenching and Backfilling |
| 1.3 | <u>Reference Standards</u> | .1 | ASTM C478M - Precast Reinforced Concrete Manhole Sections (Metric). |
| | | .2 | CGSB 56-GP-4 - Sealing Compound, Sewer Pipe Joint, Cold Applied, Mineral Filled, Bituminous. |
| 1.4 | <u>Handling and Storage</u> | .1 | Prevent damage to materials during storage and handling. |
| | | .2 | Store gaskets in cool location out of direct sunlight, and away from petroleum products. |
| 1.5 | <u>Measurement and Payment</u> | .1 | Manholes to be a lump sum quantity, including manhole frame and cover, waterproof membrane, benching and all labour and materials required for complete installation and testing. |

PART 2 - PRODUCTS

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| 2.1 | <u>General</u> | .1 | Manholes and catchbasins shall be constructed of precast concrete sections as per ASTM C478M, "Standard Specifications for Precast Reinforced Concrete Manhole Sections." |
| | | .2 | The diameter of the manholes/catchbasins is to be as shown on the drawings and details. |
| | | .3 | All storm manholes/catchbasins are to have a minimum of 300 mm sump complete with a solid precast reinforced concrete bottom. |
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- .4
 - .1 Catchbasins shall be concrete structures complete with integral base. Diameter to be as indicated on drawings. These will be topped with grade rings to reduce the diameter to 600 mm.
 - .2 Catchbasins required for yard laterals shall be 450 mm dia. structures without sumps. These structures shall be known as "Sluice Box."
- .5 Joints between the manhole and catchbasins shall be "O" ring type or "Ramnek" gasket.
- .6 If "Ramnek" is to be used, a sufficient quantity shall be supplied, and if an "O" ring is to be used, it shall be supplied complete with a sufficient quantity of lubricant.
- .7 All manholes shall be supplied with a minimum of 200 mm of grade rings included in the total depth to allow for final height adjustments in the field. Maximum depth of concrete rings allowed is 450 mm.
- .8 All manholes on the sanitary main are to be wrapped in a self-adhesive waterproofing membrane, such as Bakor Blueskin WP200. Installation to be as per manufacturer's instructions and include primer and all other appurtenances required to complete the work to the satisfaction of the Engineer.

2.2 Frames and Covers

- .1 Round catchbasin covers shall be IMP R-11 600 mm diameter not less than 140 kg mass.
- .2 Round manhole covers shall be IMP R-10, 600 mm diameter not less than 145 kg mass.
- .3 Dome grate covers shall be IMP R-30, 500 mm diameter, not less than 95 kg mass.

2.3 Grade Rings

- .1 Adjustments to manhole and catchbasin tops shall only be made using precast reinforced grade rings or flex-o-rings recycled rubber grade rings as manufactured by Highway Rubber & Safety Inc. Concrete grade rings will be for thickness 75 mm or greater and rubber for less than 75 mm.

- 2.4 Inflow Dish
- .1 Manufactured of high density polyethylene to ASTM D-1248, Class A, Cat. 5.
 - .2 Dish to be equipped with ventilation valve and corrosion resistant nylon strap for easy removal and reinstallation into manhole frame.
 - .3 Standard of Acceptance – Cretex Inflow Dish.

PART 3 - EXECUTION

- 3.1 Excavation and Backfill
- .1 Excavate and backfill in accordance with Section 31 23 33.
 - .2 Obtain approval of Engineer before installing manholes and catchbasins.
- 3.2 Installation
- .1 Construct units in accordance with details indicated, plumb and true to alignment and grade.
 - .2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.
 - .3 Pump excavation free of standing water and remove soft and foreign material before placing concrete base.
 - .4 Cast bottom slabs directly on undisturbed ground or when permitted by Engineer, set precast concrete base on 150mm minimum of well compacted granular material.
 - .5 For precast units:
 - .1 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.
 - .6 For sewers:
 - .1 Place stub outlets and bulkheads at elevations and in positions indicated.
 - .2 Bench to provide a smooth U-shaped channel. Side height of channel to be 0.75 times diameter of sewer. Slope adjacent floor at 1 on 10. Curve channels smoothly. Slope invert to establish sewer grade.
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- .7 Place frame and cover on top section to elevation indicated. If adjustment required use concrete ring. Maximum depth of concrete rings allowed is 450mm. Number of rings to be kept to a minimum.
 - .8 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.
 - 3.3 Installation in
Existing System
 - .1 Maintain service or obtain approval for alternate arrangement.
 - .2 Support existing pipe during installation of base.
 - 3.4 Testing
 - .1 Test manholes.
 - .2 Provide labour, equipment and materials required to perform testing.
 - .3 Backfill prior to testing.
 - .4 Notify Engineer 24 hours in advance of proposed test. Do test in presence of Engineer.
 - .5 Water Testing: Perform test as follows:
 - .1 Plug all inlet and outlet pipes with watertight plugs.
 - .2 Fill with water to top of precast sections.
 - .3 Allow time for initial absorption.
 - .4 Measure and record volume of water required to maintain level for one hour.
 - .5 Leakage not to exceed 5.0 litres per hour per metre of height above groundwater, per meter of diameter.
 - .6 Locate and repair defects if test fails. Retest.
 - .7 Repair visible leaks regardless of test results.
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- .6 Vacuum Testing: Perform Test as follows:
 - .1 Plug all inlet and outlet pipes. Restrain plugs.
 - .2 Place and seal vacuum tester head on the manhole frame.
 - .3 Draw vacuum of 250mm (10in) Hg on the manhole and measure the time for the vacuum to drop to 225mm (9in) Hg.
 - .4 Time to be not less than 45, 50, 65, and 80 seconds for manhole diameters of 1050mm, 1200mm, 1500mm, and 1800mm respectively.
 - .5 For manholes deeper than 6 meters, increase test times by 2 seconds per 300mm of additional manhole depth.
 - .6 Locate and repair defects if test fails. Retest.
 - .7 Repair visible leaks regardless of test results.

PART 1 - GENERAL

- 1.1 Description of Work .1 The work includes material, equipment, real-time measurement and recording instrumentation and ancillary equipment supply for the sludge testing, dredging and dewatering of lagoon biosolids. It also includes mobilization and demobilization of the equipment and manpower for completion of the work.
- .2 Lagoon Cell #1 at the North River WWTF is the priority area for sludge removal due to a subsequently scheduled project to replace the aeration equipment within Cell #1. In terms of scheduling, Cell#1 to be completed first.
- .3 At the completion of the sludge removal in the North River Cell #1, the bottom is to be surveyed by the contractor to confirm that the remaining sludge yields a bottom that is level across the entire bottom to within 150 mm. The original design elevation of the bottom of the lagoon is shown on the drawings.
- 1.2 Related Work .1 Section 31 32 19 – Dewatering Bags.
- 1.3 Definitions .1 Bone-dry Metric Ton (BDMT) – The amount of biosolids having a mass/weight of 1,000 Kilograms (Kg) or 1 tonne absent of all moisture content.
- .2 Desludging – The operation of removing accumulated biosolids (sludge), typically by means of pumping, from a wastewater lagoon cell for subsequent solids dewatering.
- .3 Dewatering – The operation of separating biosolids water and solid fractions, typically assisted with the addition of polymers. Upon removal of a portion of the water fraction, the remaining biosolids occupy a more compact volume. Dewatering can occur within a dewatering bag.
- .4 Dewatering Bag – A high-strength geo-synthetic textile dewatering container that is typically constructed in a tubular shape with sewn-closed ends. Also referred to as a geo-tubes and geo-bags, dewatering bags are used in wastewater applications for biosolids dewatering.
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- .5 Injection or Fill Port – A small diameter point of entry into a dewatering bag, typically sewn to the dewatering bag. The port is typically constructed with a PVC flange arrangement for attachment of a flexible hose through which biosolids are pumped. Pumped biosolids enter through the injection port into the dewatering bag for dewatering purposes.
- .6 Polymer - Chemical substances consisting of polyacrylamides in non-ionic, anionic, or cationic formulations. In wastewater applications, polymers are typically blended with waste biosolids to assist with unbinding water from the solid fraction to permit easier water-solids separation in the dewatering process.
- .7 Polymer System – An integrated component assembly generally consisting of a dry or emulsified polymer storage container, static mixer, polymer dosing (metering) pump, dosing pump calibration, flow control valve, back-pressure valve, isolation valves, flow meter, suspended solids (density) meter and piping.

1.4 Submittals

- .1 The Contractor shall submit a dredging and dewatering plan, including data on all equipment to be used, location of sludge loading area and tire washing station, any subcontractors and laboratories to be used and a detailed schedule of work.
 - .2 Submit a spill containment and remediation plan in accordance with the current biosolids management plan or regulatory agencies.
 - .3 Submit a process schematic showing all flow paths, instrumentation, recording devices and associated controls for the sludge pumping and conditioning system. Submittal must include a previous sample of at least one day's worth of pumping and treatment data for review and approval by the Engineer.
 - .4 Submit a list of at least five previous wastewater lagoon dewatering projects along with the primary contact name and phone number for each.
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1.5 Regulatory
Compliance
and Penalties

- .1 The Contractor shall be responsible for complying with all applicable local, provincial and federal regulations.
- .2 The Contractor shall pay any and all penalties assessed to the Owner as a result of the Contractor's negligence and/or violation of local, provincial and/or federal regulations.

1.6 Measurement
and Payment

- .1 Dredging will be measured for payment based on Bone-Dry Metric Ton (BDMT) of biosolids (sludge) extracted from the lagoon cell and deposited into the dewatering bags.
- .2 The mass of biosolids extracted will be determined based on continuous flow monitoring of biosolids extracted to determine the volume (in terms of liters or cubic meters) pumped into the dewatering bags. The suspended solids concentration (mg/L) of the biosolids will also be monitored (simultaneously with flow monitoring). Biosolids mass (bone-dry Kg or tonne) will be calculated based on the total volume (L) x average concentration (mg/L) measurements integrated continuously or occurring over short time intervals (i.e., every 5 minutes, or as agreed to with the Consultant). The Contractor is also required to perform sludge baking to supplement biosolids mass calculations. This shall be done once for every hour of sludge pumping. The collected data shall be recorded on a continuous basis and recorded as often as the instrumentation allows. The total daily biosolids mass will be the sum of individual interval mass calculations. Periodic sampling is not acceptable.
- .3 The Contractor shall be responsible for providing and monitoring real-time flow meter and suspended solids instrumentation used for biosolids mass calculations. The Contractor shall submit daily reports to the Consultant for review and approval, in which interval flow and interval suspended solids data, as well as, daily biosolids mass calculations, are summarized. Failure to provide this data and information may result in non-payment or adjusted payment of extracted biosolids during the missing data period. Under no circumstances will the Contractor be allowed to perform the dredging without the real time instrumentation and control equipment.

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| | .4 | Removal of existing in-situ lagoon cell earthen basin material will not be permitted, nor will be measured for payment. |
| | .5 | Separate payment will not be made for sweeping or any other related activities needed to complete the dredging work. |
| | .6 | Operations relating to field positioning of dredging equipment will not be measured for payment. |
| | .7 | Sludge removal from the sloped sides of the lagoon shall be discussed with and approved by the Owner and Engineer. The Contractor shall have equipment capable of safely removing the sludge from the sloped sides. |
| 1.7 | <u>Administrative Requirements</u> | |
| | .1 | Location: Dredging operations shall take place as shown on shown on Drawings. |
| | .2 | Scheduling: The Contractor shall follow a schedule approved by the Consultant. In the event of a delay in the schedule, the Contractor shall undertake immediate action to correct the delay by altering operations and/or by mobilizing additional equipment and labour forces. The Contractor shall notify the Consultant immediately of any prescriptive corrective action needed to re-adjust the project schedule. |
| 1.8 | <u>Site Conditions</u> | |
| | .1 | It is essential that the Contractor fully understand the scope of work, site conditions and site layout prior to commencing any on-site work. As part of the tender process, prospective Bidders are invited during the tender period to visit the WWTF for the purposes of preparing his/her bid package and for obtaining any necessary site information, including an opportunity to sample biosolids at their own cost. |
| | .2 | Allowance for a site visit prior to bid submittal is outlined in General Requirements 01 10 00. |
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- 1.9 Bio-solid Quantities
- .1 Biosolids sludge depths and samples were obtained at various locations by WSP from the WWTF. Sludge depth and sludge sample locations, and sludge depth measurements are provided on Drawings.
 - .2 For biosolids sampling, a composite sludge sample was collected from by broadcasting the entire cell extracting individual sludge samples and mixing them together to create a representative sludge sample for the entire cell.
 - .3 Samples were analyzed by AGAT Laboratories (Dartmouth, NS). Analytical laboratory results for all of the obtained samples are summarized in the attached table at the end of this section.
 - .4 Sludge depth measurements were used to create a three-dimensional CAD model from which bio-solid volume estimates were created. Estimated bio-solid volumes for each of the lagoon cells are shown on the drawings.
 - .5 Estimates of total accumulated biosolids mass in lagoon/cell are provided in the tables below. In the event of a discrepancy between the drawings and the specifications, the specifications shall govern.

Table 1: Estimated Biosolids Volumes in Cornwall WWTF Cells 1 & 2

Cell #	Cell Zone	Volume (m ³)	Total Suspended Solids (TSS) (%)	Total Volatile Suspended Solids (TVSS) (%)
1	A	---	4.5	0.1
1	B	---	7.1	1.2
1	C	---	0.6	0.1
Composite		2562	14.0	1.8
2	A	---	4.3	0.9
2	B	---	0.3	0.1
2	C	---	3.4	0.6
Composite		2023	2.0	0.4

* Note: Cornwall Lagoon results contain outliers; therefore, retesting must take place prior to sludge removal.

Table 2: Estimated Biosolids Mass Accumulated in Cornwall WWTF Cells 1 & 2

Cell #	TVSS / TSS (%)	TSS Mass (kg)	TVSS Mass (kg)
1	1.8	358,680	6,456.24
2	0.4	40,460	161.84

* Note: Cell 1 results are outliers; therefore, retesting must take place prior to sludge removal.
Testing is at Contractor's expense.

1.10 Dredging Plan
and Sequence

- .1 The Contractor shall submit a written plan of the proposed dredging approach, including a description of the proposed dredging methods, the general sequence of dredging operations and stages, a listing of the specific dredging equipment (capacities, horsepower) to be used, a site layout of the dredging operations, sweeping produces and equipment and a proposed dredging schedule. The plan shall also describe and detail the Contractor's proposed equipment and approach for monitoring, measuring and calculating the daily quantity of biosolids extracted and dewatered.
- .2 The Contractor shall also include in the dredging plan an estimate of the amount, in terms of mass (BDMT), of biosolids anticipated to be extracted and dewatered.
- .3 The dredging plan shall be submitted to the Consultant for approval prior to the Contractor undertaking dredging operations. The Consultant may direct the Contractor to alter the dredging sequence as needed.

PART 2 - PRODUCTS

2.1 Dredging Equipment
and Labour

- .1 The Contractor shall use a floating hydraulic dredge apparatus, or another approved equipment, to ensure optimal desludging over the surface area of the existing lagoon cell bottom. An approved polymer injection apparatus shall be used to ensure quality of results, and to monitor the sludge solids concentration. A screen shall be used and maintained to minimize foreign materials entering the dewatering bag(s).

- .2 The Contractor shall be responsible for providing experienced equipment operators knowledgeable in municipal lagoon desludging and dewatering procedures and dredging equipment operation.

PART 3 - EXECUTION

3.1 Examination

- .1 Site Location: The dredging work to be undertaken for this project is comprised of extracting accumulated biosolids from each of the lagoon cells.
- .2 All dredging operations and equipment shall be set-up and executed within the fenced property boundaries of the Town's WWTF.
- .3 The Contractor shall not locate any dredging or dewatering equipment, or any related construction vehicles, that might restrict WWTF operations staff access to essential WWTF operating components. Should this occur, the Consultant will request that the contractor re-position the equipment.

3.2 Dredging

- .1 Only in-situ lagoon contents (materials) dredged from above the sub-grade plane and within lagoon cell side-slopes, as indicated or specified, will be permitted.
- .2 Dredged areas are to be referenced to vertical benchmarks as indicated on Drawings.
- .3 The mass of biosolids extracted will be monitored based on continuous flow monitoring of biosolids extracted to determine the volume (in terms of liters or cubic meters) pumped into the dewatering bags. The suspended solids concentration (mg/L) of the biosolids will also be monitored (simultaneously with flow monitoring). The polymer dosing system will be set to automatically adjust the dose based upon flow and solids concentration. Intermittent periodic sampling is not acceptable.
- .4 The Contractor shall be responsible for providing and monitoring flow meter, suspended solids and dosing instrumentation. The Contractor shall submit daily reports to the Consultant for review and approval, in which interval flow and interval suspended solids data, as well as, daily biosolids mass calculations, are summarized.

- .5 Dredging along the lagoon cell side-slopes shall maintain the existing slope.
 - .6 The sludge shall be loaded into dewatering bags in an area previously prepared. The dewatering bag area shall drain back into the lagoon with surface and bank erosion control measures in place.
 - .7 Sludge shall be dredged from the lagoons to create a uniform bottom elevation, and work sequenced to maintain full operation of the plant. In place solids concentrations are shown in the attached tables at the end of this section.
 - .8 Do not over-excavate materials from below the bottom of the lagoon cell. Extract material from only above the lagoon cell bottom. Earthen materials removed from below the bottom of the lagoon cell, or from outside the lagoon cell side-slope will not be considered part of the work. If over-excavation occurs, the Consultant will require that the Contractor undertake restorative measures to repair any damages at no additional cost to this contract.
 - .9 Dredged sludge shall be screened to remove plastics and other solids greater than 3/4 inch in the smallest dimension. The cost for screening and screenings disposal shall be included in the unit price for dredging and no additional payment will be made. Screened material shall be placed in an onsite receptacle for washing and disposal.
 - .10 Removal of any spillage which occurs as the result of work shall be at the expense of the contractor.
 - .11 The Contractor shall, for the duration of the dredging operations, provide the Consultant with boat access to the lagoon cell surface for the purposes inspecting dredging operations and monitoring biosolids extraction.
 - .12 The Contractor shall immediately notify the Consultant should any objects be encountered that could obstruct the desludging process. As a minimum, the Contractor will be expected to mark the object's location using GPS and/or a buoy marker, and subsequently by-pass this location and continue working.
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3.3 Dredge Anchoring
System

- .1 There are no existing dredge anchors. The Contractor shall construct a dredge anchoring system as necessary for the work.
- .2 The Contractor shall notify the Owner's Representative regarding the proposed locations of the dredge anchors a minimum of 5 business days prior to beginning work. The Owner's Representative will determine if the proposed locations conflict with any existing utilities.
- .3 Do not over-excavate materials from below the bottom of the lagoon cell. Extract material from only above the lagoon cell bottom. Earthen materials removed from below the bottom of the lagoon cell, or from outside the lagoon cell side-slope will not be considered part of the work. If over-excavation occurs, the Consultant will require that the Contractor undertake restorative measures to repair any damages at no additional cost to this contract.
- .4 Removal of any spillage which occurs as the result of work shall be at the expense of the contractor.
- .5 The Contractor shall, for the duration of the dredging operations, provide the Consultant with boat access to the lagoon cell surface for the purposes inspecting dredging operations and monitoring biosolids extraction.
- .6 The Contractor shall immediately notify the Consultant should any objects be encountered that could obstruct the desludging process. As a minimum, the Contractor will be expected to mark the object's location using GPS and/or a buoy marker, and subsequently by-pass this location and continue working.

3.4 Re-dredging

- .1 Re-dredging will be considered by the Consultant in the event of unsatisfactory dredging work. Payment for dredging will be withheld if unsatisfactory dredging results are discovered.

3.5 Remedial
Procedures

- .1 The Contractor is responsible for cleanup of any biosolids spills that occur during the Work. The Contractor will take the following steps:
 - .1 Contain the spill.
 - .2 Flag the area to prevent exposure to the public especially if the spill went offsite. Notify the regulatory authorities. If there is risk that sludge will enter into any waterways, the authorities are to be contacted immediately.
 - .3 Remove spilled biosolids with a front-end loader or shovel.
 - .4 Cover the area with dry lime if needed.
 - .5 Apply absorbent (e.g., sand) if needed.
 - .6 Transport spilled product to a DEQ-authorized biosolids land application or disposal site.