

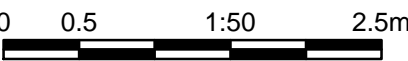
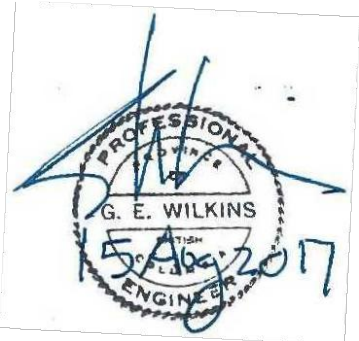




Q:\Vancouver\Transportation\TRN\VH\WV\Projects\TRN\VH\WV\03083 Alaska Highway Steamboat Replacement Salt Shed\CADD\Geomembrane Amendment\C101-104 PLAN & DETAILS CONTRACT 1.dwg [C102] August 15, 2017 - 4:33:03 pm (BY: DEEPWELL, ANDREW)

ISSUED FOR TENDER

GENERAL NOTES:  
1. DIMENSIONS, COORDINATES, ELEVATIONS  
ARE SHOWN IN METRES UNLESS NOTED



A	ISSUED FOR TENDER AMENDMENT #4	17/08/14
Revision	Description/Description	Date/Date

Client/client  
**PUBLIC WORKS AND  
GOVERNMENT SERVICES  
CANADA**



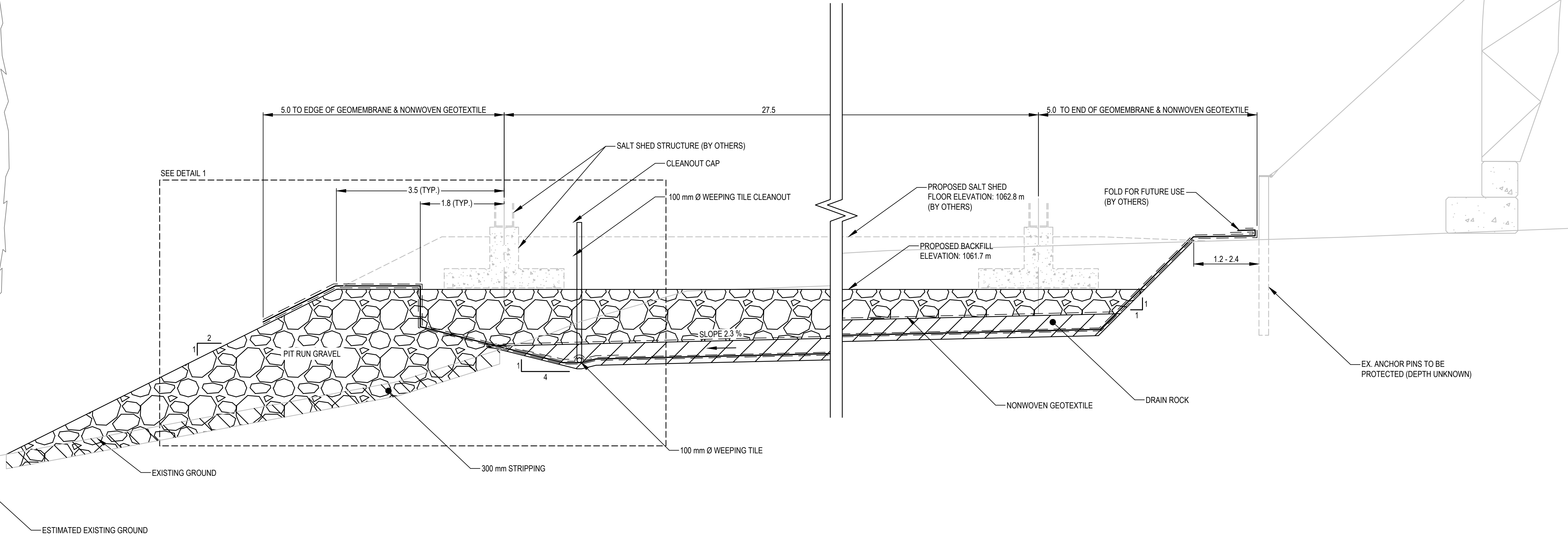
Project title/Titre du projet  
**STEAMBOAT MAINTENANCE  
CAMP REMEDIATION**

Approved by/Approuvé par  
  
Designed by/Concept par  
**A.HORWOOD**  
Drawn by/Dessiné par  
**A.DEEPWELL**  
PWGSC Project Manager/Administrateur de Projets TPSCG  
**A. TAHERI**  
PWGSC Architectural and Engineering Resources Manager/  
Ressources Architectural et de Directeur d'Ingénierie, TPSCG

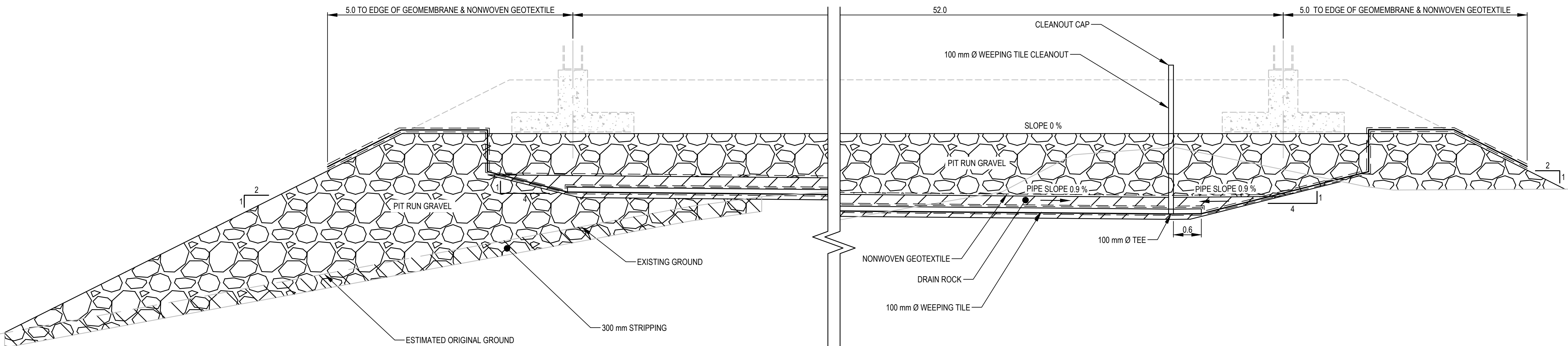
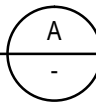
Client/client  
**PUBLIC WORKS GOVERNMENT SERVICES CANADA**

Drawing title/Titre du dessin  
**SALT SHED GEOMEMBRANE  
INSTALLATION  
SECTIONS**

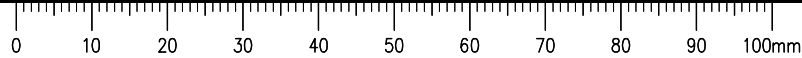
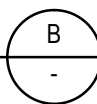
Project No./No. du projet <b>R.018393.007/8</b>	Sheet/Feuille <b>C102</b>	Revision no./ Lo Révision no. <b>A</b>
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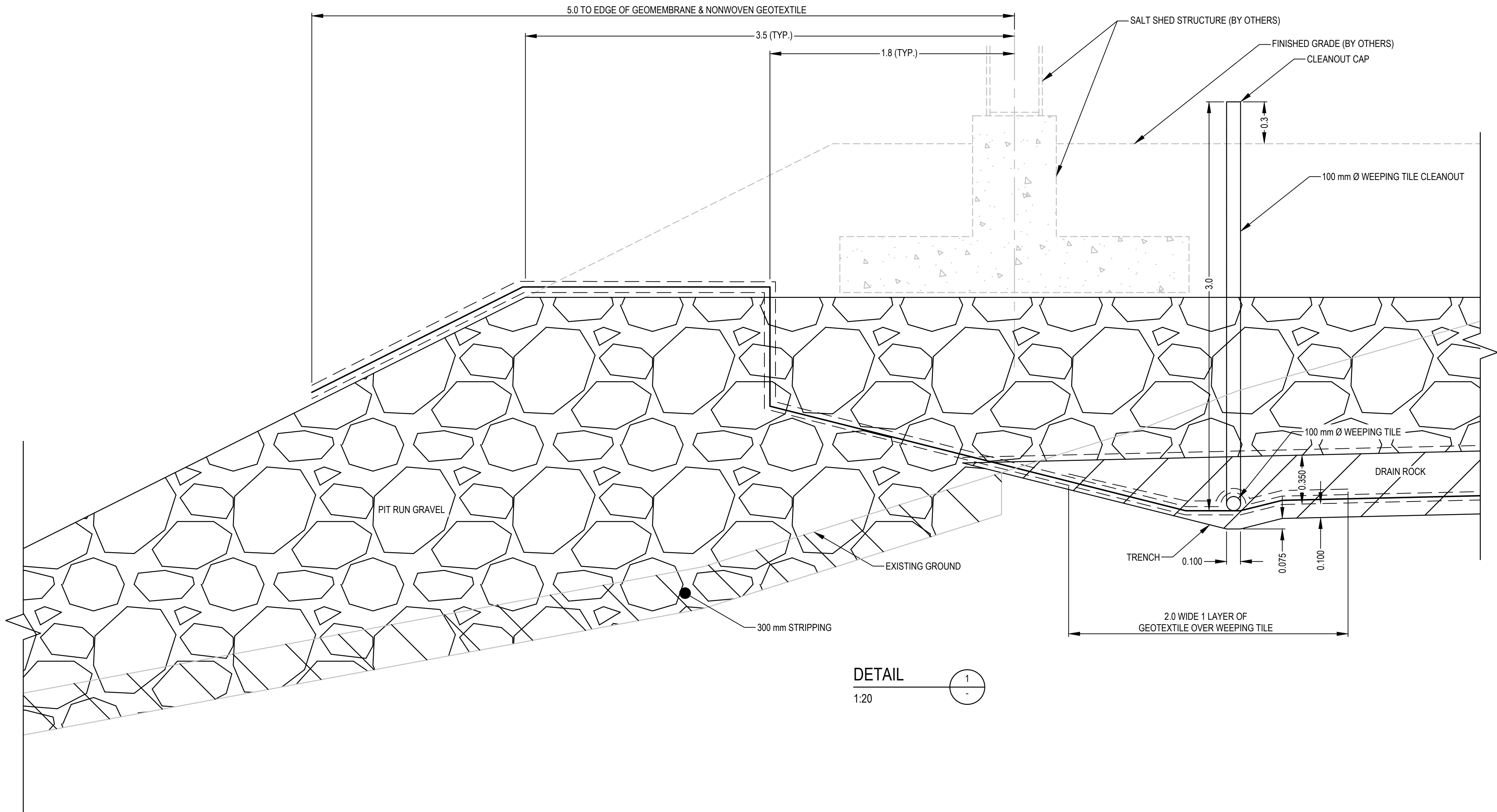
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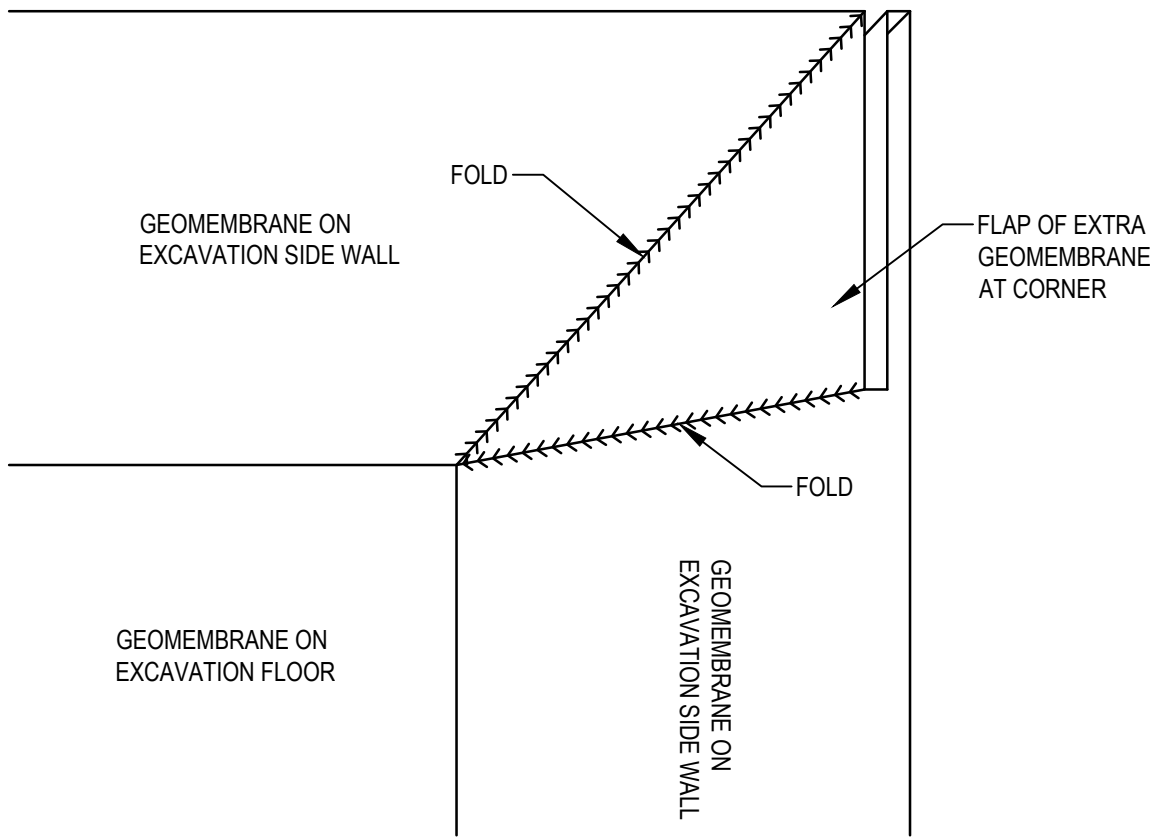
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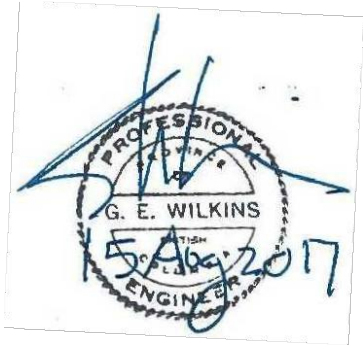
DETAIL 1  
1:20



DETAIL 2  
1:50 FOLDED GEOMEMBRANE IN CORNERS

ISSUED FOR TENDER

GENERAL NOTES:  
1. DIMENSIONS, COORDINATES, ELEVATIONS  
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A	ISSUED FOR TENDER AMENDMENT #4	17/08/14
Revision	Description/Description	Date/Date

Client/client

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CANADA



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A. DEEPWELL

PWGSC, Project Manager/Administrateur de Projets TPSGC

A. TAHERI

PWGSC, Architectural and Engineering Resources Manager/  
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Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Drawing title/Titre du dessin

SALT SHED GEOMEMBRANE  
INSTALLATION  
DETAILS

Project No./No. du projet	Sheet/Feuille	Revision no./ Lo Révision no.
R.018393.007/8	C103	A





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SALT SHED NOTES

1.0 General

These notes apply only to work associated with Drawings C101, C102 & C103.

2.0 Measurement and Payment Procedures

- 1

Payment for the supply and installation Geomembrane and Nonwoven Geotextile will be made on the basis of the Price per Unit Bid for Geomembrane and Nonwoven Geotextile in the Bid and Acceptance Form. The Price per Unit Bid shall include all cost costs for the supply and installation of the Geomembrane and nonwoven geotextile, and all other items necessary for the successful completion of the work.
- 2

Measurement for Payment for completion of the Geomembrane and Nonwoven Geotextile will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.
- 3

Payment for the Supply of Drain Rock will be made on the basis of the Price per Unit Bid for Drain Rock in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for:

1

The supply, manufacture, loading, hauling, and placement of the drain rock.

2

The supply and installation of the weeping tile including 90 degree elbow, end cap, and related nonwoven geotextile.

3

All other items necessary for successful completion of the work.
- 4

Measurement for Payment for Drain Rock will be made on the volume of material surveyed in place following placement in cubic metres and accepted by the Departmental Representative.

3.0 References

- 1

American Society for Testing and Materials (ASTM), latest edition:

1

ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>))

4.0 Protection

- 1

Prevent damage to natural features and man-made structures which are to remain. Repair any damage to an equal or better condition at the Contractors cost.

5.0 Geomembrane

- 1

The geomembrane shall be one single sheet (no seams) 40 mil Linear Low-Density Polyethylene (LLDPE) and shall meet the following requirements.

	Test	Unit	Value
Thickness	ASTM D-5199	mm (in)	1.0 (0.03937)
Sheet Density	ASTM D-1505	g/ml	0.939
Carbon Black Content	ASTM D-1603 (3)	%	2.0 - 3.0
Tensile Strength at break	ASTM D-6693	N/mm (lb/in)	27 (152)
Elongation at break	ASTM D-6693	%	800
Tear Resistance	ASTM D-1004	N (lb)	100 (22)
Puncture Resistance	ASTM D-4833	N (lb)	250 (56)
Oven Aging (HP-OIT)	ASTM D-5885	%	60
UV Resistance (HP-OIT)	ASTM D-5885	%	35

6.0 Nonwoven Geotextile

- 1

The nonwoven geotextile shall achieve or exceed the following minimum requirements.

	Test	Unit	Value
Thickness	ASTM-D5199	mm (mils)	2.9 (115)
Grab Tensile Strength	ASTM-D4632	N (lb)	1424 (320)
Elongation	ASTM-D4632	%	50
Puncture Strength	ASTM-D4833	N (lb)	934 (210)
CHR Puncture	ASTM-D6241	N (lb)	4116 (4274)
Mullen Burst	ASTM-D4786	kPa (psi)	4274 (620)
Trapezoid Tear	ASTM-D4533	N (lb)	556 (125)
Apparent Opening Size	ASTM-D4751	mm (US Sieve)	0.150 (100)
Permittivity	ASTM-D4491	sec <sup>-1</sup>	0.8
Permeability	ASTM-D4491	cm (sec)	0.29
Water Flow Rate	ASTM-D4991	l/m/m <sup>2</sup>	2556 (60)
UV Resistance	ASTM-D4355	% @ 300 hrs	70

7.0 Weeping Tile and Associated Products

- 1

The weeping tile shall be purpose built perforated 100 mm Ø HDPE Drainage Tubing. The Perforated HDPE Drainage Tubing shall come complete with Geotextile Sock (or be wrapped with Nonwoven Geotextile). If Nonwoven Geotextile is used it shall have adequate overlap to ensure complete coverage and be secured to the drain pipe such that it does not move or shift during installation.
- 2

The weeping tile "Tee" shall come from the manufacturer of the weeping tile and be designed for integration with the weeping tile product.
- 3

The Cleanout Cap shall be steel, come from the manufacturer of the weeping tile, and be designed for integration with the weeping tile product.

8.0 Pit Run Gravel

- 1

To be well graded granular material, substantially free from clay lumps, organic matter, snow, ice, frozen material, and other extraneous material, and screened as necessary to achieve the following gradation:

Sieve Designation	Percent Passing
100 mm	100
50 mm	70 - 100
25 mm	50 - 100
4.75 mm	22 - 100
2.36 mm	10 - 85
0.075 mm	2 - 8

- 2

Materials to produce Pit Run Gravel via screening or manufacture (as required) shall be sourced from PWGSC's Mill Creek Gravel Pit, or other sources pre-approved by the Departmental Representative.

9.0 Drain Rock

- 1

To consist of clean round stone or crushed rock conforming with the following gradation:

Sieve Designation	Percent Passing
25.0 mm	100
19.0 mm	0 - 100
9.5 mm	0 - 5
4.75 mm	0

- 2

Materials to produce / manufacture Drain Rock shall be sourced from PWGSC's Mill Creek Gravel Pit or other sources pre-approved by the Departmental Representative.

10.0 Excavation (Salt Shed)

- 1

Complete excavation to +/- 100 mm of the design lines and grades shown on the contract drawings but not uniformly high or low. Prep bottom of excavation surface receiving Geomembrane and Nonwoven geotextile such that there are no rocks, protrusions, or depressions above or below the finish grade larger than 20 mm.
- 2

Load, haul, and dispose of excavated material offsite at an disposal facility acceptable to the Departmental Representative.
- 3

If, during excavation, material appearing to conform to classification for rock excavation is encountered, notify Departmental Representative and provide sufficient time to enable measurements to be made to determine volume of rock. Payment for rock excavation (if required) will be completed via change order.

11.0 Install of Geomembrane and Nonwoven Geotextile

- 1

Install of Geomembrane and Nonwoven geotextiles to the extents, lines, and grades shown on the contract drawings. Take necessary precautions with placing geomembrane and nonwoven geotextiles to ensure materials are placed smooth and free of tension stress, folds (except at corners), wrinkles and creases. Fold corners of geomembrane per details shown on contract specifications.
- 2

Overlap each successive strip of nonwoven geotextile 1000 mm over previously laid strip.
- 3

Protect installed Geomembrane and Nonwoven geotextile from displacement, damage, or deterioration before, during, and after successive material placement.
- 4

Complete dewatering of excavation as necessary to allow for placement and Compaction of Pit Run Gravel.

12.0 Installation of Weeping Tile and Drain Rock

- 1

Install weeping tile to the manufactures recommendations in the locations shown on the contract drawings to the design lines and grades +/- 25 mm.
- 2

Install drain rock in the locations shown on the contract drawings to the design lines and grades - 25 mm / + 50 mm.

13.0 Placement of Pit Run Gravel (Salt Shed)

- 1

Sort and screen temporarily stockpiled excavated material and imported Pit Run Gravel such that the material achieves the requirements of Pit Run Gravel. A minimum of one sieve tests shall be completed by the Contractor for each 500 m3 of Pit Run Gravel material or each source of material (whichever is less). Material not achieving gradation requirements shall not be used until rescreened or sorted and retested. Results from the sieve test shall be provided to the Departmental Representative within 24 hrs of completion.
- 2

Do not place material which are frozen nor place material on frozen surfaces unless pre-approved by Departmental Representative.
- 3

Place Pit Run Gravel to the design lines, grades, and dimensions shown on the contract drawings. Place materials in lifts not exceeding 200 mm loose thickness. Finished surface of Pit Run Gravel to be within - 25 mm / + 75 mm of design lines and grades but not uniformly high or low.
- 4

Compact each lift of pit run gravel as follows:

- 1

If less than 30% of the Pit Run Gravel is oversized (retained on a 19 mm sieve), material shall be compacted to a minimum 98% maximum dry density (ASTM D698-12).

PWGSC will test compaction of each lift using a nuclear densometer. PWGSC will complete a proctor tests (ASTM D698-12) for each source of material or change in nature of aggregate with a material source.

Should a compaction test indicate the material has not achieved a minimum of 98% maximum dry density (ASTM D698-12), additional compaction effort in the area of the failed test shall continue.

- 2

If more than 30% of the Pit Run Gravel material is oversized (retained on a 19 mm sieve), the contractor shall test compaction of the Pit Run Gravel using proof rolling.

Proof rolling shall require one complete coverage of the entire Pit Run Gravel area for each lift by the tires of a truck having a 9 tonne single axle dual tire or 17 tonne tandem axle group with dual tires with a tire pressure of 600 kPa.

When testing the compaction of the Pit Run Gravel material using proof rolling, the material shall be considered compacted when upon completing a pass over the Pit Run Gravel area, the Pit Run Gravel exhibits no observed unsuitable deflections or rutting. If deflections or rutting is observed, compaction shall continue.

- 5

Add water or dry as required to bring moisture content of Pit Run Gravel to level required to achieve specified compaction.