

May 18, 2018

Page 1 of 2  
Our File: 389-038

**District of Summerland  
Landfill West Cell (Stage E) – Phase 4 Liner**

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**CONTRACT DOCUMENTS AND SPECIFICATIONS  
ADDENDUM #1**

This Addendum is being issued prior to the closing of Tenders and is intended as clarification and/or revision of the Contract Documents. This Addendum shall become an integral part of the Contract Documents and Tenderers shall acknowledge receipt on the appropriate page of the Form of Tender.

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1. All aggregates and granular materials shall conform with MMCD Specifications (see Section 31 05 17).
  2. Replace 50mm washed drain rock with 25mm washed drain rock, with gradation as specified in MMCD Section 31 05 1.
  3. The supplier of aggregates and granular material will be responsible for ensuring gradation of materials. Cantex will have pit-run sand and pit-run gravel available.
  4. Aggregates and granular materials supplied by Cantex will be billed directly to the District. The Contractor will be responsible for tracking volumes.
  5. The Contractor will be responsible for transport of supplied aggregates and granular materials from the designated Cantex stockpile location within the landfill area.
  6. Excess cut material will have a single haul to a designated stockpile area within the landfill.
  7. The Contractor will coordinate with Cantex for access to aggregates and granular materials as needed, supply is not to delay the construction schedule.
  8. The Contractor must provide a unit price for *supply, haul and placement of base and cover materials* in the event Cantex will not be the supplier of aggregates and granular material. See attached Appendix 7- Unit Price for Imported Materials.
  9. Omit requirement for submission of a Force Account Rate Schedule 15 days after award of Tender. Please complete Appendix 6.
  10. A 10% holdback will be applied to monthly billing certificates.
  11. Please omit SOQ Item 1.3 Environmental Protection. This is considered an incidental cost.
  12. Please omit SOQ Item 31.13 Field Survey.
  13. A typical cross section of the liner, anchor trench and access road is provided on dwg 389-038-05 Section D-03.
  14. TRUE will provide control points to the Contractor.

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15. The landfill has non-potable water on site. The Contractor must pump from the point with their own equipment. The Contractor is to coordinate with the landfill operators regarding filling of the pond and projected water demands during construction. Water supply to the Contractor can be provided as needed.
16. There is no smoking permitted on the landfill site.
17. Restroom and first aid will be Contractor supplied.
18. Liner installation is to be completed as per attached TRUE Supplementary Specification Division 2L.
19. The existing liner will be tied in as per manufacturers specifications. Assume edges of existing liner will be worn and have tears.
20. There are three access/exit points to the site. The Contractor is to use either of the side entrances, not the main landfill entrance gate. The preferred Contractor entrance is south of the main entrance. The side entrances must be closed when not being utilized.
21. Security and wildlife on site is an issue. The Contractor will be responsible for damage to and security of their materials and equipment and safety of their crew.
22. The existing piles will be moved from Phase 4 prior to the start of construction.
23. SOQ 31.9 is listed twice. Please include prices for both line items.
24. Quality Control and Materials Testing is the responsibility of the Contractor (See IT-4.9 and SP-3).
  - a. A Standard Proctor Density determination shall be required for each type of aggregate and granular material to be used in construction of an embankment. The frequency and type of compaction tests shall be at the discretion of the Engineer, but no more than as outlined below.
    - i. **Embankments** - one test per 300mm of fill per 500 square metres.
    - ii. **Subgrade** - one test per 300 square metres of subgrade.
    - iii. **Soft Spot Repair** - one test per 300mm of backfill (to a maximum of 100 square metres, and then embankment requirements apply).
    - iv. **Pitrun and Crushed Gravel** - one test per 500 square metres.
25. The Tender Closing Date has been extended to Wednesday, May 30, 2018 at 11:15 am.

  
Natalie Alteen, EIT

NA/mm

Enclosures

## District of Summerland

## Landfill West Cell (Stage E) - Phase 4 Liner

See paragraph 5.3.1 of the Instructions to Tenderers – Part II.

All prices and *Quotations* including the *Tender Price* shall include all *Taxes*, but shall not include *GST*.

| Item # | Payment Section Para    |       | Item Description                                                                          | Unit           | Quantity              | Unit Price | Amount |
|--------|-------------------------|-------|-------------------------------------------------------------------------------------------|----------------|-----------------------|------------|--------|
|        | Division 31 - Earthwork |       |                                                                                           |                | Sub-Total Division 31 |            |        |
| 31.6   | 31 22 01                | SSpec | Supply, Haul, Place, Grade and Compact Liner Base Sand to Provide Minimum 200mm Thickness | m <sup>2</sup> | 7,700                 |            |        |
| 31.9   | 31 22 01                | SSpec | Supply, Haul, and Place Liner Cover Sand to Minimum 300 mm Thickness on Floor Area        | m <sup>2</sup> | 7,700                 |            |        |
| 31.9   | 31 22 01                | SSpec | Supply, Haul, and Place Liner Cover Sand to Minimum 450 mm Thickness on Side Slopes       | m <sup>2</sup> | 7,700                 |            |        |
| 31.12  | 31 22 01                | SSpec | Supply, Haul and Place 100mm Pit-run Gravel Over Geogrid to Minimum 300mm Thickness       | m <sup>2</sup> | 7,700                 |            |        |

Tenderer's Initials

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**DIVISION 2 - SITEWORK  
SECTION 2L- LINER SYSTEM  
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**DIVISION 2 - SITEWORK  
SECTION 2L- LINER SYSTEM**

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**2L-1.0 GENERAL**

**2L-1.1 Scope**

1. This section refers to the supply and installation of the high density polyethylene liner system including appurtenances as specified herein and/or shown on the Contract Drawings. Appurtenances include connections of the liners to pipelines, liner anchorage trenches, and exit panels.

**2L-1.2 Abbreviations**

1. Abbreviations utilized herein are defined as follows:

|                       |                                                                                                                                    |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>ASTM</b>           | American Society for Testing and Materials. Where a test procedure is referred to, the most recent published standard shall apply. |
| <b>HDPE</b>           | High Density Polyethylene                                                                                                          |
| <b>mil</b>            | measurement of thickness in units of one-thousandth of an inch.                                                                    |
| <b>psi</b>            | pounds per square inch                                                                                                             |
| <b>gm</b>             | gram                                                                                                                               |
| <b>cm<sup>3</sup></b> | cubic centrimetre                                                                                                                  |
| <b>min</b>            | minutes                                                                                                                            |
| <b>lbs</b>            | pounds                                                                                                                             |
| <b>hrs</b>            | hours                                                                                                                              |
| <b>mg</b>             | milligram                                                                                                                          |
| <b>m</b>              | metres                                                                                                                             |
| <b>mm</b>             | millimetres                                                                                                                        |

**2L-1.3 Quality Control**

1. The Geomembrane Installer shall have at least three years of experience in the installation of the specified geomembrane or similar. The Geomembrane Installer shall have installed at least 10 projects involving a total of 500,000 m<sup>2</sup> of the specified type of geomembrane or similar during the last three years (as referenced in the *HDPE and LLDPE Geomembrane Installation Specification by IAGI, 2015*).

**2L-2.0 MATERIALS**

**2L-2.1 General Sheet Specifications**

1. No rework or scrap material is to be used in the manufacture of the HDPE liner.
2. The sheeting is to be free of lines, gels, streaks, blisters, pinholes, poorly dispersed ingredients, or other manufacturing defects.
3. The sheeting is to be free from holes, tears, scratches, cracks, creases or any other form of handling damage. Edges of sheeting shall be free of cuts and tears.
4. Sheets shall lay flat when rolled out with a minimum amount of cure or waves on the edge.

5. All liner sheets shall be supplied by the same manufacturer to ensure uniform composition.

### 2L-2.2 Liner Specifications

1. The HDPE liner shall conform to the following:

| PROPERTY                                                                                                                                                           | TEST METHOD                 | VALUE                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------------|
| 1. Membrane Thickness                                                                                                                                              | ASTM D5199 or D5994         | nominal 60 mils                                   |
| 2. HDPE Liner Density                                                                                                                                              | ASTM D1505 or ASTM D792     | > 0.940 mg/L                                      |
| 3. Carbon Black Content                                                                                                                                            | ASTM D6370 or D4218         | 2.0 to 3.0% by weight                             |
| 4. Carbon Black Dispersion                                                                                                                                         | ASTM D5596                  | CAT 1 or 2                                        |
| 5. Liner Tensile Properties<br>(Machine & Cross Direction)<br>a) tensile strength yield<br>b) tensile strength break<br>c) elongation yield<br>d) elongation break | ASTM6693<br>Type IV Dumbell | 22-24 kN/m<br>16 kN/m<br>12 - 14%<br>minimum 100% |
| 6. Initial Tear Resistance                                                                                                                                         | ASTM D1004                  | 42 lbs (min)                                      |
| 7. Environmental Stress<br>Crack Resistance                                                                                                                        | ASTM D 1693                 | 0 Failures in 2000 hrs.                           |
| 8. Dimensional Stability                                                                                                                                           | ASTM D 1204                 | ± 2% maximum                                      |
| 9. Oxidative Stability                                                                                                                                             | ASTM D 3895 (aluminum pans) | 75 minutes                                        |

### 2L-2.3 Quality Control

1. Mill run certificates and quality control tests are to be provided from each shift and batch.
2. Quality control testing for each 5000 square metres of liner material shall include:
  1. Resin density, melt index, number and batch number
  2. Sheet density, melt index, tensile properties and thickness
  3. Each roll of sheet shall be labeled with a roll number, date made, and roll length.
3. Quality control testing reports from the sheet manufacturer shall be supplied to the Engineer.

#### **2L-2.4 Exit Grid Materials**

1. Exit grids shall be provided at locations shown on the Drawings with top and bottom anchors in accordance with details shown on the Drawings. The exit grid material shall be equivalent to Soil Stabilization Geogrid #SS1 as manufactured by Tensar Corporation.
2. The exit grids shall be supplied and installed as one continuous piece without joints from the top anchor trench to the base anchor. The exit grid shall be 1.5 m in width.

#### **2L-3.0 SITE PREPARATION**

##### **2L-3.1 Final Slope Grading and Preparation**

1. Final grading of the reservoir berm slopes onto which the liner is to be installed is the responsibility of the Contractor.

#### **2L-4.0 INSTALLATION OF THE LINER**

##### **2L-4.1 Shipping, Delivery and Storage**

1. The liner rolls shall be shipped in a manner which precludes damage to the liner. All rolls shall be clearly labeled in relation to length and batch number.
2. Whenever possible, rolls should be unloaded directly onto their proper location on the site to minimize potential rehandling damage. Care shall be taken to orient the rolls correctly with respect to the layout of the liner.
3. The Contractor shall be responsible for identifying a secure location for unloading and/or storage of liner materials. Security measures to minimize damage to the liner materials in storage and/or in place up until acceptance by the Owner are the responsibility of the Contractor.

##### **2L-4.2 General Installation Requirements**

1. Welding operations are not to be carried out when precipitation is falling.
2. Sufficient slack shall be incorporated into the liner to allow for thermal expansion and contraction. Slack requirements shall be calculated from anchor point to anchor point. Slack wrinkles shall be evenly distributed between fixed points.
3. The Contractor shall submit calculations for slack requirements to the Engineer for approval. The slack calculation shall consider the co-efficient of thermal expansion of the membrane, extremes of liner temperature and a shrinkage factor for the membrane. The slack calculation shall consider operating temperature extremes between winter and summer and the service conditions of the liner. For slack calculations, the Contractor shall assume that the reservoir could be empty in either the winter or summer. Air temperature extremes for the area range between -30°C in winter to +45°C in the summer.

4. The Contractor shall measure the slack incorporated in the reservoir between fixed points and record the slack allowances along with the liner temperature, air temperature and liner length between anchor points.
5. Liner panels should be temporarily held in place with sandbags to prevent movement by wind action.
6. No construction vehicles or equipment shall pass over any exposed lined surface.

#### **2L-4.3 Joints and Seams**

1. An overlap of a minimum of 150 mm (6 inches) shall be used for field joints and seams.
2. Panel edges to be joined shall be wiped clean until the mating surfaces are both free of foreign material and dry.
3. All joints and seams shall be continuous with no creases, inclusions or unbonded segments.
4. Seaming shall be primarily performed using automatic fusion welding equipment and techniques. Extrusion welding should be used where fusion welding is not possible such as pipe penetrations, patches, and short runs of seams (less than a roll width). Seams are to produce a fused joint of the two liner panels. The completed seam shall be comprised of two 13 mm (1/2 inch) wide fusion seals separated by an air channel.
5. All seams shall be tested using air pressure in accordance with ASTM D5820 and ASTM D4437. Each end of the seam to be tested shall be sealed using methods similar to the joint. A test nipple shall be inserted into the air channel of the seam and pressurized to a minimum pressure of 20 psi. While the seam is pressurized, a visual inspection of the air channel shall be undertaken for bulges or other irregularities which would suggest incomplete fusion. The air test shall be acceptable if there is less than a 3 psi pressure drop in the pressurized seam over a test period of 15 minutes.
6. If a rapid pressure drop occurs during the test or the pressure drop exceeds 3 psi over the 15 minute test period, repairs shall be undertaken to the seam to achieve compliance with the testing requirements.
7. Records of all tests shall be maintained and provided to the Engineer upon request.

8. In addition to the air testing of the seams, seam strength requirements shall be as follows:

| PROPERTY                     | TEST METHOD             | VALUE                                                  |
|------------------------------|-------------------------|--------------------------------------------------------|
| a) Shear Strength (minimum)  | ASTM D882 - 1" strip    | minimum of 80% of yield strength of material.          |
| b) Elongation at break (min) | ASTM D882 - 1" strip    | 100% single thickness length in which breaking occurs. |
| c) Peel Strength (min)       | AE-PL-85-2 or ASTM D413 | not less than 70% of yield strength of liner.          |
| d) Peel Separation (min)     | AE-PL-85-2 or ASTM D413 | less than 20% of fused interface width.                |

Seam tests as described herein shall be performed by the Contractor on representative samples seamed in the field under conditions similar to the joints being undertaken. Testing results shall be tabulated in a form acceptable to the Engineer and submitted to the Engineer.

9. The Engineer may undertake quality control testing of seams as described in Item (8) through the services of an independent testing laboratory. The Contractor shall co-operate with the Engineer by providing samples when requested.
10. All seam intersections shall be tested with soap and a vacuum box. Any leaks identified with this testing procedure shall be repaired in accordance with ASTM D4437 and ASTM D5641.
11. All seams and joints shall be identified, on the liner, with the welder's initials, the welding machine number and date of welding.
12. The test seam shall be approximately 3.3m long for fusion welding and 1m long for extrusion welding with the seam centered lengthwise.
13. If a seam test fails, an additional test seam shall be immediately conducted. If the additional test seam fails, the seaming apparatus shall be rejected and not used for production seaming until the deficiencies are corrected and a successful test seam can be produced.

#### **2L-4.4 Liner Connections to Pipes**

1. Liner connections to pipes shall be undertaken in accordance with the Contract Drawings.
2. Field seaming and jointing of the liner to the specified HDPE plate and the HDPE pipe shall be done using an extrusion welder. Welding rods or pellets shall be of the same material characteristics as the materials to be joined.
3. All extrusion welds undertaken to complete the connections to pipes shall be tested with a vacuum box to ensure no leakage.

#### **2L-4.5 Repairs**

1. All identified flaws, holes, punctures or other identified inconsistencies in the liner shall be repaired.
2. Patches shall be oval in shape or have rounded corners. All patches shall be of the same material as the liner. The patch shall cover an area of at least 75 mm (3 inches) beyond the damaged area.
3. The patch shall be fused into place and the edges of the patch welded using an extrusion "fillet" weld to ensure a permanent "leak-proof seal".
4. All patches shall be tested with a vacuum box to ensure no leakage.
5. Verification of repairs on seams is required. Each repair shall be non-destructively tested. Failed tests shall be re-seamed and re-tested until a passing test result. The number, date, location, technician and test outcome of each patch shall be recorded.

#### **2L-4.6 Anchor Trench**

1. The anchor trench shall be excavated in accordance with the Contract Drawings. After installation of the liner into the anchor trench, the previously excavated material shall be backfilled and compacted to 95% Standard Proctor Density.
2. The Contractor is responsible for providing all necessary labour, equipment and materials to undertake the anchor trench and install the liner in accordance with the Contract Drawings.

#### **2L-5.0 COMPLETION REPORT AND WARRANTY**

##### **2L-5.1 Completion Report**

1. When the liner installation has been completed, the Contractor and Engineer shall undertake a complete and final inspection of the liner, joints, repairs and anchors. Any identified deficiencies shall be repaired by the Contractor.
2. After the final inspection, the Contractor shall provide three (3) copies of a Completion Report containing the following information:

- a) production data from the liner supplier including all quality control test results.
  - b) as-built drawing showing location of all rolls by number, seam numbers, and panel orientation.
  - c) data sheets summarizing all seam testing and quality control results.
3. The Contractor shall provide three (3) copies of an Operation and Maintenance Manual for the liner system. The Operation and Maintenance Manual shall describe:
    - precautions for satisfactory liner system performance.
    - routine inspection requirements.
    - repair procedures.

#### **2L-5.2 Warranty**

1. The Contractor shall provide a Two Year (2 Year) Warranty of the complete liner installation. The Warranty shall cover defects in materials, and all workmanship associated with the installation, including field joints and seams of the liner system. The Warranty shall be all-inclusive related to the liner system and shall be for a two year period beginning with the date of the Certificate of Completion.
2. The Contractor shall provide a Fifteen Year (15 Year) Warranty covering defects in the liner material in terms of being able to function satisfactorily for the normal uses and conditions.

#### **2L-6.0 MEASUREMENT AND PAYMENT**

##### **2L-6.1 Measurement**

1. The Contractor shall be paid for the supply and installation of the liner on a per square metre basis of the actual area lined. The area measurement will be computed as the product of the inside of top of berm to inside of top of berm distances in both the north-south and east-west directions. The distance shall include a correction factor for slope distance on the reservoir side slopes.
2. No allowance will be made in the liner area measurement for slack material necessary for thermal contraction and anchoring. The area measurement will be computed strictly as the surface area lined as defined herein. All other volumes shall be considered incidental.

## **2L-6.2 Payment**

1. Payment for the liner installation shall be made on the basis of the Tendered Unit Price for the liner in the Tender Form and the area measurement calculated in accordance with these specifications. The Tendered Unit Price for the liner shall be full compensation for a complete and operating system including material supply, factor quality control testing, delivery, all applicable taxes, off-loading, handling, roll-out, complete installation, seaming, jointing, testing, quality control testing, repairs as necessary, anchor trench excavation and backfill, site meetings, base preparation, Warranties, Completion Report and incidental items required to complete the Work in accordance with these Contract Documents and Drawings.
2. Payment for liner connections to pipes will be made in accordance with Tendered Lump Sum Prices for each described piping connection. The Tendered Lump Sum Price shall be full compensation for all necessary labour, equipment and materials to complete the connections in accordance with these Contract Documents including necessary testing and repairs, if necessary.
3. Payment for the exit grids shall be made in accordance with Tendered Lump Sum Prices for each exit grid installed. The Tendered Lump Sum Price shall be inclusive of all materials, labour and equipment necessary to construct the grids, including grid material, top anchor, bottom anchor, and 'wear' panels to be provided on the reservoir liner.