

ESSEX-WINDSOR SOLID WASTE AUTHORITY

REQUEST FOR TENDER

FOR

REGIONAL LANDFILL CELL 5 NORTH CONSTRUCTION, CONTRACT 9-2024

SEALED TENDERS, in envelopes clearly marked as to the contents and showing the bidder's company name, will be received by:

Mr. Tom Marentette, P.Eng., Manager of Waste Disposal, Essex-Windsor Solid Waste Authority
360 Fairview Avenue West, Suite 211, Essex, Ontario, Canada N8M 3G4

The Tender closing date is Thursday, May 16, 2024, at 12:00 noon local time.

Those interested in bidding are requested to attend a **mandatory meeting** on site on the following date: **Thursday, April 25, 2024, at 11:00 a.m. local time**, at the Essex-Windsor Solid Waste Authority, Regional Landfill, located at 7700 County Road 18, Town of Essex (former Colchester North Township, between Coulter Road and Ferris Side Road). Contractors are to check in at the Scale House upon entering the site. **Bids will not be opened from any company who did not have a representative at the mandatory site meeting.**

Please direct any questions or concerns pertaining to the tender to Mr. Tom Marentette, P.Eng., Manager of Waste Disposal by email tommarentette@ewswa.org or by phone 519-776-6441, ext. 1961, up until Tuesday, May 7, 2024.

The work consists of the following major items along with approximate estimated quantities (please refer to the tender package for detailed scope of work and estimated quantities):

1. Removals including stockpiles, litter fencing, bird poles and other miscellaneous items.
2. Cell 5 South sludge pit excavation, backfill and grading, including drying and disposal of materials – 22,000 m³.
3. Cell 5 North earth and waste excavation to the ultimate bottom of the excavation grade, including stockpiling and disposal of excavated materials – 400,600 m³.
4. Cell 5 North primary leachate collection system (PLCS) drainage gravel – 15,300 m³.
5. Cell 5 North PLCS geotextile separator – 33,000 m².
6. Cell 5 North PLCS piping and connection to Cell 4 North PLCS, including two (2) maintenance holes, appurtenances, and CCTV camera inspection and cleaning/flushing of pipes – 1,700 m.
7. Clay capping, topsoil, and seed within the designated landfill cleanout area – 75,000 m² and 37,750 m³.
8. Construction and widening of roadways (reclaimed asphalt pavement and granular surfaces), including roadside ditching – 3,380 m.
9. Construction of truck cleanout pad, including a concrete push wall.
10. Cell 5 North litter fencing – 1,095 m.
11. Electrical services.
12. Miscellaneous work, including asphalt, paving, culvert installation, regrading of ditches, raising of existing maintenance holes, etc.
13. Provisional work if directed by the Owner/Engineer, including cell base/sidewall excavation to remove unsuitable material (sand) and replacement with clay liner, cell berm excavation and construction, earth and road excavation, importation of brown clay and topsoil, and miscellaneous erosion control measures.

Each tender must be accompanied by a tender deposit in the form of a certified cheque or Bid Bond as per the tender requirements, along with a signed Agreement to Bond for 100% Performance and 50% Labour and Material Payment.

Tender documents, including maps, can be found on the Authority's website at:

<http://www.ewswa.org/about/business-opportunities-bids/>

(AutoCAD versions of drawings are available upon request)

Alternatively, paper copies can be obtained at the Authority's office at 360 Fairview Avenue West, Suite 211, Essex, ON. The cost is \$100 including HST (cash or cheque only please). The fee is non-refundable.

Lowest or any tender will not necessary be accepted and is conditional upon acceptance of the Essex- Windsor Solid Waste Authority Board.



1821 Provincial Road, Suite 100
Windsor, ON N8W 5V7
Attention: Radwan Tamr, M.S., P.Eng., QP_{ESA}
Tel: (519) 974-5887, ext. 224



360 Fairview Ave. West, Suite 211
Essex, ON N8M 3G4
Attention: Tom Marentette, P.Eng.
Tel: (519) 776-6441, ext. 1961

**Essex-Windsor Regional Landfill
Contract No. 9-2024**

**Cell 5 North Construction
April 2024**

**Prepared for:
Essex-Windsor Solid Waste Authority
360 Fairview Drive
Suite 211
Essex, Ontario N8M 3G4**

**Prepared by:
WSP Canada Inc.
1821 Provincial Road
Suite 100
Windsor, Ontario N8W 5V7**

Project No. 111-53107-10

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USB #1	<i>(In plastic pocket at the back of this document)</i>

USB Drive in Plastic Pocket

Division 1

Form of Tender

ESSEX-WINDSOR SOLID WASTE AUTHORITY

TENDER FOR CONTRACT NO. 9-2024

TENDER CLOSING DATE May 16, 2024 at 12:00 noon (Local Time)

TENDER FOR Essex-Windsor Regional Landfill, Cell 5 North Construction

Tender submitted by _____
residing at (or place of business) ¹ _____
and _____
residing at (or place of business) _____
comprising the firm of _____
a company duly incorporated under the laws of _____
and having its head office at _____
hereinafter called "the Tenderer".

Tenders shall be submitted in duplicate to:

Essex-Windsor Solid Waste Authority
360 Fairview Avenue
Suite 211
Essex ON N8M 3G4
Attention: Mr. Tom Marentette, P.Eng., Waste Disposal Manager

¹NOTE: The Tenderer's name and residence must be inserted above and, in the case of a partnership, the name and residence of each member of the partnership must be inserted.

SCHEDULE OF ADDITIONAL UNIT PRICES *

The Contractor hereby offers to complete the work specified in this Contract No. 9-2024 for the construction of Cell 5 North at the Essex-Windsor Regional Landfill for the following Tender Prices (refer to drawings and Division 5 of the specifications for details):

Item No.	Spec No.	Description	Unit	Est. Qty	Unit Price	Contractor's Total Bid
1.0	SP	Mobilization and Demobilization	LS	LS	\$	\$
2.0	206 SP	Sludge Excavation and hauling to active landfill area including backfill with native material from Cell 5 North	m ³	22,000	\$	\$
3.0	SP	Odour control during sludge excavation and placement	LS	LS	\$	\$
4.0	510 SP	Litter fence removal including salvaging/reuse of posts	m	200	\$	\$
5.0	510 SP	Bird Pole Removal (reuse as perimeter fence pole, if suitable)	ea.	6	\$	\$
6.0	206 510 SP	Clay stockpile removal including placing and grading over sludge pit area or as directed by owner	m ³	41,500	\$	\$
7.0	206 510 SP	Topsoil stockpile removal and placement at site as directed by owner	m ³	10,100	\$	\$
8.0	206 510 SP	Earth excavation and grading of Cell 5 North including disposal of excavated materials or on-site placement, as directed	m ³	400,600	\$	\$
9.0	206 510 SP	Provisional Item: Over-excavation of Cell 5 North to remove unsuitable material (sand) and backfill with suitable blue/gray clay material, including water for Compaction (quantities may vary and need to be confirmed)	m ³	40,000	\$	\$
10.0	206 510 SP	Provisional Item: Extra cost, if any, associated with additional waste excavation in east side of Cell 4 North (waste covering, odour and litter control)	m ³	5,000	\$	\$
11.0	1860 SP	Geotextile separator for base of Cell 5 North	m ²	33,000	\$	\$
12.0	206 511 SP	Primary drainage gravel for base of Cell 5 North	m ³	15,300	\$	\$
13.0	206 SP	Provisional Item: Clay berm along south limit of Cell 5 North to support access road north of sludge pits	m	230	\$	\$
14.0	206 510 511 1860 SP	Provisional Item: Remove existing clay berm between Cell 4 North and Cell 5 North and construct floor clay liner then reconstruct the clay berm	m	165	\$	\$

Item No.	Spec No.	Description	Unit	Est. Qty	Unit Price	Contractor's Total Bid
15.0	410 SP	200 mm dia. HDPE LCS perforated pipe for Cell 5 North	m	1,300	\$	\$
16.0	410 SP	200 mm dia. HDPE LCS solid wall pipe for Cell 5 North	m	400	\$	\$
17.0	409 SP	CCTV Inspection of Leachate Collection Piping, including Cleanup/Flushing for Cell 5 North	m	1,700	\$	\$
18.0	407 904 SP	2400 mm dia. pre-cast concrete manhole with cast-in-place concrete foundation and all specified accessories	ea.	2	\$	\$
19.0	410 SP	Connection to existing LCS pipe	LS	LS	\$	\$
20.0	206 SP	Runoff Separation Berm for Cell 5 North	m	160	\$	\$
21.0	206 314 510 802 804 SP	Clay access road south of Cell 5 North	m	240	\$	\$
22.0	206 310 314 510 802 804 SP	Resurface existing roads				
		a) Resurface road west of maintenance building	m	280	\$	\$
		b) Resurface Road 'C'	m	275	\$	\$
		c) Resurface Road 'D'	m	505	\$	\$
23.0	206 310 314 510 802 804 SP	Widen existing roads				
		a) Road 'E' widening	m	660	\$	\$
		b) Widen existing road to provide 20m turning radius	LS	LS	\$	\$
24.0	206 310 314 510 802 804 SP	RAP waste haul road	m	1,660	\$	\$
25.0	206 310 314 510 802 804 SP	Miscellaneous road items				
		a) Granular B Turning Area	LS	LS	\$	\$
		b) 3m Wide Granular A Access Road	m	280	\$	\$
		c) Granular A Access Ramp to Manholes	ea	4	\$	\$
		d) Granular A Path	m	150	\$	\$
		e) Granular A Pad and Access Road	LS	LS	\$	\$
26.0	410 SP	New HDPE drainage pipe with rip rap and assess condition of existing HDPE drainage pipes	ea.	6	\$	\$
27.0	412 SP	900 mm dia. HDPE vertical sump	ea.	2	\$	\$
28.0		Place final cover				

Item No.	Spec No.	Description	Unit	Est. Qty	Unit Price	Contractor's Total Bid
	206 802 804 SP	a) Clay capping of designated landfill area (Cells 2, 3 and 4), brown clay maybe arranged by EWSWA	m ³	26,500	\$	\$
		b) Place 150 mm topsoil over capped landfill area, topsoil maybe arranged by EWSWA	m ²	75,000	\$	\$
		c) Fertilize and seed topsoiled / capped part of landfill	m ²	75,000		
29.0	206 310 314 510 SP	Maintenance Building and Household Hazardous Waste Storage paving	LS	LS	\$	\$
30.0	206 510 904 SP	Construct truck clean area including RAP pad, concrete push wall and realigned drainage ditch	LS	LS	\$	\$
31.0	615 SP	Install litter fence along north and east side of Cell 5 North				
		a) With new poles	m	895	\$	\$
		b) With reused poles	m	200	\$	\$
32.0	206 802 804 SP	Drainage ditches				
		a) New drainage ditch	m	640	\$	\$
		b) Regrade existing drainage ditch	m	310	\$	\$
33.0	SP	Supply and install 2400 mm dia. risers to existing manholes	LS	LS	\$	\$
34.0	421 SP	Supply and install CSP culvert				
		a) Supply and install CSP culvert (300mm)	m	60	\$	\$
		b) Supply and install CSP culvert (400mm)	m	35	\$	\$
		c) Supply and install CSP culvert (600mm)	m	65	\$	\$
35.0	106 603 604 609 614 SP	All electrical work as required including wiring, ducts, power supply and other miscellaneous tasks as specified	LS	LS	\$	\$
36.0	603 SP	Installation of conduit for future electrical, cable and data wiring	m	1,290	\$	\$
37.0	206 510 SP	Earth shallow excavation (Cell 3 North area) and stockpile on site as directed	m ³	40,000	\$	\$
38.0	206 510 SP	Provisional Item: Earth shallow excavation (Cell 4 North area) and stockpile on site as directed	m ³	30,000	\$	\$
39.0	206 510 SP	Provisional Item: Haul road excavation (Cell 3 North area) and stockpile on site as directed	m ³	2,200	\$	\$

Item No.	Spec No.	Description	Unit	Est. Qty	Unit Price	Contractor's Total Bid
40.0	805 SP	Provisional Item: Heavy duty silt fence (OPSD 219.130)	m	600	\$	\$
41.0	805 SP	Provisional Item: Straw bale flow check dam (OPSD 219.180)	ea	2	\$	\$
42.0	805 SP	Provisional Item: Rock flow check dam (OPSD 219.210)	ea	2	\$	\$
43.0	SP	Provisional Item: Geogrid	m ²	10,000	\$	\$
44.0		Provisional Item: Import topsoil	m ³	16,500	\$	\$
45.0		Provisional Item: Import clay cap material	m ³	17,000	\$	\$
46.0	SP	Provisional Item: Contingency Allowance	LS	LS	\$ 1,000,000.00	\$ 1,000,000.00
47.0	SP	Provisional Item: Labour and Equipment Contingency Allowance (refer to Pages 12 and 13 of Form of Tender)	LS	LS	\$	\$
48.0	SP	Supply and install manual electric submersible pump	LS	LS	\$	\$
49.0	SP	Bonding, Insurance and Permits	LS	LS	\$	\$
		Subtotal	-	-	-	\$
50.0	SP	Harmonized Sales Tax (HST) Equal to Exactly 13.0% of the Above Subtotal	-	-	-	\$
TOTAL TENDER PRICE						\$

*To be completed by Tenderer.

Estimated Quantities

The quantities shown in the Schedule of Prices are estimated from the Contract Drawings and are for the sole purpose of establishing a dollar amount based on the unit price bid or lump sum price bid. For any work done or materials supplied on a unit price basis, the Contractor will be paid for the actual measured quantities at the respective unit rates tendered.

Provisional Item

The provisional items indicated in the Schedule of Prices and throughout the Contract Documents may or may not be completed under this Contract. Provisional items are only to be completed by the Contractor if directed by the Owner or Engineer.

Contract Time

All work under this contract must be completed to Substantial Performance in _____** days (130 working days maximum) from the date of the Engineer’s written instructions to commence work, and this time will become the Contract Time.

** To be completed by the Tenderer

List of Tender Documents

- A. TENDER FORM (Division 1)**
- B. INFORMATION FOR TENDERERS (Division 2)**
As issued with the Tender
- C. STANDARD CONTRACT FORMS (Division 3)**
Samples issued with the Tender
- D. GENERAL SPECIAL PROVISIONS (Division 4)**
As issued with the Tender
- E. ITEM SPECIAL PROVISIONS (Division 5)**
As issued with the Tender
- F. CONTRACT DRAWINGS**
(a) As issued with the Tender and as listed below:

Drawing No.	Title	Date
0	Title Sheet	April 2014
C01	Existing Conditions (West Side)	April 2014
C02	Existing Conditions (East Side)	April 2014
C03	Proposed Staging and Stockpile Areas	April 2014
C04	Proposed Removals	April 2014
C05	Proposed Clay Road and Sludge Pit Grading	April 2014
C06	Proposed Bottom of Cell 5N Excavation	April 2014
C07	Proposed Cell 5N Top of Drainage Layer	April 2014
C08	Cell 5N Cross-Sections	April 2014
C09	Cell 5N Typical Details	April 2014
C10	Manhole Details	April 2014
C11	Proposed Final Cover Area	April 2014
C12	Proposed Access Roads	April 2014

Drawing No.	Title	Date
C13	Waste Haul Road North and South Endings	April 2014
C14	Waste Haul Road Plan and Profile (Station 0+000 To 0+470)	April 2014
C15	Waste Haul Road Plan and Profile (Station 0+470 To 0+940)	April 2014
C16	Waste Haul Road Plan and Profile (Station 0+940 To 1+320)	April 2014
C17	Waste Haul Road Cross-Sections	April 2014
C18	Granular A Access Road Plan And Profile	April 2014
C19	Road "E" Widening Plan and Profile (Station 0+000 To 0+360)	April 2014
C20	Road "E" Widening Plan and Profile (Station 0+360 To 0+659)	April 2014
C21	Road "C" And Road "D" Resurfacing Plan	April 2014
C22	Proposed Paved Area	April 2014
C23	Typical Road Details	April 2014
C24	Typical Litter Fence and Paving Details	April 2014
C25	Proposed Truck Cleanout Area	April 2014
S1	Push Wall General Notes	April 2014
S2	Push Wall Plan and Detail	April 2014
E01	Proposed Electrical Works	April 2014
E02	Legend, Electrical Schematics, Panel Schedules and Details	April 2014

G. STANDARD SPECIFICATIONS

(a) **Ontario Provincial Standard Specifications**

The relevant municipal standard specifications (latest edition) in the Ontario Provincial Standard Specifications Manual are as follows:

Standard No.	Date	Standard No.	Date	Standard No.	Date
106	Apr-23	206	Apr-19	310	Nov-17
311	Nov-18	314	Nov-23	407	Nov-21
408	Nov-21	409	Nov-23	410	Nov-18
411	Nov-21	412	Nov-18	421	Nov-18
510	Nov-18	511	Nov-19	603	Apr-21

Standard No.	Date	Standard No.	Date	Standard No.	Date
604	Nov-17	609	Nov-19	610	Apr-17
614	Nov-19	615	Nov-22	802	Nov-19
804	Nov-14	805	Nov-21	904	Nov-23
1001	Nov-21	1004	Nov-21	1010	Nov-13
1150	Nov-18	1350	Nov-23	1860	Nov-18

(b) **Ontario Provincial Standard Drawings**

The relevant standard drawings (latest edition) in the Ontario Provincial Standard Drawings Manual are as follows:

Standard No.	Name	Date	Revision
219.130	Heavy-Duty Silt Fence Barrier	Nov 2021	3
219.180	Straw Bale Flow Check Dam	Nov 2021	3
219.210	Rock Flow Check Dam - V-Ditch	Nov 2022	3
406.010	Aluminum Ladder for Maintenance Holes	Nov 2018	3
701.013	Precast Concrete Maintenance Hole, 2400 mm Diameter	Nov 2014	5
701.100	Frost Strap Installation	Nov 2018	3
802.010	Flexible Pipe Embedment and Backfill, Earth Excavation	Nov 2014	3
802.014	Flexible Pipe Embedment in Embankment, Original Ground: Earth or Rock	Nov 2014	3
810.010	Rip Rap Treatment for Sewer and Culvert Outlets	Nov 2018	3
2100.010	Cable Installation in Trenches	Nov 2013	0
2101.010	Duct Installation in Trenches	Nov 2013	1
2238.010	Wooden Pole in Earth	Nov 2010	1

H. LIQUIDATED DAMAGES (Division 6)

As issued with the Tender

I. SUPPLEMENTAL GENERAL CONDITIONS OF CONTRACT (Division 7)

As issued with the Tender

J. GENERAL CONDITIONS OF CONTRACT (Division 8)

OPSS General Conditions of Contract - November 2006

K. OPS DRAWINGS FOR CONTRACT (Division 9)

As issued with the Tender

L. OTHER DOCUMENTS (Division 10)

As issued with the Tender

LIST OF PROPOSED SUBCONTRACTORS*

Sub Trade	Name of Proposed Contractor	Address of Subcontractor
Earthwork Contractor		
Seeding Contractor		
HDPE Pipe Supplier		
Precast Structures Supplier		
CCTV/Pipe Cleaning Contractor		
Paving Contractor		
Geotextile Supplier		
Concrete Contractor		
Metal Fabrications Supplier		
Fencing Contractor		
Electrical Contractor		
HDPE Pipe Fusing Contractor		
Drainage Gravel Supplier		
Granulars Supplier		
Geotextile Installer		
Surveyor		
Geogrid supplier		
CSP culvert supplier		
Diving Contractor		

*To be completed by Tenderer. (Add sub-trades as appropriate, or indicate "By Own Forces").

TENDERER'S EXPERIENCE IN SIMILAR WORK*

Year Completed	Description of Work	For Whom Work Performed	Value

*To be completed by Tenderer

SCHEDULE OF ADDITIONAL UNIT PRICES (LABOUR & EQUIPMENT)*

All items must be priced; failure to do so may invalidate this Tender. Prices shall be fully inclusive of all costs in carrying out the work and shall include Harmonized Sales Tax where applicable.

The Tenderer shall list the hourly rates for labour and equipment owned or rented which he proposes to use on the work. These rates will apply to any extra work, which will be completed on a time and material basis, as outlined in Section 8.02.04 of the General Conditions. The equipment hourly rates listed herein will be used instead of the equipment rates outlined in Section 8.02.04.06 of the General Conditions for any part of the contract.

DESCRIPTION	HOURLY RATE	HOURS	SUBTOTAL (BID PRICE)
LABOUR			
1. General Labourer	\$	25	\$
2. Equipment Operator	\$	25	\$
3. Foreman	\$	25	\$
4. Supervisor	\$	25	\$
5. Project Manager	\$	25	\$
EQUIPMENT			
<i>Compaction Equipment</i>			
6. Pad Foot Soil Compactor Cat 815	\$	25	\$
7. Sheepsfoot or Smooth Drum Vibratory Compactor (102" wide)	\$	25	\$
8. Manually Guided Vibratory Plate (280 kg)	\$	25	\$
<i>Earth Moving/Grading Equipment</i>			
10. Bulldozer (Cat D6 or equivalent)	\$	25	\$
11. Bulldozer (Cat D8 or equivalent)	\$	25	\$
12. Road Grader (Cat 120 or equivalent)	\$	25	\$
<i>Excavation Equipment</i>			
13. Hydraulic Excavator (32,000 kg)	\$	50	\$
14. Hydraulic Excavator (44,000 kg)	\$	50	\$
15. Scraper, Twin Engine, Four Wheel Drive (16 m ³)	\$	50	\$

DESCRIPTION	HOURLY RATE	HOURS	SUBTOTAL (BID PRICE)
Haulage Equipment			
16. Water Truck	\$	25	\$
17. Float Truck	\$	25	\$
18. Articulated Off Road Truck (30 tonnes)	\$	25	\$
19. Articulated Off Road Truck (40 tonnes)	\$	25	\$
Other Equipment:			
20. Rubber Tire Front End Loader (3 m ³ bucket)	\$	25	\$
TOTAL Items 1 to 20			\$

*To be completed by Tenderer

The total amount is referred to in this Tender as the Labour & Equipment Contingency Allowance and shall constitute Item 60.0 of the Form of Tender. The Tenderer agrees that he is not entitled to payment of any portion of this Allowance except for additional work carried out by him in accordance with the contract as directed by the Engineer in writing and only to the extent of such additional work.

PERIOD OF VALIDITY OF TENDER

This offer shall be irrevocable for a period of sixty days (60 days) following the date of Tender Closing at the prices bid in the Tender Form.

DECLARATION BY TENDERER

The Tenderer has carefully examined the Tender Documents listed herewith and understands and accepts the conditions set out therein.

Included with this Tender is a properly completed Agreement to Bond and a Tender Deposit in the form of a Bid Bond, a certified cheque or other acceptable security made payable to the Owner in the amount as set out in the Tender Documents. This deposit is subject to the conditions set out in the Information for Tenderers.

The Tenderer acknowledges that Addendum/Addenda No. ____ to ____ * inclusive has/have been received and that all changes specified in the Addendum/Addenda have been included in the prices submitted.

The Tenderer declares that no person, partnership or corporation other than the Tenderer has any interest in this tender or in the proposed contract for which this tender is made.

The Tenderer further declares that this tender is made without any connection, comparison of figures or arrangements with, or knowledge of, any other person, partnership or corporation making a tender for the same work and is in all respects made without collusion or fraud.

The Tenderer by this Tender offers to furnish all Labour, Equipment and Material, except as specified otherwise, for the performance of the Work for the item prices set forth in this Tender, all in accordance with the Tender Documents.

*** to be completed by Tenderer (enter nil if no addenda issued)**

DATED AT _____ THIS _____ DAY OF _____ 20__

Tenderer's Signature here and Seal, where applicable

Position

This is the 15th and last page of this Tender Form

Division 2

Information for Tenderers

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1.0 SCOPE OF WORK

- 1.1 The Essex-Windsor Solid Waste Authority Regional Landfill is an active landfill receiving solid, non-hazardous waste and is located at 7700 County Road 18, Cottam, Town of Essex (Part of Lots 14, 15 and 16, Concession 7, former Township of Colchester North, County of Essex). The site was opened in 1997 and operates under Provisional Certificate of Approval No. A 011101. Approximately 5 million tonnes of waste have been landfilled at the site to date. Presently, landfilling continues within the area of Cell 3 South and Cell 4 North.
- 1.2 The work to be carried out under this contract includes, but not limited to:
- .1 Removals including stockpiles, litter fencing, and other miscellaneous items.
 - .2 Cell 5 South sludge pit excavation, backfill and grading, including the drying, loading, hauling and placement of materials for disposal at the tipping face as directed by the Engineer or Owner.
 - .3 Cell 5 North earth and waste excavation to the ultimate bottom of the excavation grade, including stockpiling and hauling of excavated materials to the tipping face or as directed by the Engineer or Owner.
 - .4 Cell 5 North primary leachate collection system (PLCS) drainage gravel, including geotextile separator.
 - .5 Cell 5 North PLCS piping and connection to Cell 4 North PLCS, including two (2) maintenance holes, appurtenances, and CCTV camera inspection and cleaning/flushing of pipes.
 - .6 Construction of clay cap, topsoil, and seed within the designated landfill closure area.
 - .7 Construction of paved and gravel roads, including roadside ditching.
 - .8 Construction of truck cleanup pad, including a concrete push wall.
 - .9 Litter fencing.
 - .10 Electrical services.
 - .11 Other miscellaneous work, including asphalt paving, culvert installation, regrading of ditches, raising of existing maintenance holes, etc.
- 1.3 In addition, provisional works, which may at the discretion of the Owners be authorized as part of the contract, including but not limited to:
- .1 Landfill base and/or sidewall excavation to remove unsuitable material (sand), where required, and replace with clay liner.
 - .2 Placement of berm along the south limit of Cell 5 North.
 - .3 Removal of berm between Cell 4 North and Cell 5 North and construction of liner which will be determined at the time of construction depending on leachate levels.
 - .4 Earth and road excavation.

- .5 Importation of brown clay and topsoil
- .6 Miscellaneous erosion control measures.

2.0 INTERPRETATION

In this document,

- (a) "Corporation or Owner" in these Tender documents means Essex-Windsor Solid Waste Authority (EWSWA).
- (b) "Minister, Deputy Minister, Crown and Assistant Deputy" shall mean the Owner, Essex-Windsor Solid Waste Authority (EWSWA), or others specifically designated by the Owner as their Agent.
- (c) "Owner's Agent, Engineer, Consultant & Contract Administrator", "Contract Administrator" or "Engineer" shall mean WSP Canada Inc.
- (d) "Tender documents" include the Tender, the General Conditions of Contract, the Supplemental General Conditions of Contract (if any), the Standard Contract Forms, the General Special Provisions and Item Special Provisions (the Specifications), the Contract drawings, the Information for Tenderers, any other documents listed in the Tender and any addenda thereto issued by the Owner.
- (e) The specifications and documents herein are referenced to the Ontario Provincial Standards for Construction and Material Specifications as well as the Ontario Provincial Standards Drawings.
- (f) General Conditions of Contract - November 2019 of the Ontario Provincial Standards apply unless modified by the Supplemental General Conditions (if any), the Special Provisions or Information for Tenderers.

3.0 COMPLETION OF THE TENDER

- 3.1 All entries in the Tender shall be clear and legible and made in ink. All items shall be tendered according to any instructions in the Tender documents and with entries made for unit price, lump sum, extensions and totals as appropriate. The Tender form is to be dated, signed and sealed (where applicable).
- 3.2 Alterations may be made providing they are legible and initialled by the Tenderer's signing officer. Tenders that are incomplete, conditional, illegible, and obscure or contain additions not called for, reservations, erasures, alterations incorrectly submitted or have irregularities of any kind may be rejected.
- 3.3 Tenders to be considered must be submitted in duplicate on the Tender form provided.

4.0 DELIVERY AND OPENING OF TENDERS

- 4.1 Tenders shall be sealed in a plain envelope and clearly marked with the Contract title and the Contract number and addressed to Mr. Tom Marentette, P.Eng., Waste Disposal Manager, Essex-Windsor Solid Waste Authority, 360 Fairview Avenue, Suite 211, Essex, Ontario N8M 3G4 and will be received by the Owner at the time and place designated for receipt of Tenders. The Owner will mark the Tender envelope with the time and date that the envelope was received in the office. The use of any means of delivery of a Tender shall be at the risk of the Tenderer.
- 4.2 The Tender envelopes will be publicly opened at the time and place designated by the Owner.

4.3 Tenders received after the specified time and date for Tender closing will not be considered.

5.0 WITHDRAWAL OR ALTERATION OF TENDERS

5.1 A Tenderer who has submitted a Tender may submit a further Tender at any time up to the specified time and date for Tender closing. The last Tender received shall supersede and invalidate all Tenders previously submitted by that Tenderer for this Contract.

5.2 A Tenderer may withdraw or alter the Tender at any time up to the specified time and date for Tender closing by submitting a letter bearing the Tenderer's signature and seal to the Owner who will mark thereon the time and date of receipt. The Tenderer's name and the Contract number shall be shown on the envelope containing such letter. Telegrams, faxes, e-mails or telephone calls will not be accepted.

6.0 UNBALANCED TENDERS AND DISCREPANCIES

6.1 Tenders that contain prices that appear to be as unbalanced as likely to affect the interests of the Owner adversely may be rejected.

6.2 Wherever the amount Tendered for an item does not agree with the extension of Tender quantity and the Tendered unit price, the unit price shall govern the amount and the Total Tender Price shall be corrected accordingly.

6.3 The Owner will correct mathematical discrepancies by appropriate means to arrive at the correct Total Tender Price. Where an error has been made in transferring an amount from one part of the Tender to another, the amount shown before transfer shall, subject to any corrections as provided for above, be taken to be correct and the amount shown after transfer and the Total Tender Price shall be corrected accordingly.

6.4 Where the Tender documents do not state a definite completion time and the submitted Tender is based on an unreasonable period of time for completion of the Work, the Tender may be rejected.

6.5 Tenderers who have submitted Tenders that have been rejected by the Owner will normally be notified of the reasons for the rejection within 10 days of the specified time and date for Tender closing.

7.0 ENQUIRIES, OMISSIONS, DISCREPANCIES AND INTERPRETATIONS

7.1 All enquiries concerning the Tender documents shall be directed to Mr. Radwan Tamr, M.S., P.Eng., QP_{ESA}, WSP Canada Inc. at 226-826-0702 or email: radwan.tamr@wsp.com.

7.2 Should a Tenderer find omissions from or discrepancies in any of the Tender documents or should the Tenderer be in doubt as to the meaning of any part of such documents, the Tenderer should notify the above-designated person without delay. If the designated person considers that a correction, explanation or interpretation is necessary or desirable, an addendum will be issued to all who have taken out the Tender document.

7.3 No oral explanation or interpretation will modify any of the requirements or provisions of the Tender documents.

8.0 TENDER DEPOSIT

- 8.1 Each Tenderer shall include a Tender Deposit in the form of a Bid Bond or Certified Cheque in the amount stated in the Tender documents. The value of the Tender Deposit shall be at least three (3) percent of the Tender Price.

9.0 ACCEPTANCE OR REJECTION OF TENDERS

- 9.1 The Owner reserves the right to reject any or all Tenders and to waive formalities as the interests of the Owner may require without stating reasons therefore and the lowest or any Tender will not necessarily be accepted.
- 9.2 Subject to the General Conditions and except as provided hereunder, neither the Owner's agent nor any employee of the Owner has authority to make or accept an offer or to enter into a Contract on behalf of the Owner or to create any rights against or to impose any obligations on the Owner. The recommendation of a Tender to the Owner for acceptance does not constitute acceptance of the Tender by the Owner.
- 9.3 Tenders not accompanied by a Bid Bond, Certified Cheque or other acceptable security, if required, in the correct amount, may be rejected.
- 9.4 The Owner shall not be responsible for any liabilities, costs, expenses, loss or damage incurred, sustained or suffered by any Tenderer prior or subsequent to or by reason of the acceptance or the non-acceptance by the Owner of any Tender or by reason of any delay in the acceptance of a Tender except as provided in the Tender.
- 9.5 The Tender offer shall be irrevocable for a period of sixty (60) days following the date of Tender closing at the prices Tendered in the Form of Tender.

10.0 CONTRACT AWARD PROCEDURES

- 10.1 No announcement concerning the successful Tender will be made until a complete report and analysis is prepared by the General Manager of the Essex-Windsor Solid Waste Authority or a representative. A Tender shall not be considered as accepted or rejected until a resolution stating such a declaration is duly passed at a regular meeting of the Authority,
- 10.2 Unless stated otherwise in **Appendix A** of the Information for Tenderers, the following procedures will apply:
- (a) The Owner will notify the successful Tenderer, within the validity period following the Tender opening (subject to Clause 9.5) that his Tender has been accepted.
 - (b) Notice of acceptance of Tender will be by telephone and by written notice.
 - (c) The required Contract Documents will be sent to the successful Tenderer immediately after acceptance of the Tender. The Tenderer shall fully execute and return the documents together with the Certificate of Liability Insurance and any other required documents to the Owner within 10 days of the date of receipt.
 - (d) Following receipt of the properly executed documents, Certificate of Liability Insurance and, where applicable, the Contract bonds, the Contractor will receive written authority to proceed with the Work.

11.0 RELEASE OF TENDER DEPOSIT

- 11.1 The Tender Deposit (Bid Bond or Certified Cheque) received with the two (2) preferred Tenders, as selected by the Owner, will be retained until the required Contract documents have been received and an agreement executed with the Owner, following which the Tender Deposit received with these two (2) preferred Tenders will be returned.
- 11.2 Tender Deposits from all other Tenderers will be returned within seven (7) business days of the opening of the Tenders.

12.0 BONDING REQUIREMENTS

- 12.1 Where required in **Appendix A**, the Tenderer shall include with the Tender the Agreement to Bond in the appropriate form, jointly executed by the Tenderer and the surety company from which the bonds will be obtained.
- 12.2 The successful Tenderer shall provide to the Owner a Performance Bond in the amount of 100 percent of the Contract Price and in a form acceptable to the Owner. The Performance Bond shall cover the faithful performance of the Contract, including corrections after final payment.
- 12.3 The Performance Bond shall be taken out with a Guarantee Surety Company authorized by law to carry out business in the Province of Ontario and having an office in Ontario.
- 12.4 The Bond shall be furnished to the Owner through the Engineer prior to the signing of the Contract.
- 12.5 The successful Contractor shall provide to the Owner a Labour and Material Payment Bond in the amount of 50 percent of the Contract Price and in a form acceptable to the Owner and covering the payment of accounts incurred by the Contractor during the performance of the work on this Contract.
- 12.6 The Contractor shall provide to the Owner a Maintenance Bond in an amount equal to or greater than the amount as shown in the following table.
- 12.7 Note that a separate Maintenance Bond for the 12-month warranty period need not necessarily be submitted if the Performance Bond clearly states on the form that the required Maintenance Bond is included in the Performance Bond in accordance with the terms of the Contract.
- 12.8 The Maintenance Bond shall be furnished to the Owner through the Consultant within seven (7) days of the date of Substantial Performance of the Contract and shall be for a period of 12 months commencing on the date of Substantial Performance.
- 12.9 The holdback monies will not be released until the Owner is in possession of the Maintenance Bond.
- 12.10 The Maintenance Bond shall be taken out with a Guarantee Surety Company authorized by law to carry out business in the Province of Ontario and having an office in Ontario.

CONTRACT AMOUNT

Less than 0.1 M
0.1 M to 0.5 M
0.5 M to 1.0 M
1.0 M to 2.0 M
2.0 M to 4.0 M
4.0 M to 6.0 M
6.0 M to 10.0 M
Over 10.0 M

AMOUNT OF MAINTENANCE BOND

4% of Final Contract Price
4,000 on first 0.1 M + 3.0% on next 0.4 M
16,000 on first 0.5 M + 2.4% on next 0.5 M
28,000 on first 1.0 M + 2.2% on next 1.0 M
50,000 on first 2.0M + 2.0% on next 2.0 M
90,000 on first 4.0 M + 1.8% on next 2.0 M
126,000 on first 6.0 M + 1.5% on next 4.0 M
186,000 on first 10.0 M and 1.4% on balance

12.11 The date of Substantial Performance shall be that date when the statutory requirements under the Construction Lien Act are met.

12.12 The holdback will be released as laid out elsewhere in these Contract Documents.

13.0 SAFETY

13.1 With regard to the Occupational Health and Safety Act, RSO 1990, as amended 213/91 and Regulations made thereunder, the Contractor shall notify the Ministry of Labour with regard to all requirements of the above Act and Regulations before commencing construction. A copy of the Contractor's notice to the Ministry of Labour shall be provided to the Engineer within ten (10) days after the signing of the Construction Agreement

13.2 In addition, the Contractor shall be solely responsible for all aspects of safety, including, but not necessarily limited to safety of excavations, equipment, structures, site personnel, public, traffic, vehicles as they are related to the work and construction site.

14.0 HARMONIZED SALES TAX (HST)

14.1 The Tenderer shall Tender in the appropriate item of the Tender Form the total HST applicable to the Contract. This amount is to be calculated as exactly 13 percent of the subtotal of all preceding items of the Tender and included as the last Tender item to arrive at a Total Tender Price (including HST) for the Contract.

15.0 ADDENDA ISSUED DURING TENDERING

15.1 The Tenderer will insert in the space provided on the last page of the Form of Tender the numbers of the addenda received by him during the tendering period and taken into account by him in preparing his Tender. If none has been received, he shall also so indicate.

16.0 PLAN QUANTITY PAYMENT

16.1 In the Tender Form, a (P) in the Unit Column indicates that the item is a Plan Quantity Payment item. The quantities in the Tender Form for these items have been calculated from the plans and no adjustment in these quantities will be made by field measurements during construction. The Contractor will be paid at the unit price bid, for the plan quantities as indicated in the Tender Form. If revisions in the extent of the work under Plan Quantity items are required, the Plan Quantity unit price from the Tender Form shall be used for payment (addition/deduction) for the revised quantity of work.

16.2 The EWSWA reserves the right to add to or delete any item or items of Schedule of Items and Prices.

17.0 EXAMINATION OF SITE

17.1 Each Tenderer should visit the site of the work before submitting his Tender and should satisfy himself by personal examination as to the local conditions to be met during the construction and conduct of the work. He shall make his own estimate of the facilities and difficulties to be encountered, including the nature of the subsurface materials and conditions. He is not to claim at any time after submission of his Tender that there was any misunderstanding of the terms and conditions of the Contract relating to site conditions. A mandatory landfill site examination/bidders meeting will be held on April 25, 2024 at 11:00 a.m. Contractors will be allowed to inspect the site between 9:00 a.m. and 2:00 p.m.

18.0 INSURANCE

- 18.1 The Contractor shall procure and maintain General Liability Insurance and Automobile Liability Insurance in accordance with Section GC 6.03 of the General Conditions. Aircraft, watercraft, property and boiler insurance are not required for this project. Include the County of Essex, the Corporation of the City of Windsor, the Essex-Windsor Solid Waste Authority and WSP Canada Inc. as additional insureds.
- 18.2 Due to the nature of the project, the Contractor shall provide Pollution Liability Insurance as follows:
- a. Coverage shall be written in a form acceptable to the Owner. Such form shall provide Pollution Liability Insurance for losses arising out of or resulting from the ownership, existence, maintenance or use of premises by or on behalf of the Contractor and operations necessary or incidental to the performance of the Contract. Coverage shall be endorsed by the insurer to cover the scope of the works specified in the Contract Documents. Coverage shall include claims for damages because of:
 - i. Bodily injury, sickness, disease, mental anguish or shock sustained by any person or death of any person.
 - ii. Property damage, including physical injury to or destruction of tangible property, including the loss of use thereof, cleanup costs and the loss of use of tangible property that has not been physically injured or destroyed; and,
 - iii. Defence, including costs, charges and expenses incurred in the investigation, adjustment or defence of claims.
 - b. Coverage shall apply to sudden and accidental and non-sudden and accidental pollution conditions including, but not limited to, the discharge, dispersal, release or escape of smoke; vapours; soot; fumes; acids; alkalis; toxic chemicals, liquids or gases; waste materials; or other irritants, contaminants or pollutants into or upon land, sediments, soils, groundwater, the atmospheres or any watercourse or body of water. Coverage shall:
 - i. Be written with the following limits: General Aggregate - \$5,000,000 and per claim/reach occurrence - \$5,000,000;
 - ii. Be written to include a provision for contractual liability and separation of insureds; and,
 - iii. Provide that completed operations coverage shall be continuously maintained for a period of at least one (1) year after the date of final payment.
 - c. If coverage is written on a claims-made form, such coverage shall:
 - i. Have a retroactive date no later than the date of Notice of Award; and,
 - ii. Remain continuously in effect and without interruption for at least one (1) year after the date of final payment and include coverage for exposures arising from operations that have been completed.

APPENDIX A

Contract No. 9-2024

Contract Name Essex-Windsor Regional Landfill
Cell 5 North Construction

(1) Owner Essex-Windsor Solid Waste Authority

Address 300 Fairview Avenue, Suite 211
Essex, Ontario N8M 3G4

(2) Tenders to be received by:

Name Mr. Tom Marentette, P.Eng., Waste Disposal Manager

Office Essex-Windsor Solid Waste Authority

Location 360 Fairview Avenue, Suite 211

Telephone (519) 776-6441 Fax: (519) 776-6370

Email TomMarentette@ewswa.org

(3) Date and Time of Tender Closing: May 16, 2024 @ 12:00 noon

(4) Enquiries during Tendering to be directed to:

Name Mr. Radwan Tamr, M.S., P.Eng., QP_{ESA}

Office WSP Canada Inc.

Telephone (226) 826-0702 Fax: _____

Email radwan.tamr@wsp.com

(5) Bonds

An Agreement to Bond is required to be attached to the tender documents.

Division 3

Standard Contract Forms

TABLE OF CONTENTS

Agreement

Certificate of Completion

Certificate of Substantial Performance

Change Order

Contract Release

Final Acceptance Certificate

Labour and Material Payment Bond

Monthly Payment Certificate

Notice of Change

Performance Bond

Statutory Declaration re Liens and Liabilities

Statutory Declaration re Payment of Accounts

Bid Bond (loose with Tender)

Agreement to Bond (loose with Tender)

Project No _____

Contract No _____

THIS AGREEMENT made in triplicate this _____ day of _____ 20 _____

BETWEEN: _____

(hereinafter called "the Owner")

OF THE FIRST PART

- and -

(hereinafter called "the Contractor")

OF THE SECOND PART

WITNESSETH

That the Owner and the Contractor in consideration of the fulfillment of their respective promises and obligations herein set forth covenant and agree with each other as follows:

ARTICLE 1

- (a) A general description of the work is:

- (b) The Contractor shall, for the prices set out in the Form of Tender and except as otherwise specifically provided, provide at no additional cost to the Owner all and every kind of labour, machinery, plant, structures, roadways, materials, appliances, articles and things necessary for the due execution and completion of all the work set out in this Contract and shall forthwith according to the instructions of the Engineer, commence the works and diligently execute the respective portions thereof, and deliver the works complete in every particular to the Owner within the time specified in the Contract.

ARTICLE 2

In the event that the Form of Tender provides for and contains a Contingency Allowance, it is understood and agreed that such Contingency Allowance is merely for the convenience of accounting by the Owner, and the Contractor is not entitled to payment thereof except for extra or additional work carried out by him as directed by the Engineer and in accordance with the Contract and only to the extent of such extra or additional work.

ARTICLE 3

In case of any inconsistency or conflict between the provisions of this Agreement and the Plans or Specifications or General Conditions or Form of Tender or any other document or writing, the provisions of such documents shall take precedence and govern in the following order, namely:

- | | |
|---------------------------------|--|
| (1) This Agreement | (7) Information for Tenderers |
| (2) Addenda (if any) | (8) Form of Tender |
| (3) Special Provisions (if any) | (9) Supplementary Specifications (if any) |
| (4) Contract Drawings | (10) Supplementary General Conditions (if any) |
| (5) Standard Specifications | (11) General Conditions |
| (6) Standard Drawings | |

The Contractor shall not without the consent in writing of the Engineer and without restricting in any way the provisions of the Section of the General Conditions headed "Subletting", make any assignment of any part or the whole of any monies due or to become due under the provisions of this Contract.

ARTICLE 5

The Owner covenants with the Contractor that the Contractor having in all respects complied with the provisions of this Contract, will be paid for and in respect of the works the sum of _____ (\$ _____) subject to Article 2 and subject to such additions and deductions as may properly be made under the terms hereof, subject to the provision that the Owner may make payments on account monthly or otherwise as may be provided in the General Conditions attached hereto.

ARTICLE 6

Where any notice, direction or other communication is required to be or may be given or made by one of the parties hereto to the other or to the Engineer or to his agent, it shall be deemed sufficiently given or made if mailed or delivered in writing to such party or to the Engineer at the following addresses:

The Owner:

The Contractor:

The Engineer

Where any such notice, direction or other communication is given or made to the Engineer, a copy thereof shall likewise be delivered to any agent of the Engineer appointed in accordance with the General Conditions of this Contract and where any such notice, direction or other communication is given or made to such Agent, a copy thereof shall likewise be delivered to the Engineer.

ARTICLE 7

A copy of each of the Specifications, General Conditions, Special Provisions, Form of Tender, Information for Tenderers is hereto annexed and together with the Drawings relating thereto and listed in the Specifications are made part of this Contract as fully to all intents and purposes as though recited in full herein.

ARTICLE 8

No implied contract of any kind whatsoever by or on behalf of the Owner shall arise or be implied by or inferred from anything in this Contract contained, nor from any position or situation of the parties at any time, it being clearly understood that the express covenants and agreements herein contained made by the Owner shall be the only covenants and agreements upon which any rights against the Owner may be founded.

ARTICLE 9

Time shall be deemed the essence of this Contract.

ARTICLE 10

The Contractor declares that in tendering for the works and in entering into this Contract, he has either investigated for himself the character of the work and all local conditions that might affect his tender or his acceptance or performance of the work, or that not having so investigated, he acknowledges that his responsibility under the Contract is in no way reduced or limited thereby and, in either case, he is willing to assume and does hereby assume all risk of conditions arising, developing, or being revealed in the course of the work which might or could make the work, or any items thereof, more expensive in character, or more onerous to fulfil, than was contemplated or known when the tender was made or the Contract signed. The Contractor also declares that he did not and does not rely upon information furnished by any methods whatsoever by the Owner or its officers, employees or agents, being aware that any information from such sources was and is approximate and speculative only, and was not in any manner warranted or guaranteed by the Owner.

ARTICLE 11

Any representations in the tender documents were furnished merely for the general Information for Bidders and were not in any way warranted or guaranteed by or on behalf of the Owner or the Owner's Consultant and its Subconsultants, or the Consultants' or Subconsultants' employees, and neither the Owner nor its Consultants or its employees shall be liable for any representations negligent or otherwise contained in the documents.

ARTICLE 12

The Contract shall apply and be binding on the parties hereto and their successors, administrators, executors and assigns and each of them.

IN WITNESS WHEREOF the parties hereto have hereunto set their hands and seals the day and year first above written or caused their corporate seals to be affixed, attested by the signature of their proper officers, as the case may be.

CONTRACTOR:

Name and Title _____ Signature

Address

Witness as to signature of Contractor*

Name and Title _____ Signature

Address

OWNER:

Name and Title _____ Signature

Address

Witness as to signature of Owner*

Name and Title _____ Signature

Address

*Not necessary if corporate seal is affixed.

CERTIFICATE OF COMPLETION

Client: _____
Project: _____ Project No. _____
Contract: _____ Contract No. _____
Contractor _____
Owner¹: _____

Description of the Works:

We, _____ hereby notify the Owner that,
based upon our inspection of the works and to the best of our knowledge and judgment:

1. 1.1 The works have satisfactorily passed the required inspection and testing.
1.2 The cost of completion of all outstanding work and known defects is not more than the lesser of,
 - i) one percent (1%) of the contract price, and
 - ii) \$1,000.00
2. The following documents have been received and are forwarded herewith:
 - 2.1 The Contractor's final claim (including the value of work completed since the date of substantial performance).
 - 2.2 An up-to-date release by the Contractor in a form satisfactory to the Engineer releasing the Owner from all further claims relating to the Contract. (If the Contractor has added any qualifications to his Contract Release, this should be referred to below.
 - 2.3 An up-to-date statutory declaration in a form satisfactory to the Engineer that all liabilities incurred by the Contractor and his subcontractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and subcontracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.
3. That, as shown on the Certificate of Substantial Performance, the date of substantial performance of the works was _____.
4. The date of completion of the works was _____.
5. The Final Contract Price is \$ _____.

(1) See Instruction 1, overleaf

6. Payment is due as follows (see Instruction 5 below):

Final Contract Price			\$ _____
Deduct	1. Total payment approved up to completion	\$ _____	
	2. Sums which have been paid out by the Owner on behalf of the Contractor		
	a) _____		
	_____ \$ _____		
	b) _____		
	_____ \$ _____		
	c) _____		
	_____ \$ _____	\$ _____	
	3. Holdback for maintenance	\$ _____	
	4. Interest on maintenance security	\$ _____	
	5. Engineer's estimate of cost carrying out uncompleted work (See Item 1.2)		
	_____	\$ _____	
	_____	\$ _____	
	Total Deductions	\$ _____	\$ _____
	To be paid to Contractor (plus HST)		\$ _____

Date: _____

Agent of the Engineer (Consulting Engineer)

Date: _____ Approved: _____

Engineer

1. The Owner is _____.
2. This Certificate shall be issued for all contracts after the works have been completed in accordance with Items 1.1 and 1.2.
3. For some contracts, this certificate may be preceded by a Certificate of Substantial Performance.
4. In the case of a contract involving unit price items, the final measurement change order, accepted by the Contractor and approved by the Engineer, may be taken as the "Contractor's Final Claim" referred to in 2.1 hereof. In the case of a contract involving only lump sum prices, the "Contractor's Final Claim" should be a letter signed by the Contractor agreeing to the Final Contract Price.
5. This Certificate shall be accompanied by the two (2) Payment Certificates referred to in Section 39(g)(1) and (2) of the General Conditions.
6. Five (5) copies of this Certificate shall be completed and sent to the Engineer for approval. Two (2) copies will be returned to the Consulting Engineer who will forward one to the Contractor.

**CERTIFICATE OF SUBSTANTIAL
PERFORMANCE OF THE CONTRACT**

Owner: _____
(County/District/Regional Municipality/City)

This is to certify that the Contract for the following: Contract No.: _____

(Short description of the Contract)

was substantially performed on _____
(date)

Date certificate signed: _____

Approved by: _____

Name of Owner _____

Address for Service _____

Name of Contact Administrator _____

Name of Contractor _____

Address for Service _____

Office to which claim for lien and affidavit must be given to preserve lien:

This notice published in Daily Commercial News of:
(Date)

DISTRIBUTION: Original to Contractor, copy to Contract Administrator



CHANGE ORDER

Change Order #

Contract No.:

Project:

Date:

Dear Sirs:

Under the above mentioned Contract, we, WSP Canada Inc., are authorized by the Owner only when his signed approval appears hereon, to direct you to:

And ADD TO/ DEDUCT FROM the Contract, in accordance with the Contract the sum of
..... /100 Dollars (\$)) excluding HST.

<p>To Contractor</p> <p>.....</p> <p>hereby accepts and agrees to this Change Order in accordance with and under the Terms and Conditions of the Contract as expressly modified by this Change Order and all Change Orders as previously issued by the Engineer.</p> <p>..... 20.....</p> <p>per (Signature)</p>	<p>Recommended by:</p> <p>.....</p> <p>WSP Canada Inc.</p> <p>.....</p> <p>Approved20.....</p> <p>.....</p> <p>.....</p>
<p>.....</p>	<p>.....</p>

cc:

CONTRACT RELEASE

OWNER _____

IN THE MATTER OF a contract dated _____ known as Contract No. _____

entered into between the Owner of the _____

and the Contractor, _____

for the construction of _____

in the _____, Ontario.

KNOW ALL MEN BY THESE PRESENTS that I/we (Note 1, See Page 2)

Note 1

(See Page 2)

for and in consideration of other goods and valuable consideration and the sum of Two Dollars (\$2.00) paid by the Owner, have remised, released and forever discharged, and by these presents do for myself/ourselves, my/our heirs, executors, administrators and assigns or successors and assigns, as the case may be, remise, release and forever discharge the Owner, its successors and assigns, of and from all manner of action and actions, cause and causes of action, suits, debts, dues, sums of money, claims and demands whatsoever at law or in equity which I/we ever had or now have, or which I/we or my/our heirs, executors, administrators or assigns or successors and assigns, as the case may be, hereafter can, shall or may have by reason of the above-mentioned contract, save and except any claim which I/we have arising out of:

- 1) the retention by the Owner of the maintenance Holdback being 25% of 15% of the contract price;
- 2) any sum retained by the Owner against the cost of uncompleted work; and
- 3) Note 2 (See Page 2)

IN WITNESS WHEREOF THE parties hereto have hereunto set their hands and seals.

SIGNED SEALED AND DELIVERED)
)
)
)

Dated _____

Note 3

(See page 2)

Note 1: If the Contractor is:

- a) an individual, insert his full name
- b) a partnership, insert the full names of all partners and add "carrying on business under the name or style of (the partnership)"
Example: "John Smith and William Brown carrying on business under the name or style of Smith and Brown".
- c) a limited company, insert the full company name.

Note 2: If there are no further claims to be noted against (3), insert "NIL" or "NONE".

Note 3: 1) **Signatures**

If the Contractor is:

- a) an individual, he must sign and seal the document
- b) a partnership, two partners must sign and seal the document
- c) a limited company, two senior officials of the company, such as President and Secretary, must sign stating their rank, and the Company seal must be affixed.

2) **Witnessing**

Every signature by an individual or a partner in a partnership must be witnessed. One witness may witness several persons' signatures on one document.

The witness signs to the left of the person whose signature is witnessed and if he is only one of several witnesses to different signatures should add after he has signed "as to the signature(s) of _____"

Example:

William Brown)	
as to the signature)	John Smith (seal)
of John Smith)	
David Griffith)	
as to the signature)	Ian McKenzie (seal)
of Ian McKenzie))	

Note 4: The Corporation will require two (2) signed copies or, alternatively, the original and one (1) photostat copy of this release to be submitted with the Certificate of Completion

FINAL ACCEPTANCE CERTIFICATE

To: _____ Date: _____

Subject: Contract No.: _____

Location: _____

In accordance with Clause GC.08.02.06 Final Acceptance Certification, Para. 01) of the General Conditions of Contract, you are hereby notified that the Work in the above mentioned contract has been completed according to the Contract Documents as of this date of _____.

Certified

(Owner's Authorized Representative)

Copies to:

- (1)
- (2)
- (3)
- (4)
- (5)
- (6)
- (7)
- (8)

LABOUR AND MATERIAL PAYMENT BOND
(trustee form)

No. _____

NOTE: This Bond is issued simultaneously with another Bond in favour of the Obligees conditioned for the full and faithful performance of the Contract.

KNOW ALL MEN BY THESE PRESENTS THAT

as Principal, hereinafter called the Principal, and _____ a corporation created and existing under the laws of Canada and duly authorized to transact the business of Suretyship in Canada as Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto

as Trustee, hereinafter called the Obligees, for the use and benefit of the Claimants, their and each of their heirs, executors, administrators, successors and assigns, in the amount of _____ Dollars (\$ _____) of lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a written contract with the Obligees, dated the _____ day of _____ 20____, for _____

_____ which contracts, Specifications and Drawings are by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall make payment to all Claimants for all labour and material used or reasonably required for use in the performance of the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

- (1) A Claimant for the purpose of this Bond is defined as one having a direct contract with the Principal for labour, material, or both, used or reasonably required for use in the performance of the Contract, labour and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment directly applicable to the Contract provided that a person, firm or corporation who rents equipment to the Principal to be used in the performance of the Contract under a contract which provides that all or any part of the rent is to be applied towards the purchase price thereof, shall only be a Claimant to the extent of the prevailing industrial rental value of such equipment for the period during which the equipment was used in the performance of the Contract. The prevailing industrial rental value of equipment shall be determined, insofar as it is practical to do so, in accordance with and in the manner provided for in the latest revised edition of the publication of the Canadian Construction Association titled "Rental Rates on Contractor's Equipment" published prior to the period during which the equipment was used in the performance of the Contract.
- (2) The Principal and the Surety, hereby jointly and severally agree with the Obligees, as Trustee, that every Claimant who has not been paid as provided for under the terms of his contract with the Principal, before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's work or labour was done or performed or materials were furnished by such Claimant, may as a beneficiary of the trust herein provided for, sue on this Bond, prosecute the suite to final judgement for such sum as sums as may be justly due to such Claimant under the terms of his contract with the Principal and have execution thereon. Provided that the Obligees is not obliged to do or take any act, action or proceeding against the Surety on behalf of the Claimants, or any of them, to enforce the provisions of this Bond. If any act, action or proceeding is taken either in the name of the Obligees or by joining the Obligees as a party to such proceeding, then such act action or indemnify and save harmless against all costs, charges and expenses or liabilities incurred thereon and any loss or damage resulting to the Obligees by reason thereof. Provided still further that, subject to the foregoing terms and conditions, the Claimants, or any of them, may use the name of the Obligees to sue on and enforce the provisions of this Bond.
- (3) No suite or action shall be commenced hereunder by any Claimant:

- (a) unless such Claimant shall have given written notice within the time limits hereinafter set forth to each of the Principal, the Surety and the Obligee, stating with substantial accuracy the amount claimed. Such notice shall be served by mailing the same by registered mail to the Principal, the Surety and the Obligee, at any place where an office is regularly maintained for the transaction of business by such persons or served in any manner in which legal process may be served in the Province or other part of Canada in which the subject matter of the Contract is located. Such notice shall be given.
- (1) in respect of any claim for the amount or any portion thereof, required to be held back from the Claimant by the Principal, under either the terms of the Claimant's contract with the Principal, or under the Construction Liens Legislation applicable to the Claimant's contract with the Principal, whichever is the greater, within one hundred and twenty (120) days after such Claimant should have been paid in full under the Claimant's contract with the Principal;
- (2) in respect of any claim other than for the holdback, or portion thereof, referred to above, within one hundred and twenty (120) days after the date upon which such Claimant did, or performed, the last of the work or labour or furnished the last of the materials for which such claim is made, under the Claimant's contract with the Principal;
- (4) The Surety agrees not to take advantage of Article 1959 of the Civil Code of the Province of Quebec in the event that, by an act or an omission of a Claimant, the Surety can no longer be subrogated in the rights, hypothecs and privileges of Said Claimant.
- (5) Any material change in the contract between the Principal and the Obligee shall not prejudice the rights or interest of any Claimant under this Bond, who is not instrumental in bringing about or has not caused such change.
- (6) The amount of this Bond shall be reduced by, and to the extent of any payment or payments made in good faith, and in accordance with the provisions hereof, inclusive of the payment by the Surety of Construction Lien which may be filed of record against the subject matter of the Contract, whether or not claim for the amount of such lien be presented under and against this Bond.
- (7) The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

IN WITNESS WHEREOF, the Principal and the Surety have Signed and Sealed this bond this day of _____, 20 ____.

SIGNED and SEALED

In the presence of

Title

Witness as to Principal



MONTHLY PAYMENT CERTIFICATE

Owner Date:

Contractor Contract No.

Contract Title

Certificate No

This is to advise that with reference the above-noted contract executed on 20 . . .
between Owner, and
..... Contractor,
our estimate, to the best of our judgement, of the total value of work done and materials supplied up until
..... is
..... /100 Dollars (\$) plus HST.

Table with 2 columns: Description and Amount. Rows include ORIGINAL CONTRACT PRICE, PRESENT/*CONTRACT PRICE, and VALUE OF UNCOMPLETED WORK.

Table with 2 columns: Description and Amount. Rows include WORK PERFORMED TO DATE, LESS STATUTORY HOLDBACK, LESS HOLDBACK FOR LIENS, LESS MAINTENANCE SECURITY, TOTAL DUE TO DATE, 13% HST, TOTAL RECOMMENDED TO DATE, LESS PREVIOUSLY PAID, and TOTAL PAYMENT THIS CERTIFICATE.

RECOMMENDED Engineer

AGREED Contractor

APPROVED Owner



NOTICE OF CHANGE

Change Order #:

Contract No.:

Project:

Date:

To: _____ Contractor

Under the above-mentioned Contract, we, **WSP Canada Inc.**, are proposing to issue a change as follows:

You are hereby instructed under the Terms and Conditions of the original Contract to submit a price on the above changes. This work is not authorized unless a Change Order is issued.

Requested by:

WSP Canada Inc.

cc: Change Order File

PERFORMANCE BOND

No. _____

KNOW ALL MEN BY THESE PRESENTS THAT

as Principal, hereinafter called the Principal, and _____ a corporation created and existing under the laws of Canada and duly authorized to transact the business of Suretyship in Canada as Surety, hereinafter called the Surety, are held and firmly bound unto _____

as Oblige, hereinafter called the Oblige, in the amount of _____

_____ Dollars (\$) _____) lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a written contract with the Oblige dated the _____ day of _____, 20____ for _____

in accordance with the Specifications and Drawings submitted therefore which contract, Specifications and Drawings, are by reference made part hereof and are hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal shall promptly and faithfully perform the Contract then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Whenever the Principal shall be, and declared by the Oblige to be, in default under the Contract, the Oblige having performed the Oblige's obligations thereunder, the Surety may promptly remedy the default, or shall promptly

- (1) complete the Contract in accordance with its terms and conditions:
- (2) obtain a bid or bids for submission to the Oblige for completing the Contract in accordance with its terms and conditions, and upon determination by the Oblige and the Surety of the lowest responsible bidder, arrange for a contract between such bidder and the Oblige and make available as work progresses (even though there should be a default, or a succession of defaults, under the contract or contracts of completion, arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the Contract price", as used in this paragraph, shall mean the total amount payable by the Oblige to the Principal under the Contract, less the amount properly paid by the Oblige to the Principal.

Any suit under this Bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

No right of action shall accrue on this Bond, to or for the use of, any person or corporation other than the Oblige named herein, or the heirs, executors, administrators or successors of the Oblige.

IN WITNESS WHEREOF, the Principal and the Surety have Signed and Sealed this bond this _____ day of _____, 20_____.

SIGNED and SEALED
In the presence of

Witness as to Principal

Principal

SURETY COMPANY

STATUTORY DECLARATION RE LIENS AND LIABILITIES

DOMINION OF CANADA
PROVINCE OF
ONTARIO

IN THE MATTER OF a contract, known as Contract No. _____
of Project No. _____ entered into between _____,
Owner, and _____, Contractor,
on _____ 20 ____ for the construction of

____ in _____, Ontario.

TO WIT:

I, _____ of _____
in the Province of _____ do solemnly declare:

1. That I am _____ of the
(president, secretary, treasurer, a partner, etc)
of the Contractor named in the above-mentioned contract and, as such, have personal knowledge of the facts herein declared.
2. That all persons who have performed any work or service upon or in respect of, or placed or furnished any material or things to be used in connection with the above contract, have been fully paid or their claims have been settled in respect of such work, service, materials or things and there are no liens, garnishees, attachments or claims relating thereto.
3. That all subcontractors who were engaged in or in any manner associated with the performance of any part of the above contract have been fully paid or their claims have been settled in respect thereof except to the extent that monies (not exceeding in any instance 14% of the value of the work performed by the Subcontractor) have been held back by written agreement with any such subcontractors.
4. That all subcontractors who were engaged in or in any manner associated with the performance of any part of the above contract have discharged all liabilities that they incurred in respect thereof.
5. That all claims for damage to property or injury to persons of which the above-named Contractor has received notice have been fully paid or settled.
6. That the above-named Contractor has not had any notice of any grounds for a claim (other than those covered by paragraph 5 above) connected with this contract by a third party for which a claim might be made and I believe that no such claim will be made.

⁽¹⁾ See Instructions, overleaf.

STATUTORY DECLARATION RE PAYMENT OF ACCOUNTS

DOMINION OF CANADA

PROVINCE OF
ONTARIO

IN THE MATTER OF a contract, known as Contract No. _____
of Project No. _____ entered into between _____,
Owner, and _____, Contractor,
on _____ 20 _____ for the construction of

_____ in _____,
Ontario.

TO WIT:

I, _____ of _____
in the Province of _____ do solemnly declare:

1. That I am _____ of the
(president, secretary, treasurer, a partner, etc)
of the Contractor named in the above-mentioned contract and, as such, have personal knowledge
of the facts herein declared.
2. That all workmen employed by the said Contractor in the performance of the said Contract have
been paid in full not less frequently than semi-monthly and up to and including the pay-day
immediately preceding the date of this declaration.
3. That, with the exception of the disputed accounts set forth in Paragraph 4 hereof and amounts
held back and payments deferred by written agreement, all liabilities⁺ incurred by the said
Contractor arising out of work performed up to _____ 20 _____*, as set forth in the
Monthly Estimate relating to Payment Certificate No. _____*, have been discharged.

NOTE:

- + Including payments due to all staff, subcontractors, suppliers, Workmen's Compensation Board,
Insurance Companies.
- Except as required by Paragraph 2 hereof, it is not necessary for the Contractor to declare in
respect of accounts relating to the work set forth in the latest Monthly Estimate but only in respect
of work set forth in the Monthly Estimate immediately preceding the latest one.

4. That the following is a complete list of disputed accounts: (NOTE: This table is not intended for listing unpaid accounts that are not in dispute).

Name of Creditor	Serv. Rendered	Total Claim \$	Amount in Dispute \$	Amount Paid \$

(If there are no disputed accounts, enter "NONE" above).

AND I MAKE THIS SOLEMN DECLARATION conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of "The Canada Evidence Act".

DECLARED before me at the)
of)
in the of)
this day of)
A.D. 20)
))
))
_____)

Signature of Authorized Signing Officer of the Contractor

(A Commissioner, etc. or Notary Public)

NOTE:

- x In the Contractor's own interest, he should complete this declaration carefully and correctly. Mistakes or omissions will probably result in delayed payment. The declaration is to be submitted to the Consulting Engineer in duplicate, together with each monthly progress claim (except the first one for the Contract) and must be signed by an authorized signing officer of the Contractor. Declarations signed by others will not be acceptable.

Tender for Contract No. _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS THAT

_____ as Principal

hereinafter called the Principal, and _____

a Corporation created and existing under the laws of Canada and duly authorized to transact the business of Suretyship in Canada as Surety, hereinafter called the Surety, are held and firmly bound unto _____

_____ as Obligee

hereinafter called the Obligee, in the amount of _____

_____ Dollars (\$ _____)

lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigned, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a written tender to the Obligee, dated the _____ day of _____ 20 _____, for _____

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the aforesaid Principal shall have the tender accepted within sixty (60) days from the closing date of tender and the said Principal will, within the time required, enter into a formal contract and give the specified security to secure the performance of the terms and conditions of the Contract, then his obligation shall be null and void; otherwise the Principal and the Surety will pay unto the Obligee the difference in money between the amount of the bid of the said Principal and the amount for which the Obligee legally contracts with another party to perform the work if the latter amount be in excess of the former.

The Principal and the Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of six months from the date of this Bond.

IN WITNESS WHEREOF, the Principal and the Surety have Signed and Sealed this Bond this

_____ day of _____, for _____

SIGNED AND SEALED

In the presence of

(_____)
Witness to Principal _____ Principal

Surety Company

AGREEMENT TO BOND

We, the undersigned, hereby agree to become bound as Surety for

.....

.....

in bonds totaling One Hundred Percent (100%) of the contract amount for Performance, and Fifty Percent (50%) of the contract amount for Labour and Materials Payment, and conforming to the instruments of Contract attached hereto, for the full and due execution of the works shown as described herein, if the Tender for

.....

.....

.....

is accepted by the Owner.

It is a condition of this agreement that if the above mentioned Tender is accepted, application for a Performance Bond and a Labour and Material Payment Bond must be completed with the undersigned within ten (10) days of acceptance of the tender related thereto, otherwise this Agreement shall be null and void.

DATED this day of 20.....

.....
Name of Bonding Company

.....
Signature of Authorized Person Signing for Company
(Company Seal)

.....
Position

Division 4

General Special Provisions

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1.0 TRAFFIC CONTROL, FLAGGING AND HAUL ROADS

- .1 Flagging for traffic control on this Contract shall be in conformance with the procedure outlined in the handbook entitled "Construction Traffic Controllers Handbook" issued by the Construction Safety Association of Ontario. Copies of this pamphlet may be obtained from the Association.
- .2 Each flag person shall, while controlling traffic, wear the following:
 - .1 an approved fluorescent blaze orange or fluorescent red safety vest;
 - .2 an approved fluorescent blaze orange or fluorescent red armband on each arm; and
 - .3 an approved fluorescent blaze orange or fluorescent red hat.
- .3 Comply with all requirements for Temporary Conditions as outlined in Book 7 of the Ministry of Transportation Ontario Traffic Manual and all conditions as outlined in Section GC7.0 "Contractor's Responsibilities and Control of the Work" of the General Conditions of Contract.
- .4 The Contractor's earthmoving equipment shall not use the existing on-site road network (paved or gravel surfaced). The Contractor shall prepare and use temporary haul roads for earth/waste moving operations as required to complete all work specified. This includes the haul road leading to excess soil stockpile at the property north of the site. Where the Contractor's operation requires crossing the existing roads (paved or gravel surfaced), the Contractor shall be responsible for traffic control as per Subsection .1 above. The Contractor shall make repairs to any permanent road section damaged by his operation.
- .5 A haul road for waste delivery from Cell 5 North and sludge delivery from Cell 5 South to the active landfilling area and shall be coordinated and approved by the Owner on a daily basis. The Contractor shall be responsible for construction/ maintenance of such haul road. The Owner may allow use of the existing roadways for this purpose, but this is not guaranteed. The same applies to the haul road to be used for delivery of clay cap and topsoil to the close out area on top of the landfill (Cells 2, 3 and 4).

2.0 FIRST AID EQUIPMENT

- .1 The Contractor shall provide and maintain the necessary first aid items and equipment as called for under the First Aid Regulations of the Workplace Safety & Insurance Act.

3.0 DUST CONTROL

- .1 The Contractor shall take such steps as may be required to prevent dust nuisance resulting from his operations anywhere at the site and off site (excess soil stockpile property). This requirement shall include all areas of the work, including the use and maintenance of roadways. The roadways shall be watered whenever dust plumes approach two (2) vehicle lengths or at the discretion of the Engineer. The Contractor shall maintain and keep on site a log of dust control watering activities. This log shall be available to the Owner/Engineer upon request. Use of calcium chloride for dust control will not be allowed.

- .2 Where the work requires sawing or grinding of asphalt or concrete, blades and grinders of the wet type shall be used with sufficient water to prevent the incidence of dust, wherever dust would affect traffic or wherever dust would be a nuisance to residents or businesses in the area where the work is being carried out or as requested by the Engineer.
- .3 The Contractor shall bear the cost of all such preventive measures, including the supply and application of water as required, to control dust caused by his operations. Refer to Section 10.0 of Division 5 for further details. If water is obtained from onsite stormwater facilities the Contractor shall be responsible for any permits to take water. Refer to Section 6.0 of Division 5 for further details.
- .4 The Contractor will be fined \$500 if a request by the Owner/Engineer/MOE to correct dust issues is not addressed to by the Contractor within one (1) hour of receiving the request. More than one (1) fine a day may be applied in any given day for not implementing actions to address dust nuisances. If non-compliance continues, any fines or orders received from the MOE and associated legal and/or engineering fees to address the fine and/or order that are directed to the Owner will be paid by the Contractor.

4.0 LITTER AND ODOUR CONTROL

- .1 The Contractor shall be responsible for litter/odour control within the work area requiring waste excavation. This requirement includes the following conditions:
 1. Daily cover consisting of at least 150 mm of grey clay or other approved soil or automobile shredder residue (supplied by the Owner) shall be applied over all areas of exposed waste (boundary between Cell 4 North and Cell 5 North) by the end of each working day. The Owner will apply cover over the waste transported by the Contractor to the active landfilling area. The Contractor shall coordinate all waste haulage activities with the Owner on a daily basis.
 2. Alternate daily cover (ADC), i.e., tarps, may be used within the waste excavation area near the boundary between Cell 4 North and Cell 5 North. The use of ADC is limited to this area only and will not be allowed elsewhere on site. The area covered by ADC shall never be larger than 1,000 m² on any given day. No tarps shall be used on weekends or for a period longer than 24 hours. The Contractor shall submit ADC shop drawings for review by the Engineer. Tarps shall be designated by the manufacturer for use as an ADC and have the following characteristics:
 - .1 Provide litter, vector and odour control similar to soil material.
 - .2 Reduce infiltration of water into waste by shedding water.
 - .3 Tarps must withstand local climatic conditions, i.e., wind, rain, UV exposure, etc.
 - .4 Tarps shall be ballasted against wind uplift by heavy steel cables, chains or other method as recommended by the manufacturer and approved by the Engineer.
 - .5 Tarps shall be made of polyethylene-coated, woven fabric that is UV stabilized and water retardant.
 - .6 Tarps shall be deployed and retrieved in accordance with the manufacturer's recommendations. Tarps are to be maintained in good condition and any tears repaired or the tarp replaced.
 3. The Owner/Engineer reserves the right to suspend or terminate ADC use if odour becomes a nuisance or if tarp application does not comply with the above noted requirements.
 4. The Contractor shall be prepared to implement other odour control measures, such as odour masking sprays even when all active waste faces are properly covered. This may be needed, particularly on hot and humid summer days with no or little wind. Submit shop drawings for aerosol to be utilized and equipment for its application.

5. The Contractor shall suspend waste excavation on windy days to minimize blown litter. Waste excavation shall be suspended if wind gusts exceed 40 km/hr unless the wind has no effect on construction activities and operation is approved to proceed by the Owner/Engineer.
6. Provide labourers who will be responsible for the daily collection of litter escaping from the Contractor's work area.
7. The Contractor will be fined \$500 per incident if a request by the Owner/Engineer to correct litter/odour issues is not addressed within one (1) hour of receiving the request. More than one (1) fine a day may be applied in any given day for not implementing actions to address litter or odour nuisances. If non-compliance continues, any fines or orders received from the MOE and associated legal and/or engineering fees to address the fine and/or order that are directed to the Owner will be paid by the Contractor.

5.0 OTHER CONTRACTORS WITHIN OR ADJACENT TO THE LIMITS OF THE CONTRACT

- .1 The Contractor is advised that other work may be in progress within and/or adjacent to the limits of this Contract. The Contractor shall cooperate with other Contractors, utility companies and the Owner during the course of the Contract. The Engineer reserves the right to alter the method of operations on this Contract to avoid interference with other work.
- .2 The Contractor is hereby notified that the Essex-Windsor Regional Landfill is an active landfill site receiving a large quantity of waste each working day. The Contractor shall ensure the uninterrupted, free access to the active waste disposal areas at all times during the execution of the Contract.
- .3 The Contractor shall coordinate his activities with other Contractors and schedule his work accordingly.

6.0 PROPERTY OWNERS' RELEASE OF PIT AREAS AND WASTE DISPOSAL AREAS ON PRIVATELY OWNED AND MUNICIPAL OWNED LANDS

- .1 The Owner will, without further notice, withhold payment of monies due the Contractor until the Contractor has provided the Engineer with two (2) copies each of a release signed by the owner of each pit or waste disposal area used by the Contractor.
- .2 The Contractor is hereby notified that the Essex-Windsor Solid Waste Authority shall provide, at no cost to the Contractor, facilities for the disposal of all solid, nonhazardous, construction-related wastes generated during the execution of this Contract in accordance with its Certificate of Approval. Disposal of waste generated outside the Contract limit shall not be allowed.

7.0 UTILITY POLE LINES

- .1 The attention of bidders is drawn to the presence of utility pole lines on site. The Contractor shall be aware of this safety hazard and account for this in his operations. Where not provided elsewhere in the Contract, information on the removal, bracing or relocation of the pole lines, restriction of blasting operations, etc., may be obtained from the Engineer or from the Utility Company concerned.
- .2 The cost of any damage arising from the Contractor's operation shall be borne solely by him.

8.0 UNDERGROUND UTILITIES

- .1 The location and depth of the underground utilities shown on the Contract Drawings are based on investigations made by the Owner but are not guaranteed. The majority of the underground utilities constructed during the site preparation and subsequent cell preparation contracts are shown on the Contract Drawings. The location of some utilities is unknown and therefore is not shown on the drawings. It is, however, the Contractor's responsibility to contact the municipal authorities, utility companies and/or the Owner/Engineer for further information in regard to the exact location of these

utilities, to exercise the necessary care in construction operations and to take such other precautions as are necessary to safeguard the utilities from damage. The Contractor shall locate all existing utilities prior to excavating anywhere on site.

- .2 The Contractor shall protect all surficial utilities temporarily installed over the landfill mound. These include stormwater drains and landfill gas subheaders and laterals. Surficial landfill gas piping will be removed by Others where required if it interferes with the work to be carried out under this Contract. The Owner will make arrangements with Comcor Environmental to disconnect and remove surficial landfill gas piping to facilitate closeout of designated landfill area. The Contractor shall coordinate his work with all parties as needed. The Contractor shall provide a minimum of 72 hours' notice to the Owner in reference to any required work.
- .3 The cost of any damage arising from the Contractor's operation will be borne solely by him.

9.0 MAINTENANCE OF TRAFFIC

- .1 Minimize the disruption of the access to and from the Essex-Windsor Regional Landfill and coordinate all work with Essex-Windsor Solid Waste Authority. Note that continuous access to the active disposal area must be available at all times.

10.0 WORK ADJACENT TO THE LIMITS OF THE CONTRACT

- .1 Any work required adjacent to the limits of the Contract shall be done at the tendered unit prices or lump sum prices for the items involved and no additional compensation will be allowed.

11.0 NOTICE OF PROJECTS

- .1 The constructor of a project shall, before commencing work on the project, where,
 - .1 the total cost of labour and materials including labour and materials for work carried out by Subcontractors exceeds \$50,000;
 - .2 the work is the new erection, major alternation or demolition of a building more than two storeys or more than 7.5 metres in height;
 - .3 the work is the new erection, major alternation or structural repair of a bridge, an earth-retaining structure or water-retaining structure more than three (3) metres in height, of a silo, chimney or any similar structure more than 7.5 metres in height;
 - .4 work in compressed air is to be carried out;
 - .5 a tunnel, caisson, cofferdam or well, which a person may be required to enter or may enter for any purpose is to be constructed;
 - .6 a trench is to be excavated more than:
 - .1 300 metres long, or,
 - .2 1.2 metres deep and more than thirty metres long, and into which a worker is required to enter or may enter.
 - .7 all or part of the permanent or temporary works are required by this Regulation to be designed by a Professional Engineer,

Give to the Director* notice in writing setting out:

* Director
Construction Health and Safety Branch
Ontario Ministry of Labour
400 University Avenue TORONTO, ON, M7A 1T7

- .1 a description of the project;
 - .2 whether or not a shaft, tunnel, caisson or cofferdam is to be constructed as part of the project;
 - .3 the name and address of the constructor and of the Owner;
 - .4 the municipal address of the project and its location with respect to the nearest common and public highway;
 - .5 the starting date and the anticipated duration of the work;
 - .6 the total cost of the project for labour and materials, including labour and materials for work carried out by Subcontractor; and
 - .7 the name of the supervisor in charge of the project.
- .2 The constructor of a project shall, before commencing work on the project, where the project
- .1 requires a notice under Subsection (1); and
 - .2 is not to be more than fourteen (14) working days in duration, in addition to complying with Subsection (1);
- He shall provide to an inspector at the nearest office of the Construction Health and Safety Branch of the Ministry by telephone the information contained in the notice in writing.
- .3 A Contractor or Subcontractor shall, before commencing work on a trench more than 1.2 metres deep and into which a worker is required to enter or may enter, notify by telephone an inspector in the office of the Construction Health and Safety Branch nearest to the proposed work.
- .4 The constructor of a project shall, before commencing work on the project, post or have available for review on the project a copy of the notice required by subsection (1).
- .5 Notwithstanding Subsection (1), where it is necessary to do work on a project immediately, to prevent injury to persons or damage to property, work on the project may be begun without complying with Subsection (1), but, in any such case, the notice shall be given to the Director* as soon as practicable after work on the project begins.
- .6 Where a shaft, tunnel, caisson, or cofferdam is to be constructed, the notice required under Subsection (1) shall contain the following additional information:
- .1 specifications of the proposed construction together with drawings showing profiles, transverse sections and plans of the shaft, tunnel, caisson or cofferdam; and,
 - .2 Full details of all temporary and permanent ground support.
- .7 The Director* may by Notice in writing designate that any part of a project shall be deemed to be an individual project for the purpose of the Act and this Regulation, and the person who undertakes all the

work on the part designated to be an individual project shall be deemed to be the constructor of that part.

12.0 SAFETY REQUIREMENTS

NOTE: The Constructor is responsible for informing himself of and complying with all applicable requirements of the Occupation Health and Safety Act, latest edition, and the Regulations made thereunder. Refer to Subsection GC7.01 of the General Conditions of the Contract.

- .1 All workers must wear hard hats, safety boots, safety glasses, vests, safety belts, etc. as required. This is the total responsibility of the Contractor and failure to comply with all safety requirements may result in the removal of noncompliant workers or equipment from the site or suspension of work, without extending the "time of completion" until compliance is demonstrated. There will be a \$500.00 deduction for each recorded health and safety infraction/incident. This penalty will be included in the monthly payment certificate.
- .2 The Contractor is responsible for daily site safety inspections and must take corrective action immediately should unsafe conditions or circumstances be found. Refer to Clause 1 above for the penalty for each safety infraction. The Contractor shall maintain a log of daily site inspections and make it available to the Owner upon request.
- .3 The Contractor must provide site safety training to all new employees on the date of hire and keep written records of such. This site safety training and the record will be available to the Owner if requested.
- .4 Any accidents must be reported to the Owner immediately by the Contractor and a representative of the Owner and the Contractor will investigate for corrective action purposes.
- .5 The Owner reserves the right to conduct a site and equipment safety inspection anytime during the construction Contract to ensure safety compliance by the Contractor, including safety training and reporting and proper safety signage on the site.
- .6 The Contractor will supply to the Owner or the Engineer, if requested and prior to the Contract award, a Ministry of Labour CAD-7 report indicating frequency of accidents and rating. The Engineer also reserves the right to request a Ministry of Labour CASO safety report showing frequency of accidents.
- .7 All site safety records are to be made available to the Engineer and the Owner on request.
- .8 The Contractor, site supervisors/foremen and a health and safety representative shall organize and attend weekly progress meetings with the Owner and Engineer.
- .9 The Contractor shall adhere to the Owner's site security rules. The Contractor shall not enter any on-site buildings without written approval from the Owner.

A. General Requirements

- .1 Develop a written, site-specific Health and Safety Plan prior to commencing any on-site work and continue to implement, maintain and enforce the plan until final demobilization from the site. The development, implementation and maintenance of the site-specific Health and Safety Plan are Contractor's sole responsibility. The Contractor's site-specific Health and Safety Plan, as a minimum, shall address the specifications contained herein.
- .2 The health and safety guidelines contained herein are intended to provide for a safe and minimal risk working environment for on-site personnel.

- .3 Should the Contractor seek relief from, substitution for any portion or provision of the minimum health and safety guidelines specified herein, or the reviewed site-specific Health and Safety Plan, such relief or substitution shall be requested of Engineer in writing, and if accepted by Engineer, will be authorized in writing.
- .4 Responsibility: The Contractor will be responsible for the safety of persons and property on site and the environment to the extent that they may be affected by the conduct of works. Comply with and enforce compliance by the Contractor's employees and the employees of Subcontractors, agents and invitees, with safety requirements of Contract Documents, applicable federal, provincial and local statutes, regulations and ordinances, and with the Contractor's site-specific Health and Safety Plan. The Contractor acknowledges that safety and environment protection obligations are of paramount importance regarding all of the work performed under Contract Documents.
- .5 Hazard Communication Requirements: Comply with Ontario Regulation (O. Reg.) 860, as amended by O. Reg. 36/93, WHMIS.
- .6 Work Stoppage: The Contractor shall give precedence to the safety and health of the public and on-site personnel and the protection of the environment over cost and schedule considerations for all project work. The Health and Safety Officer shall be responsible for decisions regarding when work will be stopped or started for health or safety consideration and shall have the authority to stop or start the work for health or safety considerations. The Contractor shall assign the responsibility and obligation to the Health and Safety Officer to stop or start the work when, in the Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. The Owner or Engineer shall have the right to stop work for health and safety considerations.
- .7 Unforeseen Hazards: Should any unforeseen or site-peculiar safety-related factor, hazard or condition become evident during the performance of works at site, bring such to the attention of the Owner or Engineer verbally and in writing as quickly as possible, for resolution. In the interim, take prudent action to establish and maintain safe working conditions and to safeguard the Contractor's employees and employees of Subcontractors, agents and invitees, the public, Owner, Engineer and the environment.

B. Site Characterization

- .1 Work at the site will involve contact with municipal solid waste and associated contaminants including, but not limited to, landfill leachate, landfill gas, landfill gas condensate and asbestos.

All work involving handling of waste requires implementation of various safety procedures and measures outlined in the Health and Safety Plan. The Contractor is reminded that while the majority of waste is anticipated to be municipal solid waste, waste materials present at the site may also contain various hazardous substances such as sharps, dangerous and toxic materials, sludge, pathological waste, etc. The Contractor shall proceed with caution and in accordance with procedures outlined in the Health and Safety Plan.

The Contractor is notified that asbestos may be encountered during waste excavation. The Contractor shall proceed carefully with this work and implement appropriate health and safety measures (waste watering, etc.) in accordance with the approved Health and Safety Plan.

- .2 Landfill Gas:
 - .1 Landfill gas may be present during waste excavation, installation of the leachate collection piping and connection to the existing landfill base. Landfill gases may be present in the soil adjacent to the landfill during excavation activities.
 - .2 Landfill gas results from the decomposition of refuse and is primarily composed of 40 to 65 percent methane, and 30 to 50 percent carbon dioxide, less than 2 percent nitrogen, less than 1 percent

oxygen and trace gases including mercaptans, hydrocarbons, solvents, water vapour, and hydrogen sulphide.

- .3 Methane is explosive in concentrations between 5 and 15 percent by volume in air. Methane, carbon dioxide and nitrogen are simple asphyxiates.
- .4 Trace gases in landfill gas may be toxic and odorous. Odorous gases cause nausea in some persons. Toxic gases may also be present at concentrations above or below the levels deemed safe for human exposure; there is always a potential for levels to be sufficient to cause permanent and irreversible damage and even death.

C. Submittals

.1 Contractor's site-Specific Health and Safety Plan:

- .1 Within 7 days after the date of Notice to Proceed and prior to mobilization to site, submit a site-specific Health and Safety Plan. As a minimum, address aspects of worker protection and measures designed to prevent migration of hazardous or contaminated material to the environment, including but not limited to the provisions and guidelines contained herein, and the following specific topics:

- .1 Worker training;
- .2 Equipment wash-down area and decontamination methods;
- .3 Confined space entry program and procedures if Contractor expects confined space work to be performed;
- .4 Personal hygiene and personnel decontamination procedures;
- .5 Personal protective equipment types to be used;
- .6 Respirator protection program and procedures;
- .7 Personnel air monitoring;
- .8 Emergency and first-aid equipment and supply; and,
- .9 On-site and off-site Contingency and Emergency Response Plans.

- .2 Engineer will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within seven (7) days after receipt of the plan. Revise the plan as appropriate and resubmit the plan to the Engineer within three (3) days after receipt of comments from Engineer.

D. Health and Safety Officer

- .1 Employ and assign to works a competent and authorized representative herein referred to as Health and Safety Officer. Health and Safety Officer shall be on site during the execution of work and report directly to Superintendent.
- .2 Health and Safety Officer Experience and Responsibilities:
 - .1 Minimum of two (2) years site-related working experience specific to the activities associated with municipal solid waste landfills including landfill gas;

- .2 Basic working knowledge of occupational safety and health regulation as contained in R.S.O. 1990, c.0-1;
- .3 Formal education and/ or training in occupational safety and health;
- .4 Responsible for completing the health and safety training session and ensuring that personnel not successfully completing the required training are not permitted to enter site;
- .5 Responsible for implementing and daily enforcing and monitoring the site-specific Health and Safety Plan;
- .6 Responsible for performing air monitoring;
- .7 Responsible for the pre-construction indoctrination of on-site personnel with regard to the site-specific Health and Safety Plan and other safety requirements to be observed during performance of works, including:
 - .1 potential hazards;
 - .2 personal hygiene principles;
 - .3 use of personal protective equipment and respiratory protection, including fitness testing; and,
 - .4 emergency procedures for dealing with fire and medical situations.
- .8 Responsible for incorporating the provisions of both on-site and/ or off-site emergency services before starting any particularly hazardous work.
- .9 Responsible for alerting appropriate on-site and/ or off-site emergency services and Engineer before starting any particularly hazardous work;
- .10 Assist Engineer in contacting and advising local authorities of works to be performed; and,
- .11 Authority and obligation to stop all, or any part of works if, in his sole discretion, stoppage of works is necessary or advisable for considerations of health or safety.

E. Personnel Health, Safety and Hygiene

- .1 Training:
 - .1 Provide and require that personnel assigned to or entering site, complete site-specific training or refresher sessions. Site-specific training and refresher sessions shall ensure that personnel are capable of and familiar with the use of safety, health, respiratory, and protective equipment and with the safety and security procedures required for site. The training session shall be completed by Contractor's Health and Safety Officer.
 - .2 As a minimum, include the following items in training program:
 - .1 Names and personnel responsible for site health and safety;
 - .2 Site-specific potential hazards;
 - .3 Use of personal protective equipment (PPE), including proper donning and doffing procedures;
 - .4 Work practices by which the employee can minimize risks from these potential hazards;

- .5 Confined space entry procedures;
 - .6 Safe use of engineering controls and on-site equipment;
 - .7 Discussion and recognition of symptoms associated with exposure to hazards;
 - .8 Site control methods;
 - .9 On-site and off-site Contingency and Emergency Response Plans;
 - .10 Decontamination procedures;
 - .11 Site-specific standard operating procedures;
 - .12 Scope of the intended work of the Contract; and,
 - .13 Implement a hazard communication ("Right-to-Know") program in accordance with R.S.O. 1990, c.0-1, Regulation 860, as amended by O.Reg. 36/93 (WHMIS)
- .2 Levels of Protection:
- .1 Establish levels of protection for each work area based on planned activity, location of activity, and air monitoring results. Monitor potential exposures to landfill gas with a direct reading oxygen level meter, combustible gas meter and toxicity (H₂S) for confined space work.
- .3 Personal Protective Equipment:
- .1 Furnish on-site Contractor personnel with appropriate PPE. Ensure that safety equipment and protective clothing is kept clean and well maintained.
 - .2 The following are the minimum PPE required for each level of protection as applicable:
 - .1 Level C:
 - .1 Individually assigned half or full-face piece air-purifying respirations (NIOSH approved), with appropriate cartridges for organic vapours and particulates. Respirators shall be available at all times and donned when required as indicated by air monitoring;
 - .2 Chemical-resistant disposable coveralls (Tyvec);
 - .3 Latex and/or cotton inner gloves;
 - .4 Nitrile outer gloves;
 - .5 Work boots with steel toe and shank;
 - .6 Chemical-resistant over boots or booties, butyl rubber or neoprene;
 - .7 Hard hat; and,
 - .8 Safety glasses with side shields and/ or chemical- resistant goggles.
 - .2 Modified Level C:
 - .1 Chemical- resistant disposable coveralls (Tyvec);

- .2 Latex and/ or cotton inner gloves;
 - .3 Nitrile outer gloves;
 - .4 Work boots with steel toe and shank;
 - .5 Chemical-resistant over boots or booties, butyl rubber or neoprene;
 - .6 Hard hat; and,
 - .7 Safety glasses with side shields and/ or chemical- resistant goggles.
- .3 Level D:
- .1 Hard hats;
 - .2 Safety glasses with side shields or goggles;
 - .3 Long pants and long-sleeve shirt;
 - .4 Safety boots;
 - .5 Safety vest; and,
 - .6 Any personal protective equipment necessary for specialized tasks (for example, welding goggles).
- .3 Develop protective equipment usage procedures and ensure that procedures are strictly followed by on-site personnel; include the following procedures as a minimum:
- .1 Do not permit prescription eyeglasses to be worn that are not safety glasses.
 - .2 Change respirator cartridge/ filters daily during periods of respirator usage or upon breakthrough, whichever occurs first.
 - .3 Do not permit footwear to be worn that is not steel-toed safety shoes or boots.
 - .4 Dispose of or decontaminate PPE worn on site at the end of the workday.
 - .5 Decontaminate reusable PPE before reissuing.
 - .6 As a minimum, require on-site personnel to wear approved PPE including, but not necessarily limited to, hard hats, safety boots, safety vest and safety glasses.
- .4 Respiratory Protection:
- .1 Provide on-site personnel engaged in activities on or directly adjacent to the landfill with extensive training in the usage and limitations of, and qualitative fit test for, half- and full- face piece respirators in accordance with R.S.O. 1990, c. 0-1; include both air- purifying and supplied air type respirators.
 - .2 Develop, implement and maintain the respirator program. Incorporate or attach a copy of the respirator program to Contractor's site-specific Health and Safety Plan.
 - .3 Monitor, evaluate and provide respiratory protection for on-site personnel.
 - .4 Be responsible for appropriate respiratory protection during work activities.

- .5 Be responsible for assessing the ability for on-site personnel to wear respiratory protection.
- .5 Personnel Hygiene and Personnel Decontamination Procedures:
 - .1 Ensure that on-site personnel observe and adhere to the personal hygiene- related provisions of this Section.
 - .2 Issue a written notice of violation to on-site personnel found to be disregarding the personal hygiene- related provisions of the site-specific Health and Safety Plan or the Project specifications including but not limited to the requirements concerning PPE, respiratory protection, personnel hygiene and personnel decontamination procedures. The notice may be issued by the Engineer, the Health and Safety Officer, or any supervisory personnel of Contractor. Give a copy of the notice to the offending worker, to his immediate supervisor, to Contractor's Superintendent, and to Engineer. Upon issuance of a second written notice of such violation, terminate the worker from employment at site.
 - .3 Failure of Contractor's supervisory personnel to implement this warning/ termination provision shall be deemed a material breach of the Contract.
 - .4 Dispose of used PPE in landfill as directed by Engineer.
 - .5 Enforce the following provisions:
 - .1 Do not permit used disposable PPE to be reused, and when removed, dispose in landfill as directed by Engineer.
 - .2 Prohibit smoking, chewing nicotine products, eating, and drinking, except in a designated lunch or break area.
 - .3 Require removal of soiled disposable outerwear prior to entering the lunch area, and prior to cleansing hands.
 - .4 Require on-site personnel to cleanse their hands and other exposed areas thoroughly before entering the smoking or lunch areas.
- .6 Emergency and First-Aid Equipment:
 - .1 Locate and maintain emergency and first aid equipment in appropriate locations on site. Store this equipment on portable pallets in order that it may be easily transported within the active work location. Include the following equipment as a minimum:
 - .1 First-aid kit to accommodate on-site personnel;
 - .2 Two (2) 20-pound ABC type dry chemical fire extinguishers;
 - .3 Two (2) self-contained breathing apparatus units (if confined space entry is to occur);
 - .4 Blankets and towels;
 - .5 Stretcher;
 - .6 One (1) hand-held emergency siren.

- .2 As a minimum, provide a person trained in first aid on site at all times that on-site work activities are in progress. This person may perform other duties but shall be immediately available to render first aid when needed.

.7 Site Communications:

- .1 Post emergency number near site telephones in accordance with the on-site and off-site Contingency and Emergency Response Plans.
- .2 Ensure that personnel work under the use of a "buddy" system and develop a hand signal system appropriate for site activities.
- .3 Provide an employee alarm system to notify employees of on-site emergencies or to stop work activities if necessary.
- .4 Provide selected personnel with two-way radios or cellular phones.

F. Air Monitoring

.1 Air Monitoring Program:

- .1 During the progress of work activities, monitor air quality in and around excavations. Conduct monitoring on a regular periodic basis, and additionally as required by special or work-related conditions. Report any departures from general background to Engineer, who will, in conjunction with the Health and Safety Officer, determine when operations should be shut down and restarted.
- .2 Provide the required instruments for air monitoring including, as a minimum, an oxygen level meter, a H₂S meter, and a combustible gas meter (LEL meter). Additionally, personal sampling pumps may be required if site conditions warrant. Provide sufficient number of each instrument to monitor the active work location and to provide back up equipment in cases of equipment malfunctions.
- .3 Operate air-monitoring equipment with personnel trained in the use of the specific equipment provided and under the control of the Health and Safety officer. Monitoring equipment used shall be intrinsically safe.

.4 Action Levels:

.1 Combustible Gases:

- .1 Action levels are based on the reading from a combustible gas meter. The readings are generally given as a percentage of the lower explosion limit (percent LEL) and are collected in the general work area. An atmospheric oxygen level of less than 19.5 percent may affect the reading from a combustible gas meter and give lower than actual levels. Test oxygen content first.

NON-CONFINED SPACE READING, GENERAL AREA

Instrument Reading	Action To Be Taken
1-10% LEL	Continue working and monitor atmosphere for combustible gases. Inform personnel working in the area whenever reading is greater than 5% LEL.
11-20%	Continue working with caution. Inform personnel working in area of readings. Be prepared to cease operations.

> 20% LEL Cease operation and move to a safe place. Re-evaluate work plan. Engineering controls, such as forced ventilation and use of non-sparking tools are to be implemented if operations are to continue. DO NOT CONTINUE WORKING UNTIL CONDITIONS ARE CONSISTENTLY BELOW 20% LEL.

.2 Oxygen:

- .1 A direct reading oxygen meter is used to determine the percent of oxygen in the atmosphere.

Instrument Reading	Action to be Taken
< 19.5% or > 23.5%	Cease operations and move to safe area. Re-evaluate work plan. Engineering controls, such as forced ventilation, are to be implemented if operations continue. DO NOT CONTINUE WORKING UNTIL OXYGEN LEVELS ARE BETWEEN 19.5 AND 23.5%. When oxygen levels are outside this range, combustible gas meter readings are not reliable. Supplied air or SCBA respiratory protection may be necessary.

.3 Hydrogen Sulphide (H₂S)

- .1 Always proceed with caution when H₂S odour is noticeable. Remember that after working for a short time in an area with a small amount of hydrogen sulphide, a person can no longer detect the smell of this gas. At 4 ppm, H₂S may cause eye irritation. Always report H₂S odour to a Health and Safety Officer as a precaution.
- .2 Whenever readings approach 10 ppm on a direct reading H₂S meter, cease work immediately, move to a safe area and contact the HSO. H₂S has a Threshold Limit Value (TLV) level of 10 ppm.

.5 Air Monitoring Reporting

- .1 Report the results of air monitoring programs to Engineer daily on specific forms and include the following information as applicable:
- .1 the location/date;
 - .2 work process/operation name;
 - .3 temperature, wind speed, and wind direction;
 - .4 field notes including the following:
 1. description of operation and complaints/symptoms;
 2. chemicals/materials/equipment in use;
 3. engineering/administration controls in effect;
 4. personal protective equipment in use;
 5. sampling observations/comments; and,

.5 in addition, record daily air monitoring activities in a hard cover logbook; maintain logbook on site at all times.

G. Contingency and Emergency Response Plans

- .1 General: Prior to mobilization to site, prepare both on-site and off-site Contingency and Emergency Response Plans to ensure the safety of on-site and off-site personnel. Incorporate the on-site and off-site Contingency and Emergency Response Plans into the Contractor's site-specific Health and Safety Plan and On-site Contingency and Emergency Response Plan and coordinate with the Owner's Contingency/Emergency Response Plan.
- .2 On-site Contingency and Emergency Response Plan: Address the standard operating procedures to be implemented during emergencies. Include and address the following emergency situations and responses as a minimum:
 - .1 In the event of injury to on-site personnel or contact with hazardous materials requiring immediate medical attention, implement the following protocol:
 - .1 Notify the Health and Safety Officer and Engineer.
 - .2 Phone the hospital previously identified to be closest to site and describe injury.
 - .3 Decontaminate personnel and administer appropriate first aid.
 - .4 Transport personnel to the specified hospital along the most direct route, which shall be predefined prior to commencing site work.
 - .2 In the event that excessive gases or vapours are detected, take the following actions:
 - .1 Evacuate workers to an area upwind from the affected area.
 - .2 Identify the contaminant and monitor contaminant concentrations to determine the type of respiratory protection and/or engineering controls required before workers re-enter the area.
 - .3 In the event of a fire, quickly use earth-moving equipment to backfill the area and smother the fire if possible and if the presence of noxious gases prohibits this, employ proper evacuation procedures.
 - .4 In the highly unlikely event of a major leak of toxic gas, such as might occur if a compressed gas cylinder were encountered and ruptured, evacuate on-site personnel to a safe distance, and notify the Police and Fire Department and local hospital if deemed necessary by Engineer or the Health and Safety Officer. Police and Fire Department Officials will assume responsibility for coordination with Engineer and the Health and Safety Officer for the proper emergency response strategy upon arrival.

H. Site Health and Safety

- .1 Work Areas: Take necessary precautions to avoid hazardous conditions on site. Open flame, matches, smoking, welding or other activity potentially capable of generating an explosion will not be allowed in any area associated with landfill gases.
- .2 Field welding: If required, will only be permitted under well-ventilated conditions and only with written approval of Engineers.

- .3 Sign and Symbols: Provide signs and symbols informing personnel of the danger of combustible gases. Signs such as:
 - .1 DANGER – KEEP AWAY – EXPLOSIVE GASES.
 - .2 DANGER – NO OPEN FLAME OR MATCHES.
 - .3 DANGER – NO SMOKING.
- .4 Temporary Fencing:
 - .1 Erect temporary fencing on site to delineate work areas in accordance with the site-specific Health and Safety Plan.
 - .2 Construct temporary fencing or standard snow fence or construction fence supported by posts with warning signs.
- .5 Confined Space Entry Program:
 - .1 Responsibility: The Health and Safety Officer shall be responsible to ensure that minimum precautions as specified herein have been taken to assure safe entry of confined spaces, as stated in R.S.O. 1990 c. 0-1, O.Reg. 527-00 (Construction Projects).
 - .1 Do not allow site personnel to enter confined space without a written confined space work permit.
 - .2 Issue the confined space work permit with validity for a single shift only. For jobs requiring more than a single shift to bring to completion, issue a new permit at the start of each shift.
 - .3 Variances:
 - .1 Inability to Follow Procedure: Should any circumstances be found where these rules cannot be met, rules to ensure adequate safety for entering these specific confined spaces shall be written out by the Health and Safety Officer, for approval in accordance with the Health and Safety Plan. Detail any special conditions associated with this variance and attach to the confined space work permit.
 - .4 Availability of Permit: Maintain properly completed permits readily available at site. Keep permit on file indefinitely after the completion of the shift for which they were issued.
 - .5 Preparation of Equipment for Safety:
 - .1 Power: De-energized, locked and tagged.
 - .2 Remove hazardous contents from the confined space. Conduct tests for flammable vapour and oxygen content on a continuous basis while anyone is in the confined space. If the tests do not meet the requirements, the workers must leave the confined space.
 - .6 Testing of Atmospheres Within Confined Spaces:
 - .1 Oxygen Content: Above 19.5 percent and below 23.5 percent before entry will be allowed.
 - .2 Flammable Vapours: Require personnel to leave confined spaces if the concentration of explosive gases exceeds 10 percent of the lower explosive limit (LEL). If hot work is to be conducted in the space, then explosive gasses cannot exceed 0 percent (LEL).

- .3 Hydrogen Sulphide: Require personnel to leave confined space if the concentration of hydrogen sulphide approaches 10 ppm.
- .7 Ingress and Egress: Maintain a safe means of ingress and egress, such as a portable ladder, in place at all times when personnel are occupying a confined space.
- .8 Protective Clothing: Level D protection shall be worn as a minimum by personnel entering confined spaces where the confined space has been made vapour free, meaning, the LEL is zero and the oxygen content is between 19.5 and 23.5 percent, and continuous air monitoring with H₂S meter, oxygen meter, and combustible gas meter is maintained. If none of these conditions are met, self-contained breathing apparatus shall be worn. The site-specific Health and Safety Plan shall include a full confined space entry program.
- .9 Life Lines: Provide means for quick removal of individuals from confined spaces in emergencies. Where the least dimension of the access opening is less than 600 mm, wrist straps or noose-type wristlets shall be worn. Where the least dimension of the access opening is greater than 600 mm, either a life belt, safety harness, wrist straps, or noose-type wristlets may be worn. In either case, a lifeline shall be attached and securely anchored outside the confined space.
- .10 Safety Monitors:
 - .1 A person trained in artificial respiration designated, as a safety monitor shall be stationed at the access opening of any confined space while it is occupied. He/ she shall have continuous visual or verbal contact with occupants. One of his/ her major responsibilities shall be to summon additional help in emergencies.
 - .2 In addition to the safety monitor, provide another person located within 30 metres of the confined space opening. This individual may do work other than that related to the confined space entry but such work shall not prevent his/ her responding to a call for aid.
- .11 Equipment Immediately Available to the Safety Monitor: Locate the emergency items at the access opening of the confined space or not more than 4.5 metres from such opening.
- .12 Forced Ventilation: Provide temporary forced ventilation equipment to deal with detected combustible gas or other odorous gases.
- .13 Temporary Caps: Provide temporary gas tight caps at all cessation of pipe laying until further horizontal lengths of pipe are ready to be fitted and ensure that temporary cap is removed for installation of further pipe only under well-ventilated conditions.

13.0 FIELD OFFICE

- .1 An Engineer's field office will be required on this Contract. The Engineer's site office shall be heated/air conditioned to 22°C with adequate lighting and at least 20 m² size to accommodate site meetings for a minimum of 10 persons seated at a table. Provide a drawing lay-down table, a desk, six (6) office chairs and two (2) filing cabinets. The Contractor shall also provide power, potable water, washroom and first aid equipment. The location of the office shall be approved by the Engineer. The field office/trailer should provide access to high speed internet, phone, scanning and photocopying equipment.

14.0 MATERIALS TO BE SUPPLIED BY THE CONTRACTOR

- .1 All materials required for the satisfactory completion of this Contract will be supplied by the Contractor except source soil materials available on site. These include the following:

- clay from on site excavations,
- RAP from milling of the existing pavement,
- stripped topsoil and topsoil stockpiled on site,
- granular materials stripped from the existing compost pad.

The Owner/Engineer will decide on materials which could be reused as follows:

- litter fence poles,
- bird poles of overwiring system,
- culverts.

Bidders are also notified that the existing vehicle block heating station shall be relocated as part of the Contract. Various electrical components associated with this work shall be reused. Refer to electrical drawings for details.

15.0 REPLACE SURVEY BARS

- .1 Any survey bars or other property markers removed or disturbed by the Contractor for any reason whatsoever shall be replaced by a Registered Ontario Land Surveyor at the sole expense of the Contractor. This replacement shall be carried out when directed by the Engineer.

16.0 MEASUREMENTS OF WORK

- .1 Before ordering materials or performing work, the Contractor shall verify all measurements as may be required for the proper installation of his work. He shall be responsible for the correctness of his figures and shall satisfactorily correct, without extra charge to the Owner, any of his work that does not fit, furnishing new work if required for the purpose.

17.0 GEOTECHNICAL INVESTIGATIONS

- .1 WSP Canada Inc. has completed a geotechnical investigation of the Cell 5 North area. Numerous boreholes have been drilled and soil samples collected. Various geotechnical tests have been carried out including soil moisture, grain size analysis, hydraulic conductivity, Atterberg Limits and Proctor testing (maximum dry density and optimum moisture). Refer to background documents for the complete report presenting findings from the investigation.
- .2 The hydrogeologic/geotechnical investigations were undertaken for the sole purpose of aiding in design and are supplied for guidance of Contractors tendering on this project. The accuracy of the reports is not guaranteed. Any interpretation placed on the soil information by Tenderers is strictly the responsibility of the Tenderer.
- .3 The Contractor may undertake its own soil investigation at its own cost provided the appropriate notification is given to the Owner. The Owner, at its discretion, may require amendments to the Contractor's proposed work plan. All areas shall be restored to their original condition. It is the Contractor's responsibility to be aware of the conditions under which the work will be carried out and no extra payment shall be made for subsurface conditions adversely affecting the Contractor from carrying out the work in accordance with the specifications.

18.0 CLEANUP

- .1 Excess material and debris shall be removed and the site left in a clean and orderly condition at all times.

19.0 USE OF PREMISES

- .1 The Contractor shall confine his apparatus, storage of materials and operations of his workers to limits by law, ordinances or as directed by the Engineer and shall not unreasonably encumber the site. The location of the Contractor's compound and lay down area shall be coordinated with the Owner/Engineer. It is anticipated that the Contractor's compound will be located somewhere within the area of future Cell 4 South.
- .2 The Contractor shall restrict his operations to within the right-of-way limits for all activities under this Contract.
- .3 It is important that vegetation that is to remain on the Essex-Windsor Regional Landfill site be protected from damage. Similarly, damage to vegetation on right-of-ways shall be avoided unless absolutely necessary, in the opinion of the Engineer.

20.0 MAINTENANCE OF DITCHES AND WATERCOURSES

- .1 Ditch drainage, watercourses, culverts, etc., shall be restored to pre-construction conditions in a neat and workmanlike manner. Flow of water in ditches, culverts and natural watercourses shall be maintained at all times. The Contractor will install straw bales/check dams, as directed by the Engineer, within the ditches that are affected by the Contractor's activities. Straw bales/check dams will be installed within one (1) calendar day or the Contractor will be fined \$500.00 per day. Acceptable restored conditions are to be approved by the Owner/Engineer.

21.0 PROTECTION OF STREAM CROSSINGS AND DRAINAGE SWALES

- .1 The Contractor is hereby made aware of the sensitive nature of the stream crossings and drainage swales and the requirement that every attempt be made to avoid damage at these sites. The following conditions will thereby be strictly enforced:
 1. All exposed soil within 30 metres of each watercourse or swale must be protected from erosion and sedimentation by grading the contours smooth and by the installation of an erosion control silt fence fastened securely to the ground surface per OPSD 219.130. Further, an erosion control silt fence must also be installed at any location where the grade is sloping such that surface drainage could carry sediment into the watercourse at any time.
 2. Existing trees located on or near the watercourse banks should be left intact.
 3. Vehicles and machinery are not permitted to enter or cross through the watercourses.
 4. Machinery on site must be in a clean, washed condition and maintained free of fluid leaks.
 5. Areas of soil affected by fluid leaks from machinery will be cleaned up to the acceptance by the Owner. Costs for Owner's Engineer oversight for the clean up will be at the expense of the Contractor.
 6. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water or drainage swales to prevent any deleterious substance from entering the water. Contaminated wash water shall be contained and managed by the Contractor.

22.0 RELEASE OF HOLDBACK

- .1 The Contractor is hereby notified that the Construction Lien Act is in effect for this Contract.

- .2 Refer to Section GC 8.0 "Measurement and Payment" of the General Conditions of Contract, Division 4 – Item 34.0 and Division 7 - Item 8.0 for the manner in which the 10.0% Statutory Holdback will be released to the Contractor under this Contract.
- .3 Prior to releasing the holdback, the Contractor must provide the Owner with a Certificate of Clearance from the Workplace Safety & Insurance Board and a Statutory Declaration stating there are no liens or charges against the work and a Contract Release Form.

23.0 RESTORATION

- .1 All areas disturbed during the execution of this Contract shall be restored as specified in a tender item or to a condition at least as good as that which existed prior to the commencement of the work. No extra payment will be allowed for restoration under this Contract, and the prices bid for each item shall include full compensation for the required restoration.

24.0 PAYMENT FOR TESTING

- .1 Where required by the Engineer, the Contractor shall supply certified copies of all tests for all materials to be used in the construction of the works, including a summary letter report indicating that materials comply with the specifications. Such tests shall be made by a testing company approved by the Engineer. Reporting will be completed by a qualified professional. Testing and reporting shall be at the Contractor's expense. The Contractor shall provide thermal fusion test weld and operating data for each day of the fusion operation.

25.0 INSPECTIONS

- .1 The Contractor shall give the Engineer timely notice of readiness of the works for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- .2 The Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests or approvals required by the Contract Documents except:
 1. Inspections, tests or approvals covered by Paragraphs 3 and 4 below,
 2. Costs incurred in connection with the tests and inspections conducted pursuant to Paragraph 3 shall be paid as provided in said Paragraph 3, and
 3. As otherwise specifically provided in the Contract Documents.
- .3 If laws or regulations of any public body having jurisdiction require any works (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, the Contractor shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith and furnish the Engineer with the required certificates of inspection or approval.
- .4 The Contractor shall be responsible for arranging for and obtaining all costs in connection with any inspections, tests or approvals required for the Owner's and Engineer's acceptance of materials or equipment to be incorporated in the works, or acceptance of materials, mix designs, or equipment submitted for approval prior to the Contractor's purchase thereof for incorporation in the works.
- .5 If any works (or the work of others) that is to be inspected, tested or approved is covered by the Contractor without written concurrence of the Engineer, it must, if requested by the Engineer, be uncovered by the Contractor at the Contractor's expense and at no additional cost to the Owner.

- .6 If any works that is to be inspected or tested by the Owner or Engineer is determined to be defective after such inspection or test, all fees and charges from the Engineer or Owner in re-performing such tests or inspections will be charged against the Contractor and deducted from any monies due or to become due the Contractor.
- .7 If any works are covered contrary to the written request of the Engineer, it must, if requested by the Engineer, be uncovered for the Engineer's observation and replaced at the Contractor's expense and at no additional cost to the Owner.
- .8 Notwithstanding the requirements of Items 5 and 7, if the Contract requires, or if the Engineer notifies the Contractor in writing that specific work must be inspected before the work is covered or further work is done, and the Contractor fails to call for an inspection before covering the work or doing further work, the Engineer shall have the discretion and power to order the work uncovered at the Contractor's expense and at no additional cost to the Owner, and inspection, even if the work is later determined to be acceptable. In the event of any failure by the Contractor to timely or adequately met any of his obligations to uncover such work as described in this item, and after notice therefore to the Contractor, or without any notice in the event of emergency, the Owner may perform such tasks and deduct the costs thereof from any monies due or to become due the Contractor.
- .9 If the Engineer considers it necessary or advisable that the covered works be observed by the Engineer or inspected or tested by others, the Contractor, at the Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as the Engineer may require, that portion of the works in question, furnishing all necessary labour, material and equipment. If it is found that such works is defective, the Contractor shall pay all claims, costs, losses and damages (including, but not limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection and testing, and of satisfactory replacement or reconstruction (including, but not limited to, all costs of repair or replacement of work of others); and the Owner shall be entitled to an appropriate decrease in the Contract Price, as determined by the Engineer. If, however, such works is not found to be defective, the Contractor shall be allowed an increase in the Contract Price or an extension of the Contract times (or milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction.
- .10 After a thorough inspection by the Contractor and upon receipt of a written statement from the Contractor that work is ready for acceptance, the Engineer will inspect the work. The Contractor's superintendent and a labourer shall accompany the Engineer. If any defect is found, the work will not be approved. If in excess of two (2) defects are found, the Engineer may discontinue the inspection. The Contractor shall carry out all remedial work immediately. Where repeated inspections are required by the Engineer, the Contractor will be charged \$500 for each additional inspection required until all defects are corrected.
- .11 This work will be re-inspected by the Engineer after receipt of a request to do so from the Contractor.

26.0 DEFECTIVE WORKS

- .1 The Contractor shall correct all defective works, whether or not fabricated, installed or completed or if the works has been rejected by the Engineer, remove it from the site and replace it with works that is not defective. The Contractor shall pay all claims, costs, losses and damages arising out of or relating to such correction or removal (including, but not limited to, all costs of repair or replacement to other works or work of others resulting therefrom). If the Contractor fails within a reasonable time, or as determined by the Owner, after verbal or written notice from the Engineer, to correct such defective works or to remove and replace such rejected works as required by the Engineer, the Owner may correct the defective works or remove and replace the rejected works and deduct the costs thereof from any monies due or to become due the Contractor.
- .2 If within one (1) year after the date of Substantial Performance or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee or warranty required by the Contract Documents or by any specific provision of the Contract Documents, any works is found to be defective, or if the repair of any damages to the land or areas made available for the Contractor's use by the Owner or permitted by laws and regulations is found to be defective, the Contractor shall promptly, without cost or inconvenience to the Owner and in accordance with the Owner's or Engineer's written instructions: (i) repair such defective land areas, or (ii) correct such defective works or, if the defective works has been rejected by the Owner, remove it from the site and replace it with works that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other works, to the work of others or to other land or areas resulting therefrom. If the Contractor does not adequately respond or promptly comply with the terms of such instructions and after notice thereof to the Contractor or without any notice in an emergency, the Owner may have the defective works corrected or repaired or may have the rejected works removed and replaced, and all claims, costs, losses and damages arising out of or relating to such correction or repair or such removal and replacement (including, but not limited to, all costs of repair, removal or replacement of other works and work of others) shall be paid by the Contractor.
- .3 In special circumstances where a particular item of equipment is placed in continuous service before Substantial Performance of all the works, the correction period for that item may start to run from an earlier date if so provided in the project specifications or by written amendment.
- .4 Where defective works (and damage to other works resulting therefrom) has been corrected or removed and replaced, the correction period hereunder with respect to such works will be extended for an additional period of one (1) year after such correction or removal and replacement has been satisfactorily completed.
- .5 The Contractor's obligations under this section are in addition to any other obligation or warranty. The provisions of this section shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

27.0 EXISTING CONDITIONS

- .1 Before submitting tenders, carefully examine the drawings, specifications and job site to determine and confirm the existing conditions that affect the proposed work. Work of all trade divisions shall be examined before commencing work and any conflict or interference affecting work shall be reported to the Engineer at once. Claims for extra payment because of failure to fulfil these conditions will not be considered.
- .2 Existing conditions include, without being limited to, such items as topography with surficial features, various utilities, soil conditions, environmental conditions and space limitations.
- .3 Existing conditions as shown on the Contract Drawings are based on aerial survey data carried out to May 2, 2023 by SMC Geomatics Inc. The aerial survey is more accurate for open, bare areas of the

site than for areas obscured by vegetation growth. Results of this survey are shown on the drawings and have been used for design of new components.

- .4 The Contractor is made aware that the landfill topography changes daily. The Owner will avoid any unnecessary work prior to the start of the Contract within the work areas designated under this Contract unless noted otherwise. Refer to Clause .1 above.

28.0 WORKING DAYS AND HOURS

- .1 Normal hours of work shall be limited to 7:00 a.m. to 6:00 p.m. Monday to Friday and 7:00 a.m. to 1:00 p.m. on Saturdays. Construction activities shall cease 0.5 hours before the end of the working day (5:30 p.m. on weekdays and 12:30 p.m. on Saturdays) and all construction-related personnel must be off site by 6:00 p.m. on weekdays and 1:00 p.m. on Saturdays. Waste delivery from the Cell 5 North excavation shall be limited to between 8:00 a.m. and 3:00 p.m. on weekdays. Notify the Engineer at least 24 hours in advance of any contemplated changes in working hours.
- .2 If work is required to save or protect life, property or other such emergencies, notify the Engineer as soon as such emergencies are deemed to exist.
- .3 No Sunday work shall be carried out unless it is deemed an emergency or if directed by the Engineer.
- .4 Where extra hours are required in any day, no additional payment than under the Contract shall be made.

29.0 BACKGROUND INFORMATION

- .1 The following background documents are provided on the attached USB flash drive:
 - .1 Amended Environmental Compliance Approval for a Waste Disposal Site No. A 011101 issued by the Ministry of the Environment, Conservation and Parks, November 16, 2020.
 - .2 Findings and Observations of Sand Management Investigation and Summary of Laboratory Testing Results, WSP Canada Inc., April 10, 2024.
 - .3 Historic Shop Drawings – Pumping Station PS2 Control Panel, Sulzer Pumps shop drawings.
 - .4 Product Data – NK4-22 Manual Electric Submersible Pump
 - .5 Quotation from Soderholm Maritime Services Inc. for a dive team to enter MHL15 and install a temporary plug in the existing LCS pipe to isolate for proposed connection
- .2 The Contractor will be deemed to have read these documents and will incorporate any requirements as it affects his work into his tender prices submitted for the work.
- .3 In addition, the following documents are provided for use by the bidders:
 - .1 Contract Drawings for Cell 5 North construction in AutoCAD (.dwg) and PDF.
 - .2 Division 1, Form of Tender in Word format (.doc).
 - .3 PDF of entire Contract Document.

30.0 EQUIPMENT

All equipment brought onto the site by the Contractor shall be in good working order, properly tuned and properly muffled to minimize emissions and noise in the conduct of the work. Any equipment deemed improperly tuned, muffled or deficient in any other manner may be stopped from working by the Owner or the Engineer until it is improved to proper working condition.

All equipment used under this Contract shall be leak-free (no fuel or lubricant leaks). The Contractor shall inspect all equipment on a daily basis and keep a log of all inspections. When requested, the log shall be provided to the Owner or Engineer for review. Cleanup resulting from any equipment leaks shall be carried out by the Contractor at his own expense. Cleanup work shall be carried out when deemed necessary as determined by the Engineer. The Contractor shall be responsible for paying the Owner for the Owner's Engineer oversight to determine that the affected area(s) are remediated to the acceptance of the Engineer.

31.0 SHOP DRAWINGS

- .1 Furnish to the Engineer all Contractor's, Subcontractor's, and manufacturer's drawings which shall be deemed to include shop drawings, catalogue cuts, brochures, illustrations, material lists and performance data which may be required by the specifications, requested by the Engineer or otherwise necessary for the proper execution of the Work. Submit all drawings to the Engineer in the manner hereinafter described, in sufficient time to prevent delays in delivering of materials or in progress or completion of the Work.
- .2 All Subcontractor and manufacturer drawings shall first be sent directly to the Contractor who shall keep a record of the drawing numbers and dates of receipt.
- .3 The Contractor shall check thoroughly all such drawings for measurements, sizes of members, materials and all other details, to assure himself that they conform to the intent of the drawings and specifications, and shall promptly return to the Subcontractors and/or manufacturers for correction, such of the drawings as are found inaccurate or otherwise in error. After the Contractor has checked and approved such drawings, he shall place thereon the date of such approval and the legible signature of the checker and shall then submit them to the Engineer for review. The Engineer reserves the right to refuse to check or review any drawings of the Subcontractor or manufacturer that are not submitted in compliance with the foregoing requirements.
- .4 The Contractor shall submit in PDF format or five (5) copies of the drawings, brochures, etc. in addition to the number that the Contractor wishes returned for his own and his supplier's or Subcontractors use. One set of such drawings shall be in reproducible form.
- .5 For all equipment, shop drawings shall be complete in all respects and shall show clear compliance with the specifications. Where applicable, performance figures of equipment; finishes and reference to other relevant drawings must be noted on shop drawings. Details or auxiliary items being supplied with the particular equipment must be submitted. Piecemeal submissions will not be considered. Wiring and elementary control diagrams shall be submitted for electrical equipment. Descriptive brochures where applicable shall be included for information. Any notations made on the shop drawings by the Contractor, shall be made in red ink.
- .6 The Engineer will review the drawings submitted by the Contractor within a reasonable time and will return them with the noted comments which may be "no comment", "Amend and Submit", or "Rejected See Remarks". Drawings marked "Rejected See Remarks" shall be either corrected and resubmitted or shall be superseded by other submitted drawings. Each drawing returned "Rejected See Remarks" shall be subject to a \$500 penalty.
- .7 Drawings resubmitted for further checking will be checked for correctness of previous notations only and the Contractor, by such resubmission shall be held to have represented that such drawings contain no other alterations, additions or deletions, unless the Contractor (in writing) directs the Engineer's

specific attention to same. Should the Contractor question or dissent from such notations, instructions, or directions made by the Engineer, he shall direct the Engineer's attention to the same for clarification before resubmitting the drawings. Corrections or changes indicated on such drawings shall not be considered as an order to perform extra work.

- .8 By checking and reviewing the Contractor, Subcontractor or manufacturer's drawings, the Engineer does not assume responsibility for errors or omissions. Such errors or omissions must be made good by the Contractor, irrespective of the receipt, checking or review of the drawings by the Engineer, and even though the work is done in accordance with such drawings.
- .9 The Contractor should allow at least two (2) weeks' time for checking shop drawings by the Engineer.
- .10 Work shall not be carried out before the Engineer's review of the shop, working or setting drawings relating to such work as has been carried out. If work is carried out prior to Engineer's approval, the work will be dismantled and rebuilt as required at the sole expense of the Contractor. Costs for the Owner's Engineer to assess the deficiency, direct remedial work order, as well as conduct oversight of the remedial activities will be at the expense of the Contractor.

32.0 RECORD DRAWINGS

- .1 When work begins at the site, obtain from the Engineer a white print set of the Contract Drawings.
- .2 Record on the white prints on a daily basis the work constructed differently than shown on the Contract Documents. Record all changes in the work caused by site conditions or originated by the Owner, the Engineer, the Contractor or a Subcontractor and by addenda, supplemental drawings, site instructions, supplementary instructions, change orders, correspondence and directions of regulatory authorities. Accurately record the location of concealed mechanical services and electrical main feeders, junction boxes and pull boxes. Do not conceal critical work until its location has been recorded. Do not use these drawings for daily working purposes and make the set available for periodic inspection by the Engineer.
- .3 Make records in a neat and legibly printed manner with a non-smudging medium. Where applicable or as requested by the Engineer or Owner, provide digital versions of records, including CAD files.
- .4 Dimension the installed locations of concealed service lines on the site or within the structure by reference from the centre line of the service to structure column lines or other main finished faces or other structural points easily identified and located in the finished work.
- .5 At the conclusion of the work, pass two (2) copies of the record white prints to the Engineer. Submission of Record drawings will be one of the conditions precedent of the certifying of Substantial Performance.
- .6 Identify the marked whiteprints "Contract Record Drawings" and submit the drawings to the Engineer when apply for a Certificate of Substantial Performance. The preparation of record drawings shall be included in the Contract Price under Mobilization/Demobilization.

33.0 COMMISSIONING

Commissioning is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished project. Commissioning is performed after systems and integrated systems are completely installed, functional and the Contractor's performance verification responsibilities have been completed and approved. The objective is to verify that the installed equipment, systems and integrated system operate in accordance with the Contract Documents and design criteria and intent.

The Contractor shall assist in the commissioning process, operating equipment and systems, troubleshooting and making adjustments as required.

1. Systems shall be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactive with each other as intended in accordance with the Contract Documents and design criteria.
2. During these checks, adjustments shall be made to enhance performance to meet environmental or user requirements.

Commissioning activities supplement field quality and testing procedures. Commissioning identifies issues that must be rectified to ensure that facilities are constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements.

Should equipment, system components and associated controls be incorrectly installed or malfunction during commissioning, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required to ensure effective performance. Costs for corrective work, additional tests and inspections, including those conducted by the Owner's Engineer to determine acceptability and proper performance of such items shall be borne by the Contractor.

The Contractor shall assume liabilities and all costs for commissioning, including the supply of water, tanker truck with hoses and other equipment as required. Disassembly and reassembly after approval, starting, testing, adjusting and the supply of testing equipment shall also be included under the specific Tender item.

Operate and maintain systems for the length of time required for commissioning to be completed. Carry out commissioning under actual and accepted simulated operating conditions of the entire operating range in all modes and on independent systems and interacting systems. Commissioning procedures shall be repeatable and the reported results are to be verifiable. Follow the equipment manufacturer's operating instructions.

The Engineer shall be notified at least 24 hours prior to commissioning in order to witness all commissioning activities and verify results.

Obtain certificates of approval, acceptance and compliance with the rules and regulation of authority having jurisdiction.

Review and repeat commissioning of systems if inconsistencies are found in the reported results. Perform additional commissioning until results are acceptable to the Engineer. Make adjustments and changes that become apparent as commissioning proceeds. Perform static and operational checks as applicable and as required. Correct deficiencies found during start-up and to the satisfaction of the Engineer.

Upon completion of commissioning, leave systems in normal operating mode. Except for warranty and seasonal verification activities, complete commissioning prior to the issuance of the Certificate of Substantial Performance. Cooperate fully with the Engineer during stages of acceptance and occupancy of facilities.

34.0 CLOSEOUT PROCEDURES

The Contractor and all Subcontractors shall conduct an investigation of the work, identify deficiencies and defects and repair as required to conform to the Contract Documents.

1. Notify the Engineer in writing of the satisfactory completion of the Contractor's inspection and that corrections have been made.
2. Request the Engineer's inspection.

The Engineer and the Contractor shall inspect the work to identify obvious defects or deficiencies. The Contractor shall correct the work accordingly.

The Contractor shall submit a written certificate that the following have been performed:

1. Work has been completed and inspected for compliance with the Contract Documents.
2. Defects have been corrected and deficiencies have been corrected.
3. Equipment and systems have been tested, adjusted and balanced and are fully operational.
4. Certificate required by utility companies have been submitted.
5. Operation of systems has been demonstrated to the Owner's personnel.
6. Work is complete and ready for final inspection.

Final Inspection: When the items noted above are completed, request final inspection of the work by the Owner, Engineer and Contractor. If the work is deemed incomplete by the Owner or Engineer, complete outstanding items and request re-inspection. Repeat inspections by the Owner's Engineer to address deficiencies shall be at the Contractor's expense.

Declaration of Substantial Performance: When the Owner and Engineer consider all deficiencies and defects have been corrected, and it appears that the requirements of the Contract have been substantially performed, make an application for a Certificate of Substantial Performance. Publish Certificate of Substantial Performance and provide proof of publication to the Engineer.

Commencement of Lien and Warranty Periods: The date of publication of the Certificate of Substantial Performance shall be the date for the commencement of the warranty period and the commencement of the lien period.

Final Payment: When the Owner and the Engineer consider all final deficiencies and defects have been corrected and it appears the requirements of the Contract have been totally performed, the Contractor shall make an application for final payment. If the work is deemed incomplete by the Owner and the Engineer, he shall complete the outstanding items and request re-inspection.

Payment of Holdback: After issuance of the Certificate of Substantial Performance of the work, the Contractor shall submit an application for the payment of the holdback amount.

35.0 CLOSEOUT SUBMITTALS

1. Submission:
 1. The instructions and data shall be prepared by personnel experienced in the maintenance and operation of the described products.
 2. A copy will be returned after final inspection with the Engineer's comments.
 3. Revise the content of the documents as required prior to final submittal.
 4. Two (2) weeks prior to substantial performance of the work, submit to the Engineer three (3) final copies of the operation and maintenance manuals in English.
 5. Ensure that the spare parts, maintenance manuals and special tools provided are new, undamaged and of the same quality and manufacture as the products provided in the work.
 6. If requested, furnish evidence as to the type, source and quality of the products provided.

7. Defective products will be rejected regardless of previous inspections. Such products shall be replaced at the Contractor's expense.
2. Format:
 1. Organize data in the form of an instructional manual.
 2. Binders shall be vinyl, hard-covered, 3 "D" ring, loose leaf 219 x 279 mm with spine and face pockets.
 3. When multiple binders are used, correlate the data into related, consistent groupings. Identify the contents of each binder on the spine.
 4. On the cover, identify each binder with a type or printed title "Project Record Documents", list the title of the project and identify the subject matter of the contents.
 5. Arrange the content by systems, under section numbers and sequence in the Table of Contents.
 6. Provide a tabbed flyleaf for each separate product and system, with a typed description of the project and the major component parts of the equipment.
 7. The text shall be the manufacturer's printed data or typewritten data.
 8. Drawings shall be provided in a reinforced, punched binder tab, bound in with the text. Larger drawings shall be folded to the size of the text pages.
 3. Contents:
 1. In the Table of Contents, provide:
 - .1 title of project;
 - .2 date of submission;
 - .3 names, addresses and telephone numbers of the Engineer and the Contractor with the names of the responsible parties; and,
 - .4 schedule of products and systems indexed to the content of the volume.
 2. For each product or system, list the names, addresses and telephone numbers of all Subcontractors and supplies, including the local sources of supplies and replacement parts.
 3. Product Data: Mark each sheet to clearly identify specific products and components parts and data applicable to installation and delete inapplicable information.
 4. Drawings: Supplement product data to illustrate the relations of component parts of the equipment and systems, to show control and flow diagrams.
 5. Typewritten text shall supplement product data. Provide the logical sequence of instructions for each procedure, incorporating the manufacturer's instructions.
 4. As-Builts and Samples:
 1. In addition to the requirements in the General Conditions, maintain at the site one (1) record copy of:

- .1 Contract Drawings;
 - .2 Specifications;
 - .3 Addenda;
 - .4 Change orders and other modifications to the Contract;
 - .5 Reviewed shop drawings, product data and samples;
 - .6 Field test records;
 - .7 Inspection certificates; and,
 - .8 Manufacturer's certificates.
2. Store record documents and samples in the field office apart from the documents used for construction. Provide files, racks and secure storage.
 3. Label record documents and file in accordance with section number listings in the Table of Contents of this project manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
 4. Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
 5. Keep record documents and samples available for inspection by the Engineer.
5. Recording Actual site Conditions:
 1. Record information on a set of black line, opaque drawings and in the copy of the project manual provided by the Engineer.
 2. Provide felt-tip marking pens to record information, maintaining separate colours for each major system.
 3. Record information concurrently with the construction progress. Do not conceal work until the required information is recorded.
 4. Contract Drawings and shop drawings: Legibly mark each item to record the actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction or gridlines;
 - .2 Field changes of dimension and detail;
 - .3 Changes made by change orders;
 - .4 Details not on original Contract Drawings; and,
 - .5 References to related shop drawings and modifications:
 5. Specifications: Legibly mark each item to record the actual construction, including:
 - .1 Manufacturer, trade name and catalogue number of each product actually installed, particularly optional items and substitute items; and,

- .2 Changes made by addenda and change orders.
6. Other Documents: Maintain the manufacturer's specifications, inspection certifications and field test records required by the individual specifications sections.
6. Equipment and Systems:
 1. Each Item of Equipment and Each System: Include a description of the unit or system and the component parts. Give function, normal operation characteristics and limiting conditions. Include performance curves, engineering data and tests, and the complete nomenclature and commercial number of replaceable parts.
 2. Panel Board Circuit Directories: Provide electrical service characteristics, controls and communications.
 3. Include installed, colour-coded wiring diagrams.
 4. Operating Procedures: Include start-up, break-in and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown and emergency instructions. Include summer, winter and any special operating instructions.
 5. Maintenance Requirements: Include routine procedures and a guide for troubleshooting; disassembly, repair and reassembly instructions; and alignment, adjusting, balancing and checking instructions.
 6. Provide servicing and lubrication schedule and a list of the lubricants required.
 7. Include the manufacturer's printed operation and maintenance instructions.
 8. Include the sequence of operation by the controls manufacturer.
 9. Provide the original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 10. Provide the installed control diagrams by the controls manufacturer.
 11. Provide the Contractor's coordination drawings, with the installed, colour-coded piping diagrams.
 12. Provide charts of the valve tag numbers, with the location and function of each valve, keyed to the flow and control diagrams.
 13. Provide a list of the original manufacturer's spare parts, current prices and the recommended quantities to be maintained in storage.
 14. Include test and balancing reports.
7. Materials and Finishes:
 1. Building Products, Applied Materials and Finishes: Include product data with catalogue number, size, composition, and colour and texture designations. Provide information for reordering custom manufactured products.
 2. Provide instructions for cleaning agents and methods, precautions against detrimental agents and methods, and the recommended schedule for cleaning and maintenance.

3. Moisture Protection and Weather-Exposed Products: Include the manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and the recommended schedule for cleaning and maintenance.

8. Spare Parts:

1. Provide spare parts in the quantities specified in the individual specification sections.
2. Provide items of the same manufacture and quality as the items in the work.
3. Deliver to the site, place and store.
4. Receive and catalogue all items. Submit an inventory listing to the Engineer, including the approved listings in the Operation and Maintenance Manual.
5. Obtain receipts for delivered products and submit them prior to final payment.

9. Maintenance Materials:

1. Provide maintenance and extra materials in the quantities specified in the individual specification sections.
2. Provide items of the same manufacture and quality as the items in the work.
3. Deliver to the site, place and store.
4. Receive and catalogue all items. Submit an inventory list to the Engineer and including the approved list in the Operation and Maintenance Manual.
5. Obtain receipts for the delivered products and submit prior to final payment.

10. Special Tools:

1. Provide special tools in the quantities specified.
2. Provide the items with tags identifying their association function and equipment.
3. Deliver to the site, place and store.

11. Warranties and Bonds:

1. Separate each warranty or bond with index tab sheets keyed to the Table of Contents.
2. List Subcontractors, suppliers and manufacturers, including the names, addresses and telephone numbers of the responsible principals.
3. Obtain warranties and bonds, executed in duplicate, by Subcontractors, suppliers and manufacturers within ten days of completion of the applicable item of work.
4. Except for the items put in use with the Owner's permission, leave the date of the beginning of time of the warranty until the date of substantial performance is determined.
5. Verify that all documents are in proper form, contain full information and are notarized.
6. Co-execute submittals when required.

7. Retain warranties and bonds until the time specified for submittal.

36.0 DEMONSTRATION AND TRAINING

Demonstrate the operation and maintenance of equipment and systems to the Owner's personnel prior to the date of substantial performance. The Owner will provide a list of personnel receiving instructions and will coordinate their attendance at agreed-upon times.

Require the manufacturer to provide an authorized representative to demonstrate the operation of the equipment and system, instruct the Owner's personnel and provide a written report indicating that demonstrations and instructions have been satisfactorily completed. This requirement is generally limited to pumping stations, motorized valves, control equipment and electrical/controls.

Give the time and date of each demonstration with a list of the persons present.

Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing and maintenance of each item of equipment at the agreed-upon times at the equipment location.

Instruct personnel in all phases of operation and maintenance using the operation and maintenance manuals as the basis of instruction.

Review the contents of the manual in detail to explain all aspects of operation and maintenance.

Prepare and insert additional data in the operation and maintenance manuals when the need for additional data becomes apparent during instructions.

If requested information is not provided to Owner or Engineer after two (2) requests, separated by three (3) days, a fine of \$500 will be applied to the Contractor for each additional request for the required information to a maximum of one fine per day.

37.0 MATERIAL SAMPLING/TEST RESULTS SUBMITTALS

1. Prior to delivery of any material required for completion of the work under the Contract, the Contractor shall provide material samples/test results an appropriately accredited testing company in accordance with the Division 5 – Item Special Provisions and the applicable OPS specifications. Sample/test results shall be presented in a summary letter report prepared by a qualified individual. This requirement includes all aggregates required for this project, as well as seed mix and other materials as requested by the Engineer.
2. Verification samples may be collected on site by the Engineer to confirm the material meets the specifications. If material delivered to the site is visually assessed to be different from that approved by the Engineer, the material shall not be used until the Contractor provides updated test results for review by the Engineer. Two (2) days' notice shall be given to the Engineer to review the Contractor-supplied material/test results and summary letter. If material is brought to the site without proper notification for the Engineer to complete verification or initial assessment testing, the Contractor shall be required to pay for fees associated with rush testing and result assessments.
3. The Contractor shall pay all expenses related to the Owners' and Engineers' costs with respect to addressing failed verification results including, but not limited to, test results discussions and additional verification retest/results reviews. Any material that fails the tests must be removed from the site at the Contractor's expense.

38.0 MOBILIZATION AND DEMOBILIZATION

- .1 The first item in the Schedule of Items and Prices is to cover the Contractor's cost of mobilization at the beginning of the construction period and demobilization at the close of the construction period of the

Contract. The price entered for this item shall be consistent with the costs involved but shall not, in any event, exceed ten percent (10%) of the total tender price of the Contract.

- .2 Sixty percent (60%) of the price for the Mobilization and Demobilization item shall be considered as relating to mobilization and the balance to demobilization.
- .3 The payment for mobilization shall be included in the first payment certificate issued for the Contract subject to the Engineer being satisfied that full mobilization has been carried out. If the Engineer is not so satisfied, he shall allow a payment, which in his opinion reflects the degree of mobilization effected to date.
- .4 The payment for demobilization shall become due following Substantial Performance of the works of the Contract and subject to the Engineer being satisfied that full demobilization has been carried out.
- .5 Do not mobilize to the site without Engineer's prior written authorization. Ensure insurance as required by the Contract Documents is in full force.
- .6 Perform planning and scheduling activities as necessary for the performance of the works. Before start up, submit a detailed schedule and update weekly.
- .7 Purchase materials and mobilize equipment, supplies, and incidentals to the site. The Contractor's compound, including office location, shall be approved by the Owner/Engineer. Provide electrical service, toilet, first aid equipment, wash facilities and any other facilities as required by the Ontario Health and Safety Act and the site-specific Health and Safety Plan. Provide an adequate storage area for all materials and a parking area for all workers.
- .8 Use existing site access roads to the designated work areas during mobilization. Complete improvements to roads as necessary for the performance of the works.
- .9 Site temporary construction facilities in areas designated by Engineer. Obtain Engineer's approval prior to changing locations of temporary construction facilities. Do not use other areas without Engineer's prior approval. Provide additional land and access thereto not shown or described that may be required by Contractor for temporary construction facilities or storage of materials with no liability to Owner or Engineer. Relocate construction equipment or other materials or equipment as required for the performance of the works.
- .10 Furnish submittals as required by these specifications.

39.0 COST OF POWER AND FACILITIES AT THE SITE

The Contractor shall provide and bear the costs of all electricity, fuel, water and sanitary facilities required for, or at the site of, the works up to the date of Substantial Performance as established by the Certificate of Substantial Performance. Such costs incurred after the said date shall be borne by the Owner save that any such costs incurred in completing unfinished work or rectifying deficiencies may, at the discretion of the Engineer, be charged against the Contractor.

Division 5

Item Special Provisions

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1.0 ALL ITEMS - (TRACKING MATERIAL ON ROADS)

Material tracked on any road or material falling from trucks shall be cleaned up immediately, and if required, the roads shall be swept or flushed by the Contractor. The foregoing shall be done at the Contractor's expense and shall be to the satisfaction of the Engineer. If cleanup is requested by the Owner or Engineer, a fine of \$500 will be applied to the Contractor if required remedial activities are not initiated within two (2) hours.

Carefully clean equipment involved in excavation activities that may have been exposed to refuse, before being removed from the landfill Site or being relocated to clean areas on Site.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

2.0 ALL ITEMS - (HANDWORK AROUND EXISTING UNDERGROUND UTILITIES)

Refer to Division 4, Section 8.0 for protection measures in regard to existing underground utilities. The Contractor shall hand dig around any existing underground utilities that the Engineer, Owner, Municipality or Utility Company deems necessary to be hand dug.

The Engineer, Owner, Municipality or Utility Company not advising the Contractor of any locations to be hand dug will not relieve the Contractor of his responsibility should damage result.

Any additional costs relating directly or indirectly to this method of operation shall be borne by the Contractor.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

3.0 ALL ITEMS - (WORK AROUND EXISTING STRUCTURES)

The Contractor will be responsible for the location and safeguard of all structures both above and below the ground, including signs, poles and underground utilities, and shall take whatever precautions are necessary to ensure that they are not damaged. The Contractor shall have the Owner and Municipal or Utility Company representatives on the site when it, the Engineer, the Owner, the Municipality or the Utility Company feels it is required. The Engineer, the Owner, the Municipality or Utility Company not advising the Contractor to have a Municipal or Utility Company representative on the site shall in no way relieve the Contractor of its responsibility under this Contract.

Should damages result from any of the Contractor's operations, the costs involved for repairs to rectify the damage shall be the sole responsibility of the Contractor plus any costs incurred by the Owner (including Engineer oversight during remedial activities), the Municipality or Utility Company for their site representative.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

4.0 ALL ITEMS - (EXCAVATION OF FOREIGN MATERIAL)

No additional payment will be allowed for the removal of any foreign material, such as logs, tree roots, concrete, etc., encountered and consequently disposed of during any operation of this Contract.

Payment for this removal, including proper disposal, shall be deemed included in the tender price for the item for which they are removed.

5.0 ALL ITEMS - (ROCK)

No additional payment will be allowed for the removal of rock or boulders encountered and consequently disposed of during any operation of this Contract.

Payment for the removal of rock and boulders, including proper disposal, shall be deemed included in the tender price for the item for which it is removed.

6.0 ALL ITEMS - (DEWATERING)

The Contractor is responsible for supplying all labour, equipment and materials required to dewater the works satisfactorily. Any damage caused by its dewatering system shall be the sole responsibility of the Contractor plus any costs incurred by the Owner.

The Contractor shall provide all measures necessary to prevent silt-laden water from discharging to natural or manufactured watercourses or storm sewers. This may include sedimentation basins, straw bale filters, silt fences and other measures deemed necessary by the Ministry of the Environment, Conservation and Parks (MECP), the Conservation Authority or the Engineer to prevent contamination of natural watercourses by construction water. If silt control measures are not implemented immediately upon request, a fine of \$1,000 per day will be applied to the Contractor until the requested work is implemented. No additional payment will be made for the implementation of all required silt control works. Clean water from dewatering operations shall always be routed through the existing stormwater management ponds before leaving the site.

Dewatering operations may require pumping in excess of 50,000 L/day. If this is the case, the Contractor shall apply to the MECP Environmental Activity and Sector Registry (EASR) for construction site dewatering. All dewatering activities shall be conducted in accordance with O.Reg. 63/16. The Contractor shall keep complete dewatering records consisting of date, time, location, pumping rates and volumes of water removed. Pumping rates shall be recorded with flow totalizers or other device, as approved by the Engineer. The maximum water taking shall not exceed 400,000 L/day. Dewatering records shall be passed to the Owner/Engineer on a daily basis.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

7.0 ALL ITEMS - (MEASUREMENT FOR PAYMENT)

In the Ontario Provincial Standard Specifications specified for each listed tender item, all references to Measurement for Payment and Basis of Payment shall be deleted and payment will be made as detailed in these Item Special Provisions or on the Form of Tender.

8.0 ALL ITEMS - (DISPOSAL OF SURPLUS MATERIAL)

Surplus or unsuitable material shall be disposed of on site in disposal areas provided by the Owner. Prior to disposing of surplus material, the Contractor shall inquire as to its potential use by the Owner and shall dispose of this surplus material at a location specified by the Owner. Free disposal of unsuitable material generated from this project will be made available to the Contractor by the Owner subject to the provisions contained in Division 4, Section 6.0.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

9.0 ALL ITEMS - (RESTORATION)

It is the intention of this Contract that all areas disturbed by the Contractor's operation are restored to a condition at least as good as that which existed prior to construction or to the conditions specified.

All restoration work beyond the limits of this Contract required as a result of the Contractor's operations shall be undertaken by the Contractor at its expense.

Unless specifically stated otherwise, surface restoration shall consist of the following:

- | | | | |
|----|---|---|---|
| .1 | Grassed Areas: | Lawns | 100 mm of topsoil and sod |
| | | Other grass areas | 100 mm of topsoil, fertilize and seed |
| | | Landfill footprint | 150 mm of topsoil, fertilize and seed |
| .2 | Gravel Shoulders and Travelling Surfaces: | | 400 mm Granular B
200 mm Granular A |
| .3 | Bare Areas with No Vegetation Cover | | 100 mm of topsoil, fertilize and seed |
| .4 | Paved Areas: | | |
| | .1 | On-site Roads: (in conformance with OPSS 310) | 80 mm HL8 Base Coat
50 mm HL4 Surface Coat |
| | .2 | Sidewalks and driveways (in conformance with OPSS 311) | 40 mm HL-3 Surface Coat |
| | .3 | Municipal Streets (in conformance with OPSS 310) | 50 mm HL4 Base Coat
50 mm HL3 Surface Coat |
| | .4 | Concrete Sidewalk, Curb and Gutter, Concrete Driveways and Paving Stone Driveways | To match existing |
| | .5 | Asphalt Curb and Gutter | To match existing |

The Contractor shall saw cut and dispose of all asphalt pavement, concrete sidewalks, curb and gutters and driveways to be removed, at no additional cost to the Owner.

All restoration work must be carried out in strict accordance with the applicable Ontario Provincial Standard Specifications.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

10.0 ALL ITEMS - (WATER FOR COMPACTION AND DUST CONTROL)

Water will be applied by means of approved equipment capable of distributing it uniformly and with proper control. Water shall be applied as needed for dust control, or as directed by the Engineer.

All costs related to water supply shall be the responsibility of the Contractor. No water shall be taken from municipal fire hydrants without the prior consent of the appropriate Municipal Operating Authority and only with their assistance.

No separate payment will be made for the supply and application of water for compaction and dust control, and the supply and application of this water will be deemed included in the prices bid for the items for which the water is required.

The Contractor will be allowed to draw up to 50 m³/day of water (combined volume) from on site stormwater ponds subject to water availability and the Owner/Engineer's approval.

If water for dust control or compaction from the on-site stormwater pond is approved for use by the Owner/Engineer, the location, date, time, rates and volume of water removed shall be tracked by the Contractor. Rates and volumes will be recorded with flow totalizers or other device, as approved by the Engineer. Daily summaries will be provided by the Contractor to the Engineer.

If water is not managed in accordance with the specifications, the Contractor will be fully responsible for fines issued to the Owner, as well as, but not limited to engineering and legal fees. Costs to remediate any negatively affected water and watercourses will be the responsibility of the Contractor and required remedial actions will be implemented upon direction from the Owner or Engineer.

11.0 ALL ITEMS - (SUPPLY AND APPLICATION OF CALCIUM CHLORIDE)

Calcium chloride SHALL NOT be applied on this Contract. All costs including those borne by the Owner that are associated with remediation of areas the Contractor has applied calcium chloride, or an equivalent, will be the Contractor's responsibility. Remediation will be implemented immediately upon direction by the Owner or Engineer.

12.0 ALL ITEMS - (LINE AND GRADE)

The Contractor shall assume full responsibility for line and grade of underground piping, culverts, curbs, ditching, all earth moving, road construction and paving. He must set and maintain the necessary stakes to define the location, alignment, elevation and grade. Refer to Subsection GC 7.02 "Monuments and Layout". Benchmarks and control points are provided on the drawings.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

13.0 ALL ITEMS - (PROTECTION OF TREES)

With the exception of the trees indicated or required to be removed, the Contractor shall exercise care to minimize damage to all trees that will remain on site. The trees shall be protected by avoiding damage to roots and branches, and by avoiding compaction of the root area through operation or storage of heavy equipment or depositing of soil near to such roots.

Should any trees sustain damage as a result of the Contractor's operation, the Contractor shall repair the damaged section in an approved horticultural manner to the satisfaction of the Engineer within 24 hours of the injury.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

14.0 ALL ITEMS - (ABANDONMENT OF OLD PIPING)

No extra payment will be made for the removal of old pipes encountered during execution of all work under this Contract, and full compensation for the removal and disposal of all pipes and appurtenances shall be included in the price bid for items requiring the removal. This shall include the careful removal of all fittings, valves, etc. and an evaluation of these existing appurtenances with the Engineer. If, in the opinion of the

Engineer, the materials have re-use value, they shall be carefully stored on site at a location specified by the Engineer. If, in the opinion of the Engineer, the materials are of no further use, the Contractor shall dispose of these materials at no additional cost.

If approved by the Engineer, decommissioned pipes may be abandoned rather than removed. To prevent further silt infiltration and voids, the exposed ends of pipes 100 mm in diameter and larger shall be filled with 20 mPa concrete to a minimum distance of 3000 mm from the end of the pipe. As an alternative, both ends may be capped with approved mechanical joint caps. Ends of 50 mm diameter and smaller malleable pipes shall be bent over and hammered closed.

15.0 ALL ITEMS - (EXISTING MONITORING AND LANDFILL GAS WELLS)

The Contractor is informed that numerous monitoring wells are located at the site. All such wells in areas of the site that are not in conflict with the work of this Contract are to be marked, carefully protected and any damage to any of these wells, or the pumps within these wells, caused by the Contractor's operations shall be repaired under the direction of the Owner at the Contractor's expense.

Any monitoring wells on the site that will interfere with the work of this Contract shall be identified by the Contractor and, if approved, shall be decommissioned by others under the direction of and at the expense of the Owner.

The Contractor shall also protect all existing landfill gas wells on top of the landfill during its operations (e.g., access road construction, final cover application, etc.). These wells will be extended by others (Comcor Environmental) but the Contractor shall submit a plan for the protection of gas wells for review by the Engineer. The Contractor will be responsible for any damage to these wells resulting from its operations. Refer to Division 4, Section 8.0 for protection measures regarding the existing landfill gas system.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

16.0 ALL ITEMS - (REMOVALS)

The Contractor shall include the cost of removal work under each specific tender item if such removal is necessary. Note that, on approval of the Owner, free disposal of the removed debris will be provided to the Contractor by the Owner subject to conditions of Division 4, Section 6.0.

17.0 ALL ITEMS - (MANAGEMENT OF EXCESS SOIL AND WASTE)

Several work items under this Contract will require excavation of excess soil, which is to be stored on site at various specified locations. Excess soils are to be segregated as to types of material (i.e., brown clay, grey clay, stripped granular, topsoil, etc.) and stockpiled at specified locations.

All waste from the Cell 5 North excavation shall be delivered to the active disposal area for landfilling by the Owner. The Contractor shall not move more than 200 m³/hour of waste (truck box measurements). All deliveries shall take place on weekdays (Monday to Friday) between 8:00 a.m. and 3:00 p.m.

Other excess materials such as topsoil, earth, granular, sand and asphalt shall be stockpiled on site at location(s) designated by the Owner/Engineer during construction. Sand retrieved from Cell 5 North excavation shall be stored separately at the site at a location designated by the Owner/Engineer.

The various excess soils are to be placed in layers approximately 0.3 m thick; moderately compacted using a bulldozer or soil compactor; shaped to shed water; and graded smooth. Strip topsoil prior to placement of material in any stockpile. Clay cap installation is subject to different placement specifications which are

outlined elsewhere in this document. Brown clay from on-site excavations shall be used as subgrade fill for roads.

The Owner/Engineer may require a change in the location of the disposal area for excess soil material from those specified in this document. The Contractor is advised that his bid price to complete the work shall be the same regardless of where the excess soil material is stored on site including excess soil stockpile property.

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

18.0 ALL ITEMS - (CLEARING AND GRUBBING)

The Contractor shall perform all clearing and grubbing, as required, to undertake the work of this Contract. The Contractor shall include the cost of clearing and grubbing under each specific tender item, if this work is necessary. Generally, there is a very limited number of trees and shrubs which may interfere with the proposed work.

Process all cleared, small limbs (up to 100 mm diameter) through a grinder and deliver the wood chips to the Owner. Tree trunks larger than 100 mm diameter shall be cut to manageable size for firewood and delivered to the Owner. All oversized debris from grubbing undertaken by the Contractor shall be landfilled. No burning will be allowed on site.

19.0 ALL ITEMS - (TOPSOIL, FERTILIZER AND SEED)

Stripped topsoil and topsoil stockpiled on site shall be used for this project. If additional topsoil is required, the Owner may choose to import topsoil to the site or request the Contractor to import. Therefore, the import of topsoil to the site has been included as a provisional item.

All topsoil, whether on site or imported shall meet requirements of OPSS 802. Refer to the drawings for the location of topsoil stockpiled on site. Topsoil thickness shall be in accordance with the drawings.

The Contractor shall use a standard roadside seed mix as per Table 1 of OPSS 804 for all areas requiring seeding as follows:

50%	Creeping Red Fescue
5%	White Clover
10%	Kentucky Bluegrass
35%	Perennial Ryegrass

Percentages noted are by mass.

The seed rate shall be 130 kg/ha. Use standard hydraulic mulch and fertilizer (8-32-16) at the rates recommended by OPSS 804 (350 kg/ha). In addition, a nurse crop of Fall Rye Grain or Winter Wheat Grain shall be applied at 60 kg/ha. Alternatively, seed may be applied by a mechanical seeding device, such as a Brillion seeder or equivalent such that seeds are planted below the ground surface and not easily washed away. Apply fertilizer with a cyclone spreader or other approved method. Seeding shall take place in favourable weather conditions outside the winter dormant period defined by Table 3 of OPSS 804. The Contractor shall reseed all bare areas and areas with poor grass catch during the warranty period.

This specification applies to all work under this Contract where topsoiling and seeding is required. Submit seed mix sample prior to application for review by the Engineer.

20.0 ALL ITEMS - (PROJECT LOGISTICS)

In scheduling and pricing of the work required under the Contract, the bidders shall account for the following requirements related to continuity of the site operations:

- .1 Unobstructed access to the active landfilling area shall be provided at all times.
- .2 The Contractor shall locate and expose the existing end of the leachate collector pipe near proposed manhole MHL17. Record pipe end location including invert elevation and report to the Engineer who will verify whether the proposed cell floor design requires any modifications. If the pipe location or end invert is found much higher than 177.11 mASL (as built invert) the Engineer may decide to raise the base of Cell 5 North and/or revise manholes MHL17 and/or MHL19. This may also result in a change to the excavation volume. The Contractor shall proceed carefully with Cell 5 North excavation and not excavate too deep until the existing leachate collector pipe is found and its position in field confirmed. The Contractor shall not be compensated for any unnecessary excavation resulting from its failure to comply with the above noted condition or its inadequate grade control.
- .3 Cell 5 North excavation shall proceed in compliance with the above constraints. The Contractor shall comply with all specified traffic, dust, odour and litter control requirements when excavating Cell 5 North (waste and earth).

No additional payment will be made for the cost of this work, and it shall be deemed included in the price bid for the items that make this work necessary, and shall be full compensation for all labour, equipment and materials required to carry out the work described above.

21.0 ITEM 1.0 - (MOBILIZATION AND DEMOBILIZATION)

Under this tender item and for the associated lump sum price bid, the Contractor is responsible for supplying all labour, equipment, plant and materials to satisfactorily mobilize to the Site and demobilize from the Site. Refer to Division 4, Section 38.0 for details related to this item.

22.0 ITEMS 2.0 AND 3.0 - (SLUDGE PIT EXCAVATION AND BACKFILL)

Under these tender items and for the associated unit price and lump sum price bids, the Contractor shall remove sludge from Cell 5S as shown on the drawings and backfill with clay excavated from Cell 5N or as directed by the Engineer. The contractor will collaborate with the Engineer to define the actual sludge limits based on conditions encountered in the field and implement the approved odour control plan.

The excavation process will commence with the removal of sludge from Cell 5S before addressing stockpiles in Cell 5N. Stockpiles in Cell 5N will be removed and sorted, with sorted material either stockpiled in Cell 5S or placed as directed by the engineer. Dry material is to be separated from the wetter 'sludge' material. Dry material will be spread and graded within Cell 5S, while dry sludge material will be hauled to the active landfill as directed by the engineer. Wet sludge material will be stockpiled in Cell 5N and allowed to dry before being transported to the active landfill, or as otherwise approved by the engineer.

Temporary access/haul roads will be constructed as needed to facilitate sludge removal, regrading and management. Contractor shall establish and maintain odour control measures during sludge pit excavation and drying as required and to the satisfaction of the Owner to reduce the risk of odour complaints. Contractor to provide an Odour Control Plan for approval by Owner and Engineer prior to undertaking the work.

23.0 ITEM 4.0 - (LITTER FENCE REMOVAL)

Under this tender item and for the associated unit price bid, the Contractor shall remove the existing litter fencing at the locations shown on the drawings.

The fence posts shall be salvaged and those that are in good condition may be reused to construct the new litter fence. The welded wire mesh shall be recycled as scrap metal unless directed otherwise by the Owner. Measurement for payment will be based on the linear length of the removed fence. Salvaged posts shall not be reused until inspected/approved for reuse by the Owner/Engineer. All fencing designated for removal is located at or adjacent to the east perimeter of Cell 4N. Store all salvaged fence posts at a location designated by the Owner.

The existing fence posts, particularly those installed in waste, may become unstable during waste excavation. The Contractor shall proceed carefully with all work in the vicinity of all posts designated for removal.

24.0 ITEM 5.0 - (BIRD POLE REMOVAL)

Under this tender item and for the associated unit price bid, the Contractor shall remove the existing poles and wiring system at locations shown the drawings.

All bird poles are to be removed from the area of Cell 4N excavation at or adjacent the cell's east perimeter, including those set in waste within the waste excavation area. All bird poles shall be salvaged and those that are determined to be in good condition will be stockpiled on site for future reuse at a location determined by the Engineer or Owner. Salvaged poles shall not be stockpiled for reuse until inspected/approved by the Owner/Engineer. Poles that are not salvageable for reuse shall be disposed of at the active landfill area or the existing compost pad as directed by the Owner/Engineer.

The existing bird poles, particularly those installed in waste, may become unstable during waste excavation. The Contractor shall proceed carefully with all work in the vicinity of all poles designated for removal.

25.0 ITEMS 6.0 AND 7.0 - (CLAY AND TOPSOIL STOCKPILE REMOVAL)

Under these tender items and for the associated unit price bids, the Contractor shall remove the clay and topsoil stockpiles from Cell 5N as shown on the drawings. Materials shall be managed in accordance with S.P. 17.0 requirements.

Unit price for Item 6.0 shall include placement and grading of clay material over the sludge pit area as shown on the drawing.

26.0 ITEM 8.0 - (EARTH/WASTE EXCAVATION AND GRADING - CELL 5 NORTH)

Under this tender item and for the associated unit price bid, the Contractor shall perform the following work for the excavation and grading of Cell 5 North:

- .1 Miscellaneous minor removals, as required.
- .2 Strip all topsoil and store on site for reuse.
- .3 Undertake all earth and waste excavation to the lines and grades shown on the drawings. All extra cost attributed to additional waste excavation beyond the lines and grades shown on the drawings shall be included under a separate provisional tender item (refer to S.P. 30.0).
- .4 Application of daily cover over the exposed waste face along the boundary with Cell 4N. Refer to Division 4, Section 4.0 for the special requirements related to litter and odour control.
- .5 Dewatering, as required.
- .6 Permit the Engineer to complete a sand detection visual inspection and/or investigative drilling program.

- .7 Proof-roll the cell landfill base.
- .8 Construction and maintenance of temporary access/haul roads, as required.
- .9 Dust control in accordance with Division 4 Section 3.0.
- .10 Utilize suitable excavated earth material for the construction of the clay cap, subgrade for proposed roadways.
- .11 Dispose of excess earth and waste material in accordance with S.P. 17.0.

Refer to electronic copy of WSP Geotechnical Investigation Report in Division 10 for results of the drilling program completed within Cell 5 North.

The top surface of the native clay landfill base shall be proof-rolled with a smooth drum compactor to a uniform surface before placement of the geotextile separator. Remove any protruding cobbles larger than 100 mm in diameter. The finished surface shall not contain any loose, dry soil clumps and shall be smooth and uniform to the lines and grades shown on the drawings. Add water as necessary to achieve the desired surface finish. The vertical tolerance for all work shall be ± 30 mm. The surface shall be approved by the Engineer before the placement of the overlying geotextile separator.

Refer to S.P. 27.0, 28.0 and 29.0 for the base defect repair procedure (replacement of unsuitable sand material with clay liner material).

Under this tender item the Contractor shall include all costs associated with construction of a berm between Cell 4 North and Cell 5 North as shown on the drawings for making connection to the existing landfill cell. The berm shall be built by leaving earth material in place (if not in conflict with sand management requirements).

The work involves waste excavation and requires the implementation of various applicable health and safety measures (landfill gas, leachate, asbestos and other hazards) outlined in the Health and Safety Plan. This plan shall be prepared by the Contractor and approved before the start of construction.

Do not undermine waste in the adjacent existing part of the landfill when excavating waste. Maintain safe slopes at angles no steeper than shown on the drawings and in accordance with Ministry of Labour requirements.

The Contractor shall keep the excavation free of standing water or leachate. Any water in contact with waste shall be treated as leachate and be pumped into the existing leachate collection system via manhole MHL15 or other location approved by the Engineer. If leachate is generated due to Contractor negligence, the Contractor shall be responsible for costs associated with the treatment, transport or disposal of the generated leachate.

The Contractor shall not excavate/expose more waste than can be covered by the end of each working day or can be handled by the Owner within the active landfilling area. Refer to Division 4, Section 4.0 and S.P. 17.0 for more details. Upon completion of waste excavation, the entire 2H:1V waste side slope shall be interim covered with at least 300 mm of grey clay.

Cell 5 North excavation shall be carried out in accordance with all project logistic constraints outlined under S.P. 20.0.

Coordinate cell excavation with the Engineer who will complete the sand detection visual inspection and/or investigative drilling program. Refer to S.P. 28.0 for more details.

The Contractor shall construct and maintain all temporary access/haul roads, as required, to complete the work specified. Refer to Division 4, Section 1.0 for more details in relation to haul roads.

Excess excavated material shall be handled in accordance with S.P. 17.0 requirements.

Submit bottom of excavation surface terrain model for review by the Engineer before start of work and upon completion. A tolerance of ± 30 mm shall be acceptable.

27.0 ITEM 9.0 – PROVISIONAL ITEM - (BASE EXCAVATION TO REMOVE UNSUITABLE MATERIAL AND BACKFILL WITH CLAY LINER MATERIAL - CELL 5 NORTH)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall over-excavate the landfill base and side slopes to remove lenses or layers of unsuitable material (sand) as determined by the Engineer in accordance with the sand detection program (refer to S.P. 28.0). Sand shall be replaced with clay liner to the design base grade. The clay liner shall be placed in accordance with S.P. 29.0. The extent of the defect/repair area shall be determined by the Engineer. Dispose of the unsuitable excavated material in accordance with S.P. 17.0.

Payment for this work will be based on the cubic metres of clay backfill as measured by topographic survey prior to and following placement of clay liner. The finished volume of earthworks shall be provided by the Contractor and will be checked by the Engineer.

28.0 ITEM 9.0 – PROVISIONAL ITEM - (SAND DETECTION)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall coordinate his operations with the Engineer who will make arrangements for visual inspection and/or investigative drilling at or near the landfill base for sand detection. The Contractor will not be responsible for any costs related to this investigation but his operations and schedule shall take this task into account. The extent of the base over-excavation and the amount of select clay liner material required to replace unsuitable material will depend on the results of this investigation and actual conditions encountered at the base of excavation.

.1 Rationale:

1. The upper sand hydrostratigraphic unit consists of the upper sand stratigraphic unit and sand/silt lenses or layers within the upper 2 m to 3 m of the silt till (middle aquitard). These stratigraphic features are combined into a single hydrostratigraphic unit to permit an assessment of:
 - .1 The continuity of a sand/silt unit at this depth below ground surface;
 - .2 A potential route for the preferential movement of contaminants;
 - .3 Potentiometric pressures at this depth in regard to the inducement of upward hydraulic gradients into the proposed excavation and excavation basal stability; and,
 - .4 Geotechnical stability of excavation sidewalls.

Detailed hydrogeologic investigations conclude that the upper hydrostratigraphic sand unit is not continuous below the entire landfill site. For the design of the landfill, any upper sand stratigraphic unit will be removed below the proposed base of excavation. To determine the presence and replacement of sand, the following procedure will be completed.

Refer to background documents on enclosed CD for more details.

.2 Procedure:

1. Definition of Sand:

For the purposes of site characterization, sand is soil comprised of particles ranging from 0.06 mm to 2 mm in size, as based on the M.I.T. Classification System. At the Essex Windsor Regional Landfill Site, the sand is typically mixed with finer particle size material, such as silt (0.002 mm to 0.06 mm size) and clay (<0.002 mm size). Sand is occasionally mixed with coarser grained material, such as gravel (>2 mm size). For the purposes of sand management in this document, a sand layer or lens is defined as material containing over 35% sand or relatively coarser particles.

2. Detection:

The base of the cell excavation shall be examined by a qualified hydrogeologist/geotechnical engineer for visual evidence of sand layers/lenses, and a detailed record of the observations shall be maintained for the record.

For detection and/or confirmation of sand layers, boreholes should be advanced within the landfill cell footprint at an approximate 30 m grid or closer spacing if required, as determined by the Engineer. Boreholes which have already been drilled within the Cell 5 North area will be taken into account for positioning of new boreholes. Boreholes should be drilled either to a depth of 10 m below original ground surface where the excavation base is less than 9 m below original ground surface, or to a depth of 1 m below the base of the excavation where the excavation base is greater than 9 m below the original ground surface. In order to reduce drilling costs, the drilling program will be carried out when the excavation depth is approaching design bottom of excavation. Each borehole should be sealed on completion using bentonite grout beyond the extent of the excavation, or recompacted with approved clay.

3. Removal:

- .1 Within Permanent Sidewalls: if sand layers or lenses are detected within 2 m of the final sidewall grades during construction, the entire thickness of the sand should be removed to a distance of at least 2 m from the outside sidewalls. In addition, the underlying soil should be over-excavated by 0.5 m vertically below the base of the sand layer/lens, and at least 0.5 m horizontally beyond the extent of the sand. All removed materials shall be replaced by recompacted clay liner to the design elevation.
- .2 Within Cell Floor: if sand layers or lenses are detected within 1 m of the final cell floor grade, the entire thickness of sand should be removed to a maximum depth of 1 m below final cell floor grade. The underlying soil should be over-excavated by 0.5 m vertically below the base of the sand layer/lens (to a maximum of 1 m below final cell floor grade) and at least 0.5 m horizontally beyond the extent of the sand. All removed materials shall be replaced by recompacted clay liner to the design base elevation.

29.0 ITEM 9.0 – PROVISIONAL ITEM - (CLAY LINER)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall place the clay liner to the lines and grades shown on the drawings and as directed by the Engineer. For the purposes of this specification, the term “clay” means “native grey clay”. “Native grey clay” is also called “select clay”.

.1 Material

Select clay material for the construction of the clay liner shall be excavated from the Cell 5 North area. The characteristics of the grey clay based on the WSP Geotechnical Investigation Report, February 2017 (“n” indicates number of tested samples) are as follows:

Maximum Dry Density (n=2)	1,661 kg/m ³ to 1,666 kg/m ³
Optimum Moisture Content (n=2)	17.2 % to 18.1%
In-Situ Moisture Content (n=16)	11 % to 22%
Liquid Limit (n=9)	34 % to 42%
Plastic Limit (n=9)	17 % to 20%
Plasticity Index (n=9)	17 % to 22%
Percent Gravel (n=7)	0 % to 1%
Percent Sand (n=7)	7 % to 17%
Percent Silt (n=7)	39 % to 51%
Percent Clay (n=7)	32 % to 54%

Clay used for the construction of the clay liner shall comply with the following gradation limits:

Gravel particles:	> 2mm: less than 5%
Sand and gravel particles	> 0.06 mm: less than 18%
Clay particles:	< 0.002 mm: at least 35%

.2 Loading

The Contractor shall load and haul the clay to the liner construction area. Load clay to avoid contamination with any extraneous material, such as brown clay, sand, topsoil or any other foreign material. Load clay to optimize drying if moisture content is excessive. Avoid loading material that is too dry. Clay liner material may be pre-processed outside the construction area before it is transported for placement in the cell area. The Contractor shall notify the Engineer of any clay quality problems encountered to avoid hauling material that does not comply with the specifications or that cannot be placed because it is too wet or too dry.

.3 Execution

The clay liner installation shall be carried out with a sheepsfoot compactor having a pad foot length of approximately 100 mm. The compacted lift thickness shall be 150 mm maximum. A static, 4-wheel, tamping, pad-foot compactor may be utilized for clay compaction. The compactor weight shall be a minimum of 18,000 kg with a foot length of not less than 150 mm (Caterpillar 815 or Cat 825 or approved equivalent). The thickness of the lift (compacted) may be increased to 200 mm with the use of this equipment.

The Contractor shall test his method of operation with a demonstration test strip at a location approved by the Owner/Engineer before commencing with the installation of the clay liner. The cost of the test strip shall be included in the tender price.

Once the Contractor's placement method has been approved by the Engineer, the Contractor shall not deviate from the previously accepted method of installation.

Each lift of clay material shall be compacted at a soil water content of 1 percent to 3 percent above the optimum moisture, as established from Standard Proctor tests on the clay unless directed otherwise by the Engineer. Clay shall be placed in such a way and with sufficient compaction effort applied to achieve the required design hydraulic conductivity of 1×10^{-7} cm/s or lower.

To achieve suitable compaction (95% SPMDD), clay shall be compacted with a minimum of six (6) passes of the compactor regardless of the Standard Proctor Maximum Dry Density (SPMDD) readings. Hand and/or hoe-mounted compactors may need to be used in areas where large equipment cannot operate (i.e., edges/corners/plane changes of the lifts). Where hand/hoe-mounted compactors are required, the specified lift thicknesses may need to be reduced to achieve the required soil compaction. The Engineer will assess in the field the required effort to achieve the required liner characteristics. If more effort is required than noted above to achieve the required compaction to moisture relationship, the additional effort will be included in the tender price.

It is noted that additional compaction effort may be required in certain conditions if SPMDD readings are low or variations in material consistency are encountered.

After placement of a loose lift of clay but before compaction, the Contractor shall reduce clod size to no greater than 100 mm diameter. This may not be required if the clay has been pre-processed outside the construction area. The Contractor shall utilize a Sunflower 4411 disc ripper or approved equivalent equipment for this purpose. The Sunflower disc ripper has hydraulically adjustable discs, coil flex mounted disc blades and vertically adjustable shank assemblies.

If the clay is too dry, water shall be added utilizing a truck with spray hose or other approved method to avoid localized overwatering. The added moisture shall be thoroughly mixed into the clay utilizing a disc ripper or other adequate equipment to ensure that moisture is uniformly distributed throughout the soil. Adequate equilibration time after moisture addition shall be allowed to ensure uniform moisture content across all clods. The Engineer will determine the adequacy of the moisture equalization before the clay is compacted. If the water content is increased by more than 3 percent, 24 hours may be required for uniform absorption of water by soil particles. If clay is too wet, it shall be spread thin and allowed to dry in an area approved by the Engineer. The Contractor shall allow for sporadic use of this procedure. Generally, clay that is too wet shall not be used.

No lift of clay shall be placed on a surface that contains ponded water, including within feet imprints from the compactor.

Stones larger than 100 mm in diameter shall be handpicked from the clay liner material.

After each liner segment is installed, it shall be stair-stepped a minimum of 1 m per lift so the next segment may be tied to the previously installed segment. Any loosely compacted edges or rag ends shall be cut back to competent material as determined by the Engineer immediately prior to segment connection activities.

To protect each lift of the clay liner against desiccation (drying and cracking), the Contractor shall water clay periodically, or cover with temporary plastic sheeting (white or clear only) and sandbagged to prevent displacement. Care must be taken to deliver water uniformly and not to create zones of excessively wet soil. The Contractor shall proof-roll any finished lift or intermediate lift of the clay liner with a smooth drum compactor (weight as required) to minimize desiccation or ponding of rainwater.

To ensure proper bonding between proof-rolled, intermediate lifts, the Contractor shall scarify any previous lift to a depth of at least 25 mm before placement of the next lift. The Contractor shall protect the clay liner against desiccation cracks by covering already placed clay with 0.1 to 0.2 mm thick polyethylene sheets (white or clear) or other synthetic cover material approved by the Engineer, if the liner is to be left unattended for a period longer than 96 hours. Such cover shall be overlapped approximately 0.3 m and secured against wind with sand bags placed every 0.6 m at a minimum. If an already placed and approved top lift of clay shows a water content reduction larger than 4 percent or deep cracking greater than 25 mm in depth, and none of the desiccation protective measures are effective, the Contractor shall scarify the desiccated lift, reduce clod size, moisten and recompact. Alternatively, the Contractor may be required to remove and replace the desiccated material. No additional payment will be made for such work.

The top lift of the clay liner shall be proof-rolled with a smooth drum compactor to a uniform surface before placement of the geotextile separator. The finished surface shall not contain any loose, dry soil clumps and shall be as smooth and uniform as possible. The vertical tolerance for all clay liner work shall be ± 30 mm.

The Contractor shall be responsible for protecting the finished grade against vegetation growth, erosion, desiccation, flooding and freezing. Any base grades disturbed due to precipitation, erosion or other reasons shall be brought to final grade at the expense of the Contractor. Desiccation protection is typically a priority for liner construction and maintenance. The Contractor shall apply water or cover noted area in plastic sheeting to the liner surface as directed by the Engineer to prevent desiccation. The Contractor shall be responsible to repair/replace the failed material as required.

The Engineer shall approve the prepared surfaces of the clay liner before placement of the overlying geotextile separator.

Water for Compaction of Clay Liner

Under this tender item, the Contractor shall also include the supply and application of water as required to construct the clay liner. Water use shall be completed as approved by the Engineer and as detailed in S.P. 10.0.

Water shall be applied uniformly as required or directed by the Engineer to increase the moisture content of the clay liner to just above optimum moisture content as specified above. In addition, the Contractor will be required to apply water to prevent desiccation of the clay base liner.

The Contractor shall be responsible for finding a suitable source of water for this project and obtaining any permit(s) required to ascertain and obtain the water supply. On-site water will be available as per S.P. 10.0.

.4 Quality Assurance/Quality Control (QA/QC) Program

The Engineer will be completing the QA/QC Program generally described below. Sample/test location shall be filled with bentonite and hydrated by the Engineer.

All clay liner work shall be subject to QA/QC testing with emphasis on the following aspects of construction:

1. Material utilized;
2. Equipment utilized;
3. Loose lift placement;
4. Pulverization of clods;
5. Compaction of loose lifts;
6. Number of compaction passes;
7. Bonding (kneading) of subsequent liner lifts to the lift below;
8. Prevention of hydraulic defects between lifts from being interconnected;
9. Compacted lift thickness verifications;
10. Density tests;
11. Water content tests;
12. Lift protection; and,
13. Hydraulic conductivity.

The Contractor is to provide a minimum of two (2) hours notice to the Engineer when the Contractor deems an area acceptable for testing of each component of the QA/QC Program. The Contractor is to coordinate daily with the Engineer to discuss the day's construction schedule to avoid delays and/or conflicts in the QA/QC tests.

30.0 ITEM 10.0 – PROVISIONAL ITEM - (EXTRA COST, IF ANY, ASSOCIATED WITH ADDITIONAL WASTE EXCAVATION)

Under this tender item and for the associated unit price bid, the Contractor shall include all anticipated extra costs associated with additional waste excavation beyond the lines and grades shown on the drawings for Tender Item 8.0. Bidders are advised to evaluate all factors noted below and price work for this item accordingly. The Contractor shall not be entitled to any extra compensation.

Additional waste excavation may be necessary for Cell 5N preparation. Quantity of additional waste to be excavated cannot be calculated accurately and actual volume of waste to be moved may vary from the estimated quantity.

Additional waste excavation and handling shall be carried out in accordance with the previously approved Health & Safety Plan.

There are numerous factors which needs to be considered which makes waste excavation more challenging compared to earth like material. These include:

- non-homogenous nature of waste,
- timing and rate of waste excavation limitations,
- odour and litter control requirements,
- leachate and landfill gas control/safety requirements, and
- all other hazards, unknown factors and risk.

31.0 ITEM 11.0 - (GEOTEXTILE SEPARATOR - CELL 5 NORTH)

Under this tender item and for the associated unit price bid, the Contractor shall supply and install the geotextile separator to the details shown on the drawings. Submit panel layout for review by the Engineer prior to installation.

The geotextile separator (OPS 1860) shall be polypropylene, nonwoven and needle punched having the following characteristics:

.1 Unit weight	ASTM D 5261	339 g/m ² (MARV)
.2 Tensile strength	ASTM D 4632	900 N (MARV)
.3 Tear strength	ASTM D 4533	350 N (MARV)
.4 CBR puncture strength	ASTM D 6241	1900 N (MARV)
.5 UV resistance (500 hr)	ASTM D 4355	50% (MARV)
.6 AOS	ASTM D 4751	210 µm (MaxARV)
.7 Permittivity	ASTM D 4491	0.2 sec ⁻¹ (MARV)

Submit material shop drawings for review by the Engineer at least one (1) week prior to material delivery.

Prior to shipping to the site, the Contractor shall provide a mill certificate attesting that material meets physical and manufacturing requirements stated in these specifications including quality control data for all material.

The Contractor shall be responsible for unloading and storage of the supplied material in accordance with the manufacturer's recommendations and in compliance with ASTM D4783. The rolls shall be stored away from dirt, mud and excessive heat.

Handle geotextile in a manner to ensure it is not damaged.

Place geotextile in a manner to prevent folds and wrinkles.

Secure geotextile in an anchor trench (north and east side top of slope only), and weigh with sandbags or other product approved by the Owner to prevent displacement or wind uplift.

The geotextile shall be seamed by sewing. No horizontal seams shall be allowed on the side slopes. Sew the seam along the entire length. The seam strength shall be equal to at least 90% of the parent material (ASTM D 4632). One (1) week prior to use, the Contractor shall provide the Owner with the geotextile test

results and a summary report prepared by a qualified individual indicating that the proposed sewn seam strength is at least 90% of the parent material. The Contractor shall also provide an adequate number of test samples, as determined by the Engineer to verify sewn seam strength. Samples shall be provided at least two (2) weeks before the use of geotextile.

Overlap the geotextile a minimum of 150 mm before seaming. Any areas that cannot be sewn shall have extra geotextile placed, overlapping of 600 mm with underlying or overlaying geotextile and 3M Super 77 or equivalent adhesive shall be used. Protect the geotextile against damage during and after installation.

Repair holes or tears by patching from the same geotextile. The patch shall be spot seamed and placed with a minimum overlap of 600 mm in all directions. In these circumstances, the Engineer will approve that the repair is acceptable before the area is covered.

The Plan Quantity for the geotextile does not include overlaps but includes the material installed in the anchor trench.

The Contractor shall supply and deliver to the Owner the geotextile to be installed in the future under the runoff separation berm.

32.0 ITEM 12.0 - (PRIMARY DRAINAGE GRAVEL - CELL 5 NORTH)

Under this tender item and for the associated unit price bid, the Contractor shall supply and place drainage gravel over the geotextile separator to the lines and grades shown on the drawings.

Drainage gravel gradation shall be in accordance with OPSS 1004 for 53 mm clear stone.

The clear stone shall be compatible with leachate in the form of dolomitic limestone or dolostone. The dolostone or dolomitic limestone shall meet the following criteria (ASTM C25 or ASTM C1271):

- .1 Calcium Carbonate (CaCO_3) content Less than 60%
- .2 Magnesium Carbonate (MgCO_3) content Greater than 40%

Provide gradation curve and stone characteristics prior to material delivery. Source testing information shall be submitted for every 10,000 m³ of material.

The Contractor shall protect the installed drainage gravel from contamination by waste and any foreign debris.

The Contractor shall demonstrate his placement method for approval by the Engineer with a test strip on the base and side slope. Drainage gravel shall be installed without causing undue stress and displacement of the underlying geotextile separator. The Contractor shall utilize low ground pressure (LGP) (less than 7 psi) earthmoving equipment for placement and spreading of gravel on the slope and base. Such equipment shall never operate on less than 150 mm of gravel. There is no compaction specification for this work. The Contractor will be allowed to use wheeled equipment (trucks) for the supply of gravel material into the cell area, but because such equipment exerts much higher ground pressure, the use of trucks would be allowed only along the specially built, thick gravel ramps/roads. The required gravel thickness along such ramps shall be determined by the test strip(s). The entirety of the test strip including the slope and base will have the materials and construction procedures that apply to this project. The gravel drainage material shall be applied in the manner of the Contractor's proposed operation, which incorporates the requirements outlined in these specifications. Subsequently, gravel material shall be manually removed (or vacuumed) from the test strip to inspect the underlying geotextile. Ensure that no damage, displacement, puncture or disruption has occurred during the placement of the gravel. Once the accepted method is agreed upon with the Engineer, the Contractor shall continue to use such method unless further approval is obtained from the Engineer for alternative method(s).

The Contractor shall not move stone over the cell floor, with a dozer blade, over a long distance to avoid excessive stone abrasion and subsequent increase of fines content.

No vehicles shall be allowed to drive directly over the geotextile separator with the exception of small, rubber-tired all-terrain vehicles (ATVs). Extra care shall be exercised when placing material near leachate collection piping to avoid displacement and/or damage.

All equipment utilized during the installation of the drainage gravel shall be leak-free and in good working order.

It is noted that the Contractor shall supply and place sufficient quantity of drainage gravel in windrows beside the runoff separation berm as shown on the drawings. Stockpiled drainage gravel shall be in sufficient quantity to fill the gap when the berm is removed in the future.

Submit top of stone surface terrain model for review by the Engineer before the start of work and upon completion. A vertical tolerance of ± 30 mm shall be acceptable.

33.0 ITEM 13.0 - PROVISIONAL ITEM - (CLAY BERM SOUTH OF CELL 5 NORTH)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall include all costs associated with construction of a clay berm along the southern perimeter of Cell 5 North as shown on the drawings. The berm shall be constructed by placing earth fill (brown clay) to design grade. The fill shall be placed in lifts not greater than 300 mm and compacted to 95% SPMDD.

This work shall only be completed if determined necessary by the Engineer.

Measurement for payment shall be based on the length of clay berm constructed as determined in the field.

34.0 ITEM 14.0 - PROVISIONAL ITEM - (REMOVE BERM AND CONSTRUCT LINER)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall include all costs associated with removal of the berm to be constructed under this contract between Cell 4 North and Cell 5 North (S.P. 26.0), including construction of the clay liner and subsequent geotextile separator and drainage gravel, as directed by the Engineer, to connect the landfill base of these two cells.

This work shall only be completed if determined safe to do so by the Engineer. The berm in its entirety or only a portion may be removed as determined by the Engineer.

Refer to S.P. 29.0 for information regarding the construction of the clay liner. Refer to S.P. 31.0 for information regarding geotextile separator and S.P. 32.0 for primary drainage gravel.

Measurement for payment shall be based on the length of berm removed, liner constructed, and geotextile separator/drainage gravel installed as determined in the field.

35.0 ITEMS 15.0 AND 16.0 - (200 MM DIA. HDPE LCS PERFORATED AND SOLID WALL PIPE – CELL 5 NORTH)

Under these tender items and for the associated unit price bids, the Contractor shall include the supply and installation of leachate collector piping in accordance with the details shown on the drawings.

Pipe sizes and ratings shall be in accordance with the drawings. Piping shall be perforated or solid wall, depending on the location. The pipe (IPS) and fittings dimensions and manufacturing shall be in accordance with ASTM D3035 and ASTM F714. Pipe resin shall be grade PE4710 in accordance with ASTM D3350 requirements. Resin compound cell classification shall be 445574C with a minimum Pennsylvania Notch Test (PENT) value of 500 hours. Code C resin material shall contain minimum 2 percent carbon black sufficiently dispersed to protect the pipe against ultraviolet degradation.

Pipe joints shall be by thermal butt fusion in accordance with the procedures described in ASTM F2620. The critical parameters at each fusion joint shall be recorded either manually or by data logging device. Prior to initiating thermal fusion in the field on any pipe on a given day, provide a test weld and operating data to the Engineer including welding temperature, machine number, date of last service, and clearance certificate.

Flanged and electrofusion connections shall be used where shown on the drawings. Electrofusion couplings shall be Friatec or approved equal. Electrofusion connection, as shown on the drawings, shall be used for connection with the existing piping of Cell 4 North.

The perforated pipe shall be factory perforated and drilling on site shall not be allowed. The required perforation pattern is shown on the drawings. All holes shall be clean and smooth with no residual burr from drilling. The pipe interior shall be clean and free of any debris prior to installation. Minimum bending radius for the pipe is 10 m.

Pipe fusion shall be carried out within the cell area to avoid dragging the pipe a long distance, which could result in the contamination of the pipe interior.

Solid wall pipe shall be installed within the cell north side slope. Pipe bedding and backfill shall be select clay material placed in lifts not greater than 300 mm and compacted to 98% SPMDD except near manholes where U-fill shall be used for pipe embedment.

Refer to S.P. 39.0 for connection of the LCS pipe from MHL17 to existing LCS in MHL15.

36.0 ITEM 17.0 - (CCTV INSPECTION OF LEACHATE COLLECTION PIPING INCLUDING CLEANUP AND FLUSHING - CELL 5 NORTH)

Under this tender item and for the associated unit price bid, the Contractor shall carry out a CCTV inspection of all new leachate collector piping. CCTV inspection is required to ensure that the interior of all piping is clean and free of any debris, including small stones that may have entered the pipe through the holes after installation. The CCTV Contractor shall have the appropriate certification in accordance with OPSS 409. The camera shall be suitable for travel within the pipe specified.

Inspections shall be recorded on CD or DVD or USB flash drive and submitted to the Engineer for review. The type of recording media to be used will be determined after the initial submission by the Contractor. This submission shall be in accordance with the requirements of OPSS 409.04.01.

The Contractor shall clean/flush all newly installed piping until the Engineer confirms that the pipe is clean and free of any foreign material based on the CCTV inspection. The Contractor shall use a suitable cleaning method to remove all encountered debris. A high-pressure, self-propelled flushing system was used for this purpose in the past.

37.0 ITEM 18.0 - (CAST-IN-PLACE CONCRETE FOR 2400 MM DIA. MANHOLE FOUNDATION – CELL 5 NORTH)

All concrete shall be Type 50 sulphate-resistant cement having a compressive strength of 35 MPa at 28 days. Slag cement mixture may be used in place of Type 50 cement. Mud slab, if used, compressive strength shall be 20 MPa at 28 days. Concrete shall be in compliance with the specifications shown on the drawings and with OPSS 904 and 1350. Submit concrete design mix and rebar reinforcement shop drawings for review.

38.0 ITEM 18.0 - (PRE-CAST CONCRETE FOR 2400 MM DIA. MANHOLE WITH ALL SPECIFIED ACCESSORIES – CELL 5 NORTH)

The associated unit price bid for this tender item shall be full compensation for the supply and placement of precast structure, cast-in-place concrete, including excavation, backfill, dewatering, pipe connections, accessories and all other work necessary for the complete installation of the maintenance hole structure. Each structure shall be installed to the details shown on the drawings.

Manhole risers shall be as per OPSD 701.013. Provide mastic and gaskets between all manhole riser sections. Frost straps shall be in accordance with OPSD 701.100.

Manhole excavation shall be carried out in compliance with OHSA requirements. Refer to background documents in Division 10 for WSP Geotechnical Investigation report which makes various recommendations regarding excavation, dewatering and backfilling of both manholes.

The manhole's base foundation (i.e., cast-in-place concrete pad) shall be founded on granular B type 2 compacted to 98% SPMDD in lifts not greater than 300 mm. The remaining part of the manhole shall be backfilled with select clay compacted to 98% SPMDD in lifts not greater than 300 mm. Backfilling shall be carried out uniformly around the manhole without exerting excessive eccentric load which may endanger the structure. Contractor shall place U-fill around leachate collector pipe as required and directed by the engineer to avoid compacting granular material in restricted spaces.

.1 Metal Fabrications

Submit shop drawings for all metal fabrications.

1. Ladder to OPSD 406.010 but modified to stainless steel from aluminum.
2. Airtight aluminum access cover with a hasp locking system.

A semi-circular access hatch shall be fabricated by MSU Mississauga Ltd. The fabrication shall conform to CAN3-S157-M83, CSA W59.2-M191 and CSA W47.2-M1987. The access hatch shall be reinforced to withstand a live load of 14.4 kN/m². Refer to contract drawings for more details. Fabricate square, true and accurately to the required size. Coordinate with the precast concrete manufacturer, who shall cast the hatch into concrete. Shop drawings for access cover for both manholes shall be stamped by a Professional Engineer.

3. Stainless steel D-bolt anchor for fall protection tie off. Anchor to be the same as those used elsewhere at the site.
4. Reflective aluminum sign with text as shown on the drawings. The sign dimensions are to be the same as for the existing sign at MHL13 and MHL15 in Cell 4 North.

.2 Piping

1. Scoop assembly shall be installed by the precast concrete manufacturer. HDPE piping, fittings and fabrication shall be in accordance with the details shown on the drawings. All pipes shall be grouted by the manhole manufacturer with a CPD sulphate-resistant, non-shrink grout or approved equivalent. Refer to S.P. 35.0 and 36.0 for additional pipe information.
2. Galvanized steel vent pipe Schedule 40 complete with bird screen in accordance with the drawings to ASTM A53.
3. HDPE pipe stub for future connection to the landfill gas collection system in accordance with the details shown on the drawings. Provide stainless steel blind flange with 316 stainless steel bolts and nuts.

.3 Valve

1. Gate Valve
 - a. 200 mm dia. PVC gate valve (Chemline or approved equivalent)
 - b. One piece moulded flanged body ANSI Class 150.
 - c. Non-rising PVC stem with square operating nut.
 - d. Viton seal.
2. Valve Operator Extension stem
 - a. Stainless steel shaft and couplings as required.
 - b. Load bearing stainless steel brackets.
 - c. Stem to be compatible with 50 mm operating nut on valve.
 - d. Design stem not to rest on the operating nut.
 - e. Supply and install valve operator extension stems. Length to suit final height of manhole.
 - f. Tee wrench to be provided for valve operation, 1.2 m long.

.4 Waterproofing

The manhole assembly shall be waterproofed inside and outside with Tapecrete (acrylic cementitious mortar - marine coat) by Astek Composites, Tel: 416-590-9725. Waterproof in accordance with the manufacturer's recommendations at the locations shown on the drawings.

Submit shop drawings for all precast concrete structures, metal fabrications, piping, valving and waterproofing showing all dimensions, elevations, details, supports and accessories to the Engineer for review. Shop drawings for non-OPSD structures shall be stamped and signed by a Professional Engineer licenced to practice in Ontario. Fabrication shall not commence before final approved shop drawings are returned to the Contractor by the Engineer. Coordinate all work with metal fabricator.

39.0 ITEM 19.0 - (CONNECTION TO EXISTING LCS PIPE)

Under this tender item and for the associated lump sum price bid, the Contractor shall connect the proposed LCS pipe from MHL17 to the to the existing LCS pipe stub (northwest corner of Cell 5 North). Refer to S.P. 20.0 for additional information regarding this pipe. A leachate head of approximately 8m is expected to be built up in MH15 connected to the existing pipe and stub. There is no shut of valve in MHL15 to isolate the existing pipe stub. Contractor is responsible for securing the services of a diver to enter the MHL15 to install a temporary plug and isolate the LCS pipe. Contractor is responsible for temporary management of leachate during the connection. Contractor shall remove the temporary plug in MHL15 once the connection is made.

A quotation was received from Soderholm Maritime Services Inc. to temporary plug the LCS pipe in MHL15 to allow connection of the LCS pipes. The quotation is included in Division 10 for the Contractor's reference. The Contractor is free to propose alternative methods of dewatering the LCS pipe to make the connection to the engineer for approval. However, the Engineer will have the final decision on the methodology to be used.

Comply with the Health and Safety Plan regarding leachate and landfill gas hazard when making the connection to the existing pipe.

40.0 ITEM 20.0 - (RUNOFF SEPARATION BERM - CELL 5 NORTH)

Under this tender item and for the associated unit price bid, the Contractor shall construct the runoff separation berm to the lines and grades shown on the drawings. The berm can be built by leaving earth material in place (if not in conflict with sand management requirements) or by placing earth fill (brown clay) to design grade. If the berm is built as fill, the fill shall be placed in lifts not greater than 300 mm and compacted to 95% SPMD.

If the berm is constructed by leaving the earth material in place, the volume of excavation under Tender Item 8.0 will be reduced by the berm volume.

Adequate additional quantities of drainage gravel and geotextile shall be stockpiled alongside the berms for use by the Owner following the removal of the separation berms during waste filling operations.

41.0 ITEMS 21.0 TO 25.0 - (ROAD CONSTRUCTION - SCOPE OF WORK)

Under these tender items and for the associated unit price bids, the Contractor shall construct the roads, as specified, at the locations and to the details shown on the drawings.

The work to be performed includes the following:

- .1 Miscellaneous removals (culverts, signs, etc.) interfering with the proposed work. Remove with care for possible reuse/storage.
- .2 Stripping of topsoil and stockpiling for reuse.
- .3 Excavation as required for road and ditching construction. Stockpile unsuitable or excess earth material at location(s) shown on the drawings or as directed by the Owner/Engineer.
- .4 Subgrade fill utilizing suitable native material (brown clay) compacted to 98% SPMDD in lifts not greater than 200 mm.
- .5 Road subbase, base and surface construction utilizing materials as shown on the typical road sections. In general, these materials may include one or more of the following components as specifically indicated in S.P. 42.0, S.P. 43.0, S.P. 44.0, S.P. 45.0, S.P. 46.0, S.P. 47.0, S.P. 48.0, S.P. 49.0, S.P. 50.0:
 - non-woven geotextile (Terrafix 270R or approved equivalent) between the subgrade and subbase on sections of road that traverse over landfilled areas.
 - granular B type 2 (OPSS 1010) subbase compacted to 100% SPMDD in lifts not greater than 200 mm. Wherever granular B is noted on the drawings it means granular B type 2.
 - granular A (OPSS 1010) base compacted to 100% SPMDD in lifts not greater than 200 mm.
 - reclaimed asphalt pavement (RAP) surface obtained from pulverizing of asphalt pavement. Contractor shall supply RAP or a suitable alternative with approval from the Engineer to complete the road construction. Compact with at least four (4) passes of vibratory smooth drum compactor in lifts no greater than 150 mm.
- .6 Topsoil and seeding as specified under S.P. 19.0.

In addition to the above outlined work, where required, the Contractor shall construct side entrances, intersections, localized road widenings, localized regrading, etc., as indicated on the drawings.

The Contractor is to build each road to the details shown on the typical road section applicable to each road segment, including ditch treatment but excluding culverts which are covered under a separate tender item.

The measurement for payment for construction of the roads is on a lineal meter basis unless noted otherwise in the Form of Tender. The length shall be measured in the field along the centreline of the roads from centre of intersection to centre of intersection or to end of road construction or end of typical road section.

42.0 ITEM 21.0 - (CLAY ACCESS ROAD)

Under this tender item and for the associated unit price bid, on a linear meter basis as measured in the field along road centreline, the Contractor shall include all costs related to construction of a clay access road south of Cell 5N as shown on the drawings.

43.0 ITEMS 22.0 a), 22.0 b) AND 22.0 c) - (RESURFACE EXISTING ROADS)

Under these tender items and for the associated unit price bids, on a linear meter basis as measured in the field along road centreline, the Contractor shall include all costs related to resurfacing of Roads 'C' and 'D' and the road west of the maintenance building as shown on the drawings.

The top 150 mm of the existing roads (granular B, RAP, or asphalt) shall be removed and stockpiled as directed by the Owner/Engineer prior to placement of 150 mm RAP. Compact RAP with at least four (4) passes of a vibratory smooth drum compactor in lifts no greater than 150 mm.

44.0 ITEMS 23.0 a) AND 23.0 b) - (EXISTING ROAD WIDENING)

Under Item 23.0 a) and for the associated unit price bid, on a linear meter basis as measured in the field along road centreline, Contractor shall include all costs related to widening of Road 'E' as shown on the drawings. Under Item 23.0 b) and for the associated unit price bid, on a lump sum basis, Contractor shall include all costs related to widening of sections of Road 'D' as shown on the drawings to provide a minimum turning radius of 20m.

Road 'E' expansion will require some cut within the existing gravel roadway. Generally, existing ditching will remain as is, except some localized new ditching.

The scope of work for this item is similar to that presented under S.P. 41.0. The proposed road design is as follows:

subgrade cut or fill (98% SPMDD), as required

400 mm of granular B type 2 (100% SPMDD)

250 mm of RAP

Compact RAP with at least four (4) passes of a vibratory smooth drum compactor in lifts no greater than 150 mm.

45.0 ITEM 24.0 - (RAP WASTE HAUL ROAD)

Under this tender item and for the associated unit price bid, on a linear meter basis as measured in the field along road centreline, the Contractor shall include all costs related to construction of a RAP waste haul road to the active landfill area as shown on the drawings.

The RAP waste haul road subgrade must be at the final contour elevations (i.e., top of clay cap) prior to construction of the road. Where portions of the RAP waste haul road are to be constructed on previously completed final cover areas, the Contractor shall first strip and stockpile for reuse the existing vegetated topsoil. Additional clay is required to bring the north slopes of Cell 2, Cell 3 and Cell 4 to final contour elevations. Refer to S.P. 53.0 for placement of additional clay cap to reach final contours.

The scope of work for this item is similar to that presented under S.P. 41.0. The proposed road design is as follows:

subgrade cut or fill (98% SPMDD), as required
non-woven geotextile (Terrafix 270R or approved equivalent)
400 mm of granular B type 2 (100% SPMDD)
250 mm of RAP

Compact RAP with at least four (4) passes of a vibratory smooth drum compactor in lifts no greater than 150 mm.

Placement of geogrid on the subgrade, if required and approved by the Engineer shall be as per S.P. 69.0.

46.0 ITEM 25.0 a) - (GRANULAR B TURNING AREA)

Under this tender item and for the associated lump sum price bid, the Contractor shall include all costs related to construction of a granular B turning area in Cell 2 as shown on the drawings.

The turning area subgrade must be at the final contour elevations (i.e., top of clay cap) prior to construction of the area. Additional clay is required to bring the east slope of Cell 2 to final contour elevations. Refer to S.P. 53.0 for placement of additional clay cap to reach final contours.

The scope of work for this item is similar to that presented under S.P. 41.0. The proposed turning area design is as follows:

subgrade cut or fill (98% SPMDD), as required
non-woven geotextile (Terrafix 270R or approved equivalent)
400 mm of granular B type 2 (100% SPMDD)

Placement of geogrid on the subgrade, if required and approved by the Engineer shall be as per S.P. 69.0.

47.0 ITEM 25.0 b) - (3m WIDE GRANULAR A ACCESS ROAD)

Under this tender item and for the associated lump sum price bid, the Contractor shall include all costs related to construction of a 3m wide granular A access road in Cell 1N and Cell 2 and connect to proposed RAP waste haul road as shown on the drawings.

The scope of work for this item is similar to that presented under S.P. 41.0. The proposed granular A pad and road design is as follows:

subgrade cut or fill (98% SPMDD), as required
non-woven geotextile (Terrafix 270R or approved equivalent)
350 mm brown clay (98% SPMDD)
150 mm of granular A (100% SPMDD)

Placement of geogrid on the subgrade, if required and approved by the Engineer shall be as per S.P. 69.0.

48.0 ITEM 25.0 c) - (GRANULAR A ACCESS RAMP TO MANHOLES)

Under this tender item and for the associated lump sum price bid, the Contractor shall include all costs related to construction of a 3m wide access ramp to exiting manholes (MHL11 and MHL12) and proposed manholes (MHL17 and MHL19) as shown on the drawings.

The scope of work for this item is similar to that presented under S.P. 41.0. The proposed granular A pad and road design is as follows:

subgrade fill with brown clay (98% SPMDD), as required

200 mm of granular A (100% SPMDD)

Installation of culverts through the access ramps shall be as per S.P. 61.0.

49.0 ITEM 25.0 d) - (GRANULAR A PATH)

Under this tender item and for the associated lump sum price bid, the Contractor shall include all costs related to construction of a 6m wide granular A path on top of the existing clay path as shown on the drawings. The scope of work for this item is similar to that presented under S.P. 41.0. The contractor shall smooth grade the surface of the existing clay path prior to placement of a minimum of 200mm granular A compacted to 100% SPMDD.

50.0 ITEM 25.0 e) - (GRANULAR A PAD AND ACCESS ROAD)

Under this tender item and for the associated lump sum price bid, the Contractor shall include all costs related to construction of a 60m x 50m granular A pad and associated 8m wide granular A access road in Cell 4N as shown on the drawings. The actual location will be confirmed in the field by the Owner and Engineer.

The scope of work for this item is similar to that presented under S.P. 41.0. The proposed granular A pad and road design is as follows:

subgrade cut or fill (98% SPMDD), as required

non-woven geotextile (Terrafix 270R or approved equivalent)

350 mm brown clay (98% SPMDD)

150 mm of granular A (100% SPMDD)

51.0 ITEM 26.0 - (HDPE DRAINAGE PIPE WITH RIP RAP)

The associated unit price bid this item shall be full compensation for the supply and placement of solid HDPE drainage pipes DR11 as shown on the drawings. Refer to S.P. 35.0 for additional information regarding HDPE pipe. As part of this item the contractor shall also assess the condition of the existing HDPE drainage pipes and notify the Owner and Engineer of their findings. If existing drainage pipes need to be replaced (as determined by the Owner and Engineer), new HDPE drainage pipes shall be installed as part of this item.

All HDPE drainage pipes shall receive rip rap end treatment (OPSD 810.010) at inlet and outlet. Geotextile shall be Terrafix 270R or approved equivalent. Rip rap d_{50} shall be equal to 150 mm.

52.0 ITEM 27.0 - (900 MM DIA. HDPE VERTICAL SUMP)

Under this tender item and for the associated unit price bid, supply and install 900 mm dia. HDPE DR26 perforated vertical sump at the locations shown on the drawings. Install 1000 mm dia. HDPE base plate at the bottom of the sump to avoid damage to underlying geotextile separator. Top of pipe shall be above the top of the primary drainage gravel. The sump shall be used by Owner for pumping of clean stormwater accumulating at the landfill base with portable pump.

53.0 ITEM 28.0 a) - (CAPPING OF DESIGNATED LANDFILL AREA)

Under this tender item and for the associated unit price bid, the Contractor shall place clay cap as shown and detailed on the drawings. Before start of the work, the Owner will fill that part of the landfill to be capped within Cells 2, 3 and 4 to the approved final waste contours or as directed otherwise by the Engineer. The Contractor will be required to apply clay cap material over the designated finished landfill area, as determined in the field at the time of construction.

.1 Material:

Select clay (grey and brown) from excavation of Cell 5 North shall be used as a source of clay cap material. If additional clay cap material is required, the Owner may choose to import clay cap material to the site or request the Contractor to import. Therefore, the import of clay cap material to the site has been included as a provisional item.

Cap material shall be free of waste and near optimum water content, neither too wet nor too dry, and shall comply with the following gradation limits:

1. Gravel particles > 2 mm: less than 10%.
2. Sand and gravel particles > 0.06 mm: less than 25%.
3. Clay particles < 0.002 mm: at least 20%.

Material not meeting the above requirements shall not be used for the construction of the clay cap.

.2 Execution:

The clay cap shall be constructed to an overall, uniform minimum thickness of 900 mm. The clay cap is to consist of a minimum 600 mm layer of grey clay underlying a minimum 300 mm of brown clay. The vertical tolerance for all clay capping works shall be ± 30 mm. The clay cap shall be compacted to 95% SPMDD in lifts not greater than 300 mm. The Contractor shall use a sheepsfoot compactor of the appropriate size to achieve the specified compaction density. The Contractor shall coordinate his operations with the Engineer, who will be responsible for QA/QC testing.

Measurement for payment will be based on pre- and post-construction field surveys of the clay capped area.

54.0 ITEMS 28.0 b) AND 28.0 c) - (TOPSOIL AND SEED CLAY CAPPED LANDFILL AREA)

Under these tender items and for the associated unit price bids, the Contractor shall apply 150 mm of topsoil and seed over the clay capped area indicated above in S.P. 53.0. All of this work shall be completed in accordance with S.P. 19.0.

55.0 ITEM 29.0 - (MAINTENANCE BUILDING AND HOUSEHOLD HAZARDOUS WASTE STORAGE AREA PAVING)

Under this tender item and for the associated lump sum price bid, the Contractor shall pave the areas adjacent to the maintenance building and household hazardous waste storage area in accordance with the details shown on the drawings, and as specified herein. The scope of work for this item is similar to that outlined under S.P. 41.0. The proposed pad design is as follows:

subgrade cut or fill (98% SPMDD), as required

300 mm of granular B type 2 (100% SPMDD)

150 mm of granular A (100% SPMDD)

130 mm asphaltic concrete (75 mm HL8 binder and 55 mm HL4 surface course) as per S.P. 56.0.

56.0 ITEM 29.0 - (HOT MIX ASPHALT)

Asphaltic concrete pavement shall be constructed in accordance with the details shown on the drawings.

Asphaltic concrete binder course shall be HL8, thickness as specified. The surface course shall be HL4, thickness as specified. Asphaltic concrete shall be compacted to between 93% and 97% Marshall Density.

A tack coat shall be applied to the surface of the binder course and all vertical surfaces at a rate of 0.20 kg/m².

Stepped joints (300 mm minimum width) shall be used when joining to the existing pavement. The Engineer must verify the stepped joints before connections are made.

Three (3) material samples shall be taken for QA/QC and submitted to the Engineer.

57.0 ITEM 30.0 – (PAD AND PUSHWALL FOR TRUCK CLEANOUT AREA)

Under this tender item and for the lump sum price bid, the Contractor shall construct a truck cleanout area with a RAP pad and concrete push wall in accordance with the details shown on the drawings, and as specified herein. Construction of the cleanout area shall include realignment of the existing drainage ditch as shown on the drawings.

The scope of work for the cleanout pad is similar to that outlined under S.P. 41.0. The proposed pad design is as follows:

subgrade fill (98% SPMDD), as required

400 mm of granular B type 2 (100% SPMDD)

250 mm of RAP

58.0 ITEMS 31.0 a) AND 31.0 b) - (LITTER FENCE)

Under these tender items and for the associated unit price bids, the Contractor shall erect a new litter fence in accordance with the details shown on the drawings.

The Contractor shall supply and install new wooden Class 3 utility poles 8.5 m high or previously used poles approved for reuse by the Owner/Engineer.

The bottom 3.3 m of each pole shall be butt treated with pentachlorophenol (or approved equal). All poles shall be set at eight (8) degrees from vertical and lean towards the waste disposal area. The Contractor shall auger holes as specified, set poles and backfill them with limestone screenings. Limestone screenings shall meet the following gradation requirements:

Sieve Size (mm)	% Passing
9.5	100
4.75	90 - 98
2.36	55 - 75
1.18	35 - 55
0.6	22 - 36
0.3	16 - 30
0.15	12 - 22
0.075	less than 15

The welded wire mesh shall be 12.5 gauge galvanized steel with 100 x 50 mm openings and supplied in 1.83 m wide rolls. The wire mesh shall be secured to poles with heavy duty galvanized staples. Overlap wire mesh in accordance with details shown on the drawings. Use galvanized steel wire ties along all overlaps.

Submit shop drawings for welded wire mesh and mounting hardware to be utilized.

59.0 ITEM 32.0 a) AND 32.0 b) - (DRAINAGE DITCHES)

Under these tender items and for the associated unit price bids, the Contractor shall complete all work required to construct new grass lined ditches or regrade existing grass lined ditches as shown on the drawings and as directed by the Engineer, including the following:

- miscellaneous removals, as required
- stripping and stockpiling of topsoil for reuse
- removal and restoration of ditch surface reinforcement (rip rap, drainage gravel, etc.)
- topsoiling and seeding as per S.P. 19.0

The Contractor shall use brown clay as fill material (95% SPMDD) and to block/divert flow in the existing drainage channels where required.

60.0 ITEM 33.0 - (RAISE EXISTING MANHOLES)

Under this tender item and for the associated lump sum price bid, the Contractor shall supply and install 2400mm dia. manhole risers to raise existing manholes as shown on the drawings. Contractor shall remove existing top riser sections on existing manholes (riser section with existing manhole lid/access hatch) and install new riser sections as required/specified to raise existing manholes above the grading of slope for construction of access road. Contractor to verify height of finished grades prior to supply of risers. Approximate height of risers are as follows:

- MHL1 (in Cell 1S) to be raised 1.8m
- MHL6 (in Cell 2S) to be raised 1.0m

Refer to S.P. 38.0 for information on manhole risers.

61.0 ITEMS 34.0 a), 34.0 b) AND 34.0 c) - (CSP CULVERTS)

The associated unit price bids for these tender items shall be full compensation for the supply and placement of corrugated steel pipe culverts as shown on the drawings.

Corrugated steel piping shall be according to CSA G401 with galvanized coating and coupler joints.

The pipe culvert wall thickness shall be as follows:

- 400 mm diameter and smaller – 2.0 mm
- 450 mm to 800 mm diameter - 2.8 mm

Pipe culvert bedding and cover shall be granular A compacted to 100% SPMDD.

All pipe culverts shall receive rip rap end treatment (OPSD 810.010) at inlet and outlet. Geotextile shall be Terrafix 270R or approved equivalent. Rip rap d_{50} shall be equal to 150 mm.

62.0 ITEM 35.0 - (ELECTRICAL WORK)

Under this tender item and for the associated lump sum price bid, the Contractor shall complete all electrical work as shown on the drawings and as specified herein.

Under this tender item, the contractor shall include the cost to arrange, retain and coordinate the extension of existing power from PCP-1 with addition of breakers in existing panel.

.1 Electrical Installation:

- a. The work shall be done to comply with OESC (Ontario Electrical Safety Code) and ESA (Electrical Safety Authority).
- b. All products must bear the approval of CSA.
- c. The Contractor shall be responsible for the application and payment for electrical inspection permit with the Electrical Safety Authority (ESA). The cost for such application shall be included in the price for this item.
- d. It is the Contractor's responsibility to ensure that all electrical installations meet the requirements of the Ontario Electrical Safety Code, 25th Edition and published bulletins.
- e. The Contractor shall be responsible for arranging on-site inspections with the ESA as required by the Ontario Electrical Safety Code.
- f. Pump Control Panel P3: The pump control panel shall include a Lighting panel with main breaker.
- g. Panel shall be 316 stainless steel EEMAC 4X.
- h. Moulded Case Circuit Breakers to CSA C22.2 No. 5-1963:
 - i. Thermal magnetic moulded case circuit breaker, quick-make, quick-break type for manual operation.
 - ii. Common-trip breakers with single handle for multi-pole applications.

- iii. Individual moulded case circuit breakers to be in EEMAC I enclosures, or open type, unless otherwise noted.
- iv. 250-Volt Breakers: 10,000A, minimum symmetrical interrupting capacity.
- v. 600-Volt Breakers: 14,000A, minimum symmetrical interrupting capacity.
- vi. Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping under overload conditions and instantaneous magnetic tripping for short-circuit protection.
- vii. Directory: Provide a typewritten complete circuit directory, protected under transparent plastic showing location and load of each circuit.
- viii. Install in PCP 1.
- ix. Magnetic Breakers: Moulded case circuit breaker (motor circuit interrupter) to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for each circuit protection. Use for combination starters.
- x. Manufacturers: Acceptable manufacturers:
 - 1. Allen-Bradley or approved equal

.2 Panelboards, Breaker Type:

- a. Panelboard: To CSA 22.2 No. 29-1995
- b. 208/120 Volt, 3-phase, 4-wire: Bus and breakers rated for 5,000A symmetrical interrupting capacity.
- c. Sequence phase bussing with odd numbered breakers on the left and even numbered breakers on the right. Permanently identify each breaker with circuit number.
- d. Panelboard: Mains, number of circuits, number and size of branch circuit breakers, as indicated.
- e. Copper bus with full size neutral.
- f. Mains suitable for bolt-on breakers.

.3 Conduit, Conduit Fastenings and Conduit Fittings:

- a. Conduits: All conduits to meet CSA Specification C22.2 No. 45.
 - i. Rigid PVC or epoxy-coated, rigid, galvanized steel conduit (ECRGSC), sized as indicated or required, minimum size 19 mm. ECRGSC shall be Green-Guard as supplied by Columbex Inc., or approved equivalent.
 - ii. Liquid-tight flexible steel conduit sized as indicated and the required, minimum size 19 mm.
- b. Conduit Fastenings:

- i. One-hole, rigid PVC or epoxy-coated, rigid, malleable iron straps to secure surface conduits 50 mm or smaller. Two-hole PVC or epoxy-coated, galvanized steel straps for larger conduits.
 - 1. Beam clamps to secure conduits to exposed steelwork.
 - 2. Channel-type supports for two (2) or more conduits.
 - 3. Rod 6 mm dia. to support suspended channels.
 - c. Conduit Fittings:
 - i. Fittings as required for use with conduit specified, with coating same as conduit.
 - d. Expansion Fittings for Rigid Conduit:
 - i. Expansion sleeves with bonding where conduit crosses a structural expansion joint, Crouse-Hinds type XJ Water tight, complete with grounding strap and clamps.
 - e. Hazardous Areas:
 - i. For hazardous areas, provide epoxy-coated, rigid, galvanized steel conduit, conduit fittings, compound, etc., to conform to the code requirements for the specific type of hazard present, Class 1, Division 1 or 2, Group D.
 - f. Leave a nylon fish cord in all spare conduits and duct. Cap with connector and metal blank, flush with concrete slab or as shown on the drawings.
- .4 Wire and Cables:
- a. Building Wires:
 - i. Conductors: Stranded for #10 AWG and larger. Stranded for motor conductors for all sizes.
 - ii. Copper conductors: Sized as indicated or required, with 1,000 Volt RW90 insulation to CSA C22.2 No. 38 latest edition in conduits and ducts.
 - iii. Minimum conductor size for power and lighting wiring: #12 AWG.
 - iv. Minimum conductor size for control wiring: #14 AWG, coloured per unit function.
 - v. Flexible cable for pendant equipment: Type SEW 600 Volt, 4 conductor.
 - vi. Ground wires: Bare copper with green RW90 insulation when run in duct banks, tray or conduit.
 - b. Instrument Signal Cables:
 - i. In conduit: Two (2) individually-shielded twisted pairs, 300 Volt insulated stranded copper aluminum/polyester overall and individual shield, bare copper drain wire with extended PVC jacket, conductor size #16 AWG, Shawflex Inc., Part No. 63022-1601.
 - ii. In conduit: Two (2) pairs #18 AWG, individually-shielded twisted pairs, 300 Volt insulated stranded copper, aluminum/polyester overall and individual shield, bare copper drain wire, PVC jacket, Shawflex Inc. Part No. 63022-1802.

- iii. In conduit: Three (3) conductor #16 AWG (triad), twisted and shielded, 300 Volt insulated stranded copper, aluminum polyester overall, bare copper drawn wire, PVC jacket, Shawflex Inc., Part No. 63031-1601.
- iv. In conduit: Two (2) conductor #16 AWG, twisted and shielded, 300 Volt insulated stranded copper, aluminum polyester overall, bare copper drawn wire, PVC jacket Shawflex Inc., Part No. 63021-1601 or Belden Part No. 8719.
- v. Direct buried: Two (2) pair, two (2) conductors, twisted pairs, 300 Volt insulated stranded copper, aluminum polyester overall and individually shielded, bare copper drain wire, aluminum armoured with PVC jacket, conductor size #16 AWG, Shawflex Inc., Part No. 63021M1602.

.5 Dry-Type Transformers:

- a. Use transformers of one (1) manufacturer throughout project.
- b. Design:
 - i. Type: ANN
 - ii. 3-phase KVA as indicated, 600 Volt primary, 208/120 Volt, 3-phase, 4-wire, 60 Hz secondary.
 - iii. Insulation: Class B or H.
 - iv. Impedance: Standard.
 - v. Taps: 4-2 ½%, 2-FCANN and 2-FCBN.
 - vi. Enclosure: EEMAC 1, removable metal front panel.
 - vii. Wall mounting or on concrete pad.
 - viii. Finish: ANSI 61 grey and per Section 16010.
- c. Manufacturer:
 - i. Acceptable Manufacturer shall be Hammond (or approved equal)

.6 Direct Buried Type 2 Rigid PVC Ducts in Trench

- a. Use Type 2 rigid PVC ducts and fittings for direct buried ducts as manufactured by IPEX. Size as shown on the drawings.
- b. Buried conduit and cable marker tape shall be 150 mm wide polyethylene cable marker tape, red in colour, with the following imprinted continuously over its entire length: "CAUTION BURIED ELECTRIC LINE BELOW". The conduits shall be 1000 mm below grade as per OPD 2101.01.
- c. Provide rigid conduit expansion joints on bottom of conduits on poles prior to extending conduits below grade.
- d. Use solvent cement on all rigid PVC conduits and ducts for all couplings.

.7 Submittals:

- a. Pump control panel enclosure
- b. Breakers
- c. Lighting panel
- d. HIJB (Hazard Isolation Junction Box)

63.0 ITEM 36.0 - (CONDUIT FOR FUTURE ELECTRICAL WORK)

Under this tender item and for the associated unit price bid, the Contractor shall install conduits for future electrical work as shown on the drawings and as specified herein. Work shall include trenching, backfilling and surface restoration as required. This shall include running conduits with guy wires for future lights, cameras and receptacles.

.1 Direct Buried Type 2 Rigid PVC Ducts in Trench:

- a. Use Type 2 rigid PVC ducts and fittings for direct buried ducts as manufactured by IPEX. Size as shown on the drawings.
- b. Buried conduit and cable marker tape shall be 150 mm wide polyethylene cable marker tape, red in colour, with the following imprinted continuously over its entire length: "CAUTION BURIED ELECTRIC LINE BELOW". The conduits shall be 1000 mm below grade as per OPD 2101.01.
- c. Provide rigid conduit expansion joints on bottom of conduits on poles prior to extending conduits below grade.
- d. Use solvent cement on all rigid PVC conduits and ducts for all couplings.

.2 Conduit, Conduit Fastenings and Conduit Fittings:

- a. Refer to S.P. 62.0.3.

64.0 ITEM 37.0 - (EARTH EXCAVATION – CELL 3N AREA)

Under this tender item and for the associated unit price bid, the Contractor shall remove earth from the surface of Cell 3N (approximately 1.5m in depth). Approximate area is as shown on the drawings. Actual area shall be determined in the field by the Owner and Engineer during construction. Excavated/stripped material shall be stockpiled on site where directed by the Engineer (refer to S.P. 17.0).

65.0 ITEM 38.0 - PROVISIONAL ITEM - (EARTH EXCAVATION – CELL 4N AREA)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall remove earth from the surface of Cell 4N (approximately 0.5m in depth). Approximate area is as shown on the drawings. Actual area shall be determined in the field by the Owner and Engineer during construction. Excavated/stripped material shall be stockpiled on site where directed by the Engineer (refer to S.P. 17.0).

66.0 ITEM 39.0 - PROVISIONAL ITEM - (HAUL ROAD EXCAVATION – CELL 3N AREA)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall remove a portion of the existing haul road in Cell 3N (approximately 1m in depth) as shown on the drawings and as

directed by the Engineer. Excavated/stripped material shall be stockpiled on site where directed by the Engineer (refer to S.P. 17.0).

67.0 ITEM 40.0 - PROVISIONAL ITEM - (HEAVY DUTY SILT FENCE)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall erect and maintain silt fences at all locations directed by the Engineer. Heavy duty silt fence shall be as per OPSD 219.130.

68.0 ITEMS 41.0 AND 42.0 - PROVISIONAL ITEM - (STRAW BALE AND ROCK FLOW CHECK DAMS)

Under these Provisional tender items and for the associated unit price bid, the Contractor shall construct straw bale and rock flow check dams as appropriate to the details shown on the corresponding OPS drawings (OPSD 219.180 and OPSD 219.210, respectively) at all locations directed by the Engineer.

69.0 ITEM 43.0 - PROVISIONAL ITEM - (GEOGRID)

Under this Provisional tender item and for the associated unit price bid, the Contractor shall supply and install geogrid (Terrafix TBX1500 or approved equivalent) for the road construction works, if required and requested by the Engineer.

70.0 ITEMS 44.0 AND 45.0 - PROVISIONAL ITEM - (IMPORT OF TOPSOIL AND CLAY CAP MATERIAL)

Under these Provisional tender items and for the associated unit price bid, the Contractor shall import topsoil and clay cap material as requested by the Owner. Refer to S.P. 19.0 for specifications regarding the import of topsoil. Clay cap material to be imported shall meet the specifications outlined in S.P. 53.0.

71.0 ITEM 46.0 - PROVISIONAL ITEM - (CONTINGENCY ALLOWANCE)

The Contractor agrees that he is not entitled to payment of the Contingency Allowance except for additional work carried out by him in accordance with the Contract and only to the extent of such additional work as authorized by the Engineer in writing.

72.0 ITEM 47.0 - PROVISIONAL ITEM - (LABOUR AND EQUIPMENT CONTINGENCY ALLOWANCE)

Refer to Pages 12 and 13 of the Form of Tender for the Schedule of Additional Unit Prices pertaining to this tender item. The Contractor agrees that he is not entitled to payment of this allowance except for additional work carried out by him in accordance with the Contract and only to the extent of such additional work as authorized by the Engineer in writing.

73.0 ITEM 48.0 - (MANUAL ELECTRIC SUBMERSIBLE PUMP)

Under this tender item and for the associated lump sum price bid, the Contractor shall supply and install NK4-22 Manual Electric Submersible Pump manufactured by Tsurumi Pump including all wiring, hoses and fittings, to dewater MHL19, the Owner will provide the pump for installation. Contractor shall also provide adequate wiring and hose in order to transfer the pump to MHL17 if required.

Additional details for the pump can be found at the following link: <https://www.tsurumipump.com/nk4-22-manual-electric-submersible-pump/nk4-22/>

74.0 ITEM 49.0 - (BONDING, INSURANCE AND PERMITS)

Under this tender item and for the associated lump sum price bid, the Contractor shall include the cost of the Performance Bond, Labour and Material Payment Bond, Maintenance Bond, insurance and any required permits for the work.

75.0 ALL ITEMS - (HARMONIZED SALES TAX)

Under this tender item, the Contractor shall include the Harmonized Sales Tax (HST) for the work performed under the Contract, which is exactly 13.0 percent of the subtotal of all items, not including the HST item. Refer to Division 2 - Information for Tenderers, Clause 14.0 for information pertaining to the Harmonized Sales Tax, which applies to this Contract.

Division 6

Liquidated Damages

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1.0 TIME

Time shall be of the essence of this Contract.

2.0 PROGRESS OF THE WORK AND TIME FOR COMPLETION

The Contractor shall diligently prosecute his work on this Contract to completion on or before the completion date specified in the Tender Form as the "Contract Time" and commencing from the date of the Engineer's written order to commence work. If this time limit above specified is not sufficient to permit completion of the work by the Contractor working a normal number of hours each day or week on a single daylight shift basis, it is expected that additional and/or augmented daylight shifts will be required throughout the life of the Contract to the extent deemed necessary by the Contractor to ensure that the work will be completed within the time limit specified. Any additional costs occasioned by compliance with these provisions will be considered to be included in the prices bid for the various items of work and no additional compensation will be allowed therefore.

3.0 EXTENSION OF TIME FOR COMPLETION

An extension of time may be granted in writing by the Owner in the event of the work being delayed beyond the prescribed time for completion. Such extension may 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 for an extension of time shall be made in writing by the Contractor to the Owner at least fifteen (15) days prior to the date of completion fixed by the Contract. The date of expiry of all bonds or other surety furnished to the Owner by the Contractor shall be extended at the expense of the Contractor to at least two (2) months beyond the extended date of completion, and the Contractor shall furnish the Owner with evidence of such extension of the bond or other surety.

An extension of time that may be granted to the Contractor shall be so granted and accepted without prejudice to any rights of the Owner whatsoever under this Contract, and all such rights shall continue in full force and effect after the time limited in this Contract for the completion of the work and whenever, in this Contract, power or authority is given to the Owner or the Engineer or any person to take any action consequent upon the act, default, neglect, delay, breach, non-observance or non-performance by the Contractor in respect of the work or Contract or any portion thereof, such powers or authorities may be exercised from time to time, and not only in the event of the happening of such contingencies before the time limited in this Contract for the completion of the work but also in the event of the same happening after the time so limited in the case of the Contractor being permitted to proceed with the execution of the work under an extension of time granted by the Owner. In the event of the Owner granting an extension of time, time shall continue to be deemed of the essence of this Contract.

4.0 LIQUIDATED DAMAGES

It is agreed by the parties to the Contract that in case all the work called for under the Contract is not substantially completed or completed by the expiration of the "Contract Time" as tendered in the Tender Form, damage will be sustained by the Owner and that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the Owner will sustain in the event of and by any reason of such delay, and the parties hereto agree that the Contractor will pay to the Owner (in addition to amounts payable to the Owner with respect to site supervision of the work, engineering, inspection charges and quality control), the sum of **Two Thousand Five Hundred Dollars (\$2,500.00)** per day for liquidated damages for each and every calendar day's delay in finishing the work beyond the date established by the "Contract Time" and it is agreed that this amount is an estimate of the actual damage to the Owner which will accrue during the period in excess of the date established by the "Contract Time".

The Owner may deduct any money due under this clause from any monies that may be due or payable to the Contractor on any account whatsoever. The liquidated damages payable under this clause are in addition to and without prejudice to any other remedy, action or alternative that may be available to the Owner.

The Contractor shall not be assessed with Liquidated Damages for any delay caused by Acts of God, or of the Public Enemy, Acts of the Province or of any Foreign State, Fire or Flood which is not caused by the Contractor's negligence, Epidemics, Quarantine Restrictions, Embargoes or delays of Sub-contractors due to such causes.

If the time available for completion of the work is increased or decreased by reason of alterations or changes made under Section GC3.10 of the General Conditions, the "Contract Time" shall be increased or decreased as determined by the Owner.

Division 7

Supplemental General Conditions of
Contract

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1.0 RELIANCE ON CONTRACT DOCUMENTS

Paragraph .01a) in GC 2.01 is deleted and replaced by the following: *“The locations of all underground utilities which will affect the work are not necessarily shown in the Contract Drawings and where shown, the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, the Contractor shall inform himself of the exact location of such utilities and structures and shall assume all liability for damage to them.”*

2.0 GENERAL CONDITION GC 3.05 - LAYOUT INFORMATION

Paragraph .01 is replaced with the following: *“The Contract Administrator will provide benchmarks for the general location, alignment and elevation of the work. The Owner is not responsible for the correctness of the information provided by the Contract Administrator and all benchmarks should be verified prior to construction”.*

It is the responsibility of the Contractor to complete the construction layout for the work.

3.0 GENERAL CONDITION GC 6.03 - CONTRACTOR'S INSURANCE

Clause GC 6.03.04 - Aircraft, Watercraft, Property and Boiler Liability Insurance is deleted from the Contract.

4.0 GENERAL CONDITION GC 6.04 - BONDING

Clause GC 6.04.02: In addition to being authorized to transact a business of suretyship in the Province of Ontario, the surety company issuing the bonds on this Contract must have an office in the Province of Ontario.

5.0 GENERAL CONDITION GC 7.01 - GENERAL

Clause GC 7.01.03 deals with the Contractor being responsible for sequences and Clause GC 7.01.07 deals with the Contractor's construction schedule. As part of the work, the Contract Administrator will be carrying out various quality control requirements, particularly soil testing, as well as other types of tests. Add the following requirement: *“The Contractor shall schedule anticipated quality control (QC) requirements with the Contract Administrator for the upcoming week. If modifications to the construction schedule are required, a minimum of four (4) hours' notification is required to reschedule QC testing. Shorter notifications may be given by the Contractor but a timely response by the Contract Administrator's staff cannot be guaranteed. If a conflict in scheduling occurs, the Contractor shall prioritize the quality control work required. No construction delays will be recognized as a result of insufficient notification or rescheduling QC conflicts.”*

6.0 GENERAL CONDITION GC 7.01.07 - SCHEDULE

The Contractor shall prepare and provide to the Owner and Engineer a construction schedule for review within seven (7) days of the Contract award. The Contractor shall update the construction schedule on a weekly basis and submit to the Owner and Engineer for review.

7.0 GENERAL CONDITION GC 8.01.02 - VARIATIONS IN TENDER QUANTITIES

Sections 01 a) and b): Increase overrun and underrun percentage to 25% from 15%.

8.0 GENERAL CONDITION GC 8.02.04 - CERTIFICATION AND PAYMENT

Each payment shall be made within 45 days from the date of invoice including holdback release payment.

9.0 GENERAL CONDITION GC 8.02.04.04 - SUBSTANTIAL PERFORMANCE OF WORK

All applicable permits, inspections (ESA and other as required), QA/QC documentation, maintenance manuals and training shall be provided before the work is substantially performed and ready for the intended use.

Division 8

OPS General Conditions of Contract



OPSS MUNI GENERAL CONDITIONS OF CONTRACT

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SECTION GC 1.0 - INTERPRETATION

GC 1.01 Captions

.01 The captions appearing in these General Conditions have been inserted as a matter of convenience and for ease of reference only and in no way define, limit, or enlarge the scope or meaning of the General Conditions or any provision hereof.

GC 1.02 Abbreviations

.01 The abbreviations on the left below are commonly found in the Contract Documents and represent the organizations and phrases listed on the right:

"AASHTO"	-	American Association of State Highway Transportation Officials
"ACI"	-	American Concrete Institute
"ANSI"	-	American National Standards Institute
"ASTM"	-	ASTM International
"AWG"	-	American Wire Gauge
"AWWA"	-	American Water Works Association
"CCIL"	-	Canadian Council of Independent Laboratories
"CGSB"	-	Canadian General Standards Board
"CSA"	-	CSA Group - formerly Canadian Standards Association
"CWB"	-	Canadian Welding Bureau
"GC"	-	General Conditions
"ISO"	-	International Organization for Standardization
"MECP"	-	Ontario Ministry of the Environment, Conservation and Parks
"MTO"	-	Ontario Ministry of Transportation
"MUTCD"	-	Manual of Uniform Traffic Control Devices, published by MTO
"OHSA"	-	Ontario Occupational Health and Safety Act
"OLS"	-	Ontario Land Surveyor
"OPS"	-	Ontario Provincial Standard
"OPSD"	-	Ontario Provincial Standard Drawing
"OPSS"	-	Ontario Provincial Standard Specification
"OTM"	-	Ontario Traffic Manual
"PEO"	-	Professional Engineers Ontario
"SAE"	-	SAE International
"SCC"	-	Standards Council of Canada
"SSPC"	-	The Society for Protective Coatings
"UL"	-	Underwriters Laboratories
"ULC"	-	Underwriters Laboratories Canada
"WHMIS"	-	Workplace Hazardous Materials Information System
"WSIB"	-	Workplace Safety & Insurance Board

GC 1.03 Gender and Singular References

.01 References to the masculine or singular throughout the Contract Documents shall be considered to include the feminine and the plural and vice versa, as the context requires.

GC 1.04

Definitions

.01 For the purposes of the Contract Documents the following definitions shall apply:

Abnormal Weather means an extreme climatic condition characterized by wind speed, air temperature, precipitation, or snow fall depth, that is less than or greater than 1-1/2 standard deviations from the mean determined from the weather records of the 25-year period immediately preceding the tender opening date.

Actual Measurement means the field measurement of that quantity within the approved limits of the Work.

Addenda means any additions or change in the Tender documents issued by the Owner prior to Tender closing.

Additional Work means work not provided for in the Contract Documents and not considered by the Contract Administrator to be essential to the satisfactory completion of the Contract within its intended scope.

Agreement means the agreement between the Owner and the Contractor for the performance of the Work that is included in the Contract Documents.

Base means a layer of Material of specified type and thickness placed immediately below the pavement, driving surface, finished grade, curb and gutter, or sidewalk.

Business Day means any Day except Saturdays, Sundays, and statutory holidays.

Certificate of Subcontract Completion means the certificate issued by the Contract Administrator in accordance with clause GC 8.02.04.02, Certification of Subcontract Completion.

Certificate of Substantial Performance means the certificate issued by the Contract Administrator at Substantial Performance.

Change Directive means any written instruction signed by the Owner, or by the Contract Administrator where so authorized, directing that a Change in the Work or Extra Work be performed.

Change in the Work means the deletion, extension, increase, decrease, or alteration of lines; grades; dimensions; quantities; methods; drawings; substantial changes in geotechnical, subsurface, surface, or other conditions; changes in the character of the Work to be done; or Materials of the Work or part thereof, within the intended scope of the Contract.

Change Order means a written amendment to the Contract signed by the Contractor and the Owner, or the Contract Administrator where so authorized, covering contingencies, a Change in the Work, Extra Work, Additional Work; and establishing the basis for payment and the time allowed for the adjustment of the Contract Time.

Completion means contract completion as set out in the Construction Act.

Completion Certificate means the certificate issued by the Contract Administrator at Completion.

Completion Payment means the payment described more particularly in clause GC 8.02.04.07.

Construction Act means as set out in the Construction Act, R.S.O. 1990, c. C.30, as amended.

Constructor means, for the purposes of, and within the meaning of the Occupational Health and Safety Act, R.S.O. 1990, c.O.1, as amended and amendments thereto, the Contractor who executes the Contract.

Contract means the undertaking by the Owner and the Contractor to perform their respective duties, responsibilities, and obligations as prescribed in the Contract Documents.

Contract Administrator means the person, partnership, or corporation designated by the Owner to be the Owner's representative for the purposes of the Contract.

Contract Documents mean the executed Agreement between the Owner and the Contractor, Tender, General Conditions of Contract, Supplemental General Conditions of Contract, Standard Specifications, Special Provisions, Contract Drawings, Addenda incorporated in a Contract Document before the execution of the Agreement, such other documents as may be listed in the Agreement, and subsequent amendments to the Contract Documents made pursuant to the provisions of the Agreement.

Contract Drawings or **Contract Plans** mean drawings or plans, any Geotechnical Report, any Subsurface Report, and any other reports and information provided by the Owner for the Work, and without limiting the generality thereof, may include soil profiles, foundation investigation reports, reinforcing steel schedules, aggregate sources list, Quantity Sheets, and cross-sections.

Contract Time means the time stipulated in the Contract Documents for Substantial Performance or Completion of the Work, including any extension of time made pursuant to the Contract Documents.

Contractor means the person, partnership, or corporation undertaking the Work as identified in the Agreement.

Control Monument means any horizontal or vertical (benchmark) monument that is used to lay out the Work.

Controlling Operation means any component of the Work that, if delayed, may delay the completion of the Work.

Cut-Off Date means the date up to which payment shall be made for Work performed.

Daily Work Records mean daily Records detailing the number and categories of workers and hours worked or on standby, types and quantities of Equipment and number of hours in use or on standby, and description and quantities of Material utilized.

Day means a calendar day.

Drawings or **Plans** mean any Contract Drawings or Contract Plans, or any Working Drawings or Working Plans, or any reproductions of drawings or plans pertaining to the Work.

End Result Specification means specifications that require the Contractor to be responsible for supplying a product or part of the Work. The Owner accepts or rejects the final product or applies a price adjustment that is commensurate with the degree of compliance with the specification.

Engineer means a professional engineer licenced by the Professional Engineers of Ontario to practice in the Province of Ontario.

Equipment means all machinery and equipment used for preparing, fabricating, conveying or erecting the Work and normally referred to as construction machinery and equipment.

Estimate means a calculation of the quantity or cost of the Work or part of it depending on the context.

Extra Work means work not provided for in the Contract as awarded but considered by the Contract Administrator to be essential to the satisfactory completion of the Contract within its intended scope, including unanticipated Work required to comply with legislation and regulations that affect the Work.

Final Acceptance means the date on which the Contract Administrator determines that the Work has passed all inspection and testing requirements and the Contract Administrator is satisfied that the Contractor has rectified all imperfect Work and has discharged all of the Contractor's obligations under the Contract Documents.

Final Acceptance Certificate means the certificate issued by the Contract Administrator at Final Acceptance of the Work.

Final Detailed Statement means a complete evaluation prepared by the Contract Administrator showing the quantities, unit prices, and final dollar amounts of all items of Work completed under the Contract, including variations in tender items and Extra Work, all as set out in the same general form as the monthly Estimates.

Geotechnical Report means a report or other information identifying soil, rock, and ground water conditions in the area of any proposed Work.

Grade means the required elevation of that part of the Work.

Hand Tools means tools that are commonly called tools or implements of the trade and include small power tools.

Highway means a common and public highway any part of which is intended for or used by the general public for the passage of vehicles and includes the area between the lateral property lines thereof.

Inclement Weather means weather conditions or conditions resulting directly from weather conditions that prevent the Contractor from proceeding with a Controlling Operation.

Lot means a specific quantity of Material or a specific amount of construction normally from a single source and produced by the same process.

Lump Sum Item means a tender item indicating a portion of the Work for which payment will be made at a single tendered price. Payment is not based on a measured quantity, although a quantity may be given in the Contract Documents.

Major Item means any tender item that has a value, calculated based on its actual or estimated tender quantity, whichever is the larger, multiplied by its tender unit price, which is equal to or greater than the lesser of,

- a) \$100,000, or
- b) 5% of the total tender value calculated based on the total of all the estimated tender quantities and the tender unit prices.

Material means Material, machinery, equipment and fixtures forming part of the Work.

Monument means either a Property Monument or a Control Monument.

Owner means the party to the Contract for whom the Work is being performed, as identified in the Agreement, and includes, with the same meaning and import, "Authority."

Pavement means a wearing course or courses placed on the Roadway and consisting of asphaltic concrete, hydraulic cement concrete, Portland cement concrete, or plant or road mixed mulch.

Performance Bond means the type of security furnished to the Owner to guarantee completion of the Work in accordance with the Contract and to the extent provided in the bond.

Plan Quantity means that quantity as computed from within the boundary lines of the Work as shown in the Contract Documents.

Project means the construction of the Work as contemplated by this Contract.

Proper Invoice has the meaning as set out in the Construction Act.

Property Monument means any property bar, concrete pillar, rock post, cut cross or other object that marks the boundary between real property ownership.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that Work meets the specified requirements.

Quality Control (QC) means a system or series of activities carried out by the Contractor, Subcontractor, supplier, and manufacturer to ensure that Work meets the specified requirements.

Quantity Sheet means a list of the quantities of Work to be done.

Quarried Rock means Material removed from an open excavation made in a solid mass of rock that, prior to removal, was integral with the parent mass.

Quarry means a place where aggregate has been or is being removed from an open excavation made in a solid mass of igneous, sedimentary, or metamorphic rock or any combination of these that, prior to removal, was integral with the parent areas.

Rate of Interest means the prejudgment interest rate determined under subsection 127(2) of the *Courts of Justice Act* or, if the contract or subcontract specifies a different interest rate for the purpose, the greater of the prejudgment interest rate and the interest rate specified in the contract or subcontract.

Records mean any books, payrolls, accounts, or other information that relate to the Work or any Change in the Work, Extra Work, Additional Work or claims arising therefrom.

Roadway means that part of the Highway designed or intended for use by vehicular traffic and includes the Shoulders.

Shoulder means that portion of the Roadway between the edge of the travelled portion of the wearing surface and the top inside edge of the ditch or fill slope.

Special Provisions mean directions containing requirements specific to the Work.

Standard Drawing or Standard Specification means a standard practice required and stipulated by the Owner for performance of the Work.

Statutory Holdback means the holdbacks required under the Construction Act.

Subbase means a layer of Material of specified type and thickness between the Subgrade and the Base.

Subcontractor means a person, partnership or corporation undertaking the execution of a part of the Work by virtue of an agreement with the Contractor.

Subgrade means the earth or rock surface, whether in cut or fill, as prepared to support the pavement structure, consisting of Base, Subbase, and Pavement.

Substantial Performance has the meaning as set out in the Construction Act, R.S.O. 1990, c. C.30, as amended.

Subsurface Report means a report or other information identifying the location of Utilities, concealed and adjacent structures, and physical obstructions that fall within the influence of the Work.

Superintendent means the Contractor's authorized representative in charge of the Work and who shall be a "competent person" within the meaning of the definition contained in the Occupational Health and Safety Act, R.S.O. 1990, c. 0.1, as amended.

Surety means the person, partnership or corporation, other than the Contractor, licensed in Ontario to transact business under the Insurance Act, R.S.O. 1990, c.1.8, as amended, executing a bond provided by the Contractor.

Tender means an offer in writing from the Contractor, submitted in the format prescribed by the Owner, to complete the Work.

Time and Material means costs calculated according to clause GC 8.02.05, Payment on a Time and Material Basis.

Utility means an aboveground or underground facility maintained by a municipality, public utility authority or regulated authority and includes services such as sanitary sewer, storm sewer, water, electric, gas, oil, steam, data transmission, telephone, and cable television.

Warranty Period means the applicable time period according to clause GC 7.16.02, Warranty.

Work means the total construction and related services required by the Contract Documents.

Working Area means all the lands and easements owned or acquired by the Owner for the construction of the Work.

Working Day means any Day,

- a) except Saturdays, Sundays and statutory holidays;
- b) except a Day as determined by the Contract Administrator, on which the Contractor is prevented by inclement weather or conditions resulting immediately therefrom, from proceeding with a Controlling Operation. For the purposes of this definition, this shall be a Day during which the Contractor cannot proceed with at least 60% of the normal labour and Equipment force effectively engaged on the Controlling Operation for at least 5 hours;
- c) except a Day on which the Contractor is prevented from proceeding with a Controlling Operation, as determined by the Contract Administrator by reason of,
 - i. any breach of the Contract by the Owner or if such prevention is due to the Owner, another contractor hired by the Owner, or an employee of any one of them, or by anyone else acting on behalf of the Owner.
 - ii. non-delivery of Owner supplied Materials.
 - iii. any cause beyond the reasonable control of the Contractor that can be substantiated by the Contractor to the satisfaction of the Contract Administrator.

Working Drawings or Working Plans means any Drawings or Plans prepared by the Contractor for the execution of the Work and may, without limiting the generality thereof, include formwork, falsework, and shoring plans; Roadway protection plans; shop drawings; shop plans; or erection diagrams.

GC 1.05 Ontario Traffic Manual

- .01 All references in the Contract Documents to the MUTCD, including all Parts and Divisions thereof, or MTO Traffic Control Manual for Roadway Work Operations, or Traffic Control Manual for Roadway Operations Field Edition are hereby deleted and replaced by all currently available books which make up the Ontario Traffic Manual.

GC 1.06 Final Acceptance

- .01 For the purposes of determining whether Final Acceptance has occurred, the Contract Administrator shall not take into account, in determining the discharge of the Contractor's obligations, any warranty obligation of the Contractor to the extent that the warranty extends beyond 12 months after Substantial Performance.

GC 1.07 Interpretation of Certain Words

- .01 The words "acceptable," "approval," "authorized," "considered necessary," "directed," "required," "satisfactory," or words of like import, shall mean approval of, directed, required, considered necessary, or authorized by and acceptable or satisfactory to the Contract Administrator, unless the context clearly indicates otherwise.

SECTION GC 2.0 - CONTRACT DOCUMENTS

GC 2.01 Reliance on Contract Documents

- .01 The Owner warrants that the information furnished in the Contract Documents can be relied upon with the following limitations or exceptions:
- a) Based on available information at the time of the contract, the location of all mainline underground Utilities that may affect the Work shall be shown to a tolerance of:
 - i. 1 m horizontal, and
 - ii. 0.3 m vertical
- .02 The Owner does not warrant or make any representation with respect to:
- a) interpretations of data or opinions expressed in any Subsurface Report available for the perusal of the Contractor, that are not included as part of the Contract Documents, and
 - b) other information specifically excluded from this warranty.

GC 2.02 Order of Precedence

- .01 In the event of any inconsistency or conflict in the contents of the following documents, such documents shall take precedence and govern in the following descending order:
- a) Agreement
 - b) Addenda
 - c) Special Provisions
 - d) Contract Drawings
 - e) Standard Specifications
 - f) Standard Drawings
 - g) Tender
 - h) Supplemental General Conditions
 - i) OPSS.MUNI 100 General Conditions of Contract
 - j) Working Drawings

Later dates shall govern within each of the above categories of documents.

- .02 In the event of any conflict among or inconsistency in the information shown on Drawings, the following rules shall apply:
- a) Dimensions shown in figures on a Drawing shall govern where they differ from dimensions scaled from the same Drawing;
 - b) Drawings of larger scale shall govern over those of smaller scale;
 - c) Detailed Drawings shall govern over general Drawings; and

- d) Drawings of a later date shall govern over those of an earlier date in the same series.
- .03 In the event of any inconsistency or conflict in the contents of Standard Specifications the following descending order of precedence shall govern:
- a) Owner's Standard Specifications
 - b) Ontario Provincial Standard Specifications
 - c) Other standards referenced in OPSSs and OPSDs (e.g., CSA, CGSB, ASTM, and ANSI).
- .04 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all.

SECTION GC 3.0 - ADMINISTRATION OF THE CONTRACT

GC 3.01 Contract Administrator's Authority

- .01 The Contract Administrator shall be the Owner's representative during construction and until the issuance of the Completion Certificate or the issuance of the Final Acceptance Certificate, whichever is later. All instructions to the Contractor, including instructions from the Owner, shall be issued by the Contract Administrator. The Contract Administrator shall have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents.
- .02 All claims, disputes and other matters in question relating to the performance and the quality of the Work or the interpretation of the Contract Documents shall be referred to the Contract Administrator in writing by the Contractor.
- .03 The Contract Administrator may inspect the Work for its conformity with the Contract Documents, and to record the necessary data to establish payment quantities under the schedule of tender quantities and unit prices or to assess the value of the Work completed in the case of a lump sum price Contract.
- .04 The Contract Administrator shall provide an estimate of the amounts owing to the Contractor under the Contract as provided for in section GC 8.0, Measurement and Payment.
- .05 The Contract Administrator, to not cause delay in the schedule, shall, with reasonable promptness, review and take appropriate action upon the Contractor's submissions such as shop drawings, product data, and samples in accordance with the Contract Documents .
- .06 The Contract Administrator shall investigate all allegations of a Change in the Work made by the Contractor and issue appropriate instructions.
- .07 The Contract Administrator shall prepare Change Directives and Change Orders for the Owner's approval.
- .08 Upon written application by the Contractor, the Contract Administrator and the Contractor shall jointly conduct an inspection of the Work to establish the date of Substantial Performance of the Work or the date of Completion of the Work or both.
- .09 The Contract Administrator shall be, in the first instance, the interpreter of the Contract Documents and the judge of the performance thereunder by both parties to the Contract. Interpretations and decisions of the Contract Administrator shall be consistent with the intent of the Contract Documents and, in making these decisions, the Contract Administrator shall not show partiality to either party.
- .10 The Contract Administrator shall have the authority to reject any part of the Work or Material that does not conform to the Contract Documents.
- .11 In the event that the Contract Administrator determines that any part of the Work performed by the Contractor is defective, whether the result of poor workmanship the use of defective Material or damage through carelessness or other act or omission of the Contractor and whether or not incorporated in the Work or otherwise fails to conform to the Contract Documents, then the Contractor shall if directed by the Contract Administrator promptly, as directed by the Contract Administrator, remove the Work and replace, make good, or re-execute the Work at no additional cost to the Owner.
- .12 Any part of the Work destroyed or damaged by such removals, replacements, or re-executions shall be made good, promptly, at no additional cost to the Owner.

- .13 If, in the opinion of the Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with the Contract Documents, the Owner may deduct from monies otherwise due to the Contractor the difference in value between the Work as performed and that called for by the Contract Documents amount that will be determined in the first instance by the Contract Administrator.
- .14 Notwithstanding any inspections made by the Contract Administrator or the issuance of any certificates or the making of any payment by the Owner, the failure of the Contract Administrator to reject any defective Work or Material shall not constitute acceptance of defective Work or Material.
- .15 The Contract Administrator shall have the authority to temporarily suspend the Work for such reasonable time as may be necessary:
 - a) to facilitate the checking of any portion of the Contractor's construction layout;
 - b) to facilitate the inspection of any portion of the Work; or
 - c) for the Contractor to remedy its non-compliance with any provisions of the Contract Documents.

The Contractor shall not be entitled to any compensation for suspension of the Work in these circumstances.
- .16 The Owner has the right to terminate the Contract for wilful or persistent violation by the Contractor or its workers of any applicable laws or bylaws, including but not limited to, the Occupational Health and Safety Act legislation and regulations, Workplace Safety and Insurance Board Act, and Regulation 347 of the Environmental Protection Act.
- .17 If the Contract Administrator determines that any worker employed on the Work is incompetent, as defined by the Occupational Health and Safety Act, or is disorderly, then the Contract Administrator shall provide written notice to the Contractor and the Contractor shall immediately remove the worker from the Working Area. Such worker shall not return to the Working Area without the prior written consent of the Contract Administrator.

GC 3.02 Working Drawings

- .01 The Contractor shall arrange for the preparation of clearly identified and dated Working Drawings as called for by the Contract Documents.
- .02 The Contractor, to not cause delay in the Work, shall submit Working Drawings to the Contract Administrator with reasonable promptness and in orderly sequence . If either the Contractor or the Contract Administrator so requests, they shall jointly prepare a schedule fixing the dates for submission and return of Working Drawings. Working Drawings shall be submitted in printed form. At the time of submission, the Contractor shall notify the Contract Administrator in writing of any deviations from the Contract Documents that exist in the Working Drawings.
- .03 The Contract Administrator shall review and return Working Drawings in accordance with an agreed upon schedule, or otherwise, with reasonable promptness so as not to cause delay.
- .04 The Contract Administrator's review shall be to check for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the Working Drawings or of responsibility for meeting all requirements of the Contract Documents, unless a deviation on the Working Drawings has been approved in writing by the Contract Administrator.

- .05 The Contractor shall make any changes in Working Drawings that the Contract Administrator may require to make the Working Drawings consistent with the Contract Documents and resubmit, unless otherwise directed by the Contract Administrator. When resubmitting, the Contractor shall notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.
- .06 Work related to the Working Drawings shall not proceed until the Working Drawings have been signed and dated by the Contract Administrator.
- .07 The Contractor shall keep one set of the reviewed Working Drawings, marked as above, at the site at all times.

GC 3.03 Right of the Contract Administrator to Modify Methods and Equipment

- .01 The Contractor shall, when requested in writing, make alterations in the method, Equipment, or work force at any time the Contract Administrator considers the Contractor's actions to be unsafe, or damaging to either the Work or existing facilities or the environment.
- .02 The Contractor shall, when requested in writing, alter the sequence of its operations on the Contract so as to avoid interference with work being performed by others.
- .03 Notwithstanding the foregoing, the Contractor shall ensure that all necessary safety precautions and protection are maintained throughout the Work.

GC 3.04 Emergency Situations

- .01 The Contract Administrator has the right to determine the existence of an emergency situation and, when such an emergency situation is deemed to exist, the Contract Administrator may instruct the Contractor to take action to remedy the situation. If the Contractor does not take timely action or, if the Contractor is not available, the Contract Administrator may direct others to remedy the situation.
- .02 If the emergency situation was the fault of the Contractor, the remedial Work shall be done at the Contractor's expense. If the emergency situation was not the fault of the Contractor, the Owner shall pay for the remedial Work.

GC 3.05 Layout Information

- .01 The Contract Administrator shall provide background information, including without limitation, baseline and benchmark information, to facilitate the general location, alignment, elevation and layout of the Work.
- .02 The Contract Administrator shall provide pre and post construction inventories of all Monuments, etc. that are located within the Working Area.
- .03 The Owner shall be responsible only for the correctness of the layout information provided by the Contract Administrator.

GC 3.06 Extension of Contract Time

- .01 An application for an extension of Contract Time shall be made in writing by the Contractor to the Contract Administrator as soon as the need for such extension becomes evident and at least 15 Days prior to the expiration of the Contract Time. The application for an extension of Contract Time shall enumerate the reasons and state the length of extension required.

- .02 Circumstances suitable for consideration of an extension of Contract Time include the following:
- a) Delays, subsection GC 3.07.
 - b) Changes in the Work, clause GC 3.10.01.
 - c) Extra Work, clause GC 3.10.02.
 - d) Additional Work, clause GC 3.10.03.
- .03 The Contract Administrator shall, in reviewing an application for an extension to the Contract Time, consider whether the delays, Changes in the Work, Extra Work, or Additional Work involve a Controlling Operation.
- .04 The Contract Time shall be extended for such additional time as may be recommended by the Contract Administrator and deemed fair and reasonable by the Owner.
- .05 The terms and conditions of the Contract shall continue for such extension of Contract Time.

GC 3.07 Delays

- .01 If the Contractor is delayed in the performance of the Work by,
- a) war, blockades, and civil commotions;
 - b) errors in the Contract Documents;
 - c) an act or omission of the Owner or Contract Administrator, or anyone employed or engaged by them directly or indirectly, contrary to the provisions of the Contract Documents;
 - d) a stop work order issued by a court or public authority, provided that such order was not issued as the result of an act or omission of the Contractor or anyone employed or engaged by the Contractor directly or indirectly;
 - e) the Contract Administrator giving notice under section GC 7.0, Suspension of Work;
 - f) Abnormal Weather; or
 - g) archaeological finds, in accordance with subsection GC 3.15, Archaeological Finds,
- then the Contractor shall be reimbursed by the Owner for reasonable costs incurred by the Contractor as the result of such delay, provided that in the case of an application for an extension of Contract Time due to Abnormal Weather, the Contractor shall, with the Contractor's application, submit evidence from Environment Canada in support of such application. Extension of Contract Time may be granted in accordance with subsection GC 3.06, Extension of Contract Time.
- .02 If the Work is delayed by labour disputes, strikes or lock-outs, including lock-outs decreed or recommended to its members by a recognized contractor's association, of which the Contractor is a member or to which the Contractor is otherwise bound, which are beyond the Contractor's control, then the Contract Time shall be extended in accordance with subsection GC 3.06, Extension of Contract Time.
- .03 In no case shall the extension of Contract Time be less than the time lost as the result of the event causing the delay, unless a shorter extension is agreed to by the Contractor. The Contractor shall not be entitled to payment for costs incurred as the result of such delays unless such delays are the result of actions by the Owner.

- .04 The Contractor shall not be entitled to payment for the cost of delays incurred as a result of a dispute between the Contractor and Owner. The Contractor shall execute the Work and may pursue resolution of the dispute in accordance with subsection GC 3.13, Claims, Negotiations, Mediations.

GC 3.08 Assignment of Contract

- .01 The Contractor shall not assign the Contract, either in whole or in part, without the prior written consent of the Owner.

GC 3.09 Subcontracting by the Contractor

- .01 Subject to clause GC 3.09.03, Subcontracting by the Contractor, the Contractor may subcontract any part of the Work, in accordance with the Contract Documents and any limitations specified therein.
- .02 The Contractor shall notify the Contract Administrator in writing in 10 Days prior to the start of construction of the intention to subcontract. Such notification shall identify the part of the Work, and the Subcontractor with whom it is intended.
- .03 The Contract Administrator shall, within 5 Days of receipt of such notification, accept or reject the intended Subcontractor. The rejection shall be in writing and shall include the reasons for the rejection.
- .04 The Contractor shall not, without the written consent of the Owner, change a Subcontractor who has been engaged in accordance with this subsection.
- .05 The Contractor shall preserve and protect the rights of the Owner under the Contract Documents with respect to that part of the Work to be performed under subcontract and shall,
- a) enter into agreements with the intended Subcontractors to require them to perform their Work in accordance with the Contract Documents; and
 - b) be as fully responsible to the Owner for acts and omissions of the Contractor's Subcontractors and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the Contractor.
- .06 The Owner's consent to subcontracting by the Contractor shall not be construed to relieve the Contractor from any obligation under the Contract and shall not impose any liability upon the Owner. Nothing contained in the Contract Documents shall create a contractual relationship between a Subcontractor and the Owner.

GC 3.10 Changes

GC 3.10.01 Changes in the Work

- .01 The Owner, or the Contract Administrator where so authorized, may, by order in writing, make a Change in the Work without invalidating the Contract. The Contractor shall not be required to proceed with a Change in the Work until in receipt of a Change Order or Change Directive. Upon the receipt of such Change Order or Change Directive the Contractor shall proceed with the Change in the Work.
- .02 The Contractor may apply for an extension of Contract Time according to the terms of clause GC 3.06, Extension of Contract Time.

- .03 If the Change in the Work relates solely to quantities, payment for that part of the Work shall be made according to the conditions specified in clause GC 8.01.02, Variations in Tender Quantities. If the Change in the Work does not solely relate to quantities, then either the Owner or the Contractor may initiate negotiations upwards or downwards for the adjustment of the Contract price in respect of the Change in the Work pursuant to subsection GC 3.13, Claims, Negotiations, Mediation or payment may be made according to the conditions contained in clause GC 8.02.05, Payment on a Time and Material Basis.

GC 3.10.02 Extra Work

- .01 The Owner, or Contract Administrator where so authorized, may instruct the Contractor to perform Extra Work without invalidating the Contract. The Contractor shall not be required to proceed with the Extra Work until in receipt of a Change Order or Change Directive. Upon receipt of such Change Order or Change Directive the Contractor shall proceed with the Extra Work.
- .02 The Contractor may apply for an extension of Contract Time according to the terms of clause GC 3.06, Extension of Contract Time.
- .03 Either the Owner or Contractor may initiate negotiations upwards or downwards for the payment for the Extra Work pursuant to subsection GC 3.13, Claims, Negotiations, Mediation, or payment may be made according to the conditions contained in clause GC 8.02.05, Payment on a Time and Material Basis.

GC 3.10.03 Additional Work

- .01 The Owner, or Contract Administrator where so authorized, may request the Contractor to perform Additional Work without invalidating the Contract. If the Contractor agrees to perform Additional Work, the Contractor shall proceed with such Additional Work upon receipt of a Change Order.
- .02 The Contractor may apply for an extension of Contract Time according to the terms of subsection GC 3.06, Extension of Contract Time.
- .03 Payment for the Additional Work may be negotiated pursuant to subsection GC 3.13, Claims, Negotiations, Mediation, or payment may be made according to the conditions contained in clause GC 8.02.05, Payment on a Time and Material Basis.

GC 3.11 Notices

- .01 Any notice permitted or required to be given to the Contract Administrator or the Superintendent in respect of the Work shall be deemed to have been given to and received by the addressee on the date of delivery if delivered by hand, email, or by facsimile transmission and on the fifth Day after the date of mailing, if sent by mail.
- .02 The Contractor and the Owner shall provide each other with the mail and email addresses; cell phone, and telephone numbers for the Contract Administrator and the Superintendent at the commencement of the Work, and update as necessary.
- .03 In the event of an emergency situation or other urgent matter the Contract Administrator or the Superintendent may give a verbal notice, provided that such notice is confirmed in writing within 2 Days.
- .04 Any notice permitted or required to be given to the Owner or the Contractor shall be given in accordance with the notice provision of the Contract.

GC 3.12 Use and Occupancy of the Work Prior to Substantial Performance

- .01 Where it is not contemplated elsewhere in the Contract Documents, the Owner may use or occupy the Work or any part thereof prior to Substantial Performance, provided that at least 30 Days written notice has been given to the Contractor.
- .02 The use or occupancy of the Work or any part thereof by the Owner prior to Substantial Performance shall not constitute an acceptance of the Work or parts so occupied. In addition, the use or occupancy of the Work shall not relieve the Contractor or the Contractor's Surety from any liability that has arisen, or may arise, from the performance of the Work in accordance with the Contract Documents. The Owner shall be responsible for any damage that occurs because of the Owner's use or occupancy. Such use or occupancy of any part of the Work by the Owner does not waive the Owner's right to charge the Contractor liquidated damages in accordance with the terms of the Contract.

GC 3.13 Claims, Negotiations, Mediation

GC 3.13.01 Continuance of the Work

- .01 Unless the Contract has been terminated or completed, the Contractor shall in every case, after serving or receiving any notification of a claim or dispute, verbal or written, continue to proceed with the Work with due diligence and expedition. It is understood by the parties that such action shall not jeopardize any claim it may have.

GC 3.13.02 Record Keeping

- .01 Immediately upon commencing Work that may result in a claim, the Contractor shall keep Daily Work Records during the course of the Work, sufficient to substantiate the Contractor's claim, and the Contract Administrator shall keep Daily Work Records to be used in assessing the Contractor's claim, all in accordance with clause GC 8.02.07, Records.
- .02 The Contractor and the Contract Administrator shall attempt to reconcile their respective Daily Work Records on a daily basis, to simplify review of the claim, when submitted. If the Contractor and the Contract Administrator fail to reconcile their respective Daily Work Records, then the Contractor shall submit its Daily Work Records as part of its claim, whereby the resolution of the dispute about the Daily Work Records shall not be resolved until there is a resolution of the claim.
- .03 The keeping of Daily Work Records by the Contract Administrator or the reconciling of such Daily Work Records with those of the Contractor shall not be construed to be acceptance of the claim.

GC 3.13.03 Claims Procedure

- .01 The Contractor shall give verbal notice of any situation that may lead to a claim for additional payment immediately upon becoming aware of the situation.
- .02 The Contractor shall provide written notice within 7 Days of the commencement of any part of the Work that may be affected by the situation.
- .03 The Contractor shall submit detailed claims as soon as reasonably possible and in any event no later than 30 Days or such time as mutually agreed after completion of the Work affected by the situation. The detailed claim shall:
 - a) identify the item or items in respect of which the claim arises;
 - b) state the grounds, contractual or otherwise, upon which the claim is made; and

- c) include the Records maintained by the Contractor supporting such claim.
- .04 Within 30 Days of the receipt of the Contractor's detailed claim, the Contract Administrator may request the Contractor to submit any further and other particulars as the Contract Administrator considers necessary to assess the claim. The Contractor shall submit the requested information within 30 Days of receipt of such request.
- .05 Within 90 Days of receipt of the detailed claim, the Contract Administrator shall advise the Contractor, in writing, of the Contract Administrator's opinion regarding the validity of the claim.

GC 3.13.04 Negotiations

- .01 The parties shall make all reasonable efforts to resolve their dispute by amicable negotiations and agree to provide, without prejudice, open and timely disclosure of relevant facts, information, and documents to facilitate these negotiations.
- .02 Should the Contractor disagree with the opinion given in clause GC 3.13.03.05, with respect to any part of the claim, the Contract Administrator shall enter into negotiations with the Contractor to resolve the matters in dispute. Where a negotiated settlement cannot be reached and it is agreed that payment cannot be made on a Time and Material basis in accordance with clause GC 8.02.05, Payment on a Time and Material Basis, the parties shall proceed in accordance with clause GC 3.13.05, Mediation, or subsection GC 3.14, Arbitration.
- .03 Prior to the expiry of 30 Business Days from the date of receipt of the Contractors claim, the Contract Administrator shall provide a written response to the Contractor stating the Contract Administrator's final price for the Change Order and an explanation of the rationale and basis of the Contract Administrator's position which shall be deemed to be the initial site response.

GC 3.13.05 Mediation

- .01 If a claim is not resolved satisfactorily through the negotiation stage noted in clause GC 3.13.04, Negotiations, within a period of 30 Days following the opinion given in clause GC 3.13.03.05, and the Contractor wishes to pursue the issue further, the parties may, upon mutual agreement, utilize the services of an independent third-party mediator.
- .02 The mediator shall be mutually agreed upon by the Owner and Contractor.
- .03 The mediator shall be knowledgeable regarding the area of the disputed issue. The mediator shall meet with the parties together or separately, as necessary, to review all aspects of the issue. In a final attempt to assist the parties in resolving the issue themselves prior to proceeding to arbitration the mediator shall provide, without prejudice, a non-binding recommendation for settlement.
- .04 The review by the mediator shall be completed within 90 Days following the opinion given in clause GC 3.13.03.05.
- .05 Each party is responsible for its own costs related to the use of the mediation process. The cost of the third-party mediator shall be equally shared by the Owner and Contractor.

GC 3.13.06 Payment

- .01 Payment of the claim shall be made no later than 28 Days after the date of resolution of the claim or dispute. Such payment shall be made according to the terms of section GC 8.0, Measurement and Payment.

GC 3.13.07 Rights of Both Parties

- .01 It is agreed that no action taken under subsection GC 3.13, Claims, Negotiations, Mediation, by either party shall be construed as a renunciation or waiver of any of the rights or recourse available to the parties, provided that the requirements set out in this subsection are fulfilled.
- .02 It is further agreed that the parties may at any time resort to the adjudication procedure contained in the Construction Act.

GC 3.14 Arbitration

GC 3.14.01 Conditions of Arbitration

- .01 If a claim is not resolved satisfactorily through the negotiation stage noted in clause GC 3.13.04, Negotiations, or the mediation stage noted in clause GC 3.13.05, Mediation, either party may invoke the provisions of subsection GC 3.14, Arbitration, by giving written notice to the other party.
- .02 Notification that arbitration shall be implemented to resolve the issue shall be communicated in writing as soon as possible and no later than 60 Days following the opinion given in clause GC 3.13.03.05. Where the use of a third-party mediator was implemented, notification shall be within 120 Days of the opinion given in clause GC 3.13.03.05.
- .03 The parties shall be bound by the decision of the arbitrator.
- .04 The rules and procedures of the Arbitration Act, 1991, S.O. 1991, c.17, as amended, shall apply to any arbitration conducted hereunder except to the extent that they are modified by the express provisions of subsection GC 3.14, Arbitration.

GC 3.14.02 Arbitration Procedure

- .01 The following provisions are to be included in the agreement to arbitrate and are subject only to such right of appeal as exist where the arbitrator has exceeded his or her jurisdiction or have otherwise disqualified him or herself:
 - a) All existing actions in respect of the matters under arbitration shall be stayed pending arbitration;
 - b) All outstanding claims and matters to be settled are to be set out in a schedule to the agreement. Only such claims and matters as are in the schedule shall be arbitrated; and
 - c) Before proceeding with the arbitration, the Contractor shall confirm that all matters in dispute are set out in the schedule.

GC 3.14.03 Appointment of Arbitrator

- .01 The arbitrator shall be mutually agreed upon by the Owner and Contractor to adjudicate the dispute.
- .02 Where the Owner and Contractor cannot agree on a sole arbitrator within 30 Days of the notification of arbitration noted in clause GC 3.14.01.02, the Owner and the Contractor shall each choose an appointee within 37 Days of the notice of arbitration.
- .03 The appointees shall mutually agree upon an arbitrator to adjudicate the dispute within 15 Days after the last appointee was chosen or they shall refer the matter to the ADR Institute of Ontario (ADRIO), which may select an arbitrator to adjudicate the dispute within 7 Days of being requested to do so.
- .04 The arbitrator shall not be interested financially in the Contract nor in either party's business and shall not be employed by either party.

- .05 The arbitrator may appoint independent experts and any other persons to assist him or her.
- .06 The arbitrator is not bound by the rules of evidence that govern the trial of cases in court but may hear and consider any evidence that the arbitrator considers relevant.
- .07 The hearing shall commence within 90 Days of the appointment of the arbitrator.

GC 3.14.04 Costs

- .01 The arbitrator's fee shall be equally shared by the Owner and the Contractor.
- .02 The fees of any independent experts and any other persons appointed to assist the arbitrator shall be shared equally by the Owner and the Contractor.
- .03 The arbitration hearing shall be held in a place mutually agreed upon by both parties or in the event the parties do not agree, a site shall be chosen by the arbitrator. The cost of obtaining appropriate facilities shall be shared equally by the Owner and the Contractor.
- .04 The arbitrator may, in his or her discretion, award reasonable costs, related to the arbitration.

GC 3.14.05 The Decision

- .01 The reasoned decision shall be made in writing within 90 Days of the conclusion of the hearing. An extension of time to make a decision may be granted with consent of both parties. Payment shall be made in accordance with clause GC 3.13.06, Payment.

GC 3.15 Archaeological Finds

- .01 If the Contractor's operations expose any items that may indicate an archaeological find, such as but not limited to building remains, hardware, accumulations of bones, pottery, or arrowheads, the Contractor shall immediately notify the Contract Administrator and suspend operations within the area identified by the Contract Administrator. Notification may be verbal provided that such notice is confirmed in writing within 2 Days. Work shall remain suspended within that area until otherwise directed by the Contract Administrator in writing, in accordance with subsection GC 7.09, Suspension of Work.
- .02 Any delay in the completion of the Contract that is caused by such a suspension of Work shall be considered to be beyond the Contractor's control in accordance with clause GC 3.07.01.
- .03 Any Work directed or authorized in connection with an archaeological find shall be considered as Extra Work in accordance with clause GC 3.10.02, Extra Work.
- .04 The Contractor shall take all reasonable action to minimize additional costs that may accrue as a result of any work stoppage.

SECTION GC 4.0 - OWNER'S RESPONSIBILITIES AND RIGHTS

GC 4.01 Working Area

- .01 The Owner shall acquire all property rights that are deemed necessary by the Owner for the construction of the Work, including temporary working easements, and shall indicate the full extent of the Working Area on the Contract Drawings.

GC 4.02 Approvals and Permits

- .01 The Owner shall pay for all plumbing and building permits.
- .02 The Owner shall obtain and pay for all permits, licences, and certificates solely required for the design of the Work.

GC 4.03 Management and Disposition of Materials

- .01 The Owner shall identify in the Contract Documents the Materials to be moved within or removed from the Working Area and any characteristics of those Materials that necessitates special Materials management and disposition.
- .02 In accordance with regulations under the Occupational Health and Safety Act, R.S.O. 1990, c.O.1, as amended, the Owner advises that,
- a) the designated substances silica, lead, and arsenic are generally present throughout the Working Area occurring naturally or as a result of vehicle emissions;
 - b) the designated substance asbestos may be present in cement products, asphalt, and conduits for Utilities;
 - c) the following hazardous materials are ordinarily present in construction activities: limestone, gypsum, marble, mica, and Portland cement; and
 - d) exposure to these substances may occur as a result of activities by the Contractor such as sweeping, grinding, crushing, drilling, blasting, cutting, and abrasive blasting.
- .03 The Owner shall identify in the Contract Documents any designated substances or hazardous materials other than those identified above and their location in the Working Area.
- .04 If the Owner or Contractor discovers or is advised of the presence of designated substances or hazardous Materials that are in addition to those listed in clause GC 4.03.02, or not clearly identified in the Contract Documents according to clause GC 4.03.03, then verbal notice shall be provided to the other party immediately with written confirmation within 2 Days. The Contractor shall stop Work in the area immediately and shall determine the necessary steps required to complete the Work in accordance with applicable legislation and regulations.
- .05 The Owner shall be responsible for any reasonable additional costs of removing, managing and disposing of any Material not identified in the Contract Documents, or where conditions exist that could not have been reasonably foreseen at the time of tendering. All work under this paragraph shall be deemed to be Extra Work.

- .06 Prior to commencement of the Work, the Owner shall provide to the Contractor a list of those products controlled under the Workplace Hazardous Materials Information System (WHMIS), that the Owner may supply or use on the Contract, together with copies of the Safety Data Sheets for these products. All containers used in the application of products controlled under WHMIS shall be labelled. The Owner shall notify the Contractor in writing of changes to the list and provide relevant Safety Data Sheets.
- .07 Unless expressly permitted in the Contract Documents, the Contractor shall not bring onto the Work Area any designated substance or hazardous Material per OHSA without the prior written authorization of the Contract Administrator.
- .08 The Contractor shall use all reasonable care to avoid spilling or disturbing any designated substances or hazardous Material per OHSA.

GC 4.04 Construction Affecting Railway Property

- .01 The Owner shall pay the costs of all flagging and other traffic control measures required and provided by the railway company unless such costs are solely a function of the Contractor's chosen method of completing the Work.
- .02 Every precaution shall be taken by the Contractor to protect all railway property at track crossings; or otherwise, on which construction operations are to take place in accordance with the terms of this Contract.
- .03 The Contractor shall be required to conduct the construction operations in such a manner as to avoid a possibility of damaging any railway property in the vicinity of the Works. Every reasonable precaution shall be taken by the Contractor to ensure the safety of the workers, Subcontractors, and Equipment, as well as railway property throughout the duration of the Contract.

GC 4.05 Default by the Contractor

- .01 If the Contractor fails to commence the Work within 14 Days of a formal order to commence Work signed by the Contract Administrator or, upon commencement of the Work, should neglect to prosecute the Work properly or otherwise fails to comply with the requirements of the Contract and, if the Contract Administrator has given a written statement to the Owner and Contractor that sufficient cause exists to justify such action, the Owner may, without prejudice to any other right or remedy the Owner may have, notify the Contractor in writing that the Contractor is in default of the Contractor's contractual obligations and instruct the Contractor to correct the default in the 5 Working Days immediately following the receipt of such notice.
- .02 If the Contractor is adjudged bankrupt, or makes a general assignment for the benefit of creditors because of the Contractor's insolvency or if a receiver is appointed because of the Contractor's insolvency, the Owner may, without prejudice to any other right or remedy the Owner may have, by giving the Contractor or receiver or trustee in bankruptcy notice in writing, terminate the Contract.

GC 4.06 Contractor's Right to Correct a Default

- .01 The Contractor shall have the right within the 5 Working Days following the receipt of a notice of default to correct the default and provide the Owner with satisfactory proof that appropriate corrective measures have been taken.
- .02 If the Owner determines that the correction of the default cannot be completed within the 5 Working Days following receipt of the notice, the Contractor shall not be in default if the Contractor,
 - a) commences the correction of the default within the 5 Working Days following receipt of the notice;

- b) provides the Owner with a schedule acceptable to the Owner for the progress of such correction; and
- c) completes the correction in accordance with such schedule.

GC 4.07 Owner's Right to Correct Default

.01 If the Contractor fails to correct the default within the time specified in subsection GC 4.06, Contractor's Right to Correct a Default, or subsequently agreed upon, the Owner, without prejudice to any other right or remedy the Owner may have, may correct such default and deduct the cost thereof, as certified by the Contract Administrator, from any payment then or thereafter due to the Contractor.

GC 4.08 Termination of Contractor's Right to Continue the Work

.01 Where the Contractor fails to correct a default within the time specified in subsection GC 4.06, Contractor's Right to Correct a Default, or subsequently agreed upon, the Owner, without prejudice to any other right or remedy the Owner may have, may terminate the Contractor's right to continue the Work in whole or in part by giving written notice to the Contractor.

.02 If the Owner terminates the Contractor's right to continue with the Work in whole or in part, the Owner shall be entitled to,

- a) take possession of the Working Area or that portion of the Working Area devoted to that part of the Work terminated;
- b) utilize any Material within the Working Area;
- d) withhold further payments to the Contractor with respect to the Work or the portion of the Work withdrawn from the Contractor until the Work or portion thereof withdrawn is completed;
- d) charge the Contractor the additional cost over the Contract price of completing the Work or portion thereof withdrawn from the Contractor, as certified by the Contract Administrator and any additional compensation paid to the Contract Administrator for such additional service arising from the correction of the default;
- e) charge the Contractor a reasonable allowance, as determined by the Contract Administrator, to cover correction to the Work performed by the Contractor that may be required under subsection GC 7.16, Warranty;
- f) charge the Contractor for any damages the Owner sustained as a result of the default; and
- g) charge the Contractor the amount by which the cost of corrections to the Work under subsection GC 7.16, Warranty, exceeds the allowance provided for such corrections.

GC 4.09 Final Payment to Contractor

.01 If the Owner's cost to correct and complete the Work in whole or in part is less than the amount withheld from the Contractor under subsection GC 4.08, Termination of Contractor's Right to Continue the Work, the Owner shall pay the balance to the Contractor as soon as the final accounting for the Contract is complete.

GC 4.10 Termination of the Contract

- .01 Where the Contractor is in default of the Contract the Owner shall, without prejudice to any other right or remedy the Owner may have, terminate the Contract by giving written notice of termination to the Contractor, the Surety, and any trustee or receiver acting on behalf of the Contractor's estate or creditors.
- .02 If the Owner elects to terminate the Contract, the Owner shall provide the Contractor and the trustee or receiver with a complete accounting to the date of termination.

GC 4.11 Continuation of Contractor's Obligations

- .01 The Contractor's obligation under the Contract as to quality, correction, and warranty of the Work performed prior to the time of termination of the Contract or termination of the Contractor's right to continue with the Work in whole or in part shall continue to be in force after such termination.

GC 4.12 Use of Performance Bond

- .01 If the Contractor is in default of the Contract and the Contractor has provided a Performance Bond, the provisions of section GC 4.0, Owner's Responsibilities and Rights, shall be exercised in accordance with the conditions of the Performance Bond.

GC 4.13 Payment Adjustment

- .01 If any situation should occur in the performance of the Work that would result in a Change in the Work, the Owner shall be entitled to an adjustment and those adjustments shall be managed in accordance with clause GC 3.10.01, Changes in the Work.

SECTION GC 5.0 - MATERIAL

GC 5.01 Supply of Material

- .01 All Material necessary for the proper completion of the Work, except that listed as being supplied by the Owner, shall be supplied by the Contractor. The Contract price for the appropriate tender items shall be deemed to include full compensation for the supply and delivery of such Material.

GC 5.02 Quality of Material

- .01 All Material supplied by the Contractor shall be new, unless otherwise specified in the Contract Documents.
- .02 Material supplied by the Contractor shall conform to the requirements of the Contract.
- .03 As specified in the Contract Documents or as requested by the Contract Administrator, the Contractor shall make available, for inspection or testing, a sample of any Material to be supplied by the Contractor.
- .04 The Contractor shall obtain for the Contract Administrator the right to enter onto the premises of the Material manufacturer or supplier to carry out such inspection, sampling, and testing as specified in the Contract Documents or as requested by the Contract Administrator.
- .05 The Contractor shall notify the Contract Administrator of the sources of supply sufficiently in advance of the Material shipping dates to enable the Contract Administrator to perform the required inspection, sampling, and testing.
- .06 The Owner shall not be responsible for any delays to the Contractor's operations where the Contractor fails to give sufficient advance notice to the Contract Administrator to enable the Contract Administrator to carry out the required inspection, sampling, and testing before the scheduled shipping date.
- .07 The Contractor shall not change the source of supply of any Material without the written authorization of the Contract Administrator.
- .08 Material that is not specified shall be of a quality best suited to the purpose required, and the use of such Material shall be subject to the approval of the Contract Administrator.
- .09 All Material inspection, sampling, and testing shall be carried out on random basis in accordance with the standard inspection or testing methods required for the Material. Any approval given by the Contract Administrator for the Materials to be used in the Work based upon the random method shall not relieve the Contractor from the responsibility of incorporating Material that conforms to the Contract Documents into the Work or properly performing the Contract and of any liability arising from the failure to properly perform as specified in the Contract Documents.

GC 5.03 Rejected Material

- .01 Rejected Material shall be removed from the Working Area expeditiously after the notification to that effect from the Contract Administrator. Where the Contractor fails to comply with such notice, the Contract Administrator may cause the rejected Material to be removed from the Working Area and disposed of, in what the Contract Administrator considers to be the most appropriate manner, and the Contractor shall pay the costs of disposal and the appropriate overhead charges.

GC 5.04 Substitutions

- .01 Where the Contract Documents require the Contractor to supply a Material designated by a trade or other name, the Tender shall be based only upon supply of the Material so designated, that shall be regarded as the standard of quality required by the Contract Documents. After the acceptance of the Tender, the Contractor may apply to the Contract Administrator to substitute another Material identified by a different trade or other name for the Material designated as aforesaid. The application shall be in writing and shall state the price for the proposed substitute Material designated as aforesaid, and such other information as the Contract Administrator may require.
- .02 Rulings on a proposed substitution shall not be made prior to the acceptance of the Tender. Substitutions shall not be made without the prior approval of the Contract Administrator. The approval or rejection of a proposed substitution shall be at the discretion of the Contract Administrator.
- .03 If the proposed substitution is approved by the Contract Administrator, the Contractor shall be entitled to the first \$1,000 of the aggregate saving in cost by reason of such substitution and to 50% of any additional saving in cost in excess of such \$1,000. Each such approval shall be conveyed to the Contractor in writing or by issuance of a Certificate of Equality on the Owner's standard form of "Certification of Equality" and, if any adjustment to the Contract price is made by reason of such substitution, a Change Order shall be issued as well.

GC 5.05 Owner Supplied Material

GC 5.05.01 Ordering of Excess Material

- .01 Where Material is supplied by the Owner and where this Material is ordered by the Contractor in excess of the amount specified to complete the Work, such excess Material shall become the property of the Contractor on completion of the Work and shall be charged to the Contractor at cost plus applicable overheads.

GC 5.05.02 Care of Material

- .01 The Contractor shall, in advance of receipt of shipments of Material supplied by the Owner, provide adequate and proper storage facilities acceptable to the Contract Administrator, and on the receipt of such Material shall promptly place it in storage, except where it is to be incorporated forthwith into the Work.
- .02 The Contractor shall be responsible for acceptance of Material supplied by the Owner, at the specified delivery point and for its safe handling and storage. If such Material is damaged while under the control of the Contractor, it shall be replaced or repaired by the Contractor at no expense to the Owner, and to the satisfaction of the Contract Administrator. If such Material is rejected by the Contract Administrator for reasons that are not the fault of the Contractor, it shall remain in the care and at the risk of the Contractor until its disposition has been determined by the Contract Administrator.
- .03 Where Material supplied by the Owner arrives at the delivery point in a damaged condition or where there are discrepancies between the quantities received and the quantities shown on the bills of lading, the Contractor shall immediately report such damage or discrepancies to the Contract Administrator who shall arrange for an immediate inspection of the shipment and provide the Contractor with a written release from responsibility for such damage or deficiencies. Where damage or deficiencies are not so reported, it shall be assumed that the shipment arrived in good condition and order, and any damage or deficiencies reported thereafter shall be made good by the Contractor at no extra cost to the Owner.

- .04 The full amount of Material supplied by the Owner in each shipment shall be accounted for by the Contractor and such Material shall be at the risk of the Contractor after taking delivery. Such Material shall not, except with the written permission of the Contract Administrator, be used by the Contractor for purposes other than the performance of the Work under the Contract.
- .05 Empty reels, crates, containers, and other type of packaging from Material supplied by the Owner shall become the property of the Contractor when they are no longer required for their original purpose and shall be disposed of by the Contractor at the Contractor's expense unless otherwise specified in the Contract Documents.
- .06 Immediately upon receipt of each shipment, the Contractor shall provide the Contract Administrator copies of bills of lading, or such other documentation the Contract Administrator may require to substantiate and reconcile the quantities of Material received.
- .07 Where Material supplied by the Owner is ordered and stockpiled prior to the award of the Contract, the Contractor shall, at no extra cost to the Owner, immediately upon commencement of operations, check the Material, report any damage or deficiencies to the Contract Administrator and take charge of the Material at the stockpile site. Where damage or deficiencies are not so recorded by the Contractor, it shall be assumed that the stockpile was in good condition and order when the Contractor took charge of it, and any damage or deficiencies reported thereafter shall be made good by the Contractor at no extra cost to the Owner.

SECTION GC 6.0 - INSURANCE, PROTECTION AND DAMAGE

GC 6.01 Protection of Work, Persons and Property

- .01 The Contractor, the Contractor's agents, and all workers employed by or under the control of the Contractor, including Subcontractors, shall protect the Work, persons, and property from damage or injury. The Contractor shall be responsible for all losses and damage that may arise as the result of the Contractor's operations under the Contract, unless indicated to the contrary below.
- .02 The Contractor is responsible for the full cost of any necessary temporary protective Work and the restoration of all damage where the Contractor damages the Work or property in the performance of the Contract. If the Contractor is not responsible for the damage that occurs to the Work or property, the Contractor shall restore such damage, and such Work and payment shall be administered according to these General Conditions.
- .03 The Contractor shall immediately inform the Contract Administrator of all damage and injuries that occur during the term of the Contract. The Contractor shall then investigate and report back to the Contract Administrator within 15 Days of occurrence of incident, or as soon as possible. The Contract Administrator may conduct its own investigation and the Contractor shall provide all assistance to the Contract Administrator as may be necessary for that purpose.
- .04 The Contractor shall not be responsible for loss and damage that occurs as a result of,
 - a) war;
 - b) blockades and civil commotions;
 - c) errors in the Contract Documents; or
 - d) acts or omissions of the Owner, the Contract Administrator, their agents and employees, or others not under the control of the Contractor, but within the Working Area with the Owner's permission.
- .05 The Contractor and the Contractor's Surety shall not be released from any term or provision of any responsibility, obligation, or liability under the Contract or waive or impair any of the rights of the Owner, except by a release duly executed by the Owner.

GC 6.02 Indemnification

- .01 The Contractor shall indemnify and hold harmless the Owner and the Contract Administrator, their elected officials, agents, officers, and employees from and against all claims, demands, losses, expenses, costs, damages, actions, suits, or proceedings by third parties, hereinafter called "claims", directly or indirectly arising or alleged to arise out of the performance of or the failure to perform the Work, provided such claims are,
 - a) attributable to bodily injury, sickness, disease, or death or to damage to or destruction of tangible property;
 - b) caused by negligent acts or omissions of the Contractor or anyone for whose acts the Contractor may be liable; and
 - c) made in writing within a period of 6 years from the date of Substantial Performance of the Work as set out in the Certificate of Substantial Performance of the Work or, where so specified in the Contract Documents, from the date of certification of Final Acceptance.

- .02 The Contractor shall indemnify and hold harmless the Owner from all and every claim for damages, royalties or fees for the infringement of any patented invention or copyright occasioned by the Contractor in connection with the Work performed or Material furnished by the Contractor under the Contract.
- .03 The Owner expressly waives the right to indemnity for claims other than those stated in clauses GC 6.02.01 and GC 6.02.02.
- .04 The Owner shall indemnify and hold harmless the Contractor, their elected officials, agents, officers, and employees from and against all claims, demands, losses, expenses, costs, damages, actions, suits, or proceedings arising out of the Contractor's performance of the Contract that are attributable to a lack of or defect in title or an alleged lack of or defect in title to the Working Area.
- .05 The Contractor expressly waives the right to indemnity for claims other than those stated in clause GC 6.02.04.

GC 6.03 Contractor's Insurance

GC 6.03.01 General

- .01 Without restricting the generality of subsection GC 6.02, Indemnification, the Contractor shall provide, maintain, and pay for the insurance coverages listed under clauses GC 6.03.02 and GC 6.03.03. Insurance coverage in clauses GC 6.03.04, GC 6.03.05, and GC 6.03.06 shall only apply when so specified in the Contract Documents.
- .02 The Contractor shall provide the Contract Administrator with an original Certificate of Insurance for each type of insurance coverage that is required by the Contract Documents. The Contractor shall ensure that the Contract Administrator is, at all times in receipt of a valid Certificate of Insurance for each type of insurance coverage, in such amounts as specified in the Contract Documents. The Contractor will not be permitted to commence Work until the Contract Administrator is in receipt of such proof of insurance. The Contract Administrator may withhold payments of monies due to the Contractor until the Contractor has provided the Contract Administrator with original valid Certificates of Insurance as required by the provisions of the Contract Documents.

GC 6.03.02 Commercial General Liability Insurance

- .01 Commercial General Liability Insurance shall be in the name of the Contractor, with the Owner and the Contract Administrator named as additional insureds, with limits of not less than five million dollars inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof. The insurance shall be provided in a form acceptable to the Owner.
- .02 Approval of this insurance shall be conditional upon the Contractor obtaining the services of an insurer licensed to underwrite insurance in the Province of Ontario and obtaining the insurer's certificate of equivalency to the required insurance.
- .03 The Contractor shall submit annually to the Owner, proof of continuation of the completed operations coverage and, if the Contractor fails to do so, the limitation period for claiming indemnity described in clause GC 6.02.01 c), shall not be binding on the Owner.
- .04 Should the Contractor decide not to employ Subcontractors for operations requiring the use of explosives for blasting, pile driving or caisson work, removal or weakening of support of property building or land, the Commercial General Liability Insurance shall include the appropriate endorsements.
- .05 The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, termination, or material change.

.06 "Claims Made" insurance policies shall not be permitted.

GC 6.03.03 Automobile Liability Insurance

.01 Automobile liability insurance in respect of licensed vehicles shall have limits of not less than five million dollars inclusive per occurrence for bodily injury, death and damage to property, in the following forms endorsed to provide the Owner with not less than 30 Days written notice in advance of any cancellation, termination, or material change.

- a) standard non-owned automobile policy including standard contractual liability endorsement, and
- b) standard owner's form automobile policy providing third party liability and accident benefits insurance and covering licensed vehicles owned or operated by the Contractor.

GC 6.03.04 Aircraft and Watercraft Liability Insurance

GC 6.03.04.01 Aircraft Liability Insurance

.01 Aircraft liability insurance with respect to owned or non-owned aircraft used directly or indirectly in the performance of the Work, including use of additional premises, shall be subject to limits of not less than five million dollars inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof, and limits of not less than five million dollars for aircraft passenger hazard. Such insurance shall be in a form acceptable to the Owner. The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, change, or amendment restricting coverage.

GC 6.03.04.02 Watercraft Liability Insurance

.01 Watercraft liability insurance with respect to owned or non-owned watercraft used directly or indirectly in the performance of the Work, including use of additional premises, shall be subject to limits of not less than five million dollars inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof. Such insurance shall be in a form acceptable to the Owner. The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, change, or amendment restricting coverage.

GC 6.03.05 Property and Boiler Insurance

GC 6.03.05.01 Property Insurance

.01 All risks property insurance shall be in the name of the Contractor, with the Owner and the Contract Administrator named as additional insureds, insuring not less than the sum of the amount of the Contract price and the full value, as may be stated in the Contract Documents, of Material that is specified to be provided by the Owner for incorporation into the Work.

GC 6.03.05.02 Boiler Insurance

.01 Boiler insurance insuring the interests of the Contractor, the Owner and the Contract Administrator for not less than the replacement value of boilers and pressure vessels forming part of the Work, shall be in a form acceptable to the Owner.

GC 6.03.05.03 Use and Occupancy of the Work Prior to Completion

.01 Should the Owner wish to use or occupy part or all of the Work prior to Substantial Performance, the Owner shall give 30 Days written notice to the Contractor of the intended purpose and extent of such use or occupancy. Prior to such use or occupancy, the Contractor shall notify the Owner in writing of

the additional premium cost, if any, to maintain property and boiler insurance, which shall be at the Owner's expense. If because of such use or occupancy the Contractor is unable to provide coverage, the Owner upon written notice from the Contractor and prior to such use or occupancy shall provide, maintain, and pay for property and boiler insurance insuring the full value of the Work, including coverage for such use or occupancy, and shall provide the Contractor with proof of such insurance. The Contractor shall refund to the Owner the unearned premiums applicable to the Contractor's policies upon termination of coverage.

- .02 The policies shall provide that in the event of a loss or damage, payment shall be made to the Owner and the Contractor as their respective interests may appear. The Contractor shall act on behalf of both the Owner and the Contractor for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the Contractor shall proceed to restore the Work. Loss or damage shall not affect the rights and obligations of either party under the Contract, except that the Contractor shall be entitled to such reasonable extension of Contract Time relative to the extent of the loss or damage as the Contract Administrator may decide in consultation with the Contractor.

GC 6.03.05.04 Payment for Loss or Damage

- .01 The Contractor shall be entitled to receive from the Owner, in addition to the amount due under the Contract, the amount at which the Owner's interest in restoration of the Work has been appraised, such amount to be paid as the restoration of the Work proceeds, and in accordance with the requirements of section GC 8.0, Measurement and Payment. In addition, the Contractor shall be entitled to receive from the payments made by the insurers the amount of the Contractor's interest in the restoration of the Work.
- .02 The Contractor shall be responsible for deductible amounts under the policies, except where such amounts may be excluded from the Contractor's responsibility by the terms of this Contract.
- .03 In the event of a loss or damage to the Work arising from the action or omission of the Owner or others, the Owner shall pay the Contractor the cost of restoring the Work as the restoration of the Work proceeds and in accordance with the requirements of section GC 8.0, Measurement and Payment.

GC 6.03.06 Contractor's Equipment Insurance

- .01 All risks Contractor's Equipment insurance covering construction equipment used by the Contractor for the performance of the Work, including boiler insurance on temporary boilers and pressure vessels, shall be in a form acceptable to the Owner and shall not allow subrogation claims by the insurer against the Owner. The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, change, or amendment restricting coverage. Subject to satisfactory proof of financial capability by the Contractor for self-insurance of the Contractor's Equipment, the Owner agrees to waive the equipment insurance requirement, and for the purpose of this Contract, the Contractor shall be deemed to be insured. This policy shall be amended to provide permission for the Contractor to grant prior releases with respect to damage to the Contractor's Equipment.

GC 6.03.07 Insurance Requirements and Duration

- .01 Each insurance policy as noted in the Contract Documents shall be in effect from the date of commencement of the Work until 10 Days after the date of Final Acceptance of the Work, as set out in the Final Acceptance Certificate.
- .02 The Contractor shall provide the Owner, on a form acceptable to the Owner, proof of insurance prior to commencement of the Work and signed by the underwriter or the broker.

- .03 The Contractor shall, on request, promptly provide the Owner with a certified true copy of each insurance policy exclusive of information pertaining to premium or premium bases used by the insurer to determine the cost of the insurance. The certified true copy shall include the signature of an officer of the insurer.
- .04 Where a policy is renewed, the Contractor shall provide the Owner, on a form acceptable to the Owner, renewed proof of insurance immediately following completion of renewal.
- .05 Unless specified otherwise, the Contractor shall be responsible for the payment of deductible amounts under the policies.
- .06 If the Contractor fails to provide or maintain insurance as required in subsection GC 6.03, Contractor's Insurance, or elsewhere in the Contract Documents, then the Owner shall have the right to provide and maintain such insurance and give evidence thereof to the Contractor. The Owner's cost thereof shall be payable by the Contractor to the Owner on demand.
- .07 If the Contractor fails to pay the cost of the insurance placed by the Owner within 28 Days of the date on which the Owner made a formal demand for reimbursement of such costs, the Owner may deduct the costs thereof from monies which are due or may become due to the Contractor.

GC 6.04 Bonding

- .01 The Contractor shall provide the Owner with the surety bonds in the amount required by the Contract Documents.
- .02 Such bonds shall be issued by a duly licensed surety company authorized to transact a business of suretyship in the Province of Ontario and shall be to the satisfaction of the Owner. The bonds shall be maintained in good standing until the Final Acceptance.

GC 6.05 Workplace Safety and Insurance Board

- .01 The Contractor shall provide the Contract Administrator with a copy of a Certificate of Clearance indicating the Contractor's good standing with the Workplace Safety and Insurance Board, as follows:
 - a) Immediately prior to the Contract Administrator authorizing the Contractor to commence Work.
 - b) Prior to issue of the Certificate of Substantial Performance.
 - c) Prior to expiration of the Warranty Period.
 - d) At any other time when requested by the Contract Administrator.

SECTION GC 7.0 - CONTRACTOR'S RESPONSIBILITIES AND CONTROL OF THE WORK

GC 7.01 General

GC 7.01.01 Site Visit

- .01 The Contractor warrants that the site of the Work has been visited during the preparation of the Tender and the character of the Work and all local conditions that may affect the performance of the Work are known.

GC 7.01.02 Commencement of Work

- .01 The Contractor shall not commence the Work nor deliver anything to the Working Area until the Contractor has received a written order to commence the work from the Contract Administrator.

GC 7.01.03 Control and Responsibility

- .01 The Contractor shall have complete control of the Work and shall effectively direct and supervise the Work so as to ensure conformity with the Contract Documents. The Contractor shall be responsible for construction means, methods, techniques, sequences, and procedures and for coordinating the various parts of the Work.
- .02 The Contractor shall provide adequate labour, Equipment, and Material to ensure the completion of the Contract in accordance with the Contract Documents. The Work shall be performed as vigorously and as continuously as weather conditions or other interferences may permit.
- .03 The Contractor shall have the sole responsibility for the design, erection, operation, maintenance, and removal of temporary structures and other temporary facilities and the design and execution of construction methods required in their use.
- .04 Notwithstanding clause GC 7.01.03, where the Contract Documents include designs for temporary structures and other temporary facilities or specify a method of construction in whole or part, such facilities and methods shall be considered to be part of the design of the Work, and the Contractor shall not be held responsible for that part of the design or the specified method of construction. The Contractor shall, however, be responsible for the execution of such design or specified method of construction in the same manner that the Contractor is responsible for the execution of the Work.
- .05 The Contractor shall comply with and conform to all statutes, laws, by-laws, regulations, requirements, ordinances, notices, rulings, orders, directives and policies of the municipal, provincial and federal governments and any other lawful authority and all court orders, judgments and declarations of a court of competent jurisdiction (collectively referred to as the "Laws"), applicable to the Work to be provided by, and the undertakings and obligations of, the Contractor under this Contract.

GC 7.01.04 Compliance with the Occupational Health and Safety Act

- .01 The Contractor shall execute the terms of the Contract in strict compliance with the requirements of the Occupational Health and Safety Act, R.S.O. 1990, c.O.1, as amended, (the "Act") and Ontario Regulation 213/91, as amended, (that regulates Construction Projects) and any other regulations as amended under the Act (the "Regulations") that may affect the performance of the Work, as the "Constructor" or "employer," as defined by the Act, as the case may be. The Contractor shall ensure that:
- a) worker safety is given priority in planning, pricing, and performing the Work;

- b) its officers and supervisory employees have a working knowledge of the duties of a "Constructor" and "employer" as defined by the Act and the provisions of the Regulations applicable to the Work, and a personal commitment to comply with them;
 - c) a copy of the most current version of the Act and the Regulations are available at the Contractor's office within the Working Area, or, in the absence of an office, in the possession of the supervisor responsible for the performance of the Work;
 - d) workers employed to carry out the Work possess the knowledge, skills, and protective devices required by law or recommended for use by a recognized industry association to allow them to work in safety;
 - e) its supervisory employees are "Competent Persons" as defined in the OHS Act, and carry out their duties in a diligent and responsible manner with due consideration for the health and safety of the workers;
 - f) all Subcontractors and their workers are properly protected from injury while they are at the Working Area; and
 - g) following execution of the Contract and prior to the issuance of the order to commence by the Owner, upon request the Contractor submits to the Contract Administrator a copy of the Notice of Project issued to the Ministry of Labour.
- .02 The Contractor, when requested, shall provide the Owner with a copy of its health and safety policy and program at the pre-start meeting and shall respond promptly to requests from the Owner for confirmation that its methods and procedures for carrying out the Work comply with the Act and Regulations. The Contractor shall cooperate with representatives of the Owner and the inspectors appointed to enforce the Act and the Regulations in any investigations of worker health and safety in the performance of the Work. The Contractor shall indemnify and save the Owner harmless from any additional expense that the Owner may incur to have the Work performed as a result of the Contractor's failure to comply with the requirements of the Act and the Regulations.
- .03 Prior to commencement of the Work, the Contractor shall provide to the Contract Administrator a list of those products controlled under the Workplace Hazardous Materials Information System or "WHMIS", which the Contractor expects to use on the Contract. Related Safety Data Sheets shall accompany the submission. All containers used in the application of products controlled under "WHMIS" shall be labelled. The Contractor shall notify the Contract Administrator in writing of changes in the products to be used and provide relevant Safety Data Sheets.
- .04 During the course of the Work, the Contractor shall furnish forthwith to the Contract Administrator a copy of all correspondence, reports, orders or charges respecting occupational health and safety, including under the Act, Technical Standards and Safety Act, 2000, S.O. 2000, c.16 as amended, and the Criminal Code, R.S.C., 1985, c. C-46 as amended, which are received by, or which come to the notice of, the Contractor that apply or are relevant to any of the Work or activities conducted under the terms of the Contract.
- .05 Nothing in this Contract shall be construed as requiring the Owner to monitor or approve the workplace health and safety practices of the Contractor.

GC 7.01.05 Contractor's Representatives

- .01 The Contractor shall have an authorized representative on the site while any Work is being performed, to supervise the Work and act for or on the Contractor's behalf. Prior to commencement of construction, the Contractor shall notify the Contract Administrator of the names, addresses, positions, and cell phone, and telephone numbers of the Contractor's representatives who can be contacted at any time to deal with matters relating to the Contract, and update as necessary.

- .02 The Contractor shall designate a person to be responsible for traffic control and work zone safety. The designated person shall be a competent worker who is qualified because of knowledge, training, and experience to perform the duties; is familiar with Book 7 of the Ontario Traffic Manual; and has knowledge of all potential or actual danger to workers and motorists. Prior to the commencement of construction, the Contractor shall notify the Contract Administrator of the name; address; position; cell phone, and telephone numbers of the designated person, and update as necessary. The designated person may have other responsibilities, including other construction sites, and need not be present in the Working Area at all times.

GC 7.01.06 Assistance to the Contract Administrator

- .01 The Contractor shall, at no additional cost to the Owner, furnish all reasonable aid, facilities, and assistance required by the Contract Administrator for the proper inspection and examination of the Work or the taking of measurements for the purpose of payment.

GC 7.01.07 Schedule

- .01 The Contractor shall prepare and update, as required, a construction schedule of operations, indicating the proposed methods of construction and sequence of Work and the time the Contractor proposes to complete the various items of Work within the time specified in the Contract Documents. The schedule shall be submitted to the Contract Administrator within 14 Days from the Contract award. If the Contractor's schedule is materially affected by changes in the work, the Contractor shall submit an updated construction schedule, if requested by the Contract Administrator, within 7 Days of the request. This updated schedule shall show how the Contractor proposes to perform the balance of the Work, to complete the Work within the time specified in the Contract Documents.
- .02 For Contracts with a specified number of Working Days, the construction time shown on the initial schedule shall not exceed the specified number of Working Days. The activities on the critical path shall assist the Contract Administrator in determining the Controlling Operation for the purpose of the charging of Working Days. The construction schedule shall include all non-working periods and appropriate allowances for Inclement Weather.
- .03 For Contracts which specify a Contract Time, the construction time shown on the initial construction schedule shall not extend beyond the specified Contract Time. The construction schedule shall include all non-working periods and appropriate allowances for Inclement Weather.

GC 7.01.08 Errors and Inconsistencies Relating to the Contract

- .01 Where the Contractor finds any error, inconsistency, or omission relating to the Contract, the Contractor shall promptly report it to the Contract Administrator and shall not proceed with the activity affected until receiving direction from the Contract Administrator.
- .02 The Contractor shall promptly notify the Contract Administrator in writing if the subsurface conditions observed in the Working Area differ materially from those indicated in the Contract Documents.

GC 7.01.09 Utilities

- .01 The Contractor shall arrange with the appropriate Utility authorities for the stake out of all underground Utilities and service connections that may be affected by the Work. The Contractor shall observe the location of the stake outs prior to commencing the Work and if there is a discrepancy between the location of the stake outs and the locations shown on the Contract Documents, that may affect the Work, the Contractor shall immediately notify the Contract Administrator and the affected Utility companies, in order to resolve the discrepancy. The Contractor shall be responsible for any damage done to the underground Utilities and service connections by

the Contractor's forces during construction if the stake out locations are within the tolerances given in clause GC 2.01.01 a).

- .02 In the case of damage to or interference with any Utilities, pole lines, pipe lines, conduits, farm tiles, or other public or privately-owned works or property, the Contractor shall immediately notify the Owner, Contract Administrator, and the owner of the works of the location and details of such damage or interference.

GC 7.02 Monuments and Layout

- .01 Prior to commencement of construction, the Contract Administrator and the Contractor shall locate on site those Monuments that delineate the Working Area and may be used to lay out the Work, all as shown on the Contract Drawings. Property Monuments shall be inventoried in the report format required by the Owner.
- .02 These Monuments shall be protected by highly visible T-bars or 1.0 metre tall stakes with survey ribbon set within 0.3 metres of the Monument.
- .03 The Contractor shall be responsible for the preservation of all Property Monuments while the Work is in progress, except those Property Monuments that must be removed to facilitate the Work as identified and agreed by the Contractor and Contract Administrator. Monuments removed to facilitate the Work shall be replaced at the Owner's expense, and all others shall be replaced at the Contractor's expense.
- .04 All Monuments disturbed, damaged, or removed by the Contractor's operations shall be documented in the inventory report and replaced under the supervision of an Ontario Land Surveyor.
- .05 The Monument inventory report referred to in clauses GC 7.02.01 and GC 7.02.04 shall include as a minimum:
 - a) Contract number, Contract name, Contract Administrator's name;
 - b) Project/site construction limits;
 - c) Rough location, type, identification number, and condition of each Monument before and after construction;
 - d) The solutions for protection of the Monuments that may be impacted by construction;
 - e) Reference ties;
 - f) A summary of those Monuments affected by the Work and how they were reset or replaced, and by what type of Monument.
- .06 At no extra cost to the Owner, the Contractor shall provide the Contract Administrator with such materials and devices as may be necessary to lay out the baseline and benchmarks, and as may be necessary for the inspection of the Work.
- .07 The Contractor shall provide qualified personnel to lay out and establish all lines and grades necessary for construction. The Contractor shall notify the Contract Administrator of any layout work carried out, so that the same may be checked by the Contract Administrator.
- .08 The Contractor shall install and maintain substantial alignment markers and secondary benchmarks as may be required for the proper execution of the Work. The Contractor shall supply one copy of all alignment and grade sheets to the Contract Administrator.
- .09 The Contractor shall assume full responsibility for alignment, elevations, and dimensions of each and all parts of the Work, regardless of whether the Contractor's layout work has been checked by the Contract Administrator.

- .10 All stakes, marks, and reference points shall be carefully preserved by the Contractor. In the case of their destruction or removal, for any reason, before the end of the Contract Time such stakes, marks, and reference points shall be replaced, unless otherwise mutually agreed between the Contractor and the Contract Administrator, at the Contractor's expense.
- .11 Benchmarks and survey monuments identified in the Contract Documents shall be protected by the Contractor. In the case of their destruction or removal, such benchmarks and survey monuments shall be replaced by the Owner at the Contractor's expense.

GC 7.03 Working Area

- .01 The Contractor shall maintain the Working Area in a tidy condition and free from the accumulation of debris and prevent dust nuisance, mud, and ponding water, other than that caused by the Owner or others.
- .02 The Contractor's sheds, site offices, toilets, other temporary structures, and storage areas for Material and Equipment shall be grouped in a compact manner, maintained in a neat and orderly condition at all times and removed upon completion of the Work.
- .03 The Contractor shall confine the construction operations to the Working Area. Should the Contractor require additional space, the Contractor shall obtain such space at no additional cost to the Owner.
- .04 The Contractor shall not enter upon or occupy any private property for any purpose, unless the Contractor has received prior written permission from the property owner.
- .05 Upon completion of the Contract, the Working Area used by the Contractor shall be restored to its original condition or better unless otherwise specified in the Contract Documents including the removal of all excavated and stockpiled materials at the Contractor's expense.

GC 7.04 Damage by Vehicles or Other Equipment

- .01 If at any time, in the opinion of the Contract Administrator, damage is being done or is likely to be done to any Roadway or any improvement thereon, outside the Working Area, by the Contractor's vehicles or other Equipment, whether licensed or unlicensed Equipment, the Contractor shall, on the direction of the Contract Administrator, and at no extra cost to the Owner, make changes or substitutions for such vehicles or Equipment, and shall alter loadings, or in some other manner, remove the cause of such damage to the satisfaction of the Contract Administrator.

GC 7.05 Excess Loading of Motor Vehicles

- .01 Where a vehicle is hauling Material for use on the Work, in whole or in part; upon a Highway; and where motor vehicle registration is required for such vehicle, the Contractor shall not cause or permit such vehicle to be loaded beyond the legal limit specified in the Highway Traffic Act, R.S.O. 1990, c.H.8, as amended, whether such vehicle is registered in the name of the Contractor or otherwise, except where there are designated areas within the Working Area where overloading is permitted. The Contractor shall bear the onus of weighing disputed loads.

GC 7.06 Maintaining Roads and Detours

- .01 Unless otherwise specified in the Contract Documents, if an existing Roadway is affected by construction, it shall be kept open to both vehicular and pedestrian traffic.
- .02 Subject to the approval of the Contract Administrator, the Contractor shall, at no additional cost to the Owner, be responsible for providing and maintaining for the duration of the Work an alternative route for both pedestrian and vehicular traffic through the Working Area in accordance with the OTM,

whether along the existing Highway under construction or on a detour road beside or adjacent to the Highway under construction.

- .03 Subject to the approval of the Contract Administrator, the Contractor may block traffic for short periods of time to facilitate construction of the Work in accordance with the OTM. Any temporary lane closures shall be kept to a minimum.
- .04 The Contractor shall not be required to maintain a road through the Working Area until such time as the Contractor has commenced operations or during seasonal shut down or on any part of the Contract that has been accepted in accordance with these General Conditions. The Contractor shall not be required to apply de-icing chemicals or abrasives or carry out snowplowing.
- .05 Where only localized and separated sections of the Highway are affected by the Contractor's operations, the Contractor shall not be required to maintain intervening sections of the Highway until such times as these sections are located within the limits of the Highway affected by the Contractor's general operations under the Contract.
- .06 Where the Contract Documents provide for or the Contract Administrator requires detours at specific locations, payment for the construction of the detours and, if required, for the subsequent removal of the detours, shall be made at the Contract prices appropriate to such Work.
- .07 Compensation for all labour, Equipment, and Materials to do this Work shall be at the Contract prices appropriate to the Work and, where there are no such prices, at negotiated prices. Notwithstanding the foregoing, the cost of blading required to maintain the surface of such roads and detours shall be deemed to be included in the prices bid for the various tender items and no additional payment shall be made.
- .08 Where Work under the Contract is discontinued for any extended period, including seasonal shutdown, the Contractor shall, when directed by the Contract Administrator, open and place the Roadway and detours in a passable, safe, and satisfactory condition for public travel.
- .09 Where the Contractor constructs a detour that is not specifically provided for in the Contract Documents or required by the Contract Administrator, the construction of the detour and, if required, the subsequent removal shall be performed at the Contractor's expense. The detour shall be constructed and maintained to structural and geometric standards approved by the Contract Administrator. Removal and site restoration shall be performed as directed by the Contract Administrator.
- .10 Where, with the prior written approval of the Contract Administrator, the Highway is closed and the traffic diverted entirely off the Highway to any other Highway, the Contractor shall, at no extra cost to the Owner, supply, erect, and maintain traffic control devices in accordance with the OTM.
- .11 Compliance with the foregoing provisions shall in no way relieve the Contractor of its obligations under subsection GC 6.01, Protection of Work, Persons, and Property, dealing with the Contractor's responsibility for damage claims, except for claims arising on sections of Highway within the Working Area that are being maintained by others.

GC 7.07 Access to Properties Adjoining the Work and Interruption of Utility Services

- .01 The Contractor shall provide at all times and at no extra cost to the Owner,
 - a) safe and adequate pedestrian and vehicular access;
 - b) continuity of Utility services; and

c) access for emergency response services;

to properties adjoining the Working Area.

- .02 The Contractor shall provide at all times and at no extra cost to the Owner access to fire hydrants, water and gas valves, and all other Utilities located in the Working Area.
- .03 Where any interruptions in the supply of Utility services are required and are authorized by the Contract Administrator, the Contractor shall give the affected property owners notice in accordance with subsection GC 7.11, Notices by the Contractor, and shall arrange such interruptions so as to create a minimum of interference to those affected.

GC 7.08 Approvals and Permits

- .01 Except as specified in subsection GC 4.02, Approval and Permits, the Contractor shall obtain and pay for any permits, licences, and certificates, which at the date of tender closing, are required for the performance of the Work.
- .02 The Contractor shall arrange for all necessary inspections required by the approvals and permits specified in clause GC 7.08.01, Approvals and Permit.

GC 7.09 Suspension of Work

- .01 The Contractor shall, upon written notice from the Contract Administrator, discontinue or delay any or all of the Work and Work shall not be resumed until the Contract Administrator so directs in writing. Delays, in these circumstances, shall be administered according to subsection GC 3.07, Delays.

GC 7.10 Contractor's Right to Stop the Work or Terminate the Contract

- .01 If the Owner is adjudged bankrupt or makes a general assignment for the benefit of creditors because of insolvency or if a receiver is appointed because of insolvency, the Contractor may, without prejudice to any other right or remedy the Contractor may have, by giving the Owner or receiver or trustee in bankruptcy written notice, terminate the Contract.
- .02 If the Work is stopped or otherwise delayed for a period of 30 Days or more under an order of a court or other public authority and provided that such order was not issued as the result of an act or fault of the Contractor or of anyone directly employed or engaged by the Contractor, the Contractor may, without prejudice to any other right or remedy the Contractor may have, by giving the Owner written notice, terminate the Contract.
- .03 The Contractor may notify the Owner in writing, with a copy to the Contract Administrator, that the Owner is in default of contractual obligations if,
- a) the Contract Administrator fails to issue certificates in accordance with the provisions of section GC 8.0, Measurement and Payment;
 - b) the Owner fails to pay the Contractor, within 28 Days of the due dates identified in clause GC 8.02.04, Certification and Payment, the amounts certified by the Contract Administrator or within 28 Days of an award by an arbitrator or court; or
 - c) the Owner fails to comply with the requirements of the Contract.
- .04 The Contractor's written notice to the Owner shall advise that if the default is not corrected in the 7 Days immediately following receipt of the written notice, the Contractor may, without prejudice to any other right or remedy the Contractor may have, stop the Work or terminate the Contract.

- .05 If the Contractor terminates the Contract under the conditions set out in subsection GC 7.10, Contractor's Right to Stop the Work or Terminate the Contract, the Contractor shall be entitled to be paid for all Work performed according to the Contract Documents and for any losses or damage as the Contractor may sustain as a result of the termination of the Contract.

GC 7.11 Notices by the Contractor

- .01 Before any Work is carried out that may affect the property or operations of any Ministry or agency of government or any person; company; partnership; or corporation, including a municipal corporation or any board or commission thereof, and in addition to such notices of the commencement of specified operations as are prescribed elsewhere in the Contract Documents, the Contractor shall give at least 48 hours advance written notice of the date of commencement of such Work to the person, company, partnership, corporation, board, or commission so affected.

GC 7.12 Environmental Incident Management under Legislation Protecting the Environment and Natural Resources

- .01 The Contractor shall be in strict compliance with the requirements of the following legislation, as amended, regarding environmental incidents under the control of the Contractor or that are a result of the Contractor's operations:
- a) Environmental Protection Act, R.S.O. 1990, c. E.19
 - b) Fisheries Act, R.S.C. 1985, c. F-14
 - c) Technical Standards and Safety Act, 2000, S.O. 2000, c. 16
 - d) Pesticides Act, R.S.O. 1990, c. P.11
 - e) Ontario Water Resources Act, R.S.O. 1990, c. O.40
 - f) Transportation of Dangerous Goods Act, 1992, S.C.1992, c. 34
- .02 The requirements of the legislation listed in clause GC 7.12.01 include but are not restricted to:
- a) Immediate containment of the material, pollutant, contaminant, deleterious substance, or dangerous good;
 - b) Immediate notification of the environmental incident to the proper authority; and
 - c) Clean up and restoration of the environment to preconditions.
- .03 The Contractor shall possess a plan demonstrating that environmental incidents shall be managed to satisfy the requirements of clauses GC 7.12.01 and GC 7.12.02.
- .04 The Contractor shall provide a copy of the environmental incident plan to the Contract Administrator when required and shall inform the Contract Administrator immediately of:
- a) An environmental incident when it occurs; and
 - b) Any actions taken or intended to be taken by the Contractor regarding the environmental incident.

- .05 The Contractor shall indemnify and save the Owner harmless from any additional expense that the Owner may incur to have the Work performed as a result of the Contractor's failure to comply with the requirements of the legislation listed in clause GC 7.12.01.

GC 7.13 Obstructions

- .01 Except as otherwise noted in these General Conditions, the Contractor assumes all the risks and responsibilities arising out of any obstruction encountered in the performance of the Work and any traffic conditions, including traffic conditions on any Highway or road giving access to the Working Area caused by such obstructions, and the Contractor shall not make any claim against the Owner for any loss, damage, or expense occasioned thereby.
- .02 Where the obstruction is an underground Utility or other man-made object, the Contractor shall not be required to assume the risks and responsibilities arising out of such obstruction, unless the location of the obstruction is shown on the Plans or described in the Contract Documents and the location so shown is within the tolerance specified in clause GC 2.01.01 a), or unless the presence and location of the obstruction has otherwise been made known to the Contractor or could have been determined by the visual site investigation made by the Contractor in accordance with these General Conditions.
- .03 During the course of the Contract, it is the Contractor's responsibility to consult with Utility companies or other appropriate authorities for further information in regard to the exact location of these Utilities, to exercise the necessary care in construction operations, and to take such other precautions as are necessary to safeguard the Utilities from damage.

GC 7.14 Limitations of Operations

- .01 Except for such Work as may be required by the Contract Administrator to maintain the Work in a safe and satisfactory condition, the Contractor shall not carry out operations under the Contract on Saturdays, Sundays, and any holidays recognized by the Owner without permission in writing from the Contract Administrator.
- .02 The Contractor shall cooperate and coordinate the Work with other Contractors, Utility companies, and the Owner and they shall be allowed access to their Work or plant at all reasonable times.

GC 7.15 Cleaning Up Before Acceptance

- .01 Upon attaining Substantial Performance of the Work, the Contractor shall remove surplus materials, tools, and Equipment not required for the performance of the remaining Work. The Contractor shall also remove all temporary works and debris other than that caused by the Owner or others and leave the Work and Working Area clean and suitable for occupancy by the Owner, unless otherwise specified.
- .02 The Work shall not be deemed to have reached Completion until the Contractor has removed surplus materials, tools, and Equipment. The Contractor shall also have removed debris, other than that caused by the Owner, or others.

GC 7.16 Warranty

- .01 Unless otherwise specified in the Contract Documents for certain Materials or components of the Work, the Contractor shall be responsible for the proper performance of the Work only to the extent that the design and standards permit such performance.
- .02 Subject to the previous paragraph the Contractor shall correct promptly, at no additional cost to the Owner, defects or deficiencies in the Work that appear,

- a) prior to and during the period of 12 months from the date of Substantial Performance of the Work, as set out in the Certificate of Substantial Performance of the Work,
- b) where there is no Certificate of Substantial Performance, 12 months from the date of Completion of the Work as set out in the Completion Certificate, or
- c) such longer periods as may be specified in the Contract Documents for certain Materials or some of the Work.

The Contract Administrator shall promptly give the Contractor written notice of observed defects or deficiencies.

- .03 The Contractor shall correct or pay for damage resulting from corrections made under the requirements of clause GC 7.16.02.

GC 7.17 Contractor's Workers

- .01 The Contractor shall only employ orderly, competent, and skillful workers to do the Work and whenever the Contract Administrator shall inform the Contractor in writing that any worker or workers involved in the Work are, in the opinion of the Contract Administrator, incompetent, or disorderly such worker or workers shall be removed from the Work and shall not be employed on the Work again without the consent in writing of the Contract Administrator.

GC 7.18 Drainage

- .01 During construction and until the Work is completed, the Contractor shall make all reasonable efforts to keep all portions of the Work properly and efficiently drained, to at least the same degree as that of the existing drainage conditions.

SECTION GC 8.0 - MEASUREMENT AND PAYMENT

GC 8.01 Measurement

GC 8.01.01 Quantities

- .01 The Contract Administrator shall make an Estimate in writing once a month, unless otherwise specified in the Contract Documents, of the quantity of Work performed and provide such Estimate to the Contractor within 10 Days of the Cut-Off Date.
- .02 Quantities for progress payments shall be construed and held to approximate. The final quantities for the issuance of the Completion Payment shall be based on the measurement of Work completed.
- .03 Measurement of the quantities of the Work performed may be either by Actual Measurement or by Plan Quantity principles as indicated in the Contract. Adjustments to Plan Quantity measurements shall normally be made using Plan Quantity principles but may, where appropriate, be made using Actual Measurements. Those items identified on the Tender by the notation (P) in the unit column shall be paid according to the Plan Quantity. Items where the notation (P) does not occur shall be paid according to Actual Measurement or lump sum.

GC 8.01.02 Variations in Tender Quantities

- .01 Where it appears that the quantity of Work to be done or Material to be supplied or both by the Contractor under a unit price tender item may exceed or be less than the tender quantity, the Contractor shall proceed to do the Work or supply the Material or both required to complete the tender item and payment shall be made for the actual amount of Work done or Material supplied or both at the unit prices stated in the Tender except as provided below:
 - a) In the case of a Major Item where the quantity of Work performed or Material supplied or both by the Contractor exceeds the tender quantity by more than 15%, either party to the Contract may make a written request to the other party to negotiate a revised unit price for that portion of the Work performed or Material supplied or both which exceeds 115% of the tender quantity. The negotiation shall be carried out as soon as reasonably possible. Any revision of the unit price shall be based on the actual cost of doing the Work or supplying the Material or both under the tender item plus a reasonable allowance for profit and applicable overhead. Alternatively, where both parties agree, an allowance equal to 10% of the unit price on the amount of the underrun in excess of 15% of the tender quantity shall be paid.
 - b) In the case of a Major Item where the quantity of Work performed or Material supplied or both by the Contractor is less than 85% of the tender quantity, the Contractor may make a written request to negotiate for the portion of the actual overheads and fixed costs applicable to the amount of the underrun in excess of 15% of the tender quantity. For purposes of the negotiation, the overheads and fixed costs applicable to the item are deemed to have been prorated uniformly over 100% of the tender quantity for the item. Overhead costs shall be confirmed by a statement certified by the Contractor's senior financial officer or auditor and may be audited by the Owner. Alternatively, where both parties agree, an allowance equal to 10% of the unit price on the amount of the underrun in excess of 15% of the tender quantity shall be paid.

Written requests for compensation must be received no later than 60 Days after the issuance of the Completion Payment.

GC 8.02 Payment

GC 8.02.01 Non-Resident Contractor

- .01 If the Contractor is not a registered entity in Ontario, the Contractor shall obtain all necessary approvals, consents, permits, licences, certificates, registrations, and other authorizations prior to execution of the Contract.
- .02 The Contractor shall ensure that all Subcontractors the Contractor proposes to use for carrying out any of the Work required by the Contract and who are not a registered entity in Ontario have obtained all necessary approvals, consents, permits, certificates, registrations, and other authorizations prior to execution of the subcontract.

GC 8.02.02 Price for Work

- .01 Prices for the Work shall be full compensation for all labour, Equipment and Material required in its performance. The term "all labour, Equipment, and Material" shall include Hand Tools, supplies, and other incidentals.
- .02 Payment, for Work which is identified in the Contract Documents but not specifically detailed as part of any one item shall be deemed to be included in the items with which it is associated.

GC 8.02.03 Advance Payments for Material

- .01 The Owner shall make advance payments for Material intended for incorporation in the Work upon the written request of the Contractor and according to the following terms and conditions:
 - a) The Contractor shall deliver the Material to a site approved by the Contract Administrator and the Contractor shall, in advance of receipt of the shipment of the Material, arrange for adequate and proper storage facilities.
 - b) The value of aggregates, processed and stockpiled, shall be assessed by the following procedure:
 - i. Sources Other Than Commercial
 - (A) Granular A, B, BI, BII, BIII, M, and O shall be assessed at the rate of 60% of the Contract price.
 - (B) Coarse and fine aggregates for hot mix asphaltic concrete, surface treatment and Portland cement concrete shall be assessed at the rate of 25% of the Contract price for each aggregate stockpiled.
 - ii. Commercial Sources
 - Payment for separated coarse and fine aggregates shall be considered at the above rate when such Materials are stockpiled at a commercial source where further processing is to be carried out before incorporating such Materials into a final product. Advance payments for other Materials located at a commercial source shall not be made.
 - c) Payment for all other Materials, unless otherwise specified elsewhere in the Contract Documents, shall be based on the invoice price, and the Contractor shall submit proof of cost to the Contract Administrator before payment can be made by the Owner.
 - d) The payment for all Materials shall be prorated against the appropriate tender item by paying for sufficient units of the item to cover the value of the Material. Such payment shall not exceed 80% of the Contract price for the item.

- e) All Materials for which the Contractor wishes to receive advance payment shall be placed in the designated storage location immediately upon receipt of the Material and shall thenceforth be held by the Contractor in trust for the Owner as collateral security for any monies advanced by the Owner and for the due completion of the Work. The Contractor shall not exercise any act of ownership inconsistent with such security, or remove any Material from the storage locations, except for inclusion in the Work, without the consent, in writing, of the Contract Administrator.
 - f) Such materials shall remain at the risk of the Contractor who shall be responsible for any loss, damage, theft, improper use, or destruction of the Material however caused.
- .02 Where the Owner makes advance payments subject to the conditions listed in clause GC 8.02.03.01, such payment shall not constitute acceptance of the Material by the Owner. Acceptance shall only be determined when the Material meets the requirements of the appropriate specification.

GC 8.02.04 Certification and Payment

GC 8.02.04.01 Progress Payment

- .01 The Contractor shall submit a Proper Invoice for progress payments monthly or at intervals specified in the Contract Documents after starting the Work on this Contract. The Contractor shall submit the Proper Invoice to the Contract Administrator and to the Owner. This Proper Invoice shall be for work completed at the agreed to Cut-Off Date.
- .02 A Proper Invoice shall include;
- a) the requirements as set out in section 6.1 of the Construction Act;
 - b) the quantities of Work performed;
 - c) the value of Work performed;
 - d) any advanced payment for Material;
 - e) the amount of Statutory Holdback, liens, Owner's set-off;
 - f) the amount of any applicable taxes;
 - g) the amount due to the Contractor; and
 - h) any other information that may be prescribed in the Contract Documents.
- .03 Payment shall be made within 28 Days of the submission of the Proper Invoice unless a notice of non-payment has been issued in accordance with the Construction Act.
- .04 The Owner shall retain the Statutory Holdback in the form and amount as required under the Construction Act.

GC 8.02.04.02 Certification of Subcontract Completion

- .01 Before the Work has reached the stage of Substantial Performance, the Contractor may notify the Contract Administrator, in writing that a subcontract is completed satisfactorily and ask that the Contract Administrator certify the completion of such subcontract.

- .02 The Contract Administrator shall issue a Certificate of Subcontract Completion, if the subcontract has been completed in a form satisfactory to the Contract Administrator, and all required inspection and testing of the works covered by the subcontract have been carried out and the results are satisfactory to the Contract Administrator.
- .03 The Contract Administrator shall set out in the Certificate of Subcontract Completion the date on which the subcontract was completed and, within 7 Days of the date the subcontract is certified complete, the Contract Administrator shall give a copy of the certificate to the Contractor and to the Subcontractor concerned.

GC 8.02.04.03 Subcontract Statutory Holdback Release Certificate and Payment

- .01 Following receipt of the Certificate of Subcontract Completion, the Owner shall release and pay the Contractor the Statutory Holdback retained in respect of the subcontract. Such release shall be made 61 Days after the date the subcontract was certified complete and providing the Contractor submits the following to the Contract Administrator:
 - a) a document satisfactory to the Contract Administrator that shall release the Owner from all further claims relating to the subcontract, qualified by stated exceptions such as holdback monies;
 - b) evidence satisfactory to the Contract Administrator that the Subcontractor has discharged all liabilities incurred in carrying out the subcontract;
 - c) a satisfactory clearance certificate or letter from the Workplace Safety and Insurance Board relating to the subcontract; and
 - d) a copy of the contract between the Contractor and the Subcontractor and a satisfactory statement showing the total amount due the Subcontractor from the Contractor.
- .02 Clause GC 8.02.04.03.01 d), shall only apply to Lump Sum Items and then only when the Contract Administrator specifically requests it.
- .03 Upon receipt of the Statutory Holdback, the Contractor shall forthwith give the Subcontractor the payment due under the subcontract.
- .04 Release of Statutory Holdback by the Owner in respect of a subcontract shall not relieve the Contractor, or the Contractor's Surety, of any of their responsibilities.

GC 8.02.04.04 Substantial Performance of Work

- .01 The Contractor, as part of the application for Substantial Performance, shall submit an itemized list of the outstanding work.
- .02 Upon application by the Contractor and when the Contract Administrator has verified that the Contract has been substantially performed, the Contract Administrator shall issue a Certificate of Substantial Performance.
- .03 The Contract Administrator shall set out in the Certificate of Substantial Performance the date on which the Contract was substantially performed and, within 7 Days after signing the said certificate, and shall provide a copy to the Contractor.
- .04 Upon receipt of a copy of the Certificate of Substantial Performance, the Contractor shall forthwith, as required by Section 32(1) Paragraph 5 of the Construction Act, as amended, publish a copy of the certificate in the manner set out in the regulations.

- .05 Where the Contractor fails to publish a copy of the Certificate of Substantial Performance as required above within 7 Days after receiving a copy of the certificate signed by the Contract Administrator, the Owner may publish a copy of the certificate at the Contractor's expense.
- .06 Except as otherwise provided for in Section 31 of the Construction Act, the 60 Day lien period prior to the release of holdback as referred to in clause GC 8.02.04.05, Substantial Performance Payment and Statutory Holdback Release Payment Certificates, shall commence from the date of publication of the Certificate of Substantial Performance as provided for above.

GC 8.02.04.05 Substantial Performance Payment and Substantial Performance Statutory Holdback Release Payment Certificates

- .01 Prior to the Contract Administrator issuing the Certificate of Substantial Performance, the Contractor shall submit a Proper Invoice for the Work completed. In addition to the requirements specified under section 8.02.04.01.02, the Proper Invoice shall include:
 - a) the value of Work performed to the date of Substantial Performance;
 - b) the value of outstanding or incomplete Work;
 - c) the amount of the Statutory Holdback, allowing for any previous releases of Statutory Holdback to the Contractor in respect of completed subcontracts and deliveries of pre-selected Equipment; and
 - d) the amount due the Contractor.
- .02 Payment shall be made within 28 Days of the date of submission of the Proper Invoice.
- .03 The Substantial Performance Statutory Holdback Release Payment Certificate shall be a payment certificate releasing to the Contractor the Statutory Holdback due in respect of Work performed up to the date of Substantial Performance. Payment of such Statutory Holdback shall be due 61 Days after the date of publication of the Certificate of Substantial Performance but subject to the provisions of the Construction Act and the submission by the Contractor of the following documents:
 - a) a satisfactory Certificate of Clearance from the Workplace Safety and Insurance Board; and
 - b) proof of publication of the Certificate of Substantial Performance.
- .04 Any amount of security retained shall be identified on the Substantial Performance Payment Certificate.

GC 8.02.04.06 Certification of Completion

- .01 Upon application by the Contractor and when the Contract Administrator has verified that the Contract has reached Completion, the Contract Administrator shall issue a Completion Certificate.
- .02 The Contract Administrator shall set out in the Completion Certificate the date on which the Work was completed and, within 7 Days of signing the said certificate, the Contract Administrator shall provide a copy to the Contractor.

GC 8.02.04.07 Completion Payment and Completion Statutory Holdback Release Payment Certificates

- .01 Prior to the Contract Administrator issuing the Completion Certificate, the Contractor shall submit a Proper Invoice for the Work completed. In addition to the requirements noted under section 8.02.04.01.02, the Proper Invoice shall include:
- a) measurement and value of Work at Completion;
 - b) the amount of the further Statutory Holdback based on the value of further Work completed over and above the value of Work completed shown in the Substantial Performance Payment Certificate referred to above; and
 - c) the amount due the Contractor.
- .02 The Completion Statutory Holdback Release Payment Certificate shall be a payment certificate releasing to the Contractor the further Statutory Holdback. Subject to any outstanding liens and permissible set-offs and upon submission of a satisfactory Certificate of Clearance from the Workplace Safety and Insurance Board, the Owner shall pay the remaining holdback on the Work done, within 28 Days after the expiration of the 60-Day lien period.
- .03 Any amount of security retained shall be identified on the Completion Payment Certificate.

GC 8.02.04.08 Interest

- .01 Interest due to the Contractor shall be based on simple interest and calculated using the applicable Rate of Interest. Interest shall begin to accrue on an amount that is not paid when it is due to be paid under Part-I of the Construction Act, at the prejudgment interest rate determined under subsection 127 (2) of the *Courts of Justice Act* or, if the Contract specifies a different interest rate for this purpose, the greater of the prejudgment interest rate and the interest rate specified in the Contract.

GC 8.02.04.09 Interest for Late Payment

- .01 Provided the Contractor has complied with the requirements of the Contract, including all documentation requirements, when payment by the Owner to the Contractor for Work performed, or for release of Statutory Holdback, is delayed by the Owner, then the Contractor shall be entitled to receive interest on the outstanding payment at the Rate of Interest, if payment is not received on the dates set out below:
- a) Progress Payment: 28 Days after submission of Proper Invoice;
 - b) Subcontract Statutory Holdback Release Payment: 89 Days after the date on which the subcontract was completed;
 - c) Substantial Performance Payment: 28 Days after the date of issuance of the certificate;
 - d) Substantial Performance Statutory Holdback Release Payment: 89 Days after publication of the Payment Certificate of Substantial Performance;
 - e) Completion Payment: 28 Days after the date certified as the date on which the Contract reached Completion; and
 - f) Completion Statutory Holdback Release Payment: 89 Days after the date certified as the date that the Work was completed.

- .02 If the Contractor has not complied with the requirements of the Contract, including all documentation requirements, prior to expiration of the time periods described in clause GC 8.02.04.09.01, interest shall only begin to accrue when the Contractor has completed those requirements.

GC 8.02.04.10 Interest for Negotiations and Claims

- .01 Except as hereinafter provided, where a notice of negotiation, notice of intent to claim and the subsequent claims are submitted in accordance with the time limits or procedure or both described by subsection GC 3.13, Claims, Negotiations, Mediation, the Owner shall pay the Contractor the Rate of Interest on the amount of the negotiated price for that part of the Work or on the amount of the settled claim. Such interest shall not commence until 30 Days after the satisfactory completion of that part of the Work.
- .02 Where the Contractor fails to give notice of a claim within the time limit prescribed by subsection GC 3.13, Claims, Negotiations, Mediation, interest shall not be paid.
- .03 Where a Contractor fails to comply with the 30 Day time limit and the procedures prescribed in clause GC 3.13.03.03 for submission of claims, interest shall not be paid for the delay period.

GC 8.02.04.11 Owner's Set-Off

- .01 Pursuant to the Construction Act, the Owner may retain from monies owing to the Contractor under this Contract an amount sufficient to cover any outstanding or disputed liabilities, including the cost to remedy deficiencies, the reduction in value of substandard portions of the Work, claims for damages by third parties that have not been determined in writing by the Contractor's insurer, undetermined claims by the Owner, and any assessment due the Workplace Safety and Insurance Board.
- .02 Under these circumstances the Owner will give the Contractor appropriate notice of such action.

GC 8.02.04.12 Delay in Payment

- .01 The Owner shall not be deemed to be in default of the Contract provided any delay in payment does not exceed the due dates as defined in clause GC 8.02.04.09.01.

GC 8.02.05 Payment on a Time and Material Basis

GC 8.02.05.01 Definitions

- .01 For the purpose of clause GC 8.02.05 the following definitions apply:

Cost of Labour means the amount of wages, salary, travel, travel time, food, lodging, or similar items and Payroll Burden paid or incurred directly by the Contractor to or in respect of labour and supervision actively and necessarily engaged on the Work based on the recorded time and hourly rates of pay for such labour and supervision but shall not include any payment or costs incurred for general supervision, administration, and management time spent on the entire Work or any wages, salary, or Payroll Burden for which the Contractor is compensated by any payment made by the Owner for Equipment.

Cost of Material means the cost of Material purchased or supplied from stock and valued at current market prices for the purpose of carrying out Extra Work by the Contractor or by others, when such arrangements have been made by the Contractor for completing the Work, as shown by itemized invoices.

Operated Rented Equipment means Rented Equipment for which an operator is provided by the supplier of the Equipment and for which the rent or lease includes the cost of the operator.

Payroll Burden means the payments in respect of workplace insurance, vacation pay, employment insurance, public liability and property damage insurance, sickness and accident insurance, pension fund, and such other welfare and benefit payments forming part of the Contractor's normal labour costs.

Rented Equipment means Equipment that is rented or leased for the special purpose of Work on a Time and Material Basis from a person, firm, or corporation that is not an associate of the lessee as the word "associate" is defined by the Securities Act, R.S.O. 1990, c.S.5, as amended, and is approved by the Contract Administrator.

Road Work means the preparation, construction, finishing, and construction maintenance of roads, streets, Highways, and parking lots and includes all work incidentals thereto other than Work on structures.

Sewer and Watermain Work means the preparation, construction, finishing, and construction maintenance of sewer systems and watermain systems, and includes all work incidental thereto other than Work on structures.

Standby Time means any period of time that is not considered Working Time and which together with the Working Time does not exceed 10 hours in any one Working Day and during which time a unit of Equipment cannot practically be used on other Work but must remain on the site in order to continue with its assigned task and during which time the unit is in fully operable condition.

Structure Work means the construction, reconstruction, repair, alteration, remodelling, renovation, or demolition of any bridge, building, tunnel, or retaining wall and includes the preparation for and the laying of the foundation of any bridge, building, tunnel, or retaining wall and the installation of Equipment and appurtenances incidental thereto.

The 127 Rate means the rate for a unit of Equipment as listed in OPSS.PROV 127, Schedule of Rental Rates for Construction Equipment, Including Model and Specification Reference, that is current at the time the work is carried out or for Equipment that is not so listed, the rate that has been calculated by the Owner, using the same principles as used in determining The 127 Rates.

Work on a Time and Material Basis means Changes in the Work, Extra Work, and Additional Work approved by the Contract Administrator for payment on a Time and Material basis. The Work on a Time and Material Basis shall be subject to all the terms, conditions, Standard Specifications and provisions of the Contract.

Working Time means each period of time during which a unit of Equipment is actively and of necessity engaged on a specific operation and the first 2 hours of each immediately following period during which the unit is not so engaged but during which the operation is otherwise proceeding and during which time the unit cannot practically be transferred to other Work but must remain on the site in order to continue with its assigned tasks and during which time the unit is in a fully operable condition.

GC 8.02.05.02 Daily Work Records

- .01 Daily Work Records, prepared as the case may be by either the Contractor's representative or the Contract Administrator reporting the labour and Equipment employed and the Material used on each Time and Material project, should be reconciled and signed each Day by both the Contractor's representative and the Contract Administrator. If it is not possible to reconcile the Daily Work Records, then the Contractor shall submit the un-reconciled Daily Work Records with its claim, whereby the resolution of the dispute about the Daily Work Records shall not be resolved until there is a resolution of the claim.

GC 8.02.05.03 Payment for Work

- .01 Payment as herein provided shall be full compensation for all labour, Equipment, and Material to do the Work on a Time and Material Basis except where there is agreement to the contrary prior to the commencement of the Work on a Time and Material Basis. The payment adjustments on a Time and Material basis shall apply to each individual Change Order authorized by the Contract Administrator.

GC 8.02.05.04 Payment for Labour

- .01 The Owner shall pay the Contractor for labour employed on each Time and Material project at 135% of the Cost of Labour up to \$3,500, then at 120% of any portion of the Cost of Labour in excess of \$3,500.
- .02 The Owner shall make payment in respect of Payroll Burden for Work on a Time and Material Basis at the Contractor's actual cost of Payroll Burden.
- .03 At the Owner's discretion, an audit may be conducted in which case the actual Payroll Burden so determined shall be applied to all Time and Material work on the Contract.

GC 8.02.05.05 Payment for Material

- .01 The Owner shall pay the Contractor for Material used on each Time and Material project at 120% of the Cost of the Material up to \$3,500, then at 115% of any portion of the Cost of Material in excess of \$3,500.

GC 8.02.05.06 Payment for Equipment

GC 8.02.05.06.01 Working Time

- .01 The Owner shall pay the Contractor for the Working Time of all Equipment, other than Rented Equipment and Operated Rented Equipment, used on the Work on a Time and Material basis at The 127 Rates with a cost adjustment as follows:
 - a) Cost \$12,000 or less - no adjustment;
 - b) Cost greater than \$12,000 but not exceeding \$24,000 - payment \$12,000 plus 90% of the portion in excess of \$12,000; and
 - c) Cost greater than \$24,000 - \$22,800 plus 80% of the portion in excess of \$24,000.
- .02 The Owner shall pay the Contractor for the Working Time of Rented Equipment used on the Work on a Time and Material Basis at 110% of the invoice price approved by the Contract Administrator up to a maximum of 110% of the 127 Rate. This constraint shall be waived when the Contract Administrator approves the invoice price prior to the use of the Rented Equipment.
- .03 The Owner shall pay the Contractor for the Working Time of Operated Rented Equipment used on the Work on a Time and Material Basis at 110% of the Operated Rented Equipment invoice price approved by the Contract Administrator prior to the use of the Equipment on the Work on a Time and Material Basis.

GC 8.02.05.06.02 Standby Time

- .01 The Owner shall pay the Contractor for Standby Time of Equipment at 35% of The 127 Rate or 35% of the invoice price whichever is appropriate. The Owner shall pay reasonable costs for Rented Equipment where this is necessarily retained in the Working Area for extended periods agreed to by

the Contract Administrator. This shall include Rented Equipment intended for use on other work, but has been idled due to the circumstances giving rise to the Work on a Time and Material Basis.

- .02 In addition, the Owner shall include the Cost of Labour of operators or associated labourers who cannot be otherwise employed during the Standby Time or during the period of idleness caused by the circumstances giving rise to the Work on a Time and Material Basis.
- .03 The Contract Administrator may require Rented Equipment idled by the circumstances giving rise to the Work on Time and Material Basis to be returned to the lessor until the Work requiring the Equipment can be resumed. The Owner shall pay such costs as a result from such return.
- .04 When Equipment is transported, solely for the purpose of the Work on a Time and Material Basis, to or from the Working Area on a Time and Material basis, payment shall be made by the Owner only in respect of the transporting units. When Equipment is moved under its own power it shall be deemed to be working. The method of moving Equipment and the rates shall be subject to the approval of the Contract Administrator.

GC 8.02.05.07 Payment for Hand Tools

- .01 Notwithstanding any other provision of this Section, no payment shall be made to the Contractor for or in respect of Hand Tools or Equipment that are tools of the trade.

GC 8.02.05.08 Payment for Work by Subcontractors

- .01 Where the Contractor arranges for Work on a Time and Material Basis, or a part of it, to be performed by Subcontractors on a Time and Material basis and has received approval prior to the commencement of such Work, in accordance with the requirements of subsection GC 3.09, Subcontracting by the Contractor, the Owner shall pay the cost of Work on a Time and Material Basis by the Subcontractor calculated as if the Contractor had done the Work on a Time and Material Basis, plus a markup calculated on the following basis:
 - a) 20% of the first \$3,500; plus
 - b) 15% of the amount from \$3,500 to \$12,000; plus
 - c) 5% of the amount in excess of \$12,000.
- .02 No further markup shall be applied regardless of the extent to which the work is assigned or sublet to others. If Work is assigned or sublet to an associate, as defined by the Securities Act, no markup whatsoever shall be applied.

GC 8.02.05.09 Submission of Invoices

- .01 At the start of the Work on a Time and Material Basis, the Contractor shall provide the applicable labour and Equipment rates not already submitted to the Contract Administrator during the course of such Work.
- .02 Separate summaries shall be completed by the Contractor. Each summary shall include the Change Directive or Change Order number and covering dates of the Work and shall itemize separately the labour, Materials, and Equipment. Invoices for Materials, Rented Equipment, and other charges incurred by the Contractor on the Work on a Time and Material Basis shall be included with each summary.

- .03 Each month the Contract Administrator shall include with the monthly progress payment, the costs of the Work on a Time and Material Basis incurred during the preceding month all in accordance with the contract administrative procedures and the Contractor's invoice of the Work on a Time and Material Basis.
- .04 The final summary as per clause 8.02.05.09.02 shall be submitted by the Contractor within 60 Days after the completion of the Work on a Time and Material Basis.

GC 8.02.05.10 Payment Other Than on a Time and Material Basis

- .01 Clause GC 8.02.05 does not preclude the option of the Contract Administrator and the Contractor negotiating a Lump Sum Item or unit price payment for Change in the Work, Extra Work, and Additional Work.

GC 8.02.05.11 Payment Inclusions

- .01 Except where there is agreement in writing to the contrary, the compensation, as herein provided, shall be accepted by the Contractor as compensation in full for profit and all costs and expenses arising out of the Work, including all cost of general supervision, administration, and management time spent on the Work, and no other payment or allowance shall be made in respect of such Work.

GC 8.02.06 Final Acceptance Certificate

- .01 After the acceptance of the Work or, where applicable, after the Warranty Period has expired, the Contract Administrator shall issue the Final Acceptance Certificate. The Final Acceptance Certificate shall not be issued until all known deficiencies have been adjusted or corrected, as the case may be, and the Contractor has discharged all obligations under the Contract.
- .02 Any remaining amount of security shall be released upon Final Acceptance of the Contract.

GC 8.02.07 Records

- .01 The Contractor shall maintain and keep accurate Records relating to the Work, Changes in the Work, Extra Work, Additional Work and claims arising therefrom. Such Records shall be of sufficient detail to support the total cost of the Work, Changes in the Work, Extra Work, Additional Work and claims arising therefrom. The Contractor shall preserve all such original Records until 12 months after the Final Acceptance Certificate is issued or until all claims have been settled, whichever is longer. The Contractor shall require that Subcontractors employed by the Contractor preserve all original Records pertaining to the Work, Changes in the Work, Extra Work, Additional Work and claims arising therefrom for a similar period of time.
- .02 The Owner may inspect and audit the Contractor's Records relating to the Work, Changes in the Work, Extra Work, and Additional Work at any time during the period of the Contract. The Contractor shall supply certified copies of any part of its Records required, whenever requested by the Owner.

GC 8.02.08 Taxes

- .01 Where a change in Canadian Federal or Provincial taxes occurs after the date of tender closing for this Contract, and this change could not have been anticipated at the time of Tender, the Owner shall increase or decrease Contract payments to account for the exact amount of tax change involved.

- .02 Claims for compensation for additional tax cost shall be submitted by the Contractor to the Contract Administrator on forms provided by the Contract Administrator to the Contractor. Such claims for additional tax costs shall be submitted not less than 30 Days after the date of Final Acceptance.
- .03 Where the Contractor benefits from a change in Canadian Federal or Provincial taxes, the Contractor shall submit to the Contract Administrator on forms provided by the Contract Administrator, a statement of such benefits. This statement shall be submitted not later than 30 Days after Final Acceptance.
- .04 Changes in Canadian Federal or Provincial taxes that impact upon commodities, which when left in place form part of the finished Work, or the provision of services, where such services form part of the Work and where the manufacture or supply of such commodities or the provision of such services is carried out by the Contractor or a Subcontractor, are subject to a claim or benefit as detailed above. Services in the latter context means the supply and operation of Equipment, the provision of labour, and the supply of commodities that do not form part of the Work.
- .05 The Contractor shall add the Harmonized Sales Tax (HST) to all invoices.

GC 8.02.09 Liquidated Damages

- .01 When liquidated damages are specified in the Contract and the Contractor fails to complete the Work in accordance with the Contract, the Contractor shall pay such amounts as are specified in the Contract Documents.

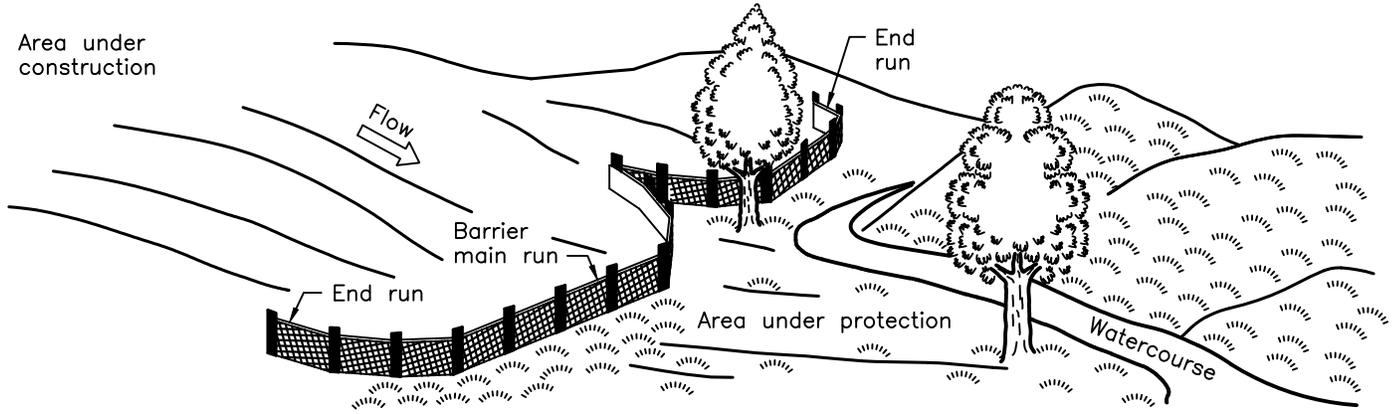
Division 9

OPS Drawings for Contract

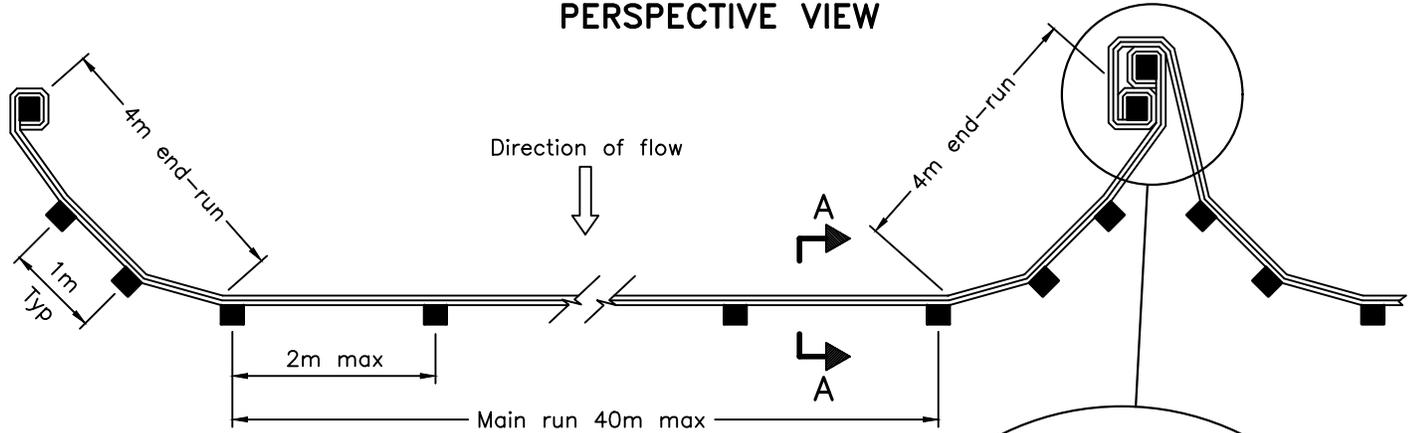
Ontario Provincial Standard Drawings

Standard No.	Name	Date	Revision
219.130	Heavy-Duty Silt Fence Barrier	Nov 2021	3
219.180	Straw Bale Flow Check Dam	Nov 2021	3
219.210	Rock Flow Check Dam - V-Ditch	Nov 2022	3
406.010	Aluminum Ladder for Maintenance Holes	Nov 2018	3
701.013	Precast Concrete Maintenance Hole, 2400 mm Diameter	Nov 2014	5
701.100	Frost Strap Installation	Nov 2018	3
802.010	Flexible Pipe Embedment and Backfill, Earth Excavation	Nov 2014	3
802.014	Flexible Pipe Embedment in Embankment, Original Ground: Earth or Rock	Nov 2014	3
810.010	Rip Rap Treatment for Sewer and Culvert Outlets	Nov 2018	3
2100.010	Cable Installation in Trenches	Nov 2013	0
2101.010	Duct Installation in Trenches	Nov 2013	1
2238.010	Wooden Pole in Earth	Nov 2010	1

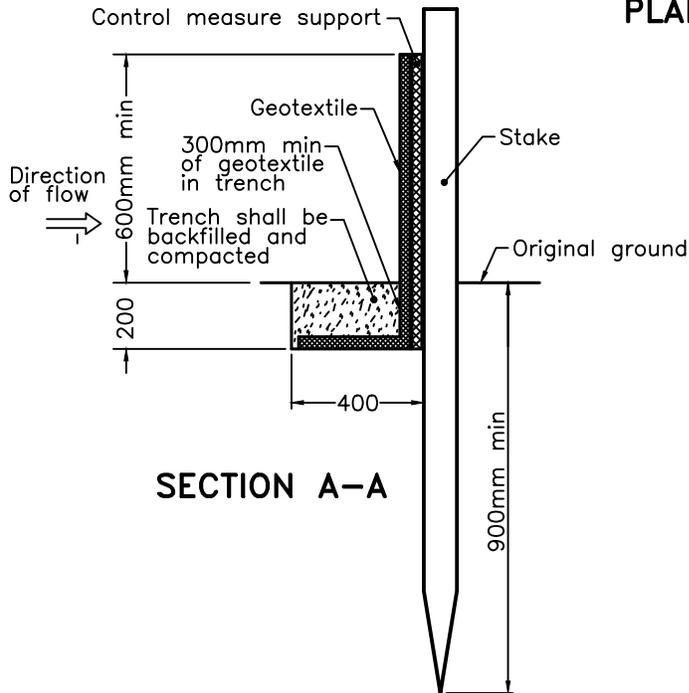
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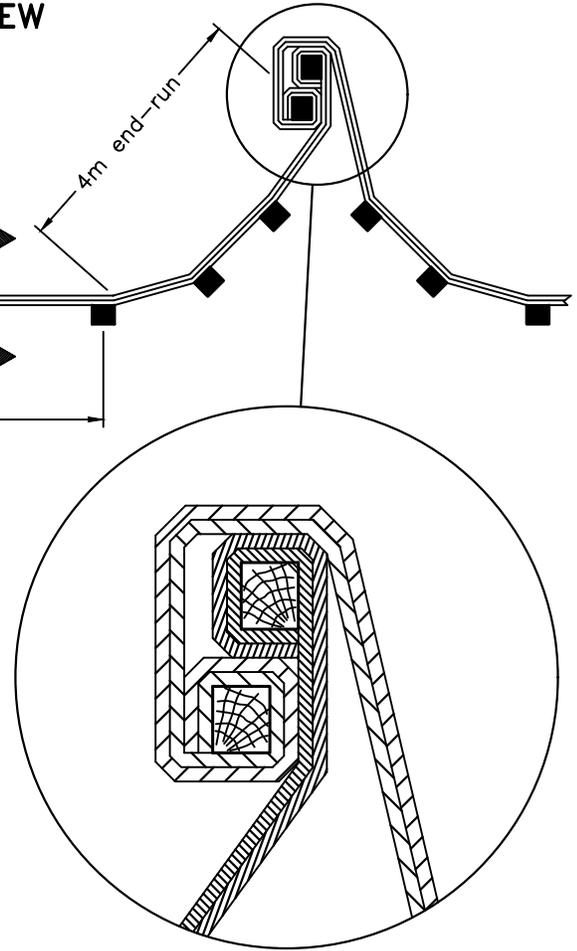
PERSPECTIVE VIEW



PLAN



SECTION A-A



JOINT DETAIL

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

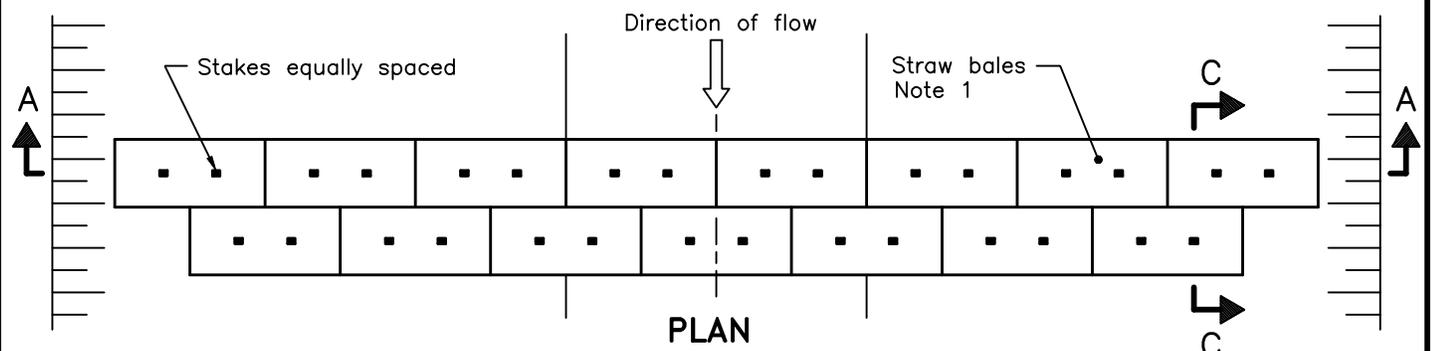
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Rev 3

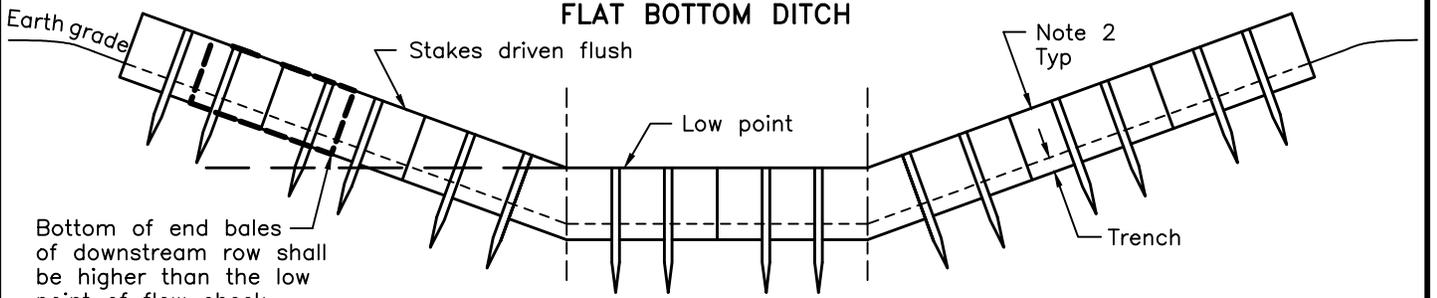
HEAVY-DUTY
SILT FENCE BARRIER



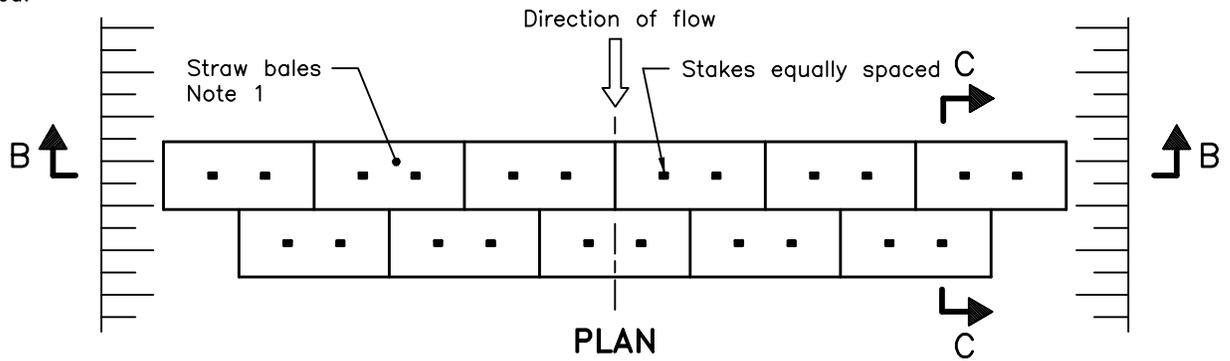
OPSD 219.130



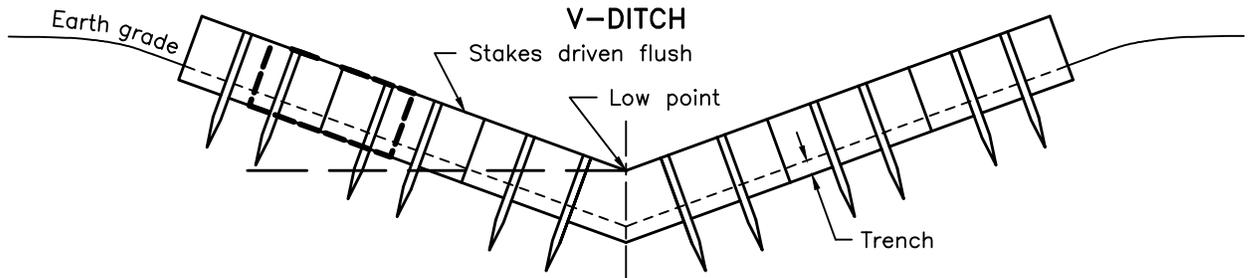
FLAT BOTTOM DITCH



SECTION A-A



V-DITCH



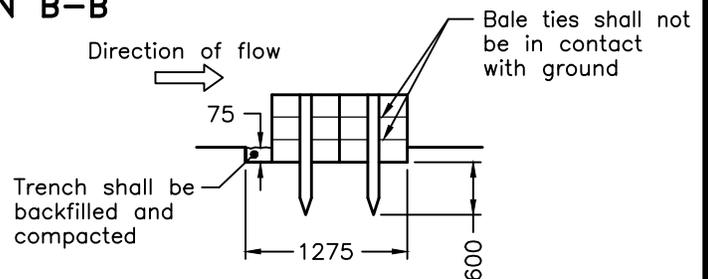
SECTION B-B

NOTES:

- 1 Number of bales varies and shall suit ditch.
- 2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.

A Fill and compact gaps with loose straw.

B All dimensions are in millimetres unless otherwise shown.



SECTION C-C

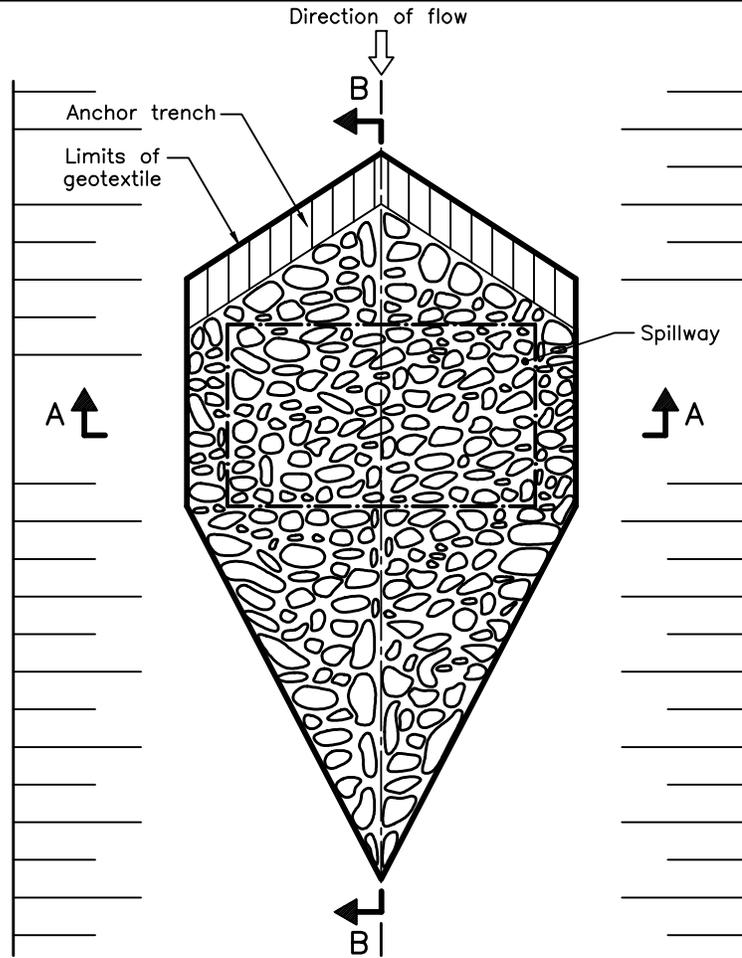
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2021 | Rev | 3

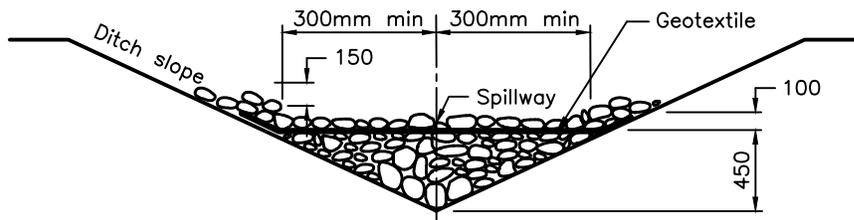
STRAW BALE FLOW CHECK DAM



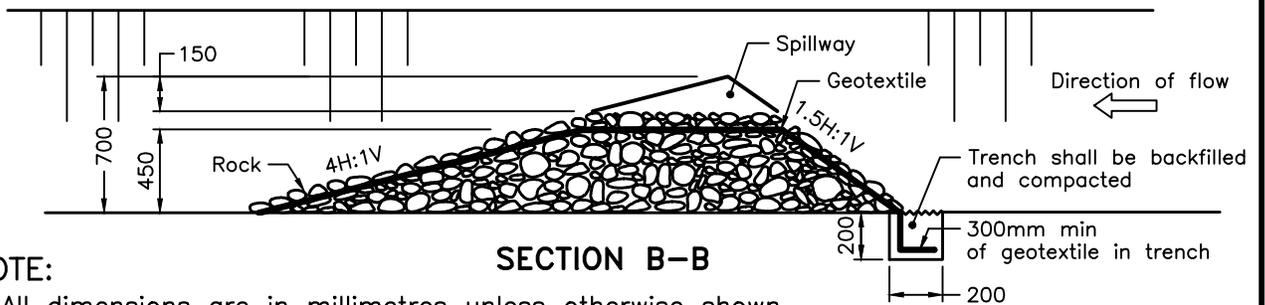
OPSD 219.180



PLAN
SPILLWAY



SECTION A-A



SECTION B-B

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

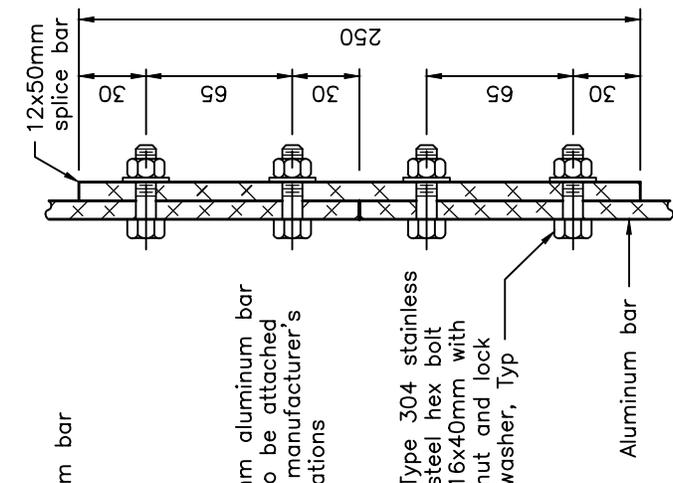
Nov 2022

Rev 3

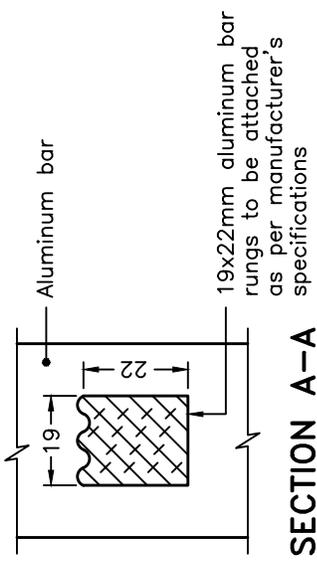
TEMPORARY
ROCK FLOW CHECK DAM
V-DITCH



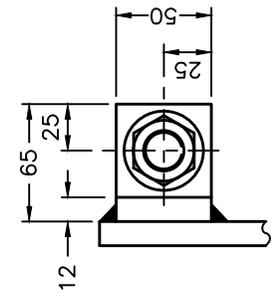
OPSD 219.210



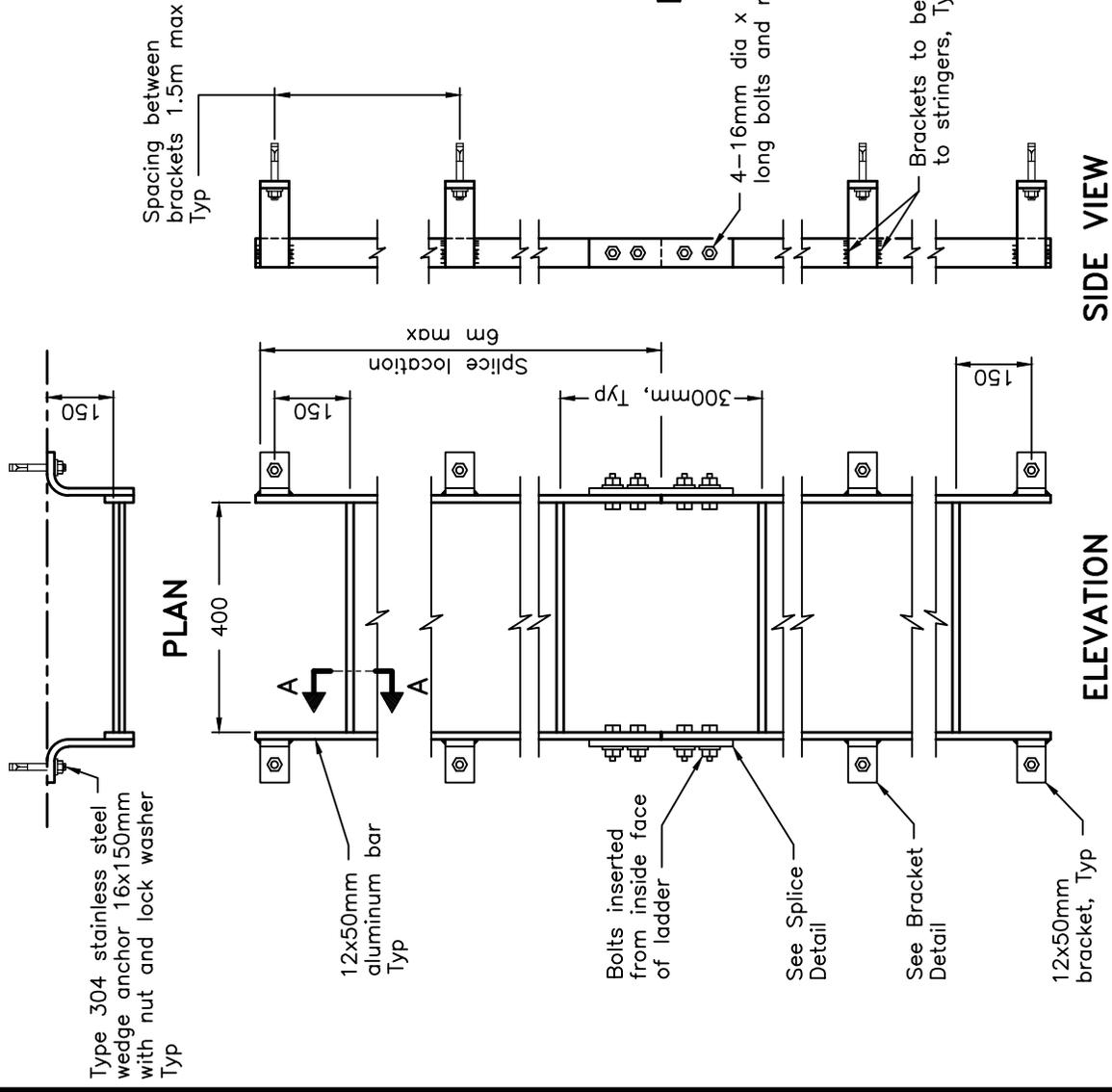
SECTION THROUGH SPLICE DETAIL



SECTION A-A



BRACKET DETAIL



PLAN
ELEVATION
SIDE VIEW

NOTES:

- A All aluminum in contact with concrete shall be thoroughly coated with asphalt paint.
- B All bolts, nuts, and washers shall be made of Type 304 stainless steel.
- C All welding shall be according to CSA W47.2 and W59.2.
- D All brackets, bars, rungs, and stringers shall be fabricated from 6000 series structural aluminum.
- E All dimensions are in millimetres unless otherwise shown.



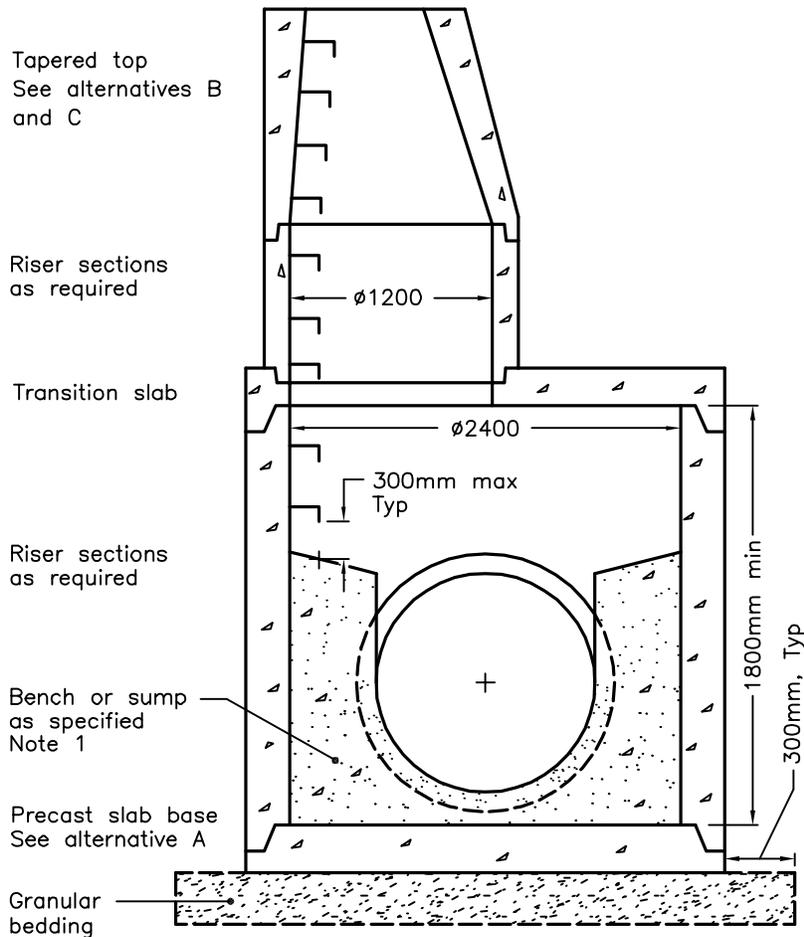
Nov 2018	Rev 3

ONTARIO PROVINCIAL STANDARD DRAWING

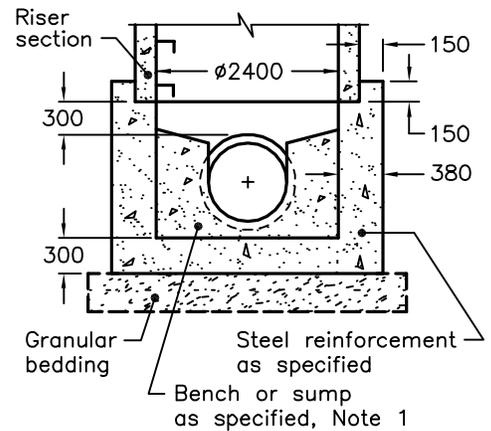
ALUMINUM LADDER

FOR MAINTENANCE HOLES

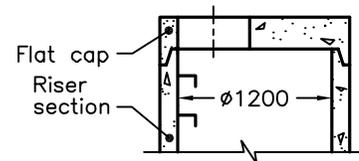
OPSD 406.010



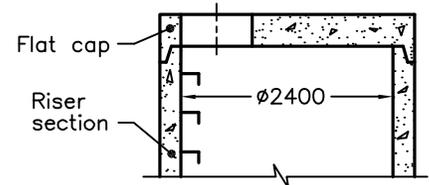
ALTERNATIVES



A CAST-IN-PLACE BASE



B 1200mm PRECAST FLAT CAP



C 2400mm PRECAST FLAT CAP

NOTES:

- 1 For sump detail, see OPSD 701.010.
- A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
- B Precast concrete components shall be according to OPSD 701.030, 701.031, 701.060, 701.061, 703.013, 703.023, 706.030 and 706.031.
- C Structures exceeding 5.0m in depth shall include safety platform according to OPSD 404.020.
- D Pipe support shall be according to OPSD 708.020.
- E For benching and pipe opening details, see OPSD 701.021.
- F For adjustment unit and frame installation, see OPSD 704.010.
- G All dimensions are nominal.
- H All dimensions are in millimetres unless otherwise shown.

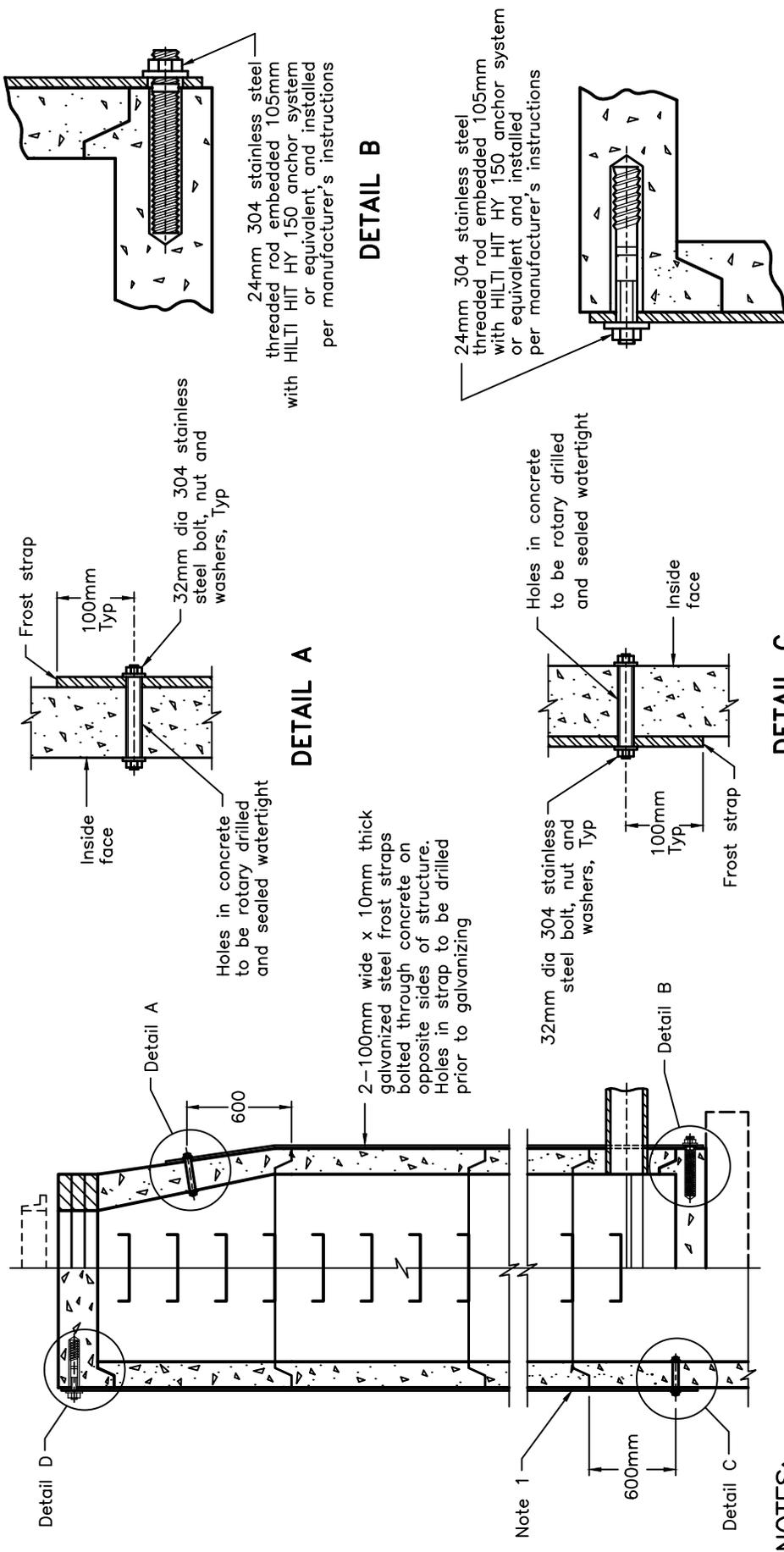
ONTARIO PROVINCIAL STANDARD DRAWING

**PRECAST CONCRETE
MAINTENANCE HOLE
2400mm DIAMETER**

Nov 2014 | Rev | 5



OPSD 701.013



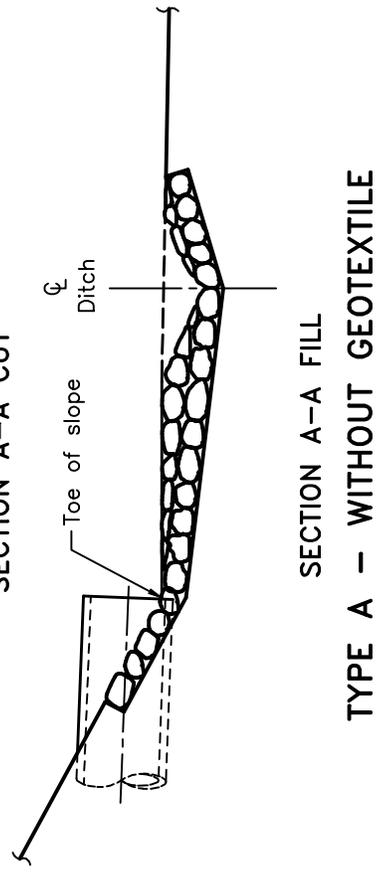
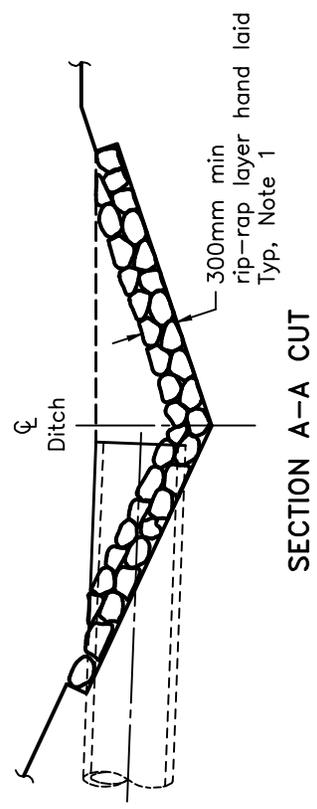
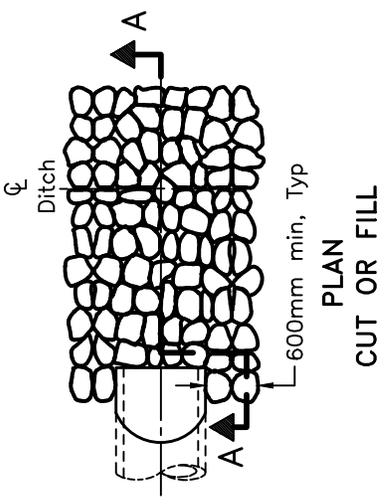
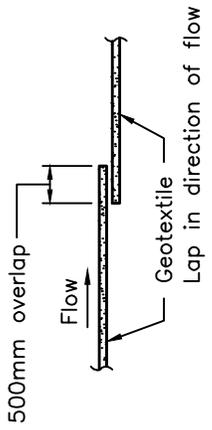
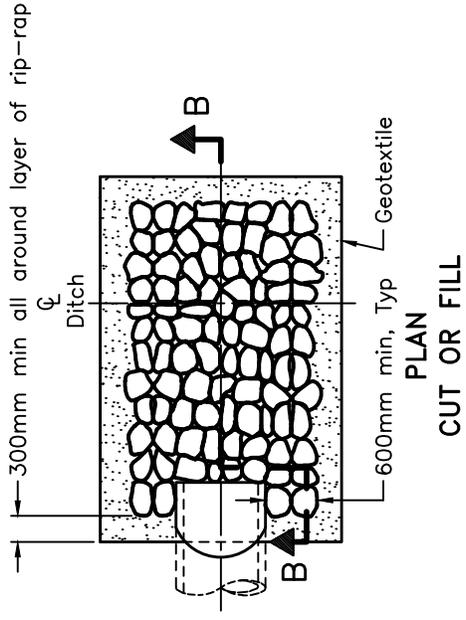
NOTES:

- 1 Depth of frost strap shall be as specified.
- A Frost straps shall be placed so they do not interfere with sewer pipe openings and the steps.
- B Frost straps shall be placed when specified.
- C Galvanizing shall be according to CAN/CSA G164.
- D All dimensions are in millimetres unless otherwise shown.

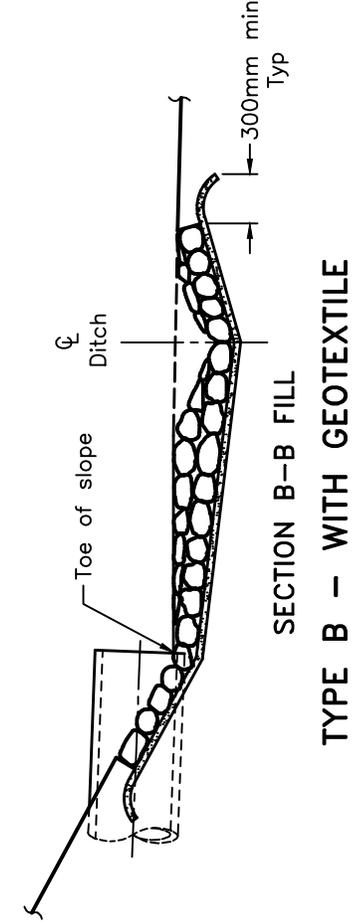
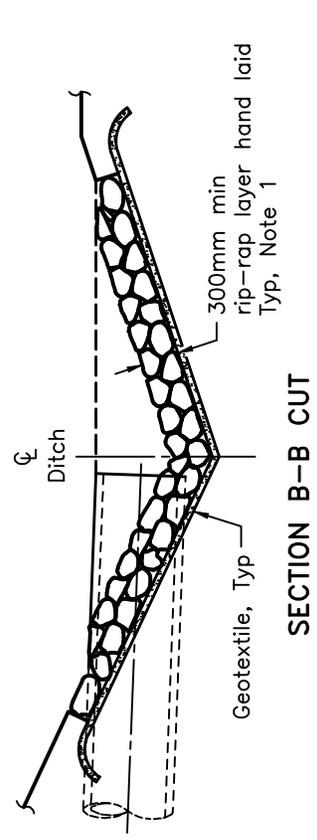
Nov 2018	Rev 3
<p style="font-size: 2em; font-weight: bold;">OPSD 701.100</p>	

ONTARIO PROVINCIAL STANDARD DRAWING

FROST STRAP INSTALLATION



TYPE A - WITHOUT GEOTEXTILE

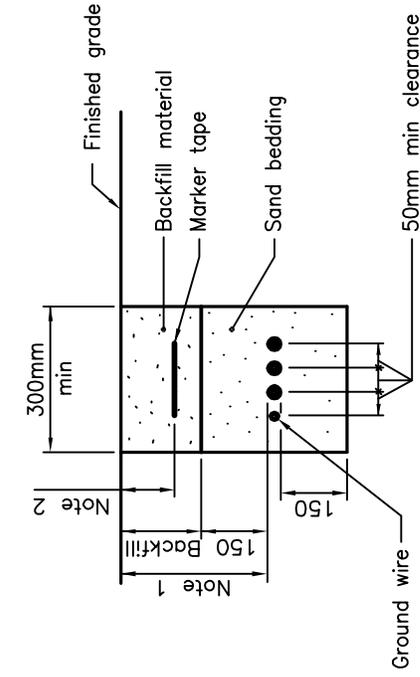


TYPE B - WITH GEOTEXTILE

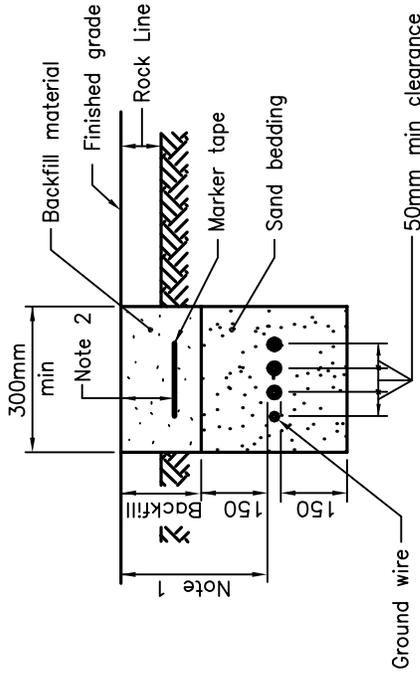
NOTES:

- 1 The thickness of the rip-rap layer shall be at least 1.5 times the rip-rap mean diameter.
- A All dimensions are in millimetres unless otherwise shown.

	Nov 2018 Rev 3	
ONTARIO PROVINCIAL STANDARD DRAWING		
GENERAL RIP-RAP LAYOUT FOR SEWER AND CULVERT OUTLETS		
OPSD 810.010		



IN EARTH



IN ROCK

NOTES:

- 1 Depth of cable shall be as specified in the Ontario Electrical Safety Code.
- 2 Depth of marker tape shall be as specified in the Ontario Electrical Safety Code.
- A Ground wire shall be installed as specified in the Contract Documents.
- B Cable brick or concrete slab shall be installed where specified in the Contract Documents. See OPD 2100.050.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 0

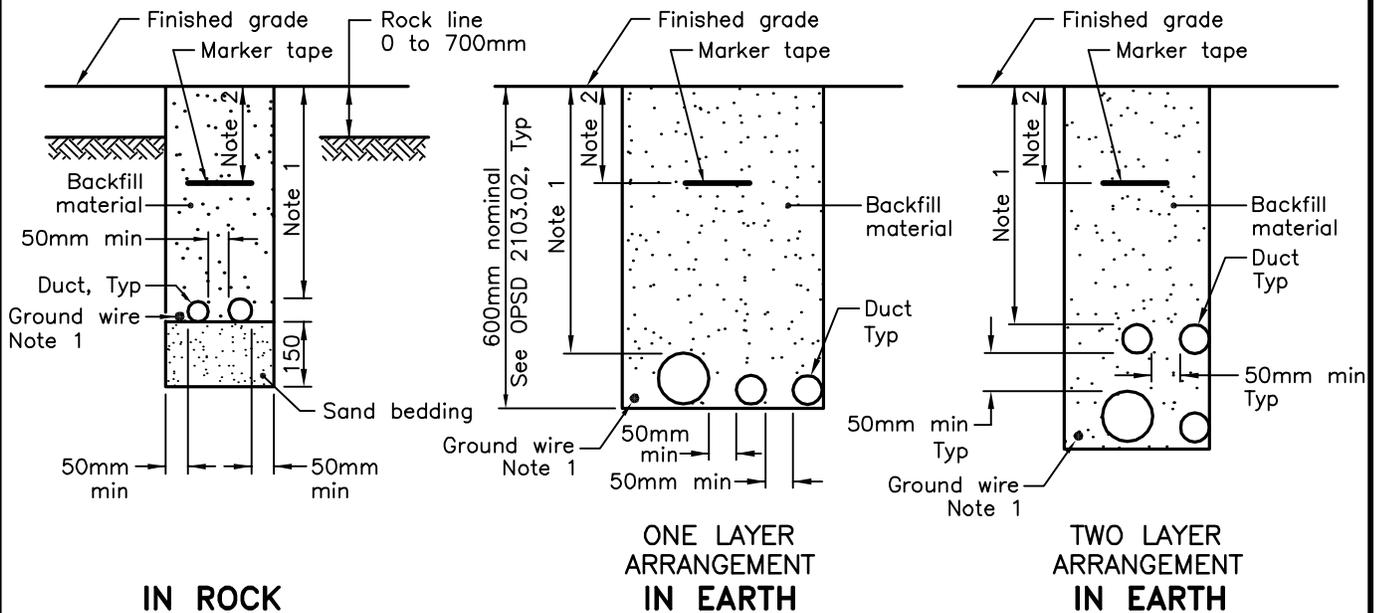


**CABLE INSTALLATION
IN TRENCHES**

OPSD 2100.010

MINIMUM TRENCH WIDTH FOR ONE LAYER AND TWO LAYER DUCT ARRANGEMENT

No. OF 100 mm DUCTS	No. OF LAYERS	NUMBER OF 50 mm DUCTS										
		0	1	2	3	4	5	6	7	8	9	10
0	1	N/A	150	205	300	460	610	N/A	N/A	N/A	N/A	N/A
	2	N/A	N/A	N/A	N/A	205	300	350	460	460	610	610
1	1	150	255	460	610	610	N/A	N/A	N/A	N/A	N/A	N/A
	2	N/A	N/A	205	255	300	460	460	610	610	610	N/A
2	1	300	460	610	N/A							
	2	150	255	255	460	460	610	610	610	N/A	N/A	N/A
3	1	460	610	N/A								
	2	300	300	460	460	610	610	610	N/A	N/A	N/A	N/A
4	1	610	N/A									
	2	300	460	460	610	610	N/A	N/A	N/A	N/A	N/A	N/A

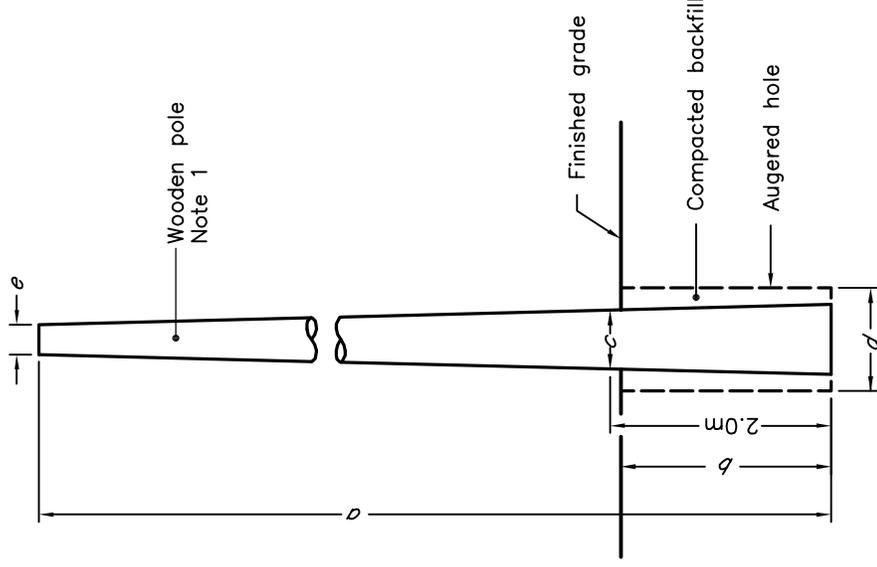


NOTES:

- 1 Ground wire shall be installed in the duct or trench as specified in the Contract Documents.
- 2 Depth of marker tape shall be as specified in the Ontario Electrical Safety Code.
- A Cable brick or concrete slab shall be installed where specified in the Contract Documents. See OPSP 2100.050.
- B This OPSP shall be read in conjunction with OPSP 2103.02.
- C Contractor has the option of installing one or two layer duct arrangement.
- D N/A – Not Applicable, undesirable or exceeding equipment limits.
- E All dimensions are in millimetres unless otherwise shown.

<p>ONTARIO PROVINCIAL STANDARD DRAWING</p> <p style="font-size: 24pt; font-weight: bold;">DUCT INSTALLATION IN TRENCHES</p>	<p>Nov 2013</p>	<p>Rev</p>	<p>1</p>	
<p>OPSD 2101.01</p>				

Class of pole	Approximate breaking strength N	Pole length σ m	Pole setting depth b m	Minimum diameter at c	Minimum augering diameter d'	Minimum pole top diameter e
1	20,200	8.0	1.50	310	610	215
		9.5	1.65	330	685	
		11.0	1.80	350	685	
		12.5	1.95	370	685	
		14.0	2.10	390	760	
		15.5	2.25	410	760	
		17.0	2.40	430	760	
2	16,600	8.0	1.50	290	610	200
		9.5	1.65	310	610	
		11.0	1.80	330	685	
		12.5	1.95	350	685	
		14.0	2.10	370	685	
		15.5	2.25	390	710	
		17.0	2.40	400	710	
3	13,500	8.0	1.50	265	610	185
		9.5	1.65	290	610	
		11.0	1.80	310	610	
		12.5	1.95	330	685	
		14.0	2.10	350	685	
		15.5	2.25	370	685	
		17.0	2.40	390	710	
4	10,700	8.0	1.50	245	560	170
		9.5	1.65	265	610	
		11.0	1.80	290	610	
		12.5	1.95	310	610	
		14.0	2.10	330	685	
		15.5	2.25	340	685	
		17.0	2.40	350	685	
5	8,500	8.0	1.50	230	560	155
		9.5	1.65	245	560	
		11.0	1.80	265	610	
		12.5	1.95	290	610	
		14.0	2.10	310	610	
		15.5	2.25	330	685	
		17.0	2.40	350	685	



NOTES:

- 1 Length and class of pole as specified.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2010 Rev 1



WOODEN POLE IN EARTH

OPSD 2238.01

Division 10

Other Documents

TABLE OF CONTENTS

<u>Item</u>	<u>Name</u>
1.	Amended Environmental Compliance Approval for a Waste Disposal Site No. A 011101 issued by the Ministry of the Environment, Conservation and Parks, November 16, 2020.
2.	Findings and Observations of Sand Management Investigation and Summary of Laboratory Testing Results, April 10, 2024, WSP Canada Inc.
3.	Historic Shop Drawings – Pumping Station PS2 Control Panel, Sulzer Pumps shop drawings.
4.	Product Data – NK4-22 Manual Electric Submersible Pump
5.	Quotation from Soderholm Maritime Services Inc. for a dive team to enter MHL15 and install a temporary plug in the existing LCS pipe to isolate for proposed connection.

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER A011101

Issue Date: November 16, 2020

Essex-Windsor Solid Waste Authority
360 Fairview Ave W, No. 211
Essex, Ontario
N8M 3G4

Site Location: Essex-Windsor Regional Landfill Site
7700 Essex County Road 18 R.R. # 3, Cottam
Essex Town, County of Essex
N0R 1B0

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the use and operation of a 64.5 hectare landfill site, waste diversion area and a municipal hazardous or special waste depot (formerly referred to as the Household Hazardous Waste Depot) within a total site area of 123.5 hectares.

For the purpose of this environmental compliance approval, the following definitions apply:

"Adverse Effect" means the same as the definition in the EPA;

"Colchester in Action" means the citizens' group that took part in the public consultation process associated with this proposed site and whose membership draws mainly from residents and landowners in the vicinity of the site;

"Compensation Policy" means the document entitled, Compensation Policy for new Regional Landfill" dated June 7, 1994 prepared by the Essex-Windsor Solid Waste Authority as contained in Schedule "A" to the Environmental Assessment Act conditions of approval as it may be amended from time to time;

"Cover material" means soil or other material including types of waste or geotextile material approved for use in sealing cells in landfilling by the MECP;

"Director" means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part V of the EPA;

“District Manager” refers to the District Manager in the Ministry's Sarnia District Office;

“District Office” refers to the Ministry's Sarnia District Office;

"EMP" refers to the Environmental Monitoring Plan;

“EPB” refers to the Environmental Permissions Branch of the Ministry;

"Environmental Compliance Approval" or "ECA" or "Approval" means this entire provisional Environmental Compliance Approval document, issued in accordance with Section 20.3 of Part II.1 of the EPA, and includes any schedules to it and the application and the supporting documentation listed in Schedule "A";

"EPA" or "Act" means Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended from time to time;

"Essex-Windsor" means the corporation of the County of Essex and the Corporation of the City of Windsor and includes the Essex-Windsor Solid Waste Authority, or its successors. This authority has been established by the City and County to be responsible for the joint management of certain municipal waste management functions, including the operation of the Site;

"hazardous waste" as defined in Regulation 347 as amended;

"LLC" means the Landfill Liaison Committee as established in the Environmental Assessment Act approval for the site and in accordance with the terms of reference set out in the conditions contained herein;

"municipal hazardous or special waste" and "MHSW" means the same as the definition in Ontario Regulation 387/16 - Municipal Hazardous or Special Waste, made under the Waste Diversion Transition Act, 2016, S.O. 2016, c. 12, Sched. 2;

"MHSW HHW Depot" means that part of the Site where waste management activities pertaining to the bulking and temporary storage pending transfer of MHSW take place;

“MECP” or “Ministry” refers to the Ontario Ministry of the Environment, Conservation and Parks;

“Operator” has the same meaning as “Operator” as defined in s.25 of the EPA;

“Owner” means Essex-Windsor Solid Waste Authority;

"O. Reg. 101/94" means Ontario Regulation 101/94 as amended from time to time;

“PA” means the Pesticides Act, R.S.O. 1990, c. P-11, as amended from time to time;

"Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the OWRA or Section 5 of the EPA or Section 17 of PA;

“Regional Director” refers to the Director of the Ministry’s South-western Regional Office;

"Regulation 232" or "Reg. 232" or "O. Reg. 232/98" means Ontario Regulation 232/98 (New Landfill Standards) made under the EPA, as amended from time to time;

"Regulation 347" or "Reg. 347" means Regulation 347, R.R.O. 1990, made under the EPA, as amended from time to time;

"Site" means the Regional Landfill site located at 7700 Essex County Road 18 R.R. # 3, Cottam, part of Lots 14, 15 and 16, Concession VII, Town of Essex, County of Essex; and

"Trained personnel" means knowledgeable in the following through instruction and/or practice:

- a. relevant waste management legislation, regulations and guidelines;
- b. major environmental concerns pertaining to the waste to be handled;
- c. occupational health and safety concerns pertaining to the processes and wastes to be handled;
- d. management procedures including the use and operation of equipment for the processes and wastes to be handled;
- e. emergency response procedures;
- f. specific written procedures for the control of nuisance conditions;
- g. specific written procedures for refusal of unacceptable waste loads;
- h. the requirements of this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

Compliance

- 1.0 This Approval revokes all previously issued Approvals issued under Part V, EPA, for this Site. The approval given herein, including the Terms and Conditions set out, replaces all previously issued approvals and related Terms and Conditions under Part V, EPA for this Site.
- 1.1 The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of the ECA and the conditions herein and shall take all reasonable measures to ensure the person complies with the same.
- 1.2 Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this ECA.

In Accordance

- 1.3 Except as otherwise provided for in this ECA, the Site shall be designed, developed, constructed, operated and maintained in accordance with the supporting documentation listed in Schedule "A".

Other Legal Obligations

1.4. The issuance of, and compliance with, this ECA does not:

- i. relieve any person of any obligation to comply with any provision of the EPA or any other applicable statute, regulation or other legal requirement; or
- ii. limit in any way the authority of the Ministry to require certain steps be taken or to request that any further information related to compliance with this ECA be provided to the Ministry.

unless a provision of this ECA specifically refers to the other requirement or authority and clearly states that the other requirement or authority is to be replaced or limited by this ECA.

Adverse Effect

1.5. The Owner or Operator remain responsible for any contravention of any other condition of this ECA or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect or impairment of air and/or water quality.

Furnish Information

1.6. Any information requested by the Director or a Provincial Officer concerning the Site and its operation under this ECA, including but not limited to any records required to be kept by this ECA shall be provided in a timely manner.

1.7. The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action, under this ECA or under any statute, regulation or subordinate legal instrument, in relation to the information, shall not be construed as:

- I. an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any condition of this ECA or any statute, regulation or other subordinate legal requirement; or
- II. acceptance by the Ministry of the information's completeness or accuracy.

1.8. Any information related to this ECA and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

Interpretation

1.9. This ECA revokes and replaces the previous ECA and all subsequent amendments.

1.10. Where there is a conflict between a provision of any document, including the application, referred to in this ECA, and the conditions of this ECA, the conditions in this ECA shall take

precedence.

- 1.11. Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the Ministry approved the amendment in writing.
- 1.12. Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.
- 1.13. The conditions of this ECA are severable. If any condition of this ECA, or the application of any condition of this ECA to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this ECA shall not be affected thereby.

Certificate of Requirement

- 1.14. Pursuant to Section 197 of the EPA, no person having an interest in the Site shall deal with the Site in any way without first giving a copy of this Approval to each person acquiring an interest in the Site as a result of the dealing.
- 1.15. The Certificate of Requirement shall be registered in the appropriate land registry office on title to the Site and a duplicate registered copy shall be submitted to the Director within ten (10) calendar days of receiving the Certificate of Requirement signed by the Director.

No Transfer or Encumbrance

- 1.16. No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and is satisfied with the arrangements made to ensure that all conditions of this ECA will be carried out and that sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

Change of Owner

- 1.17. The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:
 - I. the ownership of the Site;
 - II. the Operator of the Site;
 - III. the address of the Owner or Operator;
 - IV. the partners, where the Owner or Operator is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R. S. O. 1990, c. B.17, shall be included in the notification; and
 - V. the name of the corporation where the Owner or Operator is or at any time becomes a corporation, other than a municipal corporation, and a copy of the most current information filed under the Corporations Information Act, R. S. O. 1990, c. C.39, shall be included in the

notification.

- 1.18. In the event of any change in the ownership of the Site, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this ECA, and a copy of such notice shall be forward to the Director and District Manager.

Inspections

- 1.19. No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the EPA, or the PA, of any place to which this ECA relates, and without limiting the foregoing:
- I. to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this ECA are kept;
 - II. to have access to, inspect, and copy any records required to be kept by the conditions of this ECA;
 - III. to inspect the Site, related equipment and appurtenances;
 - IV. to inspect the practices, procedures, or operations required by the conditions of this ECA; and
 - V. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this ECA or the EPA, or the PA.

2. PUBLIC PARTICIPATION

Landfill Liaison Committee

- 2.1. Essex-Windsor shall take all reasonable steps to establish and maintain a Landfill Liaison Committee(LLC) to deal with matters, issues, and concerns relating to the operation and monitoring of the Essex-Windsor Regional Landfill Site.The Committee shall be established within six(6) months of the granting of approval under both the Environmental Assessment Act and Environmental Protection Act. The terms of reference related to the LLC are as follows :

2.1.1. Purpose

The purpose of LLC shall be to review and make comment on any activities associated with the Essex-Windsor Regional Landfill Site, and shall include, but not necessarily be limited to, the following :

- (a) Quarterly Operation Reports;
- (b) Annual Operations Reports;
- (c) Compliance of EA/EPA conditions of Approval ;
- (d) Interim Monitoring Reports;
- (e) Biennial Monitoring Reports;
- (f) Complaints Forms Received & Mitigation Action Taken;
- (g) Timetable of Development;

- (h) Development and Implementation of End Use Plans; and
- (i) Development and Implementation of Closure and Perpetual Care Plans.

2.1.2. Membership

- (i) Essex-Windsor shall offer eight memberships for the LLC as follows:
- (ii) One member from Essex-Windsor who is not a member of Council from the Town of Essex.
- (iii) Essex-Windsor shall request that two members from the Town of Essex be appointed concurrent with their Municipal Council term of office.
- (iv) The District Manager shall be requested to appoint a member from the MECP, and may appoint an alternate as well.
- (v) Four member from the public at large. To initially establish these members the following procedures shall take place :
 - (a) the Citizens group Colchester In Action shall be requested to appoint one member, who shall sit for a one year term.
 - (b) For the other three positions, Essex-Windsor shall mail a notice and application form to:
 - (i) all owners of property listed in Schedule "G" of the compensation policy, as amended from time to time, (referred to in Schedule "A" to the Environmental Assessment Act Approval); and
 - (ii) to all tenants of property listed in Schedule "G" as are identified as tenants in the most recent assessment roll of the Town of Essex seeking applications for the three offered memberships.
 - (c) A spouse of an owner may apply instead of owner, but only one person may apply from any one property.
 - (d) A family member of the owner, who is 19 years of age or older, may apply instead of the owner, but only one person may apply from any one property.
 - (e) Where the owner of the property is a corporation, the corporation may nominate one of its officers or Directors as the applicant. Where the corporation owns more than one parcel of land only one nomination from that corporation shall be permitted.
 - (f) Essex-Windsor shall request comments on the applications received from the Council of Town of Essex. The original applications, together with the comments from the two townships, shall be forwarded to the current landfill Liaison committee and the

current LLC shall designate three members for appointment by Essex-Windsor.

- (g) If three or less applications are received, Essex-Windsor shall appoint those applicants and the number of members of the LLC will be adjusted accordingly for that year.
- (h) In order to establish some continuity on the LLC from the members of the Public At large the initial appointments shall be one member for a 3 year term, one member for a 2 year term and one member for a 1 year term. If less than three applications are received, Essex-Windsor may amend the terms of appointments at its discretion.
- (vi) Following the initial establishment of the LLC, members from the Public at Large shall be appointed as follows:
 - (a) by the end of October each year, Essex-Windsor shall mail a notice of application for membership to those persons set out in Clause .2.1.2 (v) (b) seeking applications for the number of membership necessary to have four members from the Public At large on the LLC for the following calendar year.
 - (b) Applications from a spouse of an owner, a family member of the owner, or a corporation are acceptable as set out in Clauses 2.1.2 (vi) (c) (d) and (e).
 - (c) All applications shall be forwarded to the LLC along with any comments Essex-Windsor may have on the applications. At its last scheduled meeting in the calendar year, the LLC will appoint sufficient applicants from the applications received to maintain four members on the LLC in the following year.
 - (d) If insufficient applications are received in any year to maintain four members in the next year, the applicants will be appointed and number of members of the LLC will be adjusted accordingly for that year.
 - (e) The LLC has the discretion to adjust the terms of appointment as it sees fit to achieve continuity on the committee so long as no appointment is for more than three years without reapplication.
- (vii) The seat of a member of the Committee becomes vacant if the member is absent from the meeting of the Committee for three successive meetings without prior authorisation by a resolution of the committee entered upon its minutes. The LLC shall have the power to adopt further rules concerning minimum attendance.
- (viii) If for any reason a member is unable to complete the term of the appointment the appointing authority shall be requested to make a further appointment. In the case of a member from the Public At Large, the LLC may make an appointment from the applications received from the most recent request for applications or leave the position vacant until next year. Where an appointment is made from the most recent applications, the term of the appointment will coincide with that of the departing member.

2.1.3. Meetings

1. Essex-Windsor shall request that the LLC meet at least quarterly;
2. A quorum of the meeting shall be 50% of the members;
3. At the first meeting of each year, the membership shall elect a chairperson from amongst themselves;
4. All meetings of the LLC shall be open to the public;
5. Notice of the meetings shall be mailed to those persons as set out in Clause 2.1.2 (v) (b) the members of LLC, and the Clerk of the Town of Essex at least 2 weeks in advance of the scheduled meeting. If an emergency meeting of the LLC is called and there is insufficient time to meet the notice requirements of this paragraph, the notice requirements are waived;

2.1.4. Budget

1. Essex-Windsor shall provide a reasonable budget and such financial resources as are required for the effective operation of the LLC. This shall include, but not necessarily be limited to:

-per diem and mileage allowances for committee members.

-funds for the mailing and meeting notices and other information from the LLC to owners and tenants as set out in Clause 2.1.2 (v) (b).

-The hiring of consultants, where considered appropriate, to provide a peer review of work carried out by or on behalf of Essex-Windsor in connection with the operation, monitoring, closure or perpetual care of the Site. The hiring of consultants by the LLC must receive prior approval from Essex-Windsor, and such approval shall not be unreasonably withheld. In the event there is disagreement over the hiring of a consultant the matter may be referred to the Adjudicator created under section 5.1 of the compensation policy, by either party, for determination.

2. By the end of September of each year the LLC will prepare a budget for the following year for the approval of Essex-Windsor.

2.1.5. Support Staff

1. Essex-Windsor shall provide secretarial and other administrative support to the LLC.
2. Essex-Windsor shall record, print, and circulate the minutes of all LLC meetings to the persons noted in Clause 2.1.2 (v) (b) unless any such person informs Essex-Windsor in

writing that he she does not wish to receive this documentation.

3. Essex-Windsor shall make available its own technical staff and consultants to the LLC :
 - to explain the reports to be reviewed by the Committee,
 - to answer any enquiries raised by the Committee in response to its review of the reports,
 - to explain and answer questions on the actions taken with respect to any complaints received regarding the site operations,
 - to explain and answer questions on any aspect of site operations raised by a member of the LLC.

2.1.6. Reporting Relationships

1. The minutes of all meetings of the LLC shall be forwarded to Essex-Windsor for review.
2. The Chairperson, or designate, of the LLC is encouraged to attend meetings of Essex-Windsor to present the minutes of the meeting, and be prepared to discuss any issues raised by the LLC.
3. Essex-Windsor shall include a standing delegation item for the LLC on each of its meeting agendas.
4. An annual joint meeting of the LLC and Essex-Windsor shall be held in March of each year for the presentation of the Annual Operations Report and the Biennial Monitoring Report.
5. The Chairperson of the LLC will receive agenda packages for EWSWA meetings.

3. CONSTRUCTION, INSTALLATION and PLANNING

- 3.1. As-built drawings for the landfill shall be retained on site and made available to Ministry staff for inspection.

4. GENERAL OPERATIONS

Proper Operation

- 4.1. The Site shall be properly operated and maintained at all times. All waste shall be managed and disposed of in accordance with the EPA and Regulation 347 and the requirements of this ECA. At no time shall the discharge of a contaminant that causes or is likely to cause an

Adverse Effect be permitted.

Operations Manual

- 4.2. The Owner shall ensure that an operations and procedures manual that addresses the requirements of this ECA is prepared for the Site:
- I. Health and safety;
 - II. Operation and maintenance of the Site;
 - III. Waste acceptance;
 - IV. Waste disposal area and development;
 - V. Nuisance management;
 - VI. Leachate management;
 - VII. Landfill gas management;
 - VIII. Surface water/Storm water management;
 - IX. Inspections and monitoring;
 - X. Contingency plans and emergency procedures;
 - XI. Complaints; and,
 - XII. Reporting and record keeping.
- 4.3. The operations and procedures manual shall be:
- I. retained at the Site;
 - II. reviewed on an annual basis and updated by the Owner as required; and
 - III. be available for inspection by Ministry staff.
- 4.4. The Site shall be operated in accordance with the supporting documents to the application for a Environmental Compliance Approval prepared by Proctor & Redfern Limited, dated October 1993 and in accordance with those documents detailed in Schedule "A" attached.

Capacity

- 4.5. (1) The total site area shall be 123.5 hectares.
- (2) The Total waste disposal fill area shall be 64.5 hectares which includes 58 hectares of new waste disposal area.
- (3) The Final waste disposal fill area footprint and site contours shall provide a capacity of 12,200,000 cubic meters of landfill volume (including waste, daily and interim cover material); and
- (4) The total capacity as identified in Condition No. 4.5 (3) does not include the final cover.
- (5) There shall be buffer area of a minimum 100 meters between the edge of the new fill area and the property boundary for a total buffer area of 58.5 hectares. The buffer area shall not be used for the disposal of waste.

(6) The final contours of the site are not to exceed those shown in the end use plan.

Service Area

4.6. The Site service area shall be the Province of Ontario. No waste shall be received for disposal at this Site from outside the approved service area.

Hours of Operation

4.7. Waste shall only be accepted at the Site during the following time periods:

- (i) Monday- Friday - 7:00 a.m. to 5:00 p.m; and
- (ii) Saturday - 8:00 am to 1:00 p.m or such reduced hours as identified by Essex-Windsor
- (iii) The Site will be closed all Sundays and Statutory holidays.

4.8. The landfill may open one hour earlier and two hours later than the waste disposal operating hours on Monday to Friday, for purposes other than disposal of waste. The landfill may open one hour earlier and one hour later than the waste disposal operating hours on Saturday for purposes of the application of daily cover only.

Signage

4.9. Signs shall be placed at the landfill Site entrance/exit indicating, at a minimum, the following:

- (a) Name of the landfill and name of the Owner/Operator;
- (b) MECP ECA Number;
- (c) Days and hours of operation and public use;
- (d) Contact telephone number at the Essex- Windsor Main Office;
- (e) Service Area for the Site;
- (f) Types of waste accepted and prohibited;
- (g) Overview of landfill complaints procedure, including a phone number for registering a complaint;
- (h) Unauthorized entry is prohibited; and
- (i) A warning against dumping wastes outside the Site.

Site Security

4.10. During non-operating hours, the Site entrance and exit gates shall be locked and the Site shall be secured against access by unauthorized persons.

On-Site Roads

4.11. On-Site roads shall be provided and maintained in a manner that vehicles hauling waste to and on the Site may travel readily and safely on any operating day. During winter months, when the

Site is in operation, roads must be maintained to ensure safe access to the landfill working face. On-Site roads must be clear of mud, ice and debris which may create hazardous conditions.

Site Access

- 4.12. Members of the public may request access to the site during normal operating hours. Such access shall not be unreasonably withheld and any reason for denial of access must be put in writing. The MECP accepts no liability, through the imposition of this condition, for the safety of such members of the public while they are on-site.

Traffic Control

- 4.13. Essex-Windsor shall apply following requirements to vehicles delivering waste or soil to the site and vehicles hauling leachate or soil from the site:
- (a) The vehicle net weight must be over three (3) tonnes;
 - (b) All vehicles hauling waste must be licensed as part of a Waste Management System Approval or an Approval from the MECP issued pursuant to S. 27 of the Environmental Protection Act;
 - (c) All vehicles hauling waste to the Site from Transfer Station 2 shall use the designated haul route of County Road 31 northerly to County Road 18, and then westerly on County Road 18 to the Site. The same roads shall be used in returning to the transfer station;
 - (d) All vehicles hauling waste to the Site from Transfer Station 1 (Windsor Transfer Station) and, from the City of Windsor, shall use the designated haul route of Highway 3 easterly to County Road 23, then southerly on County Road 23 to County Road 18, and then westerly on County Road 18 to the Site. The same roads shall be used in returning to the intersection of County Road 23 with Highway 3;
 - (e) Vehicles transporting leachate from the Site to an approved disposal facility, shall use only Provincial, County of Essex roads;
 - (f) Essex-Windsor shall specify designated haul routes for any new waste transfer stations established during the operating life of the Site. Such haul routes shall be restricted to Provincial, county of Essex roads;
 - (g) Vehicles hauling soil to or from the Site shall use Provincial, County or Essex roads to the greatest extent reasonably possible and shall minimise the use of Township roads during these activities;
 - (h) The owners or operators of waste hauling vehicles shall not use the site unless they are approved by Essex-Windsor;
 - (i) All open vehicles containing waste or soil being delivered to or removed from the site

shall be covered in accordance with provisions of the Highway Traffic Act;

- (j) Essex-Windsor shall take all reasonable steps to ensure that all vehicles operators using the Site observe local speed limits and demonstrate safe and courteous driving habit;
- (k) In a temporary, emergency situation where the above designated haul routes are blocked, unusable or unsafe, and upon approval of the District Manager of MECP, Essex-Windsor may designate alternative haul routes to be used for the duration of emergency;
- (l) Vehicles carrying waste for diversion (recycling and/or reuse) including Municipal Hazardous or Special Waste are not required to meet conditions 4.13 (a) and (b);
- (m) All open vehicle boxes shall be inspected prior to leaving the Site to ensure that loose refuse is not present within the box. All vehicles disposing of waste at the operating face shall be visually inspected to ensure that loose refuse is not attached to the body of undercarriage of the vehicle prior to the vehicle leave the operating face; and
- (n) All vehicles hauling waste to the site from outside of the County of Essex shall use the following haul route : Highway 401 to the intersection of Highway 401 and County Road 19, along the county road 19 to Highway 3, and thence along the existing haul route described in condition d above. The same roads shall be used in returning to Highway 401.

Bird Control

- 4.14. A detailed bird control and monitoring program shall be developed, implemented and maintained at the commencement of landfilling of Cell 1. The program shall include, as a minimum, and overhead wire system over the active disposal area.

Waste Inspection Procedures and Deposition.

- 4.15. The Operator shall develop and implement a program to inspect waste to ensure that the waste is of a type approved for acceptance under this ECA.
- 4.16. Essex-Windsor shall maintain a qualified inspector at the site to inspect and report on all wastes entering the site. Should unauthorised or restricted wastes enter the Site, the waste shall either be reloaded or separated for disposal in an appropriate manner. The waste hauler transporting such unauthorised or restricted wastes shall be disciplined in accordance with hauler discipline policies established by Essex-Windsor.
- 4.17. All loads of waste must be properly inspected by trained site personnel prior to acceptance at the Site and waste vehicles must be diverted to appropriate areas for waste disposal.

Vermin, Scavenging, Dust, Litter, Odour, Noise, etc.

- 4.18. The Site shall be operated and maintained such that the vermin, vectors, dust, litter, odour, noise

and traffic do not create a nuisance.

4.19. No scavenging is to occur at the Site.

Litter Control:

4.20. The Owner shall take all practical steps to prevent escape of litter from the Site. The Owner shall inspect and collect litter from the Site on a monthly basis from April to November and as needed between December and March. All loose, windblown litter shall be collected and disposed of at the landfill working face.

The following litter control program shall be implemented at the site:

- (i) A 1.83 meter high permanent chain link fence shall be constructed around the perimeter of the landfill area prior to the placement of waste;
- (ii) A 5 meter high fence shall be constructed around the perimeter of the active waste disposal cell prior to the placement of waste in that cell;
- (iii) Portable litter control fences of between 3.5 meters and 5 meters in height shall be maintained down-wind of the working area and be re-positioned according to wind direction; and
- (iv) The litter control fence(s) shall be inspected daily and any litter shall be removed.

4.21. A litter collection program shall be implemented and shall include collection along the following public roads on weekly basis ;

- a. County Road 18 from County Road 23 to Coulter sideroad;
- b. County Road 23 from Highway 3 to County Road 18;
- c. Ferris Sideroad from Concession Road 8 to County Road 18;
- d. McCormick Sideroad from Country Road 18 to concession road 6;
- e. Coulter sideroad from concession road 8 to concession road 6;
- f. Concession Road 8 between the Coulter and Ferris sideroads; and
- g. Concession Road 6 between the Coulter and McCormick sideroads.

Dust

4.22. The Owner shall control fugitive dust emissions from on site sources including but not limited to on-Site roads, stockpiled cover material and, closed landfill area prior to seeding especially during times of dry weather conditions. If necessary, major sources of dust shall be treated with water and/or dust suppression materials to minimize the overall dust emissions from the Site.

4.23. A dust control program shall be implemented and shall include, but not limited to , the following components:

- (i) All permanent on-site roads shall be paved;

- (ii) All non-paved roads and working areas shall be watered or treated as required during dry-weather; and
 - (iii) All paved on-site roads, and off- site roads in the vicinity of the site entrance, shall be wet swept or vacuum swept a minimum weekly basis during dry weather conditions, and as often as required during wet weather conditions.
- 4.24. A truck tire wash station shall be constructed on the internal access road at the site to reduce the potential for off-site dust and mud.
- 4.25. Off-site dust monitoring shall be carried out at the site in accordance with the program outlined in the attachment to the letter May 28, 1997 from R.C.Reiser of Essex-Windsor to Mr. A. Dominski of the MECP. The results of the dust monitoring program shall be submitted as part of the biennial monitoring report for the site.
- 4.26. Should the dust monitoring program indicate that there are exceedances pursuant to MECP regulations then the dust control program shall be reviewed and amended.

Noise

- 4.27. The Owner shall comply with noise criteria in MECP Guideline entitled "Noise Guidelines for Landfill Sites."
- 4.28. All equipment associated with the development, operation, and closure of the Site shall comply with relevant noise abatement standards.
- 4.29. The perimeter berm around the fill area shall be constructed prior to the start of landfilling operations in accordance with the description contained in the Design and Operation Report.

Landfill Gas

- 4.30. All buildings are to be free of any landfill gas accumulation. The Owner shall provide adequate ventilation systems to relieve landfill gas accumulations in buildings if necessary.

5. LANDFILL SITE OPERATIONS

Waste Types

- 5.1. Only Domestic, Commercial, Institutional, non-hazardous solid industrial, agricultural (limited to miscellaneous debris from agricultural activities) and Dewatered Sewage Sludge generated within Service Area shall be accepted at the Site for landfilling.

Unacceptable Waste

- 5.2. (i) The Owner shall conduct appropriate inspections and ensure that appropriate controls are in place to prevent the acceptance and landfilling of fish offal, liquid industrial waste and hazardous waste and to prevent the acceptance of waste from outside the approved service area;

(ii) The Owner shall record in the daily records for the Site operations any occurrence of unacceptable waste delivered to the Site, the name of the waste hauler delivering the waste to the Site and waste generator (if known); and

(iii) The Owner shall record in the Annual Operations Report of any and all waste load refusals at the Site related to requirements in this ECA, including service area and waste types.

5.3. The following materials shall be restricted from disposal at the site:

Pallets, tires, old corrugated cardboard from industrial and commercial sources : white goods, leaves, and such other materials as may be designated from time to time by policy adopted by Essex-Windsor.

5.4. Materials, in addition to those listed above in condition 5.2 and 5.3 proposed to be prohibited or restricted from disposal at the site shall be prohibited and restricted only following public consultation and the identification of an alternative for their use or disposal.

Burning of Waste

5.5. Burning of waste is not permitted at the Site.

Waste Placement

5.6. No waste shall be landfilled outside of the **limit of fill area** for the Site

5.7. No waste shall be landfilled at any time above the **final waste grades**.

5.8. No waste shall be landfilled in the buffer area.

5.9. The Owner shall deposit waste in a manner that minimizes exposure area at the landfill working face and all waste shall be compacted before cover is applied.

5.10. The landfill shall be generally filled one cell at a time and progressively capped and rehabilitated, including the placement of final cover, topsoil and herbaceous vegetation, within 1 year after the cell is filled in accordance with the end use plan for the cell. The final contour plan shall represent the top surface of the low permeability soil cover plus at least 0.15 meters of top soil. construction preparation and implementation of waste disposal operation may occur in a new cell, in accordance with the cell development plan, as the preceding cell is being closed out.

5.11. A minimum compaction rate of 600 kilograms of waste per cubic meter shall be maintained.

Natural Environment

5.12. Final contour and end use plans shall be developed in conjunction with the detailed design of the Site. The plans shall provide flexibility to allow for one or more active or passive uses, such as

golf facilities, nature trails, and cross country skiing facilities.

- (a) The proposed final contour and end use plans, and any revisions proposed to them, shall be reviewed with the Town of Essex, the Landfill Liaison Committee, area residents through one or more public meetings, the Ministry of Natural Resources, the MECP and the Essex Region Conservation Authority.
- (b)
 - (i) Final contours for the site shall be in accordance with those drawn on Map 3-1 of Appendix C of the report entitled " Site Specific Investigation; Visual Analysis, End Use and Site Landscaping; volume2-2" by Ted Baker and Associates for Proctor & Redfern Limited, October 1993.
 - (ii) Notwithstanding condition 5.12(b) (i) above, final contours of the site may be amended from time to time in accordance with the terms of conditions 5.12 (a), 5.12 (c).
- (c) The Final Contours and end use plans may be reviewed from time to time and must be reviewed no later than five years prior to the estimated landfill closure date.

5.13. A Woodlot monitoring program shall be implemented and maintained for the Central and Eastern woodlots located on the Site and shall consist of the following :

- (a) The program shall be carried out by a professional botanist or forester;
- (b) Two fixed radius (0.04 hectare) permanent sample plots shall be established in each of the two woodlots. One plot shall be in an edge location closest to the fill area, and the other in an interior location, within each woodlot. in each plot all trees with a diameter at breast height (dbh) of 10.0 cm shall be tagged and measured within 1 year of the issuance of the this Approval, and assigned a numerical decline index for hardwood forest species (Mclaughlin et al ND.);
- (c) During the month of September of each subsequent year all tagged trees shall be re-measured. An assessment shall be made of the general health of the trees in the woodlots and a determination made if there are any landfill impacts on the woodlots. Remedial re-vegetative actions shall be undertaken should the monitoring indicate that damage is being caused to the woodlots and/or other vegetation;
- (d) Fixed point colour photographs of each of the woodlots shall be taken from the same location during the month of September of each year. A comparative analysis shall be made of the current year's photographs to the previous year's photographs for noteworthy changes or occurrences and their relation to any landfill impacts; and
- (e) All results are to be reported as part of the Annual operation report prepared under condition 15.1 to this Approval.

5.14. Except for evergreen trees used for visual mitigation, the buffer area shall be re-vegetated in a

manner consistent with the historic natural vegetation of the region

An aquatic biology monitoring program shall be established as follows :

- (a) Essex-Windsor shall consult with the MECP, the Essex Region Conservation Authority and the LLC to establish a study area and sampling locations on that portion of the watercourse that will receive treated effluent from the on-site leachate treatment facility and that sustains year round flow. The study area will be continued on the watercourse to its confluence with Cedar creek.
- (b) The Monitoring Program shall include fish presence, benthic invertebrate counts and the measurement of pH, temperature, dissolved oxygen, ammonia, and conductivity at the sampling locations established.
- (c) The program shall be established and the first sampling event shall take place within six months of the issuance of this Approval.
- (d) The frequency of sampling shall be established in consultation with the MECP, Essex Region Conservation Authority and the LLC and will be sufficient to establish representative background conditions prior to the discharge of treated leachate and to monitor any impact from the operation of the leachate treatment facility following its establishment.

Dewatered Sewage Sludge

- 5.15. Dewatered sewage sludge may be received from the Little River Pollution Control Plant and Lou Romano Water Reclamation Plant.
- 5.16. Dewatered sewage sludge may be received for disposal from the Amherstburg and Gosfield south pollution control plants.
- 5.17. Dewatered Sewage sludges may be received for disposal from the Lakeshore Pollution Control Plant when access to farmers fields is limited due to inclement weather.
- 5.18. Up to 700 tonnes per year dewatered sewage sludges may be received at this Site for disposal from the Essex Pollution Control Plant.
- 5.19. Dewatered Sewage Sludge may be received from the Leamington Pollution Control Plant on an emergency basis.
- 5.20. The total amount of sludge received from the Leamington Pollution Control Plant on an emergency basis shall not exceed 600 tonnes per year.
- 5.21. Dewatered sewage sludges may be received at the site no later than 2.00 pm, Monday to Thursday, and prior to noon on Fridays.

- 5.22. In the event that there are unsatisfactory impacts due to the disposal of dewatered sewage sludges, the District Manager shall be notified and no further dewatered sewage sludges shall be received for disposal until the District Manager has given written authorisation for recommencement of operations
- 5.23. Application of sewage sludges as a final cover soil amendment shall be as follows :
- a) the sewage sludges shall be placed uniformly on top of the final cover for the landfill; prior to the placement of the final 15 centimetres of top soil; and
 - b) the ratio of topsoil/sewage shall not be lower than 60/40 and this ratio shall be increased (e.g. more topsoil) if operational problems and /or environmental impacts are observed during the covering operations.
- 5.24. Quantities of dewatered sewage sludges that may be received for disposal shall be limited to no more than 2% by tonnage of the total waste received at the site.
- 5.25. Sewage sludges shall not be placed for disposal within 3 meters of any leachate collector pipe.

Asbestos Waste

- 5.26. Any waste that is considered asbestos waste shall be handled in accordance with Section 17 of Reg. 347 as amended from time to time.
- 5.27. A suitable sized excavation for the asbestos waste shall be made by the Owner in a location away from the active landfilling face.
- 5.28. All asbestos waste shall be inspected to ensure that the asbestos waste is properly bagged or contained and free from puncture, tears or leaks.
- 5.29. The asbestos waste shall be placed in the excavation to avoid damage to the containers and to prevent dust and spillage.
- 5.30. Upon completion of the unloading and deposition of the asbestos in the excavation, at least 125 centimetres of cover or waste material shall be placed over the asbestos.
- 5.31. All asbestos waste shall be deposited to a level no higher than 1.25 metres below the general elevation of the disposal area to ensure that daily cover material removal in the future does not encounter the asbestos waste.

Cover Material

- 5.32. Daily Cover - By the end of each working day, the entire working face shall be compacted and covered with a minimum thickness of 150 mm of soil cover or an approved thickness of alternative cover material.

- 5.33. No lime stabilised sewage sludge shall be used as cover material. Lime stabilised sewage sludge may be used as a top soil amendment to assist in the establishment of the vegetative layer.
- 5.34. The foundry sands to be used as alternative daily cover satisfy the definition of Non-hazardous solid industrial waste as defined in Reg 347 of the Environmental Protection Act.
- 5.35. The foundry sands to be used as alternative daily cover material are transported to the site in accordance with Condition 4.13.
- 5.36. Auto Shredder Fluff is permitted for use as a daily cover material at the site, all in accordance with Items 13,14, 15, and 16 of Schedule "A". Samples of the daily cover material are to be taken on a monthly basis and submitted for analysis of Ontario Regulation 558 Schedule IV Inorganics and PCBs. Auto Shredder Fluff is to confirm with the specifications of a non-hazardous waste under Ontario Regulation 558.

Intermediate Cover

- 5.37. In areas where landfilling has been temporarily discontinued for six (6) months or more, a minimum thickness of 300 mm of soil cover or an approved thickness of alternative cover material shall be placed.

Landfill Surface Water Management

- 5.38. Stormwater runoff generated from the active waste fill area shall be considered contaminated and treated as leachate. Operational methods shall ensure that any precipitation falling onto active waste fill areas, not under final cover, shall be directed into the waste or into a control structure for testing prior to confirm surface water can be discharged to the natural environment.

6. TRAINING

Employees and Training

- 6.1. A training plan for all employees that operate any aspect of the site shall be developed and implemented by the Operator. Only trained employees shall operate any aspect of the Site or carry out any activity required under this ECA. For the purpose of this ECA "trained" means knowledgeable either through instruction or practice in:
 - I. the relevant waste management legislation including EPA, Reg. 347 , regulations and guidelines;
 - II. major environmental and occupational health and safety concerns pertaining to the waste to be handled;
 - III. the proper handling of wastes;
 - IV. the management procedures including the use and operation of equipment for the processes and wastes to be handled;
 - V. the emergency response procedures;
 - VI. the specific written procedures for the control of nuisance conditions;

- VII. the terms, conditions and operating requirements of this ECA and,
- VIII. proper inspection, receiving and recording procedures and the activities to be undertaken during and after a load rejection.

- 6.2. Essex-Windsor shall ensure that the Site Supervisor is a Certified Manager of Landfill Operations as designated by the Solid Waste Association of North America, or its equivalent.
- 6.3. Essex-Windsor has compiled an Inspector Manual, dated March 1994 to assist waste inspection personnel in the performance of their duties. Essex-Windsor shall ensure that all Inspectors receive initial and ongoing training on the details of the Manual.

7.0. INSPECTIONS AND RECORD KEEPING

Daily Inspections and Log Book

- 7.1. An inspection of the entire Site and all equipment on the Site shall be conducted each day the Site is in operation to ensure that the site is being operated in compliance with this ECA. Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the Site if needed.
- 7.2. A record of the inspections shall kept in a daily log book or a dedicated electronic file that includes:
 - I. the name and signature of person that conducted the inspection;
 - II. the date and time of the inspection;
 - III. the list of any deficiencies discovered;
 - IV. the recommendations for remedial action; and
 - V. the date, time and description of actions taken.
- 7.3. (1) A record shall be kept in the daily log book for any refusal of waste shipments, the reason(s) for refusal, and the origin of the waste, if known; and
(2) At least once a year before the submission of the Annual Report required by Condition 15.0 the Owner shall conduct a topographic survey of the limit of landfilling to determine the approximate volume of waste that has been landfilled at the Site. The survey results shall be included in the Annual Report required by Condition 15.0.

Site Inspections

- 7.4. During Site operations, the Owner shall inspect the Site monthly for the following items but not limited to these items:
 - I. General settlement areas or depressions on the waste mound;
 - II. Shear and tension cracks on the waste mound;
 - III. Condition of surface water drainage works;

- IV. Erosion and sedimentation in surface water drainage system;
- V. Presence of any ponded water on the waste mound;
- VI. Evidence of vegetative stress ;
- VII. Condition of fence surrounding the Site.

7.5. The Owner shall inspect the waste mound and surrounding areas weekly for presence of leachate seeps. Any leachate seeps that are discovered shall be repaired within 48 hours of notice by the Owner

Record Retention

7.6. Except as authorized in writing by the Director, all records required by this ECA shall be retained at the Site for a minimum of two (2) years from their date of creation.

7.7. The Owner shall retain all documentation listed in Schedule “A” for as long as this ECA is valid.

7.8. All quarterly summary reports are to be kept at the Site until they are included in the Annual Report.

7.9. The Owner shall retain employee training records as long as the employee is working at the Site.

7.10. The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

8. MONITORING

Groundwater Monitors

8.1. The Owner shall ensure all groundwater monitoring wells are properly capped, locked and protected from damage.

8.2. In areas where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and they shall be properly re-secured.

8.3. All groundwater monitoring wells whether included in the monitoring program or not shall be assessed, repaired, replaced or decommissioned as required. Any well being decommissioned shall be decommissioned in accordance with good standard practice that will prevent contamination through the abandoned well and in accordance with Ontario Regulation 903.

8.4. The Owner shall repair or replace any monitoring well included in the monitoring program which is destroyed or in any way made inoperable for sampling such that no more than one sampling event is missed.

8.5. Any monitoring well included in the monitoring program that is no longer required as part of the groundwater monitoring program may be decommissioned provided its removal from the

monitoring program has been approved by the Director. A report on the decommissioning shall be provided in the biennial monitoring report for the period during which the well was decommissioned.

Surface Water

- 8.6. Surface water quality testing shall be carried out in accordance with the monitoring program described in Schedule "E" to this Approval, or as amended by the Biennial Monitoring Report required to be submitted and approved by District Manager
- (1) For any changes to the monitoring program, the Owner shall in a cover letter request the acceptance of the changes by the District Manager.
 - (2) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager, to the Director requesting the ECA be amended to approve the proposed changes prior to implementation.
 - (3) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the Monitoring Report, the Owner shall follow current ministry procedures for seeking approval for amending the Approval.

Ground Water

- 8.7. Ground water quality testing shall be carried out in accordance with the monitoring program described in Schedule "B" to this Approval, or as amended by the Biennial Monitoring Report required to be submitted as a part of condition 15.3 and approved by District Manager
- (1) For any changes to the monitoring program, the Owner shall in a cover letter request the acceptance of the changes by the District Manager.
 - (2) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the Monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager, to the Director requesting the ECA be amended to approve the proposed changes prior to implementation.
 - (3) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the Monitoring Report, the Owner shall follow current ministry procedures for seeking approval for amending the Approval.

Leachate

- 8.8. A leachate management monitoring system will be carried out in accordance with the monitoring program as described in Schedule "F" to this Approval or as amended by the Biennial monitoring Report required to be submitted as a part of condition 15.3 and approved by the District Manager.
- (1) For any changes to the monitoring program, the Owner shall in a cover letter request the acceptance of the changes by the District Manager.
 - (2) Within fourteen (14) days of receiving the writing correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager, to the Director requesting the ECA be amended to approve the proposed changes prior to implementation.
 - (3) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the Monitoring Report, the Owner shall follow current ministry procedures for seeking approval for amending the Approval.
- 8.9. The Owner shall ensure the Site is in compliance with MOE Guideline B-7 Reasonable Use Concept is applied and met at all points on the property line which are impacted by leachate from the Site.

Air

- 8.10. The Essex-Windsor Solid Waste Authority (EWSWA) shall conduct an air monitoring program in accordance with the proposal submitted by WSP Canada Inc., dated November 2014, entitled "Air Quality Monitoring Program Plan, Essex-Windsor Regional Landfill", with the revisions included in the letter from WSP Canada Inc. to the Ministry, dated June 22, 2016, Subject: Letter, Response to Information Request/Comments, Application for Approval of Waste Disposal Sites, Notice to ECA No. A011101 - Air Quality Monitoring Program Plan Compliance with Existing Conditions 8.1, 8.2, and 8.3, Essex-Windsor Regional Landfill, 7700 County Road 18, RR#3, Essex ON N0R 1B0, Reference # 7272-A4ZTC8.
- (1) For any changes to the monitoring program, the Owner shall in a cover letter request the acceptance of the changes by the District Manager.
 - (2) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager, to the Director requesting the ECA be amended to approve the proposed changes prior to implementation.
 - (3) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the Monitoring Report, the Owner shall follow current ministry procedures for seeking approval for amending the Approval.

- 8.11. EWSWA shall collect at least four sets of air samples at each of the five perimeter sampling locations. These sample sets shall take place from midnight to midnight Eastern Standard Time and shall occur in accordance with Environment and Climate Change Canada's NAPS (National Air Pollution Surveillance) 12-day program schedule, starting not sooner than the beginning of May and finishing before the end of October. All samples in a set must be taken in the same sampling period.
- 8.12. EWSWA shall notify the ministry's district office at least one business day in advance of each sampling event so that the ministry may, at its discretion, audit the sampling, or place co-located samplers. The proponent will ensure that arrangements are made to place additional samplers should the MECP require.
- 8.13. The EWSWA shall send the MECP a compilation and technical evaluation of the monitoring results as soon as practicable after the completion of each sampling event, and include the results and interpretation in the next biennial monitoring report. The Analysis report shall include information on wind speed and wind direction during the VOC sampling and THC survey as well as precipitation measurement. Ministry will determine based on baseline sampling results whether sampling frequency and number of samples collected need to be modified for the periodic follow-up monitoring
- 8.14. The Sampling program shall be carried out beginning in 2017 and every fifth year thereafter, starting in 2017. The proponent may make modifications to the sampling schedule, target list, locations, or other monitoring plan details only upon receipt of written approval of the MECP.
- 8.15. EWSWA shall notify the MECP Windsor Area District Office of any air monitoring program results that indicate an exceedance of a MECP standard, guideline, or AAQC as soon as practicable upon completion of sample collection and data analysis/interpretation.
- 8.16. The contingency plan shall be implemented in accordance with item 23 of Schedule "A" if there are exceedances to the applicable MECP standards.

9. LEACHATE TREATMENT

- 9.1 (a) Construction and operation of a leachate land treatment (" Spray irrigation") and recirculation (drip irrigation) system is permitted in accordance with following provisions :
 - (i) report entitled " Proposal for a Municipal-scale pilot MSW landfill leachate land treatment-Recirculation at Essex Landfill No. 1" dated June 1995 and prepared by Cuthill Scientific ;
 - (ii) the application dated January 4, 1999 and supporting documents entitled " Supporting documentation to amend condition 21 of ECA No. A011101 to permit a leachate land treatment system to be constructed on the cap of cell
- (b) Application rates of leachate are not to exceed 10 millimetres of leachate per day less daily precipitation

- (c) Operations must immediately stop if leachate contamination problems in surface water and/or groundwater , attributable to the operation of the leachate land treatment and/or recirculation system, are found to be occurring. Recommencement of operations may proceed only upon further written approval of the Director.
- (d) Operations must be discontinued immediately if operations cause surface run-off of leachate from the leachate land treatment and recirculation area and/or if operations cause surface ponding of leachate within the area ; operations cannot be restarted during that application day and only can be restarted after surface ponding has evaporated and/or infiltrated and/or conditions causing the runoff of leachate have been rectified.
- (e) Monitoring programs, except as may be modified from time to time by the District Manager of the Sarnia District Office of the Ministry, shall be in accordance with monitoring programs for the site and with the applications and supporting documents as listed in item 1 above.
- (f) If there are any stoppages of operations under the requirements of item c and/or d, above, then the District Manger of the Sarnia District Office of the Ministry shall be notified immediately.
- (g) Reporting on the operations and monitoring shall be incorporated into the Annual Leachate Monitoring Report for the site, due by **June 1st** of each year, and shall cover the year ending the preceding December 31st. This shall include the following addition to the annual report:
 - results and analysis of the results of the monitoring programs;
 - assessment of the need to change the monitoring program for the leachate land treatment and a recommendation of the required changes;
 - tabulation and assessment of the volumes of leachate produced by the landfill , and those volumes treated and recirculate by these methods;
 - a report on operational problems identified during the operation of the leachate land treatment and a discussion of each and details of what was done to rectify each; and
 - assessment of the need for operational changes for the leachate land treatment and a recommendation of the required changes.
- (h) Operation of the recirculation (drip irrigation) system is permitted until such time as environmental monitoring indicates that the treatment capacity of the system has been exhausted.

9.2. Prior to the construction of the leachate collector system in Cells 2 to 5, the base of the excavation shall be investigated to identify the extent of sand in accordance with the procedures and specifications to manage sand included as Schedule "C".

- 9.3. The leachate underdrain system shall be operated in such manner as to maintain the leachate mound elevation at least 0.5 meters below the bedrock piezometric elevation.
- 9.4. Cleaning of the leachate collection system shall be conducted by power flushing of the system and vacuuming of the sumps at least once every two years.
- 9.5. Leachate collected at the site shall be transported off-site for treatment to a water pollution control plant, approved for this wastewater, until such time as leachate treatment facility is approved and established on-site as proposed in Volume 2 , section 2.4 of the documentation titled, "Final report of the supporting documentation to the Application for a Certificate of Approval for the Essex-Windsor Regional Landfill Site" dated October 1993.
- 9.6. Essex-Windsor shall make all the necessary applications for the construction and operation of an on-site leachate treatment facility, as described in Volume 2, section 2.4 of the supporting documentation referred to in Condition 15.3, within 3 years of the issuance of this Approval.
- 9.7. Once the on-site leachate treatment facility is operational, if it is found that;
 - (1) it is unable to produce an effluent consistently meeting approved effluent discharge criteria or
 - (2) it is determined that the effluent has an impact on the receiving watercourse environment that is unacceptable to MECP.
- 9.8. the leachate shall be managed in accordance with condition 10.5 unless and until the on-site facility can be operated in a manner that results in an acceptable effluent for discharge to the receiving watercourse.
- 9.9. The existing section of the Perimeter leachate collection system along the west side of the proposed cell be deepened to the same depth as base elevation of the excavated cell, only if monitoring results indicate that leachate is moving in a westerly direction.
- 9.10. Approval is granted for the proposed expansion to the land leachate treatment system. The proposed construction and operation for the expansion to the leachate land treatment system shall be completed in accordance with Items 7 through 11 in Schedule "A".
- 9.11. Any changes to the Systems Operation Manual shall be submitted to the District Manager for acceptance prior to their implementation.
- 9.12. When the Closure Plan, as required by Condition 16.1, is submitted to the Director for approval, with a copy also sent to the District Manager, the Owner shall include a plan for the future use of the Spray Irrigation Systems that outlines the procedures for either the continued use or decommissioning of the leachate management systems, which includes the Land Treatment System and the Land Treatment and Recirculation System.
- 9.13. The reporting for the operation and monitoring of the leachate management systems, which

includes the Land Treatment System and the Land Treatment and Recirculation System, shall be submitted to the District Manager as part of the reporting requirements for the Leachate Management Plan Annual Monitoring Report and the Annual Operations Report.

10. LANDFILL GAS

- 10.1. A gas monitoring program to monitor the lateral subsurface migration of methane gas will be carried out at the perimeter soil monitors in February and August of each year, and in leachate monitors prior to purging for each leachate sampling event.
- 10.2. (1) Approval is hereby granted for the construction and operation of a gas collection system in accordance with Items (17) through (19) in Schedule "A".

(2) Approval is hereby granted for the construction of a landfill gas electric generating facility in accordance with Item (17) in Schedule "A".
- 10.3. Within forty (40) days of completion of installation of the gas wells GW1-1 through GW1-6 and GW1-12 through GW1-16 and GW1-25 located in Cell 1, the Owner shall submit to the District Manager, a construction report detailing the following:
 - i. Bottom of Well Elevation;
 - ii. Well Depth;
 - iii. Screened Length (in metres);
 - iv. Wells Logs for material encountered; and
 - v. Base of Liner (if reached).
- 10.4. For Each Cell, within 120 days of commencement of operation of all the gas wells in that cells, the Owner shall submit to the District Manager, a construction report detailing the construction activities and any design changes made during construction. The report shall include but not be limited to the following topics:
 - i. drawing(s) of the "as-built" final cover;
 - ii. a description of the various construction stages;
 - iii. quality assurance/control measures for the construction; and
 - iv. any changes to the design.
- 10.5. The Owner in writing shall at least (7) seven days prior to commencement of operation of the gas collection system and landfill gas generating facility notify the District Manager that these systems will commence operation and provide the start-up date.

11. COMPLIANCE

- 11.1 The Site shall be operated in such a way as to ensure compliance with the following:

- (a) Reasonable Use Guideline B-7 for the protection of the groundwater at the Site; and
- (b) Provincial Water Quality Objectives included in the July 1994 publication entitled Water Management Policies, Guidelines, Provincial Water Quality Objectives, as amended from time to time or limits set by the Regional Director, for the protection of the surface water at and off the Site.

12. CONTINGENCY PLANS

- 12.1. A detailed contingency plan has been developed for the Site in the event that groundwater quality at perimeter monitoring locations exceeds the boundary criteria as specified by the MECP. The plan is included in Schedule "D" to this Approval. The Plan will be implemented in accordance with the Predictive Monitoring Program outlined in Schedule "B" .

13. COMPLAINTS PROCEDURE

- 13.1. If at any time, the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:
 - I. The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;
 - II. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine all possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant; and
 - III. The Owner shall complete a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents. A copy of the report shall be retained on-site.
- 13.2. The Owner shall post site complaints procedure at site entrance along with the name and phone number of a suitable, local contact to receive complaints or questions related to the Site. All complaints and the Owner's actions taken to remedy the complaints must be summarized in the Annual Operations Report.
- 13.3. While constructing and operating the Site, Essex-Windsor shall provide a procedure for receiving and responding to complaints as follows :
 - (a) Essex-Windsor will maintain a local, or toll free, telephone number for the public to register any complaint arising from the operations of the site, or vehicles accessing the Site. The telephone shall be staffed during the normal business hours, and shall have a provision for a recorded message during all other hours of the day.

- (b) The telephone number shall be prominently displayed on a sign at the entrance to the Site, and shall be included in an annual mailing to all owners of property listed in Appendix A of the Compensation Policy, as amended from time to time.
- (c) Complaints may also be registered in person at the administrative office or scale house at the site.
- (d) Each complaint received shall be recorded on a formal complaint form setting out the nature and description of the complaint, with the consent of the complainant, the name, address, and telephone number of the complainant, the date and time of complaint, and any other relevant details in support of the complaint. Each complaint form shall be sequentially logged and placed in a log book at the Site.
- (e) Each complaint shall be referred to the Manager of the Site, or, that person's designate, as soon as practicable after the complaint is received.
- (f) Upon receipt of the complaint the Manager of the Site, or, that person's designate shall investigate the complaint, correct any situation that was cause of the complaint, and where the complainant has identified himself/herself, respond to the complainant any findings or action taken. These findings or actions shall be recorded on the complaint form noted in d above.
- (g) The pattern and nature of complaints received, actions and responses taken, and recommendations for operational changes made or needed to prevent the recurrence of complaints, shall be recorded in the Annual Operations Report.

14. EMERGENCY SITUATIONS

- 14.1. In the event of a fire or discharge of a contaminant to the environment, Site staff shall contact the MECP Spills Action Centre (1-800-268-6060) and the District Office of the MECP.
- 14.2. The Owner shall submit to the District Manager a written report within 3 days of the spill or incident, outlining the nature of the incident, remedial measures taken and measures taken to prevent future occurrences at the Site.
- 14.3. The Emergency Response Manual shall be updated on a regular basis and be provided to the District Manager within one month of the revision date.
- 14.4. The Owner shall ensure that adequate fire fighting and contingency spill clean up equipment is available and that emergency response personnel are familiar with its use and location.

15. REPORTING

- 15.1. A written report on the development, operation, maintenance and closure of the Site, shall be completed annually (the “Annual Operation Report”). The Annual Report shall be submitted to the District Office, Regional Office and LLC by **June 1st** of each year and shall cover the year ending the preceding December 31st.
- 15.2. The Annual Operation Report shall include, but its not limited to, the following:
- (1) Waste Quantities and waste types disposed of, and the waste generation sources, as determined by landfill and transfer station records;
 - (2) Areas of intended operation during the next reporting period;
 - (3) Calculations of the Volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site Capacity used during the reporting period;
 - (4) details of any non-hazardous industrial sludge approved for landfilling, including sludge source, volumes, location landfilled, and leachate extraction test results;
 - (5) A summary of the amount of waste refused for disposal at the Site, the reasons for refusal;
 - (6) details of any special wastes disposed of and wastes refused from disposal, as determined by landfill and transfer station records;
 - (7) Areas if excavation during the reporting period;
 - (8) The progress of final cover, vegetative cover, and any intermediate cover;
 - (9) A discussion of any operational problem encountered at the Site and corrective action taken;
 - (10) a summary of site inspections and complaints and resulting remedial actions taken;
 - (11) a summary of any accidents or occurrences at the Site including the reasons for the accident or occurrence, any damage or injury suffered, and the measures taken to repair, mitigate or prevent damage or injury;
 - (12) estimates of the volumes of waste landfilled and the locations filled;
 - (13) the results of the monthly compaction survey;
 - (14) the volume of cover soil stockpiled at the Site and the volume of cover soil used during the year;
 - (15) Facilities installed during the reporting period;
 - (16) Site preparations and facilities planned for the installation during the next reporting period;
 - (17) Any changes in operation, equipment or procedures employed at the Site;
 - (18) a list of all technical, design, and operations reports or drawings issued or prepared;
 - (19) a summary of site development activities and site conditions;
 - (20) a recording of leachate levels within the leachate retention pond, leachate system and leachate monitors;
 - (21) a summary of monitoring programs conducted;
 - (22) confirmation that the Site inspection program as required by the ECA has been complied with by the Owner;
 - (23) recommendations regarding and proposed changes in operations of the Site;
 - (24) any MECF reports or inspection forms, to be included as an appendix; and
 - (25) details of any mitigative measures carried out at the Site during the year.

- 15.3. The Biennial Monitoring Report shall be submitted to the District Office, Regional Office and LLC by **June 1st** (alternating) and shall include, but not necessarily limited to, the following :
- i. the results and an interpretive analysis of the results of all leachate, groundwater, surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
 - ii. an assessment with regards to compliance of the groundwater quality at the property boundary and compliance point with regards to Guideline B-7 - Reasonable Use Concept;
 - iii. an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the contingency plans;
 - iv. site plans showing the existing contours of the Site;
 - v. previously existing site facilities;
 - vi. a report on the status of all monitoring wells and a statement as to compliance with R.R.O. 1990, Reg. 903: WELLS;
 - vii. any other information with respect to the site which the District Manager or Regional Director may require from time to time;
 - viii. a statement of compliance with all conditions of this ECA and other relevant Ministry groundwater and surface water requirements;
 - ix. a confirmation that the site inspection program as required by this ECA has been complied with by the Owner;

16. SITE CLOSURE

- 16.1. At least two (2) years prior to the anticipated date of closure of this Site or the date 90 per cent of the total waste disposal volume is reached, whichever occurs first, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site Closure Plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring, and end use.

17. WASTE DIVERSION

- 17.1. Waste diversion activities for Solid Non-Hazardous Waste including Waste Electrical and Electronic Equipment are hereby approved subject to the following conditions:
- (1) The Owner shall ensure that:
 - (a) all bins and waste storage areas are clearly labelled;
 - (b) all lids or doors on bins shall be kept closed during non-operating hours and during high wind events; and
 - (c) if necessary to prevent litter, waste storage areas shall be covered during high winds events.
 - (2) The Owner shall provide a segregated area for the storage of Refrigerant Appliances so that the following are ensured:

- (a) all Refrigerant Appliances have been tagged to indicate that the refrigerant has been removed by a licensed technician. The tag number shall be recorded in the log book and shall remain affixed to the appliance until transferred from the Site; **or**
 - (b) all Refrigerant Appliances accepted at the Site, which have not been tagged by a licensed technician to verify that the equipment no longer contains refrigerants, are stored segregated, in a clearly marked area, in an upright position and in a manner which allows for the safe handling and transfer from the Site for removal of refrigerants as required by O.Reg. 189; and
 - (c) all Refrigerant Appliances received on-site shall either have the refrigerant removed prior to being transferred from the Site or shall be shipped off-site only to facilities where the refrigerants can be removed by a licensed technician in accordance with O.Reg. 189.
- (3) The Owner shall transfer waste and recyclable materials from the Site as follows:
- (a) recyclable materials shall be transferred off-site once their storage bins are full;
 - (b) scrap metal shall be transferred off-site at least twice a year unless there is not enough scrap metal to warrant a shipment. No scrap metal shall be stored at the site for more than two (2) years;
 - (c) any incoming tires shall be transferred off-site as soon as a load for the contractor hired by the Owner has accumulated. No tires shall be stored at the site for more than two (2) years; and
 - (d) immediately, in the event that waste is creating an odour or vector problem.
- (4) The Owner shall notify the appropriate contractors that waste and recyclable wastes that are to be transferred off-site are ready for removal. Appropriate notice time, as determined by the contract shall be accommodated in the notification procedure.

17.2. Ontario Electronic Stewardship - Waste Electrical and Electronic Equipment (WEEE) Collection Site

A facility for the acceptance, storage and preparation for transport for recycling, of waste electronic and electrical materials, and subsequent transfer of such wastes by an approved carrier for disposal elsewhere shall be established and operated in accordance with the following:

- (1) the materials shall be stored: in an enclosed, dry structure such as a trailer, shipping container or other suitable structure; in an orderly fashion, to avoid breakage (broken materials shall be placed in containers).
- (2) maximum storage volume is 32 cubic yards (16 bins or cardboard gaylords on skids, 2 cubic yards each).
- (3) the Site Plan submitted annually shall show the location of the storage facility.
- (4) a log shall be kept of the company used for the transportation and the destination where

the waste is to be disposed.

18. MHSW TRANSFER STATION

18.1. Essex-Windsor shall undertake the following activities to reasonably minimise the disposal of household chemical waste as part of domestic waste at the Site:

- (a) continue to promote the use of alternatives to household chemical products through its public education program;
- (b) continue to promote the proper handling and disposal of household chemical waste through its public education program;
- (c) establish and operate a permanent household chemical waste facility at the Essex-Windsor Recycling Centre located in the City of Windsor to allow for the receipt and disposal of this waste from residents;
- (d) Organize household chemical waste activities, which will include temporary, and/or permanent drop off facilities in various locations in the County of Essex, to allow for the receipt and disposal of this waste from residents; and
- (e) make reasonable inspection of the waste received for disposal and remove household chemical waste that is identified in that waste.

18.2. Municipal Hazardous or Special Waste may be collected for transfer subject to the following conditions:

- (1) The Owner shall ensure that all MHSW is removed from the Site for disposal in accordance with Regulation 347:
 - (a) when the Hazardous Waste storage has reached capacity, or
 - (b) at least once every two (2) years;whichever occurs first.
- (2) The construction and operation of the MHSW Depot shall be in accordance with the Design and Operations Report as per item 22 of Schedule "A" as approved by the Director. The Design and Operations Report shall be retained at the Site; kept up to date through periodic revisions; and be available for inspection by Ministry staff. Changes to the Design and Operations Report shall be submitted to the Director for approval.
- (3) The MHSW Depot shall only accept for bulking and temporary storage pending transfer to an approved carrier for disposal elsewhere.

- (4) The MHSW Depot shall be supervised at all times during operating hours by staff that have been adequately trained to handle spill emergencies.
- (5) Waste received at the MHSW Depot shall be stored in the following manner:
 - (a) propane cylinders shall be stored outdoors in a segregated area in a manner which prevents cylinders from being knocked over or cylinder valves from being damaged;
 - (b) all other waste shall be stored in a covered area such that it is sheltered from rain and snow;
 - (c) all liquid wastes shall be stored in secondary containment that meets the requirements of the Ministry document entitled "Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities" dated May 2007;
 - (d) containers and storage areas containing flammable and/or ignitable materials shall be adequately grounded;
 - (e) storage containers shall be clearly labelled indicating the type and nature of the hazardous waste stored as required by applicable legislation;
 - (f) incompatible waste types shall be segregated during storage;
 - (g) batteries shall be stored in a secure area apart from other wastes and provided with a containment area to ensure against leakage or spilled battery acid; and
 - (h) all waste being transported from the MHSW Depot shall be transported in accordance with Regulation 347 and the Environmental Protection Act.
- (6) The Owners shall not offer Municipal Hazardous or Special Waste for reuse unless:
 - (a) the waste is in its original packaging, and the label on the package is legible;
 - (b) the waste has been inspected by trained personnel to ensure the waste meets the requirements for reuse for that specific waste type; and
 - (c) the waste is one of the following:
 - (i) waste paint, subject to the requirements of Condition 11(8) below;
 - (ii) aerosols;
 - (iii) waxes and soaps;
 - (iv) motor oil, provided the original container has never been opened;
 - (v) antifreeze, provided the original container has never been opened;
 - (vi) household cleaning products, other than bleach or ammonia, that are no more than 5 years old;
 - (vii) drywall compound;
 - (viii) cement; and
 - (ix) fertilizers that do not contain pesticides, provided the original container/packaging has never been opened.
 - (d) All waste offered for reuse shall be inspected by trained personnel to ensure that waste meets the requirements for reuse for that specific waste.
- (7) The Owner shall only offer waste paint for reuse provided that the following conditions are met:

- (a) the waste paint is contained in the original manufacturer's container;
- (b) the original manufacturer's label containing product information use and product hazards is clearly legible;
- (c) the original manufacturer's container is in an undamaged state such that the material may be transported without risk of leaks or spills; and
- (d) the Owner does not suspect the paint to have been manufactured prior to 1972.

19. MHSW - DESIGN AND OPERATIONS PLAN

19.1. Approval is hereby granted for the operation of MHSW at the Waste Disposal Site, in accordance item 22 of Schedule "A"

MHSW TRANSFER STATION

- 19.2.
- (a) Only the following waste classes may be collected at the MHSW Depot, for temporary storage and transfer to an approved carrier for off-site disposal: 112, 145, 146, 147, 148, 212, 213, 221, 242, 243, 252, 261, 263 and 331;
 - (b) The following types of waste/materials are prohibited for acceptance at the MHSW Depot: ammunition, explosives, sharps, radioactive materials, unidentifiable materials, and materials containing PCB other than ballasts and paint; and
 - (c) The maximum storage quantity of materials permitted to accumulate at the MHSW Depot at any time, shall not exceed the quantities as individually described in Section 12 in Item 22 of Schedule "A" attached to this Approval.
- 19.3. The MHSW depot shall be inspected daily by Landfill personnel trained in contingency measures; all inspections shall be recorded and these records shall be maintained by the Owner/Operator for a period of at least three years.
- 19.4. The Owner/Operator shall include in the Annual Report for the Site, a summary of description of the operations of the MHSW Depot from the prior year that includes but is not limited to the following: waste types and quantities; source of generation; ultimate disposal sites; daily inspection results; the nature and description of spills/upsets; clean up and corrective actions taken; and prevention actions taken.

SCHEDULE "A"

1. Technical Summary Report volumes 1 to 4, Supporting Documentation to an Application for a Certificate of Approval, Proposed Essex-Windsor Regional Landfill Site, FINAL, by Proctor Redfern Limited, dated October 1993.
2. Report entitled " Essex-Windsor Regional Landfill Site, Conditions of Approval", comprising Schedules B,C,D,E, and F. Prepared by Jagger Hims Limited dated March 1995.
3. Application dated June 10, 1998 and supporting document entitled " Application for Approval of a Waste Disposal Site From the Essex-Windsor Solid Waste Authority"
4. Letter dated September 24, 2003 from Micheline Riopelle, MECP to Todd Pepper, General Manager, EWSWA regarding the approval of the amended Schedules.
5. Letter from Todd R. Pepper, General Manager of Essex-Windsor Solid Waste Authority, to Ontario Ministry of the Environment, re: Condition 21 - Certificate of Approval No. A 011101, dated October 3, 2001.
5. Application for a Provisional Certificate of Approval for a Waste Disposal Site (landfill), dated October 2, 2001, and signed by Todd R. Pepper.
6. Report prepared by Cuthill Scientific, entitled "Essex-Windsor Solid Waste Authority, Regional Landfill, Land Treatment System &, Cell 1 - Land Treatment System &, West Cell Land Treatment - Recirculation System, 2000 Report" dated 2000 (day/month not provided).
7. Application for amendment to the Certificate of Approval from Essex-Windsor Solid Waste Authority dated February 2003 requesting amendment to the Certificate to permit a leachate land treatment system. The application was dated February 26, 2003 and signed by Ralph Reiser .
8. Supporting Documentation to the Application to Amend Condition 21 of Provisional Certificate of Approval No. A 011101 to Permit Leachate Land Treatment System to be Constructed on the Cap of Cell 1 South, assumed to be prepared by Essex-Windsor Solid Waste Authority, undated.
9. Drawing prepared by the Essex-Windsor Solid Waste Authority, Proposed Cell 1 South Leachate Land Treatment System dated January 3, 2003.
10. Letter dated August 24, 2004 to Mr. Ralph Reiser, Essex-Windsor Solid Waste Authority from Mr. Dale I. Gable, Ministry of the Environment requesting additional information on proposed expansion to leachate land treatment system.
11. Letter and supporting documentation dated February 22, 2005 to Mr. Dale Gable, Ministry of the Environment from Mr. Ralph Reiser, Essex-Windsor Solid Waste Authority providing the additional information requested in the August 24, 2004 letter. The supporting documentation included the following:

- i. Drawing 1 - Essex Windsor Solid Waste Authority Regional Landfill Leachate Land Application System dated February, 2005
 - ii. Drawing 2 - Essex Windsor Solid Waste Authority Regional Landfill Leachate Land Application System dated February, 2005
 - iii. Operation Manual - West Cell Land Treatment Recirculation System amended February 22, 2005
12. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated January 13, 2006 and signed by Todd R. Pepper, General Manager, Essex-Windsor Solid Waste Authority.
13. Application for a Provisional Certificate of Approval for a Waste Disposal Site for Essex-Windsor Regional Landfill Site, signed by Todd Pepper, General Manager, Essex-Windsor Solid Waste Authority, dated May 14, 2007.
14. Letter from Todd Pepper, General Manager, Essex-Windsor Solid Waste Authority, to Josephine DeSouza, Ministry of the Environment, dated July 9, 2007, providing additional information.
15. Electronic mail from Todd Pepper, General Manager, Essex-Windsor Solid Waste Authority, to Alan Tan, Ministry of the Environment, dated September 13, 2007, providing additional information.
16. Auto Shredder Fluff Sampling Protocol (Policy No. WD-040), prepared by Todd Pepper, General Manager, Essex-Windsor Solid Waste Authority.
17. Application for a Provisional Certificate of Approval and supporting documentation submitted by the EWSWA requesting approval for the construction and operation of a gas collection system and gas electric generating facility. The application was signed by Ralph Reiser and dated October 3, 2007. The supporting documentation included the following:
- i. Report entitled "Landfill Gas Collection System Design- Essex-Windsor Regional Landfill Site" prepared for Integrated Gas Recovery System by Comcor Environmental Limited (Project No. 9-380) dated October 2, 2007
 - ii. Design Drawing for EWSWA Gas Collection System (Project No. 9-380)
 - a. Drawing No. G101 - Existing Site Conditions dated September 27, 2007
 - b. Drawing No. G102 - Proposed System Layout dated September 27, 2007
 - c. Drawing No. G104 - Proposed Landfill Gas Utilization Facility Layout dated September 27, 2007;
 - d. Drawing No. G105 - Proposed LFG Utilization Plan, Profile and Details dated September 27, 2007;
 - e. Drawing No. G111 - Plan and Profile - 450 Diameter Header Sta 0+000 to 0+800 dated September 27, 2007 2004;
 - f. Drawing No. G112 - Plan and Profile - 450 Diameter Header Sta 0+800 to 1+500 dated September 27, 2007;
 - g. Drawing No. G113 - Plan and Profile - 450 Diameter Header Sta 1+500 to 2+000

- dated September 27, 2007;
 - h. Drawing No. G114 - Plan and Profile - 450 Diameter Header Sta 2+000 to 2+700 dated September 27, 2007;
 - i. Drawing No. G115 - Plan and Profile - 450 Diameter Header Sta 2+700 to 3+300 dated September 27, 2007;
 - j. Drawing No. G116 - Plan and Profile - 450 Diameter Header Sta 3+300 to 3+519.05 dated September 27, 2007
 - k. Drawing No. G121 - Plan and Profile - 200 Diameter Lateral 1-4 dated September 27, 2007;
 - l. Drawing No. G122 - Plan and Profile - 200 Diameter Lateral 1-5 dated September 27, 2007;
 - m. Drawing No. G123 - Plan and Profile - 200 Diameter Lateral 2-1 dated September 27, 2007;
 - n. Drawing No. G161 - Trench Details dated September 27, 2007;
 - o. Drawing No. G162 - System Details dated September 27, 2007; and
 - p. Drawing No. G163 - System Details dated September 27, 2007.
18. Letter dated November 27, 2007 addressed to Mr. Ralph Reiser, EWSWA from Mr. Dale Gable, Ministry of the Environment requesting additional information on the proposed gas collection wells for the gas collection system.
19. Letter dated November 30, 2007 addressed to Mr. Dale Gable, Ministry of the Environment from Ms. Denise Burgess, Comcor Environmental Limited providing information on gas well details.
20. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated March 5, 2008 and signed by Todd R. Pepper, General Manager, Essex-Windsor Solid Waste Authority.
21. Application for a Certificate of Approval for a Waste disposal Site dated March 3, 2009 signed by Todd R. Pepper including supporting documentation attached.
22. Report entitled "Design and Operations Plan, Municipal Hazardous and Special Waste Depot", Essex-Windsor Regional Landfill, 7700 County Road 18, Cottam, Ontario, Revised May 23, 2013, prepared by D. C. McCloskey Engineering Ltd., including the following Engineering Drawings:
- (a) Figure 1:MHSW Drop Off Site, Essex-Windsor Regional Landfill, dated February 14, 2013.
 - (b) Figure 2:Essex-Windsor Regional Landfill - Site Plan Overview, dated February 13, 2013.
 - (c) Figure 3:Interior Layout, MHSW Site, Essex-Windsor Regional Landfill, dated February 14, 2013.
23. Report entitled "Air Quality Monitoring Program Plan, Essex-Windsor Regional Landfill , dated November 2014", developed by WSP Canada Inc.
24. Application for Environmental Compliance Approval for Waste Disposal Site dated April 28, 2015 signed by Ralph Reiser, Manager of Waste Disposal.

25. Environmental Compliance Approval (ECA) amendment Application for Approval A011101 and supporting documentation submitted by the EWSWA (Essex-Windsor Solid Waste Authority) requesting approval for the relocation of the HHW pad and continued use and operation of the leachate treatment systems. The application was signed by Tom Marentette, Waste Disposal Manager and dated May 14, 2019. The supporting documentation included the following:
- i. Report titled "ECA Amendment Application for Approval - Relocation of Compost and Household Hazardous Waste Pads at the Regional Landfill Site and Request to Extend the Operation of the On-site Leachate Treatment Systems and Operation and Monitoring of the Drip Irrigation System as per Conditions 9.12 and 9.13,. 7700 Essex County Road 18, Essex Town, County of Essex, Ontario. Essex Windsor Solid Waste Authority Amended Certificate of Approval Waste Disposal Site (Processing) A011105 and Environmental Compliance Approval Waste Disposal Site A011101. Reference Numbers: 0065-B8ALEN (pad relocation) and 2778-B7YMMJ (Spray and Drip Irrigation Systems). Prepared by WSP, May 9, 2019.
 - ii. Design Drawing Set for EWSWA HHW pad relocation and spray and drip irrigation systems for Project No: 111-53107-03
 - a. Figure No. 1 - ECA Amendment - Site Location Map dated April, 2019;
 - b. Figure No. 2 - ECA Amendment - Former and Existing Compost Pad Locations dated April, 2019;
 - c. Figure No. 3 - ECA Amendment - New Compost Pad Location dated April, 2019;
 - d. Figure No. 4 - ECA Amendment - New Household Hazardous Waste Pad Location dated April, 2019;
 - e. Figure No. 5 - ECA Amendment - Plan View of On-site Leachate Treatment Systems dated April, 2019;
 - f. Figure No. 6 - ECA Amendment - West Cell Land Treatment Spray Irrigation Configuration dated April, 2019;
 - g. Figure No. 7 - ECA Amendment - West Cell Recirculation System Subsurface Configuration dated April, 2019;
 - h. Figure No. 8 - ECA Amendment - Land Treatment System Plan View of Delivery Apparatus and Treatment Area dated April, 2019;
 - i. Figure No. 9 - ECA Amendment - Land Treatment System Plan View of Surface Spray Laterals and Sprinklers dated April, 2019; and
 - j. Figure No. 10 - ECA Amendment - Land Treatment System Plan View of Subsurface Trickle Laterals dated April, 2019.

The reasons for the imposition of these terms and conditions are as follows:

1. The reason for Conditions 1.1 and 1.2 is to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

2. The reason for Conditions 1.3, 1.4, 1.5, 1.9, 1.10, 1.11, 1.12 and 1.13 is to clarify the legal rights and responsibilities of the Owner under this ECA.
3. Conditions 1.6, 1.7 and 1.8 are included to ensure that the appropriate Ministry staff have ready access to information and the operations of the Site, which are approved under this Certificate.
4. Conditions 1.14 and 1.15 are included, pursuant to subsection 197(1) of the EPA, to provide that any persons having an interest in the Site are aware that the land has been approved and used for the purposes of waste disposal.
5. The reasons for Condition 1.16 are to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this ECA.
6. The reasons for Conditions 1.17 and 1.18 are to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.
7. The reason for Condition 1.19 is to ensure that appropriate Ministry staff have ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this ECA. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the EPA and OWRA.
8. The reason for condition 2 is to establish Landfill Liaison Committee. The committee is established to review all reports related to the operations and monitoring of the site, and provides the resources for the independent review of these reports. The condition is to enhance public confidence in the facility and is in the public interest.
9. The reason for Condition 3.1 is to ensure the Owner keeps a record of as-built drawing for the set available.
10. The reasons for Conditions 4.1, 4.2, 4.3 and 4.4 are to ensure the Owner operates the Site in an environmentally safe manner. This to is ensure the environment and public health are protected.
11. The reasons for Conditions 4.5 and 4.6 is to specify the approved areas from which waste may be accepted at the Site and the types and amounts of waste that may be accepted for disposal at the Site, based on the Owner's application and supporting documentation.
12. The reasons for Conditions 4.7 and 4.8 are to specify the normal hours of operation for the landfill Site and a mechanism for amendment of the hours of operation.
13. The reason for Condition 4.9 is to ensure that users of the Site are fully aware of important information and restrictions related to Site operations under this ECA of Approval.
14. The reason for Condition 4.10 is to specify Site access to/from the Site and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no Site attendant is on

duty.

15. The reason for condition 4.11 has been included is to ensure that access roads are clear and do not pose a safety hazard to the general public.
16. The reason for Condition 4.13 is to regulate the type of traffic that will enter the landfill site thereby reducing nuisance, health and safety concerns associated with traffic volume and route considerations.
17. The reason for Condition 4.14 is to establish bird control program to discourage birds, including gulls, from feeding and loafing on the landfill site thereby creating a nuisance for adjacent landowners.
18. The reason for Condition 4.15 is needed in order to make certain that the waste received at the site is in accordance with the ECA and Reg. 347.
19. The reason for Condition 4.16 and 4.17 is necessary in order to ensure that all waste loads are inspected and waste that is disposed of at the site is in accordance with the terms and conditions in this ECA .
20. The reasons for Conditions 4.18, 4.20, 4.21,4.22,4.23,4.24,4.25, 4.26, 4.27 are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.
21. The reasons for Condition 4.19 are the protection of public health and safety and minimization of the potential for damage to environmental control, monitoring and other works at the landfill Site. Scavenging is the uncontrolled removal of material from waste at a landfill site.
22. The reasons for Conditions 4.27, 4.28, 4.29 are to ensure that noise from or related to the operation of the landfill is kept to within Ministry limits and does not result in a hazard or nuisance to any person.
23. The reason for Condition 5.38 is to ensure that appropriate measures are taken in order to prevent surface water from contacting waste so as not to cause an adverse effect on the environment.
24. Condition 4.30 has been inserted in order to ensure that concentrations of landfill gas do not pose a hazard to human health or the environment.
25. The reasons for Conditions 5.1 to 5.4 are to specify the approved types of waste that may be accepted for disposal at the Site, based on the Owner's application and supporting documentation.
26. The reason for Condition 5.5 is that open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance affects, and the potential fire hazard.
27. The reason for Condition 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12 is to specify restrictions on the extent of landfilling at this Site based on the Owner's application and supporting documentation. These limits define the approved volumetric capacity of the site. Approval to landfill beyond these limits would require an application with supporting documentation submitted to the Director.
28. The reason for Condition 5.13 and 5.14 is to protect identified features of the existing natural environment of

the site, including the existing woodlots and aquatic biology. The condition will also provide mitigation of the visual effects of the landfill site. The condition will also provide for the establishment of final contour plan for the site while recognising the need to be consistent with the final end use plan.

29. The reason for condition 5.15 to 5.25 is to allow the acceptance of dewater sewage sludge and to allow the storage and use of sludge as an soil amendment over the final cover of the site.
30. Conditions 5.26 to 5.31 inclusive have been included in order to ensure asbestos waste is handled and disposed of in accordance with Reg. 347 as amended from time to time. Proper handling and disposal of asbestos waste ensures that the asbestos waste does not cause an adverse impact on the environment and also does not affect human health.
31. The reason for Condition 5.32 to 5.37 is to ensure that landfilling operations are conducted in an environmentally acceptable manner. Daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the site.
32. The reason for Condition 5.38 is to ensure impacted surface water at the site is handled in a manner that does not impact the environment or human health.
33. The reason for Condition 6.1 to 6.3 is to ensure that the Site is supervised and operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.
34. The reason for Conditions 7.1, 7.2, 7.3, 7.4 and 7.5 are needed to ensure regular inspections of the site are conducted in order to protect the natural environment.
35. The reason for Conditions 7.6, 7.7, 7.8, 7.9 and 7.10 is to ensure that accurate waste records are maintained to ensure compliance with the conditions in this ECA (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.
36. The reasons for Conditions 8.1 to 8.5 inclusive are to ensure protection of the natural environment and the integrity of the groundwater monitoring network.
37. The reason for Condition 8.6 inclusive is to demonstrate that the landfill site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
38. The reason for Condition 8.7 and 8.8 are included to require the Owner to demonstrate that the Site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
39. The reason for Condition 8.10 to 8.16 is to ensure the approval of Air Quality Monitoring Program as

required.

40. The reason for condition 9.1 to 9.8 is to provide proper planning, implementation, reporting and assessment of the leachate land treatment system, as well as for protection of the environment.
41. The reasons for Condition 9.10 is to ensure the owner constructs and operates the expansion to the leachate land treatment system as per the application submission. This is to ensure the long-term health and safety of the public and the environment.
42. The reasons for Condition 9.11 is to ensure the owner obtains acceptance to any operational changes in the system prior to implementation. This is to ensure the long-term health and safety of the public and the environment.
43. The reason for Condition 9.12 is to phase out the spray irrigation system in order to protect the environment
44. The reason for Condition 9.13 is to have an updated information regarding the function and operation of the drip irrigation system.
45. The reasons for Condition No. 10.1 are to approve the gas collection system and landfill gas generating facilities as per the submitted information. This is to ensure the long-term health and safety of the public and the environment.
46. The reasons for Condition No 10.2 and 10.3 are to ensure the Owner provides the District Manager on as-built information for the system.
47. The reason for Condition No. 10.4 and 10.5 are to ensure the Owner informs the District Manager that the systems will be commencing operation such that the clock for completion of Conditions 10.4 and 10.5 can be initiated.
48. The reason for Conditions 12.0 are to ensure that the Owner follows a plan with an organized set of procedures for identifying and responding to unexpected but possible problems at the Site. A remedial action / contingency plan is necessary to ensure protection of the natural environment. A leachate contingency plan is a specific requirement of Reg. 232.
49. The reason for Conditions 13.1 to 13.3 is to establish a forum for the exchange of information and public dialogue on activities carried out at the landfill Site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and environmental protection.
50. The reasons for Conditions 14.1 to 14.4 are to ensure that the Ministry is informed of any spills or fires at the Site and to provide public health and safety and environmental protection.
51. The reasons for Conditions 15.0 to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design

52. The reasons for Condition 16.0 is to ensure that final closure of the Site is completed in an aesthetically pleasing manner and to ensure the long-term protection of the natural environment.
53. Condition 17.1 is included to ensure that the recyclable materials are stored in their temporary storage location in a manner as to minimize a likelihood of an adverse effect or a hazard the natural environment or any person.
54. The reason for Condition 17.2 is to ensure that electronic and electrical waste is stored, transported and disposed of in an environmentally acceptable manner.
55. Conditions 18.2 (1)is included to ensure that waste storage is done in a manner and duration which does not result in a nuisance or a hazard to the health and safety of the environment or people
56. The reason for Condition 18.2 (3) is to ensure that only acceptable waste is received at the MHSW Depot, and to ensure all waste received is handled in an appropriate manner.
57. The reason for Condition 18.2 (4) is to ensure that all waste is handled in an appropriate manner, and that any spills are handled in an appropriate manner.
58. The reason for Conditions 18.2 (6) and 18.2 (7) is to allow the Owner to distribute certain wastes for reuse subject to restrictions
59. The reason for Condition 19.1 is to specify the approved waste/materials types and amounts that may be accepted for disposal at the MHSW Depot, based on the Owner's application and supporting documentation.
60. The reason for Condition 19.2 is to ensure that the Site is operated, inspected and maintained appropriately in an environmentally acceptable manner for protection of the natural environment and public health and safety.
61. The reason for Condition 19.3 and 19.4 is to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design. Condition 11.1. (1) is added to allow vehicles smaller than 3 tonnes to enter the Site to bring waste for diversion purposes.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A011101 and all subsequent amendments issued on September 28, 1995.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

- a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
- b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of
the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 16th day of November, 2020



Mohsen Keyvani, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

CF/

c: Area Manager, MECP Windsor
c: District Manager, MECP Sarnia
Luis Alvarez, P. Eng.
Radwan Tamr, WSP Canada Inc.



Date: April 10, 2024
To: Mr. Tom Marentette (Essex-Windsor Solid Waste Authority)
From: Radwan Tamr
Copy:
Project No.: 111-53107-10-200 (2023 Cell 5 North Design Services)
Subject(s): **Findings and Observations of Sand Management Investigation and Summary of Laboratory Testing Results**
Proposed Cell 5 North, Essex-Windsor Regional Landfill, EWSWA

Introduction and Background

WSP Canada Inc. (WSP) is pleased to submit to the Essex Windsor Solid Waste Authority (EWSWA) the following summary of the field findings and observations noted during the sand management investigation to assess the presence and approximate extent of sand layers within the subsurface materials located within the footprint of the proposed Cell 5 North at the Regional Landfill site. Also, a summary of the laboratory testing results of the soil samples collected from the boreholes advanced within the location of the new Cell 5 North is presented below.

Please note that the north and east side slopes of the cell excavation are permanent and there will be two manholes located directly along the north side of the north side slope. The south side slope will be excavated during the construction of the future Cell 5 South. The west side of the new cell excavation will be connected to the existing Cell 4 north. Surface water will be directed to the existing drainage ditch system that discharges to the existing west and east ponds. The existing roads will be used to access the cell excavation during the new cell construction work.

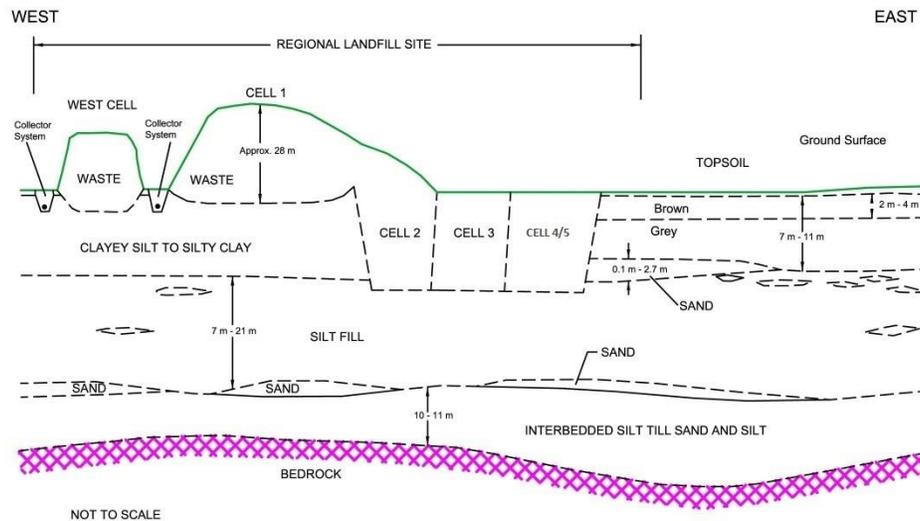
The landfill is located in the south half of Lots 14, 15, and 16, Concession VII, in the Town of Essex. The site location map is shown on the attached Figure 1. The site is operated under the Amended Environmental Compliance Approval (ECA) No. A011101, dated November 16, 2020 (the original Certificate of approval is dated September 28, 1995). The area licensed for waste disposal is 64.5 ha. Hydrogeologic details concerning the design and operation of the landfill (prepared by others) are documented in the original hydrogeologic assessment report (Jagger Hims Limited, 1993). As of the end of 2023, waste was confined to Cell 1, Cell 2, Cell 3 North, and portions of Cell 3 South Cell 4 North as well as the previously completed East Cell and West Cell of the former Essex County Landfill No. 1. The base of the landfill is estimated to average about 10 m below surrounding existing ground surface.

The following findings and results will be included in the tender package with the design drawings and project specifications for the proposed new cell construction in the Summer of 2024.

Local Subsurface Conditions

The landfill is situated in the St. Clair Clay Plain physiographic region. The site geology consists of the waste, four main geologic units, and one minor geologic unit as confirmed through previously detailed subsurface investigations. General local geology is summarized in the following figure.

SCHEMATIC OF LOCAL GEOLOGY



The uppermost geologic unit at the site is glaciolacustrine silty clay to clayey silt textured soil. This unit typically ranges in thickness from 7 to 11 m and contains sand to gravel-sized particles, and silt and clay inclusions about 1 mm to 5 mm in diameter. Occasional silt and fine sand laminae were observed within this unit. The upper portion of this unit is a weathered, brown zone that ranges in depth from 2 m to 4 m below the original ground surface. Fractures typically extend through the brown zone into the underlying grey zone of this unit to an average depth of 4.6 m below the original ground surface, although occasional fractures at greater depths were detected. The grey zone occurs beneath the entire site and varies in thickness between 2.4 and 8.2 m on a local basis.

There is a discontinuous unit of sand beneath the glaciolacustrine unit within the southern portion of the landfill. This upper sand unit has a thickness of 0.1 m to 2.7 m, where detected. It is noted that this sand unit was not detected during the excavation of the southern portion of Cell 1 or Cell 2. However, this unit was detected during the excavation of Cell 3 North in 2012, Cell 4 North in 2015 and Cell 3 South in 2018.

Below the glaciolacustrine unit and the sand unit, there is an approximately 10 m thick deposit of glacial till. The till is typically silty in texture with variable amounts of sand and clay-sized particles in the matrix. Within the upper section of this unit, discontinuous pockets and layers of generally fine sand occur to thicknesses of typically less than 0.1 m. Sand lenses were also detected sporadically through the central section of the glacial till and did not appear to be continuous. This unit is referred to as the silt till unit.

The lowest unit of the Quaternary sequence, which was intersected within and around the landfill, is an interbedded glacial till, sand, and silt unit. This unit is dominated by a silt-textured glacial till similar to the overlying unit. Still, it contains layers of sand and silt varying in thickness from generally a few millimeters to a few meters. The sand and silt layers are likely discontinuous. Sand within the upper portion of the interbedded unit forms the lower sand unit.

The bedrock encountered at the site is typically limestone of the Lucas Formation of the Detroit River Group. The contact between the bedrock and the overlying soil is gradational owing to the broken nature of the upper approximately 1 m of the bedrock and the gravel content within the lower portion of the overlying unit. Below the gradational contact, the bedrock is generally competent with some fractures.

Existing lateral shallow groundwater movement is regionally in a southwesterly direction within the upper 2 m to 4 m of the subsurface soil. Still, it is locally influenced by existing features such as the leachate collector systems, waste underdrains, field tiles, ditches, subsurface structures, perimeter soil berms, and landfill construction activities. Lateral groundwater flow in the underlying upper and lower sand groundwater systems is dominantly southerly direction. Within the aquitards, long-term groundwater elevation trends vary with time. Within the bedrock aquifer, groundwater flow is southerly to southwesterly direction. The hydraulic gradients around the waste footprint continue to be predominantly downward within the aquitards, but are generally upward below the waste cells.

Observations & Findings of Sand Management Investigation

A total of 19 boreholes (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19) were advanced to depths ranging from 12 to 16 meters below existing ground surface (mbgs) to assess the subsurface soil and groundwater conditions within the footprint of the proposed new Cell 5 North. The surface elevation of the investigated area ranged from 189 to 198 mASL based on the recent aerial survey of the site with various stockpiles of topsoil, clayey soils and other materials that were previously generated during the previous construction of cell 4 north and cell 3 south, and placed west of the existing compost pad.

The boreholes were advanced in accessible areas within the existing stockpiled materials. Also, the boreholes were used to identify the presence of potential sand layers within the investigated areas for estimating the quantity of sand that may require excavation and removal during the new cell construction. The field observations will also be used to assess the subsurface conditions, the new cell slope conditions, and potential groundwater seepage during the cell excavation work.

The borehole drilling program was completed between June 19 and July 14, 2023, by Orbit Garant Drilling and monitored by WSP's field staff. The borehole locations are shown on the attached Figure 2 and the borehole coordinates and surface elevations are presented on the attached Table 1. Copies of the borehole logs with the noted field information are also attached.

Based on field observations during the drilling and sampling program, the subsurface soil conditions generally consisted of

- Brown clay with silt and variable amounts of sand and gravel to a depth of approximately 4 to 9 mbgs followed by;

- Gray clay and silt with variable amount of sand and gravel to a depth of approximately 5 to 10 mbgs followed by;
- Gray till to the maximum drilled depths of 12 to 16 mbgs.

Thin sand seams/layers greater than 75mm thickness were encountered at variable depths in boreholes C1, C2, C3, C4, C9, C12, C13, C14, C16, C17, and C18. The thickness of the sand seams/layers ranged from 610 mm to 2,380 mm and were encountered at depths ranging from 8.69 to 13.17 mbgs. The sand layer/seams consisted of brown and gray fine to coarse sand and silt. Thin sand seams less than 75mm were also encountered in all boreholes except boreholes C11, and C15. Samples from the encountered sand seams/layers were collected from each borehole. Select samples were submitted for laboratory testing for clarification purposes.

Wet conditions were encountered during the drilling and sampling program in boreholes C1, C2, C3, C4, C5, C7, C8, C9, C11, C12, C13, C16, C17, and C19 at depths ranging from a depth of 9.3 to 13.26 mbgs. Dry conditions were also encountered in boreholes C6, C10, C14, C15, and C18. No monitoring wells were installed as the majority of the investigated areas will be excavated during the proposed new cell construction.

Upon completion of the drilling and sampling program, the boreholes were grouted to a depth of 8 mbgs above the cell floor in the boreholes advanced within the footprint of the new cell and then backfilled with soil cuttings to the existing grade.

Based on the field blow counts and the laboratory results, the consistency of the brown clay and silt was generally stiff to hard, the gray clay and silt was soft to hard, and the till was hard.

Summary of Laboratory Testing Results

A total of 32 soil samples were collected from the 19 boreholes that were advanced during the above noted sand management investigation program and submitted for various laboratory testing to assess the subsurface soil conditions and to obtain data to be used for the design of the new Cell 5 North. The results will also be used to assess the new cell slope conditions.

All submitted soil samples were tested for moisture content. A total of 12 soil samples were tested for Atterberg Limits, 20 soil samples for gradation/grain size analysis, and 5 soil samples were tested for dry density and hydraulic conductivity/permeability. The permeability testing was performed on select soil samples to assess the hydraulic conductivity of the native clayey materials below the new cell floor. The testing results are summarized in the attached Table 2.

Based on the reported results, the soil classifications noted in the field were supported by the lab results as shown on the attached borehole logs. The permeability of the sampled native materials at various depths ranged from 8.69E-11 to 1.01E-10 m/s which represent a tight stratigraphic soil formation and meet the requirements presented in the original Design and Operation Report (date October 20, 1993) for the site of 1.0E-9 m/s.

Conclusions

Based on the field observations reported during the field sampling programs and subsequent laboratory testing, sand and sandy materials will likely be encountered during the excavation and construction of the proposed Cell 5 North and will require management.

Details related to sand management procedures (definition, detection and removal) are included in the proposed cell construction specifications. A copy of the sand management procedures is attached. The actual locations and extents of sand materials within the proposed cell will likely vary and will be determined during the cell construction activities. The sand management will require coordination between the contractor, owner and the engineer.

Attachments:

- Figures 1 (Site Plan) and 2 (BH Layout)
- Tables 1 and 2
- Borehole Logs
- Laboratory Results and Reports
- Sand Management Procedures (specifications)

Table 1**Borehole Coordinates and Elevations**

Cell 5N Sand Management Drilling Program, RLF, EWSWA

Borehole ID	East (m)	North (m)	Elevation mASL
C1	346350.74	4661422.10	189.00
C2	346361.79	4661450.60	190.00
C3	346354.05	4661482.84	191.50
C4	346366.71	4661513.51	191.50
C5	346356.57	4661547.78	193.50
C6	346370.40	4661570.92	192.00
C7	346354.58	4661594.89	190.50
C8	346356.82	4661615.85	190.50
C9	346328.61	4661619.83	190.50
C10	346279.55	4661609.93	190.00
C11	346208.65	4661576.49	189.50
C12	346310.00	4661566.00	191.00
C13	346224.04	4661628.44	191.00
C14	346198.17	4661642.71	189.50
C15	346259.98	4661527.44	191.50
C16	346299.30	4661471.07	191.00
C17	346207.81	4661478.77	191.00
C18	346248.19	4661425.48	189.00
C19	346171.51	4661529.77	190.00

Table 2

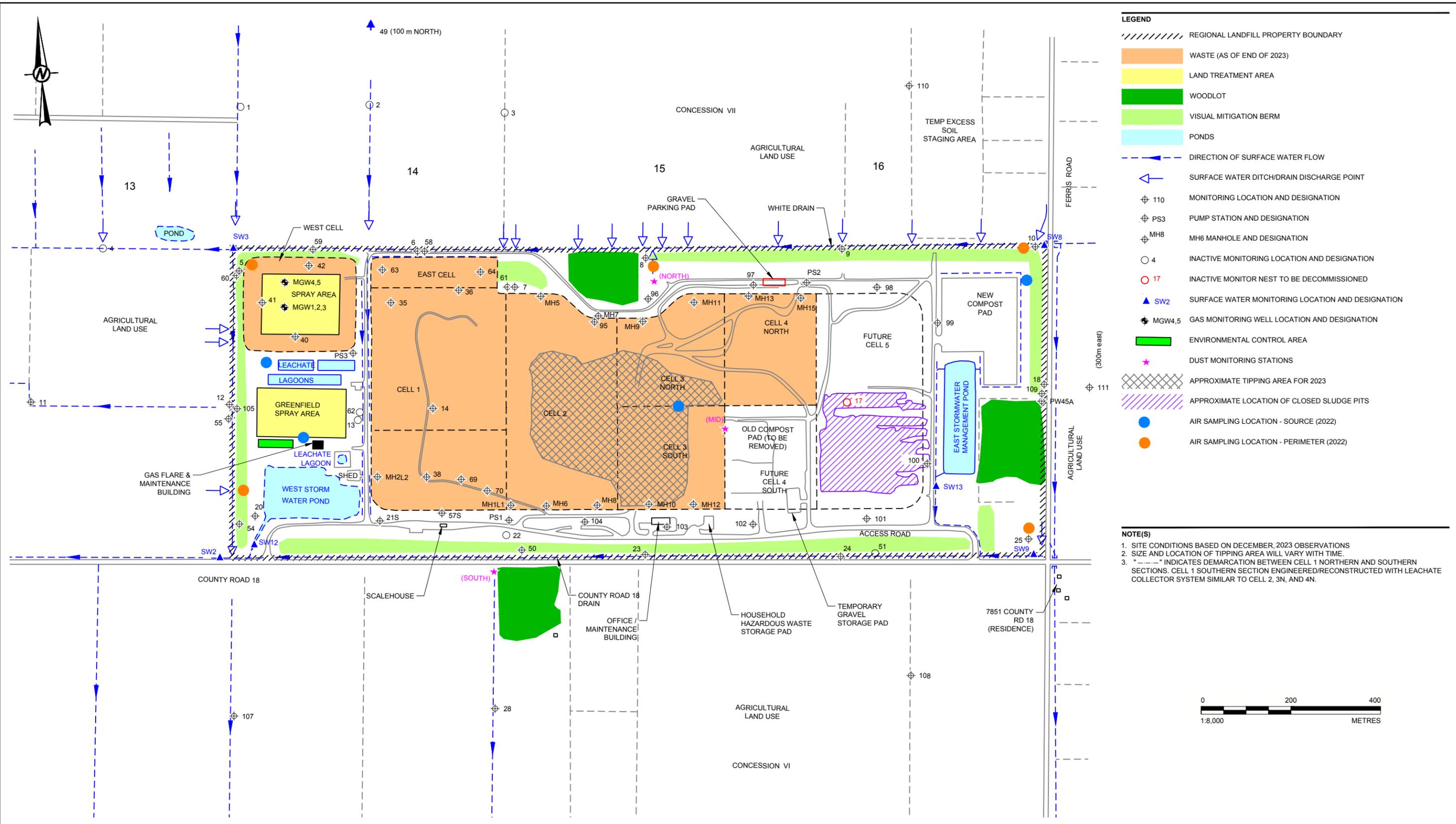
Summary of Laboratory Testing Results
Cell 5N Sand Management Drilling Program, RLF, EWSWA

Sample ID	Sample Depth mASL (mbgs)	% Gravel	%Sand	% Fines		Moisture Content (%)	Material Description
				Silt	Clay		
C1-13B	179.7 - 179.2	0.3	48.6	39.4	11.7	14.6	Silty Sand, some clay
C2-14A	180.0 - 179.79	0.1	54.1	38.1	7.7	16.5	Silty Sand, trace clay
C2-14B	179.79 - 179.48	0.3	51.3	38.0	10.4	9.2	Silty Sand, some clay
C3-15C	180.44 - 180	0.2	24	49.8	26	15.0	Silt, some clay and sand
C3-16A	180.0 - 179.5	0.0	40.3	54.8	4.9	17.1	Sandy Silt, trace clay
C4-17B	178.85 - 178.55	0.0	44.9	51.1	4.0	18.1	Sandy Silt, trace clay
C5-19B	179.17 -	0.9	42.2	41.7	15.2	9.5	Sandy Silt, some clay
C6-16A	180.57 - 180.33	0.0	8.7	71.8	19.5	16.0	Clayey Silt, trace sand
C7-16A	179.07 - 178.6	0.1	39.3	41.1	19.5	6.5	Sandy Silt, some clay
C9-15B	179.5 - 179.07	0	57	26.2	16.8	8.5	Sand, some clay and silt
C10-14	180.0 - 179.5	0.9	33.0	47.0	19.1	12.3	Sandy Silt, some clay
C11-6	181.0 - 180.5	0	19.4	68.8	11.8	20.6	Sandy Silt, some clay
C12-8A	186.57 - 185.0	0.6	45.7	36.7	17.0	17.3	Silty Sand, some clay
C12-9B	185.4 - 185.05	3.1	48.3	32.5	16.1	8.8	Silty Sand, some clay, trace gravel
C13-16A	177.3 -177.0	1.0	37.1	48.8	13.1	9.4	Sandy Silt, some clay, trace gravel
C13-17B	176.44 - 176.05	1.7	37.8	44.5	16.0	8.3	Silty Sand, some clay, trace gravel
C14-13A	180.36 - 180	3.8	45.5	42.4	8.3	10.3	Silty Sand, some clay, trace gravel
C15-10B	183.74 - 183.2	0.1	21.3	46.6	32.0	14.5	Clayey Silt, some sand
C17-7A	179.57-178.9	8.4	44.8	33.6	13.2	11.0	Silty Sand, some clay and gravel
C19-6B	179.0 - 178.57	0.7	18.6	61.6	19.1	13.2	Silt, some clay and sand

Sample ID	Sample Depth (mbgs)	Dry Density (g/cm ³)	Permeability (m/s)	Moisture Content (%)
C4-8A	5.5	1.81	8.69E-11	20.3
C6-13A	9.14	1.72	1.25E-10	24.6
C11-5	9	1.56	2.83E-10	28.0
C14-4	2.29	1.90	1.01E-10	19.7
C14-9	6.3	1.78	1.24E-10	20.0

Sample ID	Sample Depth mASL (mbgs)	Atterberg Limits		
		WI (%)	WP(%)	IP(%)
C1-8A	183.67 - 183.37	32.0	17.7	14.3
C2-5A	186.95 - 186.65	36.1	20.1	16.0
C3-18A	178.55 - 178.25	18.8	12.9	6.0
C5-14A	183.59 - 183.29	28.2	17.1	11.2
C5-21A	177.0 - 176.7	17.3	12.1	5.2
C6-8A	186.5 - 183.2	37.5	10.2	27.4
C9-6B	185.5 - 185.2	34.7	20.5	14.2
C9-11A	182 - 181.7	34.2	19.2	15.0
C9-16A	179.07 - 178.8	20.0	12.9	7.2
C13-8A	183.67 - 183.37	36.3	20.3	16.1
C14-10A	182.64 - 182.34	24.6	15.7	9.0
C14-14A	179.59 - 179.29	16.7	13.1	3.7

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LEGEND

- REGIONAL LANDFILL PROPERTY BOUNDARY
- WASTE (AS OF END OF 2023)
- LAND TREATMENT AREA
- WOODLOT
- VISUAL MITIGATION BERM
- PONDS
- DIRECTION OF SURFACE WATER FLOW
- SURFACE WATER DITCH/DRAIN DISCHARGE POINT
- MONITORING LOCATION AND DESIGNATION
- PUMP STATION AND DESIGNATION
- MH6 MANHOLE AND DESIGNATION
- INACTIVE MONITORING LOCATION AND DESIGNATION
- INACTIVE MONITOR NEST TO BE DECOMMISSIONED
- SURFACE WATER MONITORING LOCATION AND DESIGNATION
- GAS MONITORING WELL LOCATION AND DESIGNATION
- ENVIRONMENTAL CONTROL AREA
- DUST MONITORING STATIONS
- APPROXIMATE TIPPING AREA FOR 2023
- APPROXIMATE LOCATION OF CLOSED SLUDGE PITS
- AIR SAMPLING LOCATION - SOURCE (2022)
- AIR SAMPLING LOCATION - PERIMETER (2022)

NOTE(S)

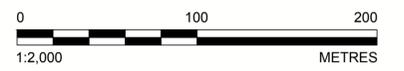
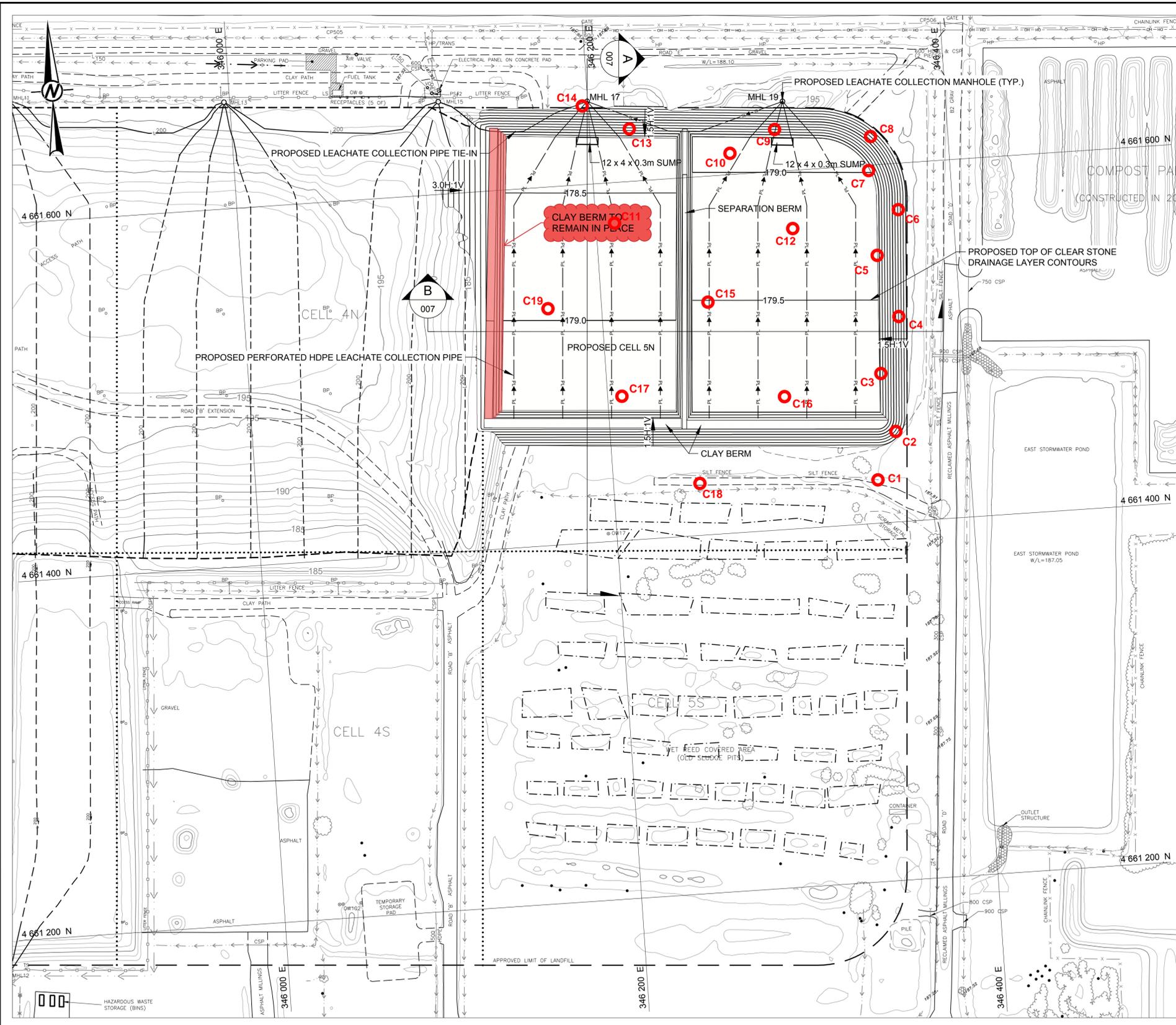
- SITE CONDITIONS BASED ON DECEMBER, 2023 OBSERVATIONS
- SIZE AND LOCATION OF TIPPING AREA WILL VARY WITH TIME.
- "-----" INDICATES DEMARCATION BETWEEN CELL 1 NORTHERN AND SOUTHERN SECTIONS. CELL 1 SOUTHERN SECTION ENGINEERED/RECONSTRUCTED WITH LEACHATE COLLECTOR SYSTEM SIMILAR TO CELL 2, 3N, AND 4N.



CLIENT	ESSEX WINDSOR SOLID WASTE AUTHORITY	PROJECT	2023 ANNUAL MONITORING PROGRAM ESSEX-WINDSOR REGIONAL LANDFILL SITE
CONSULTANT		TITLE	SITE PLAN
DESIGNED	YYYY-MM-DD 2024-03-08	PROJECT NO.	111-53107-09 100
PREPARED	SC	CONTROL	0001
REVIEWED	MM	REV.	A
APPROVED	RT	FIGURE	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3 (841x1191 mm) TO A4 (210x297 mm)

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SEAL	CLIENT					
						
	CONSULTANT					
A	2024-03-01	ISSUED FOR CLIENT REVIEW	IH	FZG	JO	JO
REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED

PROJECT		ESSEX WINDSOR REGIONAL LANDFILL			
		CELL 5 NORTH DESIGN			
TITLE		BOREHOLE LOCATION PLAN			
PROJECT NO.	CONTROL	REV.	6 of 16	FIGURE	
115310710	2001	A		2	

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI D

PROJECT: 111-53107-10
 LOCATION: N 4661422.10; E 346350.74

RECORD OF BOREHOLE: C1

SHEET 1 OF 2

BORING DATE: 21 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
0		GROUND SURFACE		189.00											GR SA SI CL		
0.5		SILTY CLAY - trace gravel; mottled grey brown; APL, firm to stiff		0.00	1	SS	16										
1.0					2	SS	12										
1.5					3	SS	15										
2.0					4A	SS	15										
2.5		- trace gravel; brown		186.71 2.29	4B	SS	15										
3.0					5	SS	11										
3.5		- brownish grey		185.95 3.05	6A	SS	12										
4.0					6B	SS	12										
4.5		- grey; soft		185.03 3.97	7	SS	8										
5.0					8	SS	6										
5.5					9	SS	4										
6.0					10	SS	2										
6.5					11	SS	4										
7.0					12	SS	0										
7.5					13A	SS	13										
8.0					13B	SS	13										
8.5					14	SS	51										
9.0																	
9.5																	
10.0		SAND, fine, with some silt, trace clay; wet		179.70 9.30	13A	SS	13								0 49 39 12		
10.5																	
11.0																	

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661450.60; E 346361.79

RECORD OF BOREHOLE: C2

SHEET 2 OF 2

BORING DATE: 22 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
10		-- CONTINUED FROM PREVIOUS PAGE --															
		SILTY SAND, trace of clay; grey; wet, compact, firm		179.79	14A										GR SA SI CL		
		SILTY SAND, trace of clay; grey; dry stiff		10.21	14B	SS	26								0 54 38 8		
		SAND to fine SILTY SAND, coarse, wet, loose		179.48	14C										0 51 38 10		
				10.52													
				10.67													
11		CLAYEY SILT TILL, trace of fine gravel, fine sand; grey; dry, stiff			15	SS	53										
12					16	SS	50										
				177.81													
		CLAYEY SILT TILL, some fine gravel, coarse sand fractures; grey; dry or moist		12.19	17	SS	49										
13		END OF BOREHOLE		177.20													
				12.80													

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DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661482.84; E 346354.05

RECORD OF BOREHOLE: C3

SHEET 1 OF 2

BORING DATE: 06 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U	● ○			Wp	W
0		GROUND SURFACE		191.50											GR SA SI CL		
		sandy SILT TILL; grey; DTPL, loose		0.00	1	SS	12										
1		SILTY CLAY, trace gravel; grey; APL, soft to firm		190.74	2	SS	8										
				0.76													
					3	SS	5										
2																	
				188.85	4	SS	5										
		SILTY CLAY, trace gravel; dark grey, contains rootlets; APL, soft		2.65													
3		SILTY CLAY, trace gravel; mottled brown grey; APL, firm		188.45	5	SS	12										
				3.05													
4					6	SS	16										
				186.62	7	SS	19										
5		- brown; stiff		4.88													
					8	SS	24										
6		- grey; firm		185.40	9	SS	9										
				6.10													
7		- soft		184.64	10	SS	7										
				6.86													
8					11	SS	7										
					12	SS	4										
9		- wet, very soft		182.36	13	SS	4										
				9.14													
10					14	SS	4										

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661482.84; E 346354.05

RECORD OF BOREHOLE: C3

SHEET 2 OF 2

BORING DATE: 06 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+ Q - U		Wp			W
10		-- CONTINUED FROM PREVIOUS PAGE -- - wet, very soft														GR SA SI CL	
11				180.44 11.06	15	SS	10									0 24 50 26	
12					16	SS	53									0 40 55 5	
13				179.22 12.28	17	SS	54										
13				178.55 12.95	18	SS	47										
14				177.94 13.56													
14		END OF BOREHOLE															
15																	
16																	
17																	
18																	
19																	
20																	

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661513.51; E 346366.71

RECORD OF BOREHOLE: C4

SHEET 1 OF 2

BORING DATE: 05 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
0		GROUND SURFACE		191.50											GR SA SI CL		
		SILTY CLAY, trace gravel, trace sand; grey; APL; firm to soft		0.00	1	SS	6										
1					2	SS	5										
2					3	SS	5										
3					4	SS	10										
3		- trace gravel; mottled grey brown; APL, stiff		188.45	5	SS	14										
4				3.05	6	SS	15										
5					7	SS	27										
5		Shelby Tube Sample BHC4-8A			8	-											
6					9	SS	7										
6		- grey; soft to firm		185.40	10	SS	4										
7				6.10	11	SS	5										
8					12	SS	7										
8		- sticky at 8.05 m			13	SS	8										
9		CLAYEY SILT to silty clay, trace gravel; grey; APL, firm		183.12	14	SS	5										
9		SILTY CLAY, trace gravel; grey; sticky, APL, very soft		8.38													
9				8.53													
9		SILTY CLAY, trace sand, trace gravel; grey; APL, soft to firm		182.36													
9		- thin fine gravel sand seam at 9.45 m		9.14													
10				181.59													
10				9.91													

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▼
 =20.50
 kN/m²

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661513.51; E 346366.71

RECORD OF BOREHOLE: C4

SHEET 2 OF 2

BORING DATE: 05 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
10		-- CONTINUED FROM PREVIOUS PAGE --													GR SA SI CL		
		SILTY CLAY, trace sand, trace gravel; grey; APL, soft		180.83	14	SS	5										
		SILTY CLAY, trace sand, trace gravel; grey; APL, very soft		180.53	15	SS	12										
11		SAND, fine to coarse, wet, compact		180.07	16	SS	12										
		SAND and GRAVEL, coarse, wet, compact		178.85	17	SS	41								0 45 51 4		
		sandy SILT, trace clay, fine, wet, dense		178.55													
		SAND and GRAVEL, coarse, compact		178.33	18	SS	79										
		CLAYEY SILT TILL, some sand, trace gravel; grey; hard - fine grained sand seam at 13.26 m		177.78													
		sandy SILT, coarse, wet		177.17	19	SS	18										
14		END OF BOREHOLE		14.33													

GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESSEX REGIONAL LANDFILL\02_DATA\GINT\ESSEX REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661547.78; E 346356.57

RECORD OF BOREHOLE: C5

SHEET 2 OF 2

BORING DATE: 23 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
10		--- CONTINUED FROM PREVIOUS PAGE ---													GR SA SI CL		
		SILTY CLAY, trace of fine gravel; grey to reddish tint; moist															
		sandy SILT, fine to coarse; grey; wet, compact		182.68	15A												
11				10.82	15B												
					16												
12					17												
		gravely SAND; wet, coarse		180.24	18A												
				13.26	18B												
13					19A												
		SILT and SAND, some clay, trace of gravel		179.17	19B												
		sandy SILT TILL, with some gravel; stiff		14.33	20										1 42 42 15		
				14.48	21												
14																	
		END OF BOREHOLE		177.50													
				16.00													
15																	
16																	
17																	
18																	
19																	
20																	

GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESXSWA REGIONAL LANDFILL02_DATA\GINT\ESXSWA REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661570.92; E 346370.40

RECORD OF BOREHOLE: C6

SHEET 2 OF 2

BORING DATE: 04-05 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	SHEAR STRENGTH				WATER CONTENT PERCENT					
							Cu, kPa		nat V. rem V.		Q - U		Wp			Wi
		-- CONTINUED FROM PREVIOUS PAGE --				20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³			
10		SILTY CLAY, trace gravel, trace sand; grey; APL, soft	[Pattern]	181.88	14	SS	7									
		sandy SILT, fine, some clay, grey; dense	[Pattern]	10.12												
				181.33												
11		SILTY CLAY, trace gravel, trace sand; grey; sticky, APL, very soft to soft	[Pattern]	10.67	15	SS	4									
				180.57												
		sandy SILT, fine, some clay, grey; moist, dense	[Pattern]	11.43												
				180.33												
12		SILT, with some sand, trace of clay; grey; hard	[Pattern]	11.67	16	SS	13								0 9 72 20	
					17	SS	32									
13					18	SS	94									
14					19	SS	37									
		END OF BOREHOLE		177.67												
				14.33												

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661594.89; E 346354.58

RECORD OF BOREHOLE: C7

SHEET 1 OF 2

BORING DATE: 04 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+		Q - U			Wp
0		GROUND SURFACE		190.50												GR SA SI CL	
		SANDY SILTY CLAY, trace gravel, trace rootlets; brown; DTPL		0.00	1	SS	9										
1					2	SS	10										
2		SILTY CLAY to CLAYEY SILT, trace gravel, trace sand; grey; APL, firm		188.73 1.77	3	SS	9										
		sandy SILT, some clay, trace gravel; grey; DTPL		188.21 2.29	4	SS	14										
3		SILTY CLAY, trace gravel; grey; APL		187.45 3.05	5	SS	19										
4					6	SS	9										
5					7	SS	19										
6		- brown; stiff		185.17 5.33	8	SS	19										
		- grey; soft		184.10 6.40	9	SS	20										
7					10	SS	8										
8					11	SS	4										
					12	SS	4										
9					13	SS	3										
		- fine sandy seam at 9.60 m, wet			14	SS	6										
10																	

CONTINUED NEXT PAGE

GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESSEX REGIONAL LANDFILL\02_DATA\GINT\ESSEX REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661594.89; E 346354.58

RECORD OF BOREHOLE: C7

SHEET 2 OF 2

BORING DATE: 04 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+		Q - U -			Wp
10		-- CONTINUED FROM PREVIOUS PAGE -- - grey; soft													GR SA SI CL		
				179.83													
				10.67													
11		SILTY CLAY, trace sand, trace gravel; grey; APL, soft															
				179.47													
				11.03													
		SILTY CLAY to CLAYEY SILT, trace gravel; grey; APL, soft															
				179.07													
				11.43													
12		CLAYEY SILT TILL, trace gravel, some sand seams; grey; DTPL, very stiff													0 39 41 20		
				178.09													
				12.41													
		sandy SILT, some clay; grey; wet															
				177.55													
				12.95													
13		CLAYEY SILT, trace gravel; grey; fractured; DTPL, very stiff															
				176.94													
				13.56													
14		END OF BOREHOLE															
15																	
16																	
17																	
18																	
19																	
20																	

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661615.85; E 346356.82

RECORD OF BOREHOLE: C8

SHEET 1 OF 2

BORING DATE: 30 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+			Q - U -	Wp
0		GROUND SURFACE		190.50											GR SA SI CL		
		CLAYEY SILT to SILTY CLAY, some sand, some gravel; grey; DTPL, firm to stiff		189.74	1	SS	20										
1		CLAY, some sand, some gravel; grey; DTPL, firm to stiff - fine sand seam at 0.86 m - coarse sand seam at 1.07 m		188.98	2	SS	17										
		CLAYEY SILT, trace gravel; dark grey, some rootlets; DTPL to APL		188.12	3	SS	18										
2		SILTY CLAY, trace gravel; mottled brown grey; APL, stiff		188.12	4	SS	19										
				188.12	5	SS	19										
3				188.12	6	SS	25										
4				188.12	7	SS	18										
5				185.17	8	SS	8										
		- grey; soft to firm		185.17	9	SS	7										
6				183.40	10	SS	11										
		CLAYEY SILT, some sand, trace gravel; grey; DTPL, wet		183.40	11	SS	13										
7				182.33	12	SS	6										
		SILTY CLAY, trace gravel, trace sand; grey; APL, very soft		182.33	13	SS	7										
8				180.59	14	SS	3										
		- thin fine sand seams at 8.84 m		180.59													
9				180.59													
10				180.59													

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661615.85; E 346356.82

RECORD OF BOREHOLE: C8

SHEET 2 OF 2

BORING DATE: 30 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
10		-- CONTINUED FROM PREVIOUS PAGE --													GR SA SI CL		
		SILTY CLAY, trace gravel; grey purple tint; sticky, moist to wet, very soft															
11		CLAYEY SILT TILL, trace sand, trace gravel; grey; wet, very stiff		179.47	15	SS	7										
		- fine to coarse sand seam at 11.73 m		11.03													
12					16	SS	48										
					17	SS	67										
13					18	SS	28										
14		END OF BOREHOLE		176.94													
				13.56													

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661619.83; E 346328.61

RECORD OF BOREHOLE: C9

SHEET 1 OF 2

BORING DATE: 27 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT						
								20	40	60	80	nat V. +	rem V. ⊕	Q - ●				U - ○
0		GROUND SURFACE		190.50														
		sandy CLAY, trace gravel, APL, soft		0.00														
		SILTY CLAY, some gravel; brown grey; APL, firm to stiff		0.09	1	SS	21											
1					2	SS	22											
2					3	SS	18											
3					4	SS	5											
4					5	SS	13											
5					6	SS	33											
6					7	SS	27											
		SILTY CLAY, trace gravel; grey; moist to wet, APL, soft to very soft		184.92	8	SS	13											
				5.58	9	SS	6											
7					10	SS	5											
8					11	SS	7											
9					12	SS	3											
					13	SS	6											
		SILTY CLAY to clayey silt, trace gravel; grey; APL, soft to firm		180.81	14	SS	32											
				9.69														
		CONTINUED NEXT PAGE																

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661609.93; E 346279.55

RECORD OF BOREHOLE: C10

SHEET 1 OF 2

BORING DATE: 07 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+ Q - U				Wp	
0		GROUND SURFACE		190.00											GR SA SI CL		
		SILTY CLAY, trace gravel, trace rootlets; brown; soft to firm		189.70	1	SS	4										
		CLAYEY SILT; dark grey; DTPL, very soft		189.24													
1		SILTY CLAY, trace gravel; mottled brown grey; APL, stiff		188.48	2	SS	13										
		- grey; soft		186.10	3	SS	8										
2				184.67	4	SS	7										
		- brown; soft		182.38	5	SS	10										
3				181.10	6	SS	8										
		- grey; soft		180.70	7	SS	9										
4				180.70	8	SS	5										
		- grey; soft		181.10	9	SS	5										
5				182.38	10	SS	4										
		- grey; moist, very soft		181.10	11	SS	1										
6				180.70	12	SS	4										
		sandy SILT, some clay, fine, moist		180.70	13	SS	55										
		- dry		180.00	14	SS	89										
10				180.00											1 33 47 19		

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661609.93; E 346279.55

RECORD OF BOREHOLE: C10

SHEET 2 OF 2

BORING DATE: 07 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U	● ○			Wp	W
10		-- CONTINUED FROM PREVIOUS PAGE --													GR SA SI CL		
		- moist		10.00	14	SS	89								1 33 47 19		
		- small pebbles		179.33 10.67	15	SS	50										
11																	
12					16	SS	82										
13					17	SS	36										
					18	SS	31										
13				176.44 13.56													
14		END OF BOREHOLE															
15																	
16																	
17																	
18																	
19																	
20																	

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661576.49; E 346208.65

RECORD OF BOREHOLE: C11

SHEET 1 OF 2

BORING DATE: 10 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U -	● ○			Wp	W
0		GROUND SURFACE		191.00													
		SILTY CLAY, gravel, dry		0.00	1	SS	8										
3		SILTY CLAY, gravel, dry		187.95	2	SS	18										
5		Shelby Tube Sample BHC11															
6		CLAY; grey; moist		184.90	3	SS	8										
8		SILTY CLAY; grey; moist		182.77	4	SS	12										
9				8.23	5	SS											
10				181.00	6	SS	29								0 19 69 12		
		CONTINUED NEXT PAGE															

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DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661576.49; E 346208.65

RECORD OF BOREHOLE: C11

SHEET 2 OF 2

BORING DATE: 10 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+		Q - U -			
10		--- CONTINUED FROM PREVIOUS PAGE ---														GR SA SI CL	
		SILT with some sand and clay; grey; wet, fine			10.00	6	SS	29									0 19 69 12
11						7	SS	25									
12						8	SS	45									
		SILT TILL; grey; moist to wet, hard			178.50 12.50	9	SS	81									
13		END OF BOREHOLE			178.20 12.80												

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DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661566.00; E 346310.00

RECORD OF BOREHOLE: C12

SHEET 1 OF 2

BORING DATE: 11 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U	● ○			Wp	
0		GROUND SURFACE		198.00											GR SA SI CL		
		SILT; brown; dry		0.00	1	SS	12										
1																	
2																	
3		SILT; brownish grey; dry		194.95	2	SS	12										
4				3.05													
5																	
6		SILTY CLAY; mottled brownish grey; moist		192.67	3	SS	15										
				5.33													
7		SILTY CLAY; grey; moist		191.90	4	SS	15										
				6.10													
8																	
9		SILTY CLAY; grey; moist		188.86	5	SS	13										
				9.14													
10				188.09	6	SS	24										
				9.91													

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DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661566.00; E 346310.00

RECORD OF BOREHOLE: C12

SHEET 2 OF 2

BORING DATE: 11 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
		-- CONTINUED FROM PREVIOUS PAGE --													GR SA SI CL		
10		SILTY CLAY, moist		187.79													
		SAND; grey; wet		10.21	6	SS	24										
11					7	SS	27										
		SILTY SAND, with some clay, and trace of gravel; grey; wet		186.57													
				11.43	8	SS	28							1	46 37 17		
12																	
		SILT; grey; moist, hard		185.41													
				12.59	9	SS	71							3	48 33 16		
13		CLAYEY SILT, hard		185.05													
				12.95	10	SS	39										
14		SILT; grey; hard		184.28													
				13.72	11	SS	29										
15		END OF BOREHOLE		183.67													
				14.33													

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DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661628.44; E 346224.04

RECORD OF BOREHOLE: C13

SHEET 1 OF 2

BORING DATE: 27 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U	
0		GROUND SURFACE		189.00											GR SA SI CL		
		SILTY CLAY - trace of rootlets, mottled grey brown; APL, very stiff		0.00	1	SS	14										
1					2	SS	7										
2		- grey; soft		187.32 1.68	3	SS	6										
					4	SS	6										
3		- firm to stiff		185.95 3.05	5	SS	13										
4		- trace gravel, soft		185.19 3.81	6	SS	8										
5		sandy SILT, some clay, trace of gravel; brown; very stiff		184.43 4.57	7	SS	17										
6		SILTY CLAY, trace of gravel; brown; very stiff		183.67 5.33	8	SS	21										
7		- grey; APL, soft		182.69 6.31	9	SS	13										
					10	SS	8										
8					11	SS	7										
9		- some sand, very stiff		180.62 8.38	12	SS	5										
		- sandy seam at 8.69 m			13	SS	13										
		CLAYEY SILT/SILTY CLAY, soft to firm		179.86 9.14	14	SS	14										
10				179.09 9.91													

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GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESXSWA REGIONAL LANDFILL\02 DATA\GINT\ESXSWA REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661628.44; E 346224.04

RECORD OF BOREHOLE: C13

SHEET 2 OF 2

BORING DATE: 27 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20 40 60 80		nat V. + Q - rem V. ⊕ U - ⊙		10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³				Wp W Wi	
		-- CONTINUED FROM PREVIOUS PAGE --													GR SA SI CL		
10		SILTY CLAY, trace gravel; grey; APL, soft to firm		178.33	14	SS	14										
11		sandy SILT, very fine silt coarse sand; grey; wet, compact		10.67	15	SS	40										
12		sandy SILT, fine to medium, with some clay and trace of gravel; grey; wet		177.30	16	SS	33								1 37 49 13		
		sandy SILT, fine to medium sand, trace clay, trace gravel, some silt; grey; wet, firm		176.81													
		sandy SILT, fine, unconsolidated		176.44	17	SS	30								2 38 45 16		
13		SAND, fine to coarse; grey; wet		176.05													
		CLAYEY SILT TILL, some sand, trace gravel; grey; stiff		13.01	18	SS	50										
		SAND, fine to coarse; grey; wet		175.28													
		SILT TILL, trace gravel; grey; very stiff		13.72													
14				174.52	19	SS	50										
		END OF BOREHOLE		14.48													

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DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661642.71; E 346198.17

RECORD OF BOREHOLE: C14

SHEET 1 OF 2

BORING DATE: 28-29 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U	
0		GROUND SURFACE		189.50											GR SA SI CL		
		SILTY CLAY, trace gravel, trace rootlets; brown; very stiff		0.00	1	SS	12										
1		- mottled grey brown		188.65	2	SS	18										
				0.85													
2					3	SS	13										
		Shelby Tube Sample BHC14-4			4	SS	-										
3																	
					5	SS	23										
4		- grey; firm		185.60	6	SS	13										
				3.90													
5					7	SS	7										
6					8	SS	4										
		Shelby Tube Sample BHC14-9			9	SS	-										
7		SILTY CLAY to CLAYEY SILT, trace gravel; grey; APL, firm		182.64	10	SS	11										
				6.86													
8					11	SS	11										
9		SILTY CLAY to CLAYEY SILT, trace gravel, trace sand; grey; APL, firm		181.12													
		sandy SILT TILL, trace gravel; grey; firm		8.38													
		- coarse sand seam at 8.6 m		8.53													
		CLAYEY SILT TILL, some sand and gravel; grey; stiff		8.69	12	SS	39										
		SAND and SILT, with trace of clay and gravel; TILL, fine; grey; compact		180.36													
		- coarse sand seams 9.45 m		9.14													
10				179.59	13	SS	36								4 46 42 8		
				9.91													
		CONTINUED NEXT PAGE			14	SS	60										

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DEPTH SCALE

1 : 50

LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661642.71; E 346198.17

RECORD OF BOREHOLE: C14

SHEET 2 OF 2

BORING DATE: 28-29 June, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
							20	40	60	80	nat V. +	rem V. ⊕	Q - ●			U - ○
10		--- CONTINUED FROM PREVIOUS PAGE ---													GR SA SI CL	
11		CLAYEY SILT TILL, trace sand, trace gravel; grey; APL, very stiff														
				178.07												
12		SILTY CLAY to CLAYEY SILT, trace sand, trace gravel; grey; APL, firm to stiff														
				11.43												
13																
14		CLAYEY SILT to SILTY CLAY, trace sand, some gravel; grey; wet, APL, firm														
				175.78												
				13.72												
15																
16		END OF BOREHOLE														
				173.65												
				15.85												
17																
18																
19																
20																

GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESSEX REGIONAL LANDFILL\02_DATA\GINT\ESSEX REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MM

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661527.44; E 346259.98

RECORD OF BOREHOLE: C15

SHEET 1 OF 2

BORING DATE: 10 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
0		GROUND SURFACE		197.00											GR SA SI CL		
		SILT; brown; dry		0.00	1	SS	11										
3		SILTY CLAY; mottled brown to grey; moist		193.95	2	SS	6										
4		SILTY CLAY; grey; moist		193.19													
6		CLAY; grey, blue; moist		190.90	4	SS	8										
9		CLAY; grey, blue; moist		187.86	5	SS	5										
10				187.09	6	SS	2										
		CONTINUED NEXT PAGE															

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DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661527.44; E 346259.98

RECORD OF BOREHOLE: C15

SHEET 2 OF 2

BORING DATE: 10 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴			10 ⁻³
10		--- CONTINUED FROM PREVIOUS PAGE --- CLAY; grey, blue; moist														GR SA SI CL	
11					6	SS	2										
12					7	SS	2										
13					8	SS	7										
14					9	SS	2										
15					10	SS	4									0 21 47 32	
16					11	SS	19										
17																	
18																	
19																	
20																	
		END OF BOREHOLE															

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DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661471.07; E 346299.30

RECORD OF BOREHOLE: C16

SHEET 1 OF 2

BORING DATE: 12 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U	● ○			Wp	W
0		GROUND SURFACE		198.00													
		SILTY CLAY; brown; moist		0.00	1	SS	9										
4		SILTY CLAY; grey		194.19 3.81	2	SS	8										
7		CLAY; blue grey; moist		191.14 6.86	3	SS	6										
10				188.09 9.91	4	SS	5										
					5	SS											

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GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\NEWSWA REGIONAL LANDFILL\02_DATA\GINT\NEWSWA REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661471.07; E 346299.30

RECORD OF BOREHOLE: C16

SHEET 2 OF 2

BORING DATE: 12 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U	● ○			Wp	
10		--- CONTINUED FROM PREVIOUS PAGE --- CLAY; blue grey; moist		187.33	5	SS											
				10.67													
11		SAND; grey; wet			6	SS	27										
				186.57													
				11.43													
12		SILTY CLAY; grey; moist; hard			7	SS	19										
					8	SS	19										
13					9	SS	22										
				184.44													
		END OF BOREHOLE		13.56													

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DEPTH SCALE

1 : 50



LOGGED: LA

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661478.77; E 346207.81

RECORD OF BOREHOLE: C17

SHEET 1 OF 2

BORING DATE: 13 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U	● ○			Wp	W
0		GROUND SURFACE		191.00											GR SA SI CL		
		CLAYEY SILT; brown; moist, compact		0.00													
1					1	SS	18										
2																	
3																	
4		SILTY CLAY, trace of fine gravel; grey; moist, APL, firm		187.19 3.81	2	SS	7										
5																	
6																	
7		SILTY CLAY; grey; moist, APL, soft		184.14 6.86	3	SS	6										
8																	
9					4	SS	3										
10				181.09 9.91	5	SS	3										

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DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661478.77; E 346207.81

RECORD OF BOREHOLE: C17

SHEET 2 OF 2

BORING DATE: 13 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	- ⊙	Wp			W	Wi
10		-- CONTINUED FROM PREVIOUS PAGE --													GR SA SI CL		
		SILTY CLAY, trace of fine gravel; grey; moist, APL, firm		180.18	5	SS	3										
11		sandy SILT, trace of clay, dry, compact, firm		10.82	6	SS	16										
		SILTY SAND, some clay, trace gravel; wet		179.57	7	SS	66								8 45 34 13		
12		- becoming silty at 11.89 m		11.43													
		SAND, some gravel, coarse, wet		178.81													
		CLAYEY SILT TILL; grey; DTPL, stiff		12.19	8	SS	70								▽		
				12.34													
13					9	SS	49										
				177.44													
		END OF BOREHOLE		13.56													
14		Note(s): 1. Groundwater encountered at 12.22 m															

GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESXWA REGIONAL LANDFILL\02_DATA\GINT\ESXWA_REGIONAL_LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661425.48; E 346248.19

RECORD OF BOREHOLE: C18

SHEET 1 OF 2

BORING DATE: 13 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U	
0		GROUND SURFACE		189.00											GR SA SI CL		
0.00		CLAYEY SILT; mottled, grey brown; dry, DTPL															
1					1	SS	11										
2																	
3																	
4		CLAYEY SILT, silty clay; mottled grey brown; moist, APL		185.19 3.81	2	SS	15										
5																	
6																	
7		CLAYEY SILT; brown; dry SILTY CLAY, trace of fine gravel, moist, APL, firm		182.14 6.86	3	SS	4										
8																	
9		SILTY CLAY; grey; moist, APL, soft		179.86 9.14													
		SILTY SAND; grey; wet, soft		179.55 9.45	4	SS	4										
10				179.09 9.91	5	SS	9										
		CONTINUED NEXT PAGE															

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DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661425.48; E 346248.19

RECORD OF BOREHOLE: C18

SHEET 2 OF 2

BORING DATE: 13 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+		Q - U			Wp
10		--- CONTINUED FROM PREVIOUS PAGE ---														GR SA SI CL	
		SAND, coarse, some silt, wet, loose															
				178.33													
11		SAND to some coarse sand, wet, medium compact to loose															
				10.67													
				177.57													
				11.43													
12		CLAYEY SILT TILL, trace of fine gravel; grey; wet, stiff															
				176.20													
				12.80													
13		END OF BOREHOLE															

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DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661529.77; E 346171.51

RECORD OF BOREHOLE: C19

SHEET 1 OF 2

BORING DATE: 14 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	- ⊙	Wp			W	WI
0		GROUND SURFACE		190.00													
		CLAYEY SILT; brown; dry, compact		0.00													
1					1	SS	18										
2																	
3																	
4		SILTY CLAY, clayey silt; grey; moist, DTPL, firm		186.19 3.81	2	SS	9										
5																	
6																	
7																	
8																	
9		SILTY CLAY; grey; moist, APL, firm		181.62 8.38	3	SS	5										
					4	SS	7										
		- small fine sand fracture at 9.60 m															
10				180.09 9.91	5	SS	7										
		CONTINUED NEXT PAGE															

GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESXSWA REGIONAL LANDFILL\02_DATA\GINT\ESXSWA REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ

PROJECT: 111-53107-10
 LOCATION: N 4661529.77; E 346171.51

RECORD OF BOREHOLE: C19

SHEET 2 OF 2

BORING DATE: 14 July, 2023

DATUM:

DRILL RIG: CME 1050 Rubber Tire

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	Q - ●			rem V. ⊕	U - ○
10		-- CONTINUED FROM PREVIOUS PAGE --													GR SA SI CL		
		SILTY CLAY; grey; moist, APL, firm															
				179.33													
		- trace of fine sand at 10.52 m															
		SILTY CLAY; grey; moist to wet, APL, soft															
11				10.82											1 19 62 19		
		SILT, some clay and sand, with trace of gravel; wet, soft															
				178.57													
		CLAYEY SILT TILL to some fine gravel; grey; moist, firm to stiff															
				11.43													
12		END OF BOREHOLE															
				177.96													
				12.04													

GTA-BHS 005 S:\CLIENTS\COUNTY OF ESSEX\ESSEX REGIONAL LANDFILL\02_DATA\GINT\ESSEX REGIONAL LANDFILL.GPJ GAL-MIS.GDT 11/7/23

DEPTH SCALE

1 : 50



LOGGED: MEQ

CHECKED: MQ



WATER CONTENT DETERMINATION (LS 701)

Borehole Number	C1	C1	C2	C2	C2	C3
Sample Number	8A	13B	5A	14A	14B	15C
Depth of Sample (m)						
Tare Number	259	298	229	216	294	274
Wt. Of Wet Soil + Tare	57.33	54.58	65.27	66.71	51.19	51.06
Wt. Of Dry Soil + Tare	49.40	49.62	57.30	59.41	48.19	46.40
Wt. Of Water	7.93	4.96	7.97	7.30	3.00	4.66
Wt. Of Tare	15.66	15.73	15.63	15.30	15.61	15.41
Wt. Of Dry Soil	33.74	33.89	41.67	44.11	32.58	30.99
Water Content, %	23.5	14.6	19.1	16.5	9.2	15.0

Borehole Number	C3	C3	C4	C5	C5	C5
Sample Number	16A	18A	17B	14A	19B	21A
Depth of Sample (m)						
Tare Number	288	282	340	309	277	389
Wt. Of Wet Soil + Tare	53.19	60.40	58.14	53.23	50.19	53.91
Wt. Of Dry Soil + Tare	47.70	57.25	51.62	46.41	47.15	50.74
Wt. Of Water	5.49	3.15	6.52	6.82	3.04	3.17
Wt. Of Tare	15.67	15.43	15.58	15.68	15.31	15.48
Wt. Of Dry Soil	32.03	41.82	36.04	30.73	31.84	35.26
Water Content, %	17.1	7.5	18.1	22.2	9.5	9.0

Borehole Number	C6	C6	C7	C9	C9	C9
Sample Number	8A	16A	16A	6B	11A	15B
Depth of Sample (m)						
Tare Number	394	210	331	285	333	366
Wt. Of Wet Soil + Tare	51.77	52.63	51.49	50.78	50.17	52.52
Wt. Of Dry Soil + Tare	45.64	47.55	49.27	45.40	44.28	49.63
Wt. Of Water	6.13	5.08	2.22	5.38	5.89	2.89
Wt. Of Tare	15.65	15.72	15.36	15.66	15.51	15.53
Wt. Of Dry Soil	29.99	31.83	33.91	29.74	28.77	34.10
Water Content, %	20.4	16.0	6.5	18.1	20.5	8.5

$$\text{Water Content, \%} = \frac{\text{Weight of Water}}{\text{Weight of Dry Soil}} \times 100$$

Project Number: CA-WSP-111-53107-10/100/1002	Tested By: SV
Project Name: EWSWA EFL Cell 5N Design	Calculated By: SV
Date of Testing: 1 August, 2023	Checked By: DD
Remarks	

**WATER CONTENT DETERMINATION (LS 701)**

Borehole Number	C9	C10	C11	C12	C12	C13
Sample Number	16A	14	6	8A	9B	8A
Depth of Sample (m)						
Tare Number	287	321	289	258	205	345
Wt. Of Wet Soil + Tare	50.15	52.99	48.49	57.63	50.53	50.71
Wt. Of Dry Soil + Tare	47.23	48.92	42.88	51.40	47.69	45.19
Wt. Of Water	2.92	4.07	5.61	6.23	2.84	5.52
Wt. Of Tare	15.71	15.94	15.62	15.45	15.39	15.61
Wt. Of Dry Soil	31.52	32.98	27.26	35.95	32.30	29.58
Water Content, %	9.3	12.3	20.6	17.3	8.8	18.7

Borehole Number	C13	C13	C14	C14	C14	C15
Sample Number	16A	17B	10A	13A	14A	10B
Depth of Sample (m)						
Tare Number	379	226	360	217	239	266
Wt. Of Wet Soil + Tare	50.99	52.81	52.28	53.82	51.68	54.96
Wt. Of Dry Soil + Tare	47.93	49.95	48.40	50.26	48.84	49.98
Wt. Of Water	3.06	2.86	3.88	3.56	2.84	4.98
Wt. Of Tare	15.50	15.59	15.57	15.55	15.46	15.53
Wt. Of Dry Soil	32.43	34.36	32.83	34.71	33.38	34.45
Water Content, %	9.4	8.3	11.8	10.3	8.5	14.5

Borehole Number	C17	C19				
Sample Number	7A	6B				
Depth of Sample (m)						
Tare Number	262	261				
Wt. Of Wet Soil + Tare	52.94	55.12				
Wt. Of Dry Soil + Tare	49.23	50.49				
Wt. Of Water	3.71	4.63				
Wt. Of Tare	15.56	15.43				
Wt. Of Dry Soil	33.67	35.06				
Water Content, %	11.0	13.2				

$$\text{Water Content, \%} = \frac{\text{Weight of Water}}{\text{Weight of Dry Soil}} \times 100$$

Project Number: CA-WSP-111-53107-10/100/1002	Tested By: SV
Project Name: EWSWA EFL Cell 5N Design	Calculated By: SV
Date of Testing: 1 August, 2023	Checked By: DD
Remarks	



HYDRAULIC CONDUCTIVITY TEST
ASTM D 5084 (CONSTANT HEAD - Method A)

SAMPLE IDENTIFICATION

PROJECT NUMBER	111-53107-10	SAMPLE	-
PROJECT TITLE	RLF Cell 5N / Lab Testing / Miss	SAMPLE DEPTH, m	-
BOREHOLE NUMBER	BHC4-8A	DATE	August 10, 2023

SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

SAMPLE HEIGHT, cm	5.97	UNIT WEIGHT, kN/m ³	20.50
SAMPLE DIAMETER, cm	6.76	DRY UNIT WEIGHT, kN/m ³	17.13
SAMPLE AREA, cm ²	35.88	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	214.31	VOLUME OF SOLIDS, cm ³	138.63
TOTAL MASS, g	448.04	VOLUME OF VOIDS, cm ³	75.68
DRY MASS, g	374.30	VOID RATIO	0.55
WATER CONTENT, %	19.7		

SATURATION STAGE

CELL PRESSURE, kPa	210.00	EFFECTIVE CONSOLIDATION STRESS, kPa	10
HEAD PRESSURE, kPa	200.00	DURATION, min	2,775
BACK PRESSURE, kPa	200.00	B COEFFICIENT	0.96

CONSOLIDATION STAGE

CELL PRESSURE, kPa	300.00	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	200.00	DURATION, min	1,137
BACK PRESSURE, kPa	200.00	VOLUME CHANGE, cm ³	7.40
		DRAINAGE	Top and Bottom

SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

SAMPLE HEIGHT, cm	5.90	SAMPLE AREA, cm ²	35.05
SAMPLE DIAMETER, cm	6.68	SAMPLE VOLUME, cm ³	206.97

HYDRAULIC CONDUCTIVITY STAGE

CELL PRESSURE, kPa	312	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	212	DURATION, min	7128
BACK PRESSURE, kPa	200	HYDRAULIC GRADIENT, $\frac{h}{L}$	21

SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

SAMPLE HEIGHT, cm	5.90	UNIT WEIGHT, kN/m ³	21.34
SAMPLE DIAMETER, cm	6.68	DRY UNIT WEIGHT, kN/m ³	17.74
SAMPLE AREA, cm ²	35.05	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	206.97	VOLUME OF SOLIDS, cm ³	138.63
TOTAL MASS, g	450.29	VOLUME OF VOIDS, cm ³	68.34
DRY MASS, g	374.30	VOID RATIO	0.49
WATER CONTENT, %	20.3		

TEST RESULTS

ELAPSED TIME TO STEADY STATE FLOW (min)	0.0
DURATION OF STEADY STATE FLOW (min)	7128
INFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	3.0
OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	2.8
INFLOW TO OUTFLOW RATIO	1.1
HYDRAULIC CONDUCTIVITY (INFLOW) (m/s)	9.65E-11
HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s)	9.01E-11
HYDRAULIC CONDUCTIVITY, K, m/s	9.33E-11
HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, K₂₀, m/s	8.69E-11

NOTES:

Effective consolidation stress assigned, by client according to ASTM D 5084.

PERMEANT FLUID	Deaired tap water
AVERAGE TEST TEMPERATURE	23.0 °C

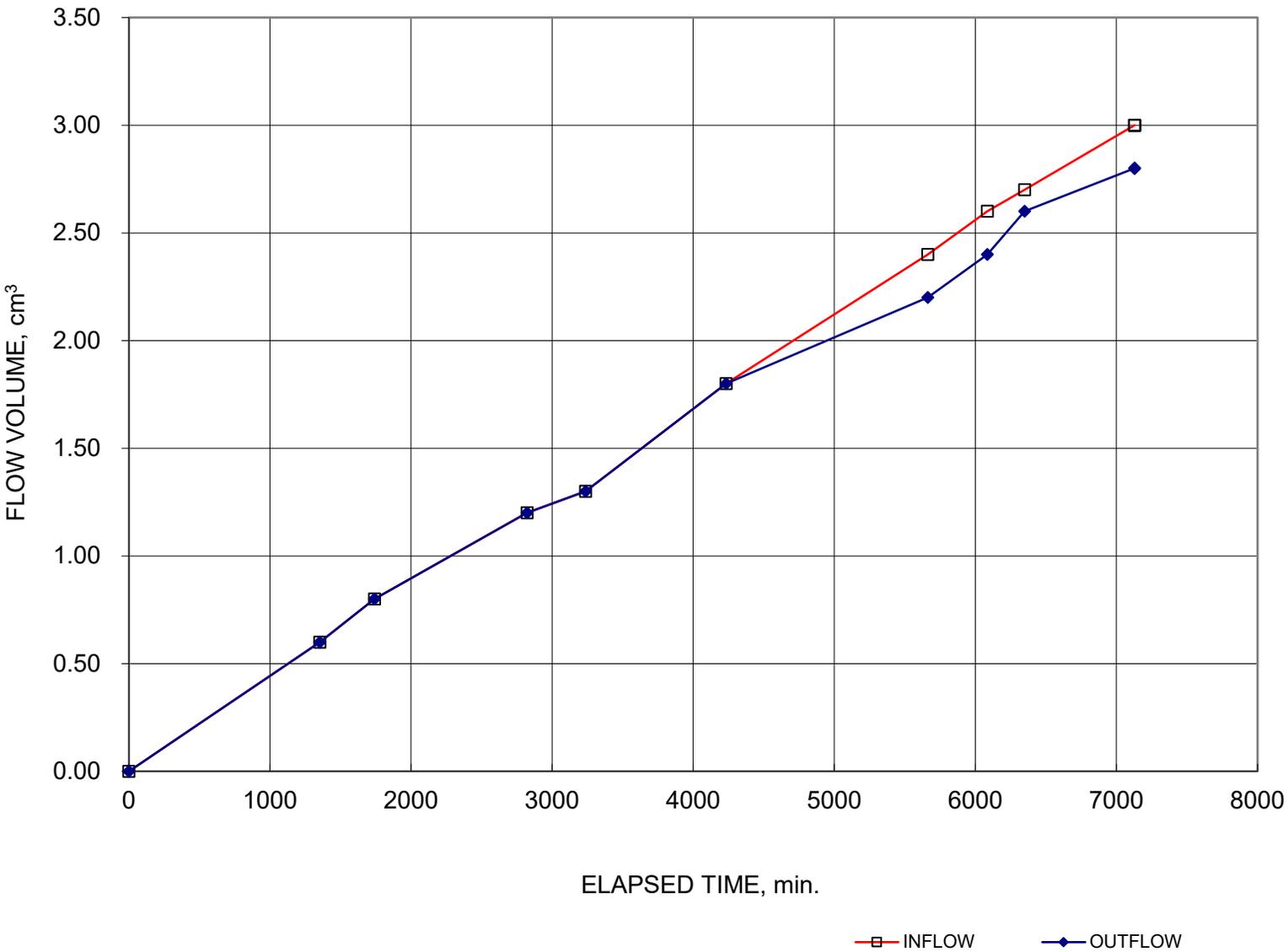
HYDRAULIC CONDUCTIVITY TEST

August 10, 2023

Project title: RLF Cell 5N / Lab Testing / Miss
Borehole number: BHC4-8A
Sample depth: -

Flow volume vs. Time

BOREHOLE NUMBER - BHC4-8A



Project number : 111-53107-10
Prepared by : LL

WSP Canada Inc.

Checked by : AH



HYDRAULIC CONDUCTIVITY TEST
ASTM D 5084 (CONSTANT HEAD - Method A)

SAMPLE IDENTIFICATION

PROJECT NUMBER	111-53107-10	SAMPLE	-
PROJECT TITLE	RLF Cell 5N / Lab Testing / Miss	SAMPLE DEPTH, m	9.14-9.45
BOREHOLE NUMBER	BHC6-13A	DATE	August 15, 2023

SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

SAMPLE HEIGHT, cm	6.20	UNIT WEIGHT, kN/m ³	20.09
SAMPLE DIAMETER, cm	6.89	DRY UNIT WEIGHT, kN/m ³	16.79
SAMPLE AREA, cm ²	37.33	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	231.43	VOLUME OF SOLIDS, cm ³	146.72
TOTAL MASS, g	474.17	VOLUME OF VOIDS, cm ³	84.72
DRY MASS, g	396.13	VOID RATIO	0.58
WATER CONTENT, %	19.7		

SATURATION STAGE

CELL PRESSURE, kPa	210.00	EFFECTIVE CONSOLIDATION STRESS, kPa	10
HEAD PRESSURE, kPa	200.00	DURATION, min	5,323
BACK PRESSURE, kPa	200.00	B COEFFICIENT	0.96

CONSOLIDATION STAGE

CELL PRESSURE, kPa	300.00	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	200.00	DURATION, min	5,725
BACK PRESSURE, kPa	200.00	VOLUME CHANGE, cm ³	1.50
		DRAINAGE	Top and Bottom

SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

SAMPLE HEIGHT, cm	6.19	SAMPLE AREA, cm ²	37.17
SAMPLE DIAMETER, cm	6.88	SAMPLE VOLUME, cm ³	229.93

HYDRAULIC CONDUCTIVITY STAGE

CELL PRESSURE, kPa	312	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	212	DURATION, min	4310
BACK PRESSURE, kPa	200	HYDRAULIC GRADIENT, $\frac{h}{L}$	20

SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

SAMPLE HEIGHT, cm	6.19	UNIT WEIGHT, kN/m ³	21.05
SAMPLE DIAMETER, cm	6.88	DRY UNIT WEIGHT, kN/m ³	16.89
SAMPLE AREA, cm ²	37.17	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	229.93	VOLUME OF SOLIDS, cm ³	146.72
TOTAL MASS, g	493.58	VOLUME OF VOIDS, cm ³	83.22
DRY MASS, g	396.13	VOID RATIO	0.57
WATER CONTENT, %	24.6		

TEST RESULTS

ELAPSED TIME TO STEADY STATE FLOW (min)	0.0
DURATION OF STEADY STATE FLOW (min)	4310
INFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	2.8
OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	2.3
INFLOW TO OUTFLOW RATIO	1.2
HYDRAULIC CONDUCTIVITY (INFLOW) (m/s)	1.47E-10
HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s)	1.21E-10
HYDRAULIC CONDUCTIVITY, K, m/s	1.34E-10
HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, K₂₀, m/s	1.25E-10

NOTES:

Effective consolidation stress assigned, by client according to ASTM D 5084.

PERMEANT FLUID	Deaired tap water
AVERAGE TEST TEMPERATURE	23.0 °C

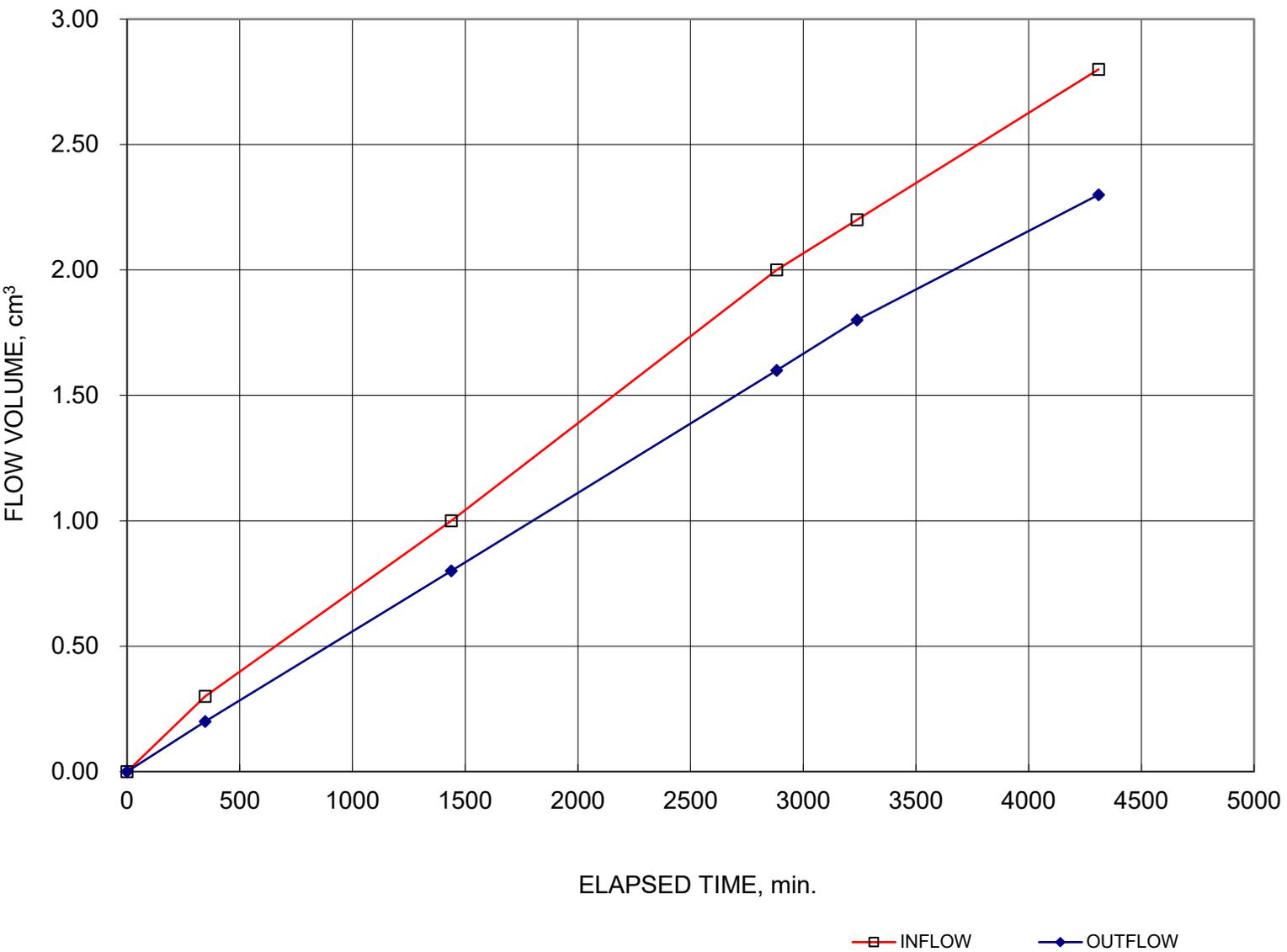
HYDRAULIC CONDUCTIVITY TEST

August 15, 2023

Project title: RLF Cell 5N / Lab Testing / Miss
Borehole number: BHC6-13A
Sample depth: 9.14-9.45

Flow volume vs. Time

BOREHOLE NUMBER - BHC6-13A



Project number : 111-53107-10
Prepared by : LL

WSP Canada Inc.

Checked by : AH



HYDRAULIC CONDUCTIVITY TEST
ASTM D 5084 (CONSTANT HEAD - Method A)

SAMPLE IDENTIFICATION

PROJECT NUMBER	111-53107-10	SAMPLE	-
PROJECT TITLE	RLF Cell 5N / Lab Testing / Miss	SAMPLE DEPTH, m	9.14-9.75
BOREHOLE NUMBER	BHC11	DATE	August 23, 2023

SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

SAMPLE HEIGHT, cm	6.28	UNIT WEIGHT, kN/m ³	19.39
SAMPLE DIAMETER, cm	6.91	DRY UNIT WEIGHT, kN/m ³	15.08
SAMPLE AREA, cm ²	37.50	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	235.51	VOLUME OF SOLIDS, cm ³	134.13
TOTAL MASS, g	465.71	VOLUME OF VOIDS, cm ³	101.38
DRY MASS, g	362.14	VOID RATIO	0.76
WATER CONTENT, %	28.6		

SATURATION STAGE

CELL PRESSURE, kPa	210.00	EFFECTIVE CONSOLIDATION STRESS, kPa	10
HEAD PRESSURE, kPa	200.00	DURATION, min	2,860
BACK PRESSURE, kPa	200.00	B COEFFICIENT	0.96

CONSOLIDATION STAGE

CELL PRESSURE, kPa	300.00	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	200.00	DURATION, min	1,110
BACK PRESSURE, kPa	200.00	VOLUME CHANGE, cm ³	4.20
		DRAINAGE	Top and Bottom

SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

SAMPLE HEIGHT, cm	6.24	SAMPLE AREA, cm ²	37.06
SAMPLE DIAMETER, cm	6.87	SAMPLE VOLUME, cm ³	231.32

HYDRAULIC CONDUCTIVITY STAGE

CELL PRESSURE, kPa	312	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	212	DURATION, min	5736
BACK PRESSURE, kPa	200	HYDRAULIC GRADIENT, $\frac{h}{L}$	20

SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

SAMPLE HEIGHT, cm	6.24	UNIT WEIGHT, kN/m ³	19.65
SAMPLE DIAMETER, cm	6.87	DRY UNIT WEIGHT, kN/m ³	15.35
SAMPLE AREA, cm ²	37.06	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	231.32	VOLUME OF SOLIDS, cm ³	134.13
TOTAL MASS, g	463.54	VOLUME OF VOIDS, cm ³	97.20
DRY MASS, g	362.14	VOID RATIO	0.72
WATER CONTENT, %	28.0		

TEST RESULTS

ELAPSED TIME TO STEADY STATE FLOW (min)	0.0
DURATION OF STEADY STATE FLOW (min)	5736
INFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	7.4
OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	7.8
INFLOW TO OUTFLOW RATIO	0.9
HYDRAULIC CONDUCTIVITY (INFLOW) (m/s)	2.96E-10
HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s)	3.12E-10
HYDRAULIC CONDUCTIVITY, K, m/s	3.04E-10
HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, K₂₀, m/s	2.83E-10

NOTES:

Effective consolidation stress assigned, by client according to ASTM D 5084.

PERMEANT FLUID	Deaired tap water
AVERAGE TEST TEMPERATURE	23.0 °C

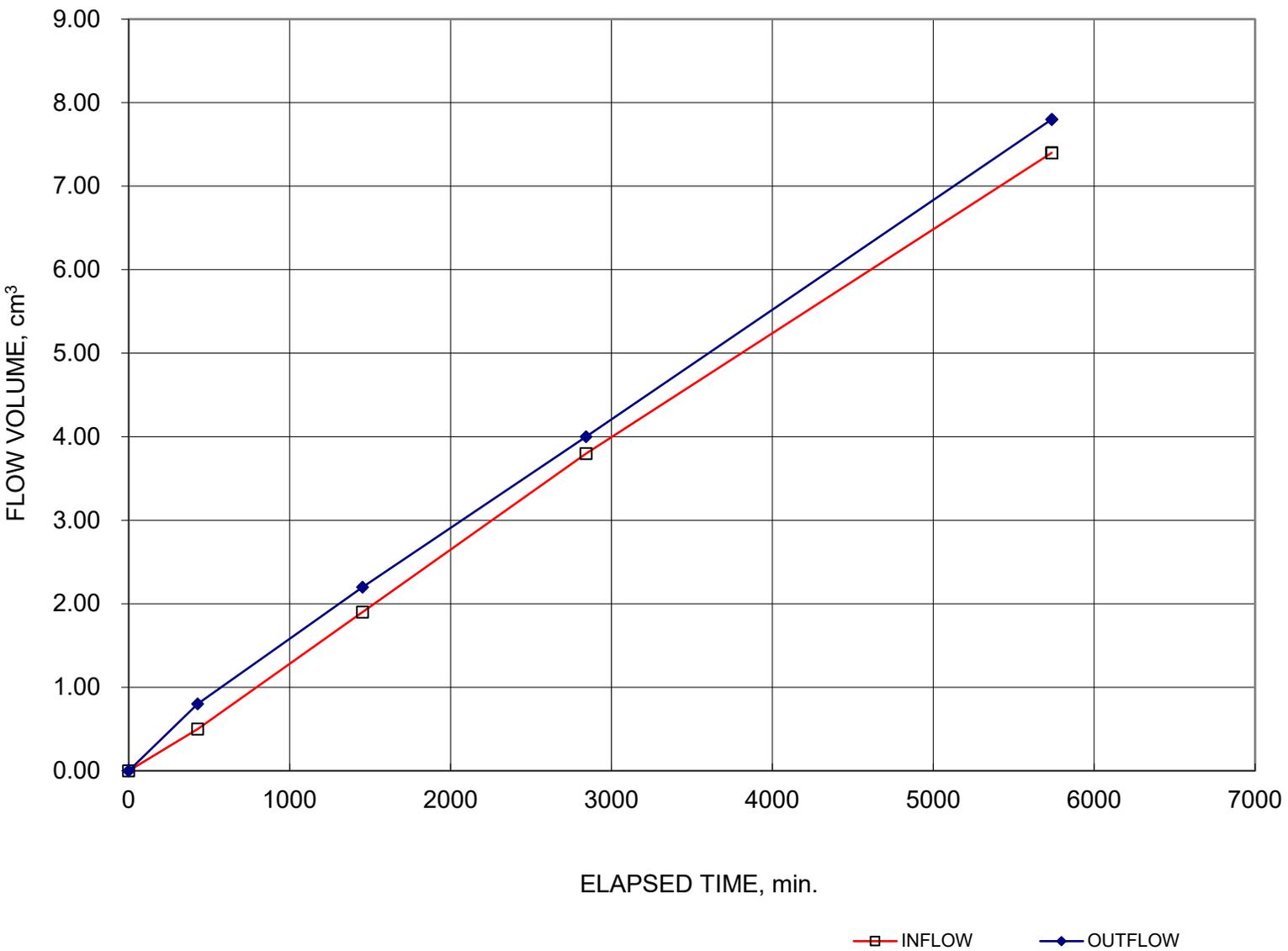
HYDRAULIC CONDUCTIVITY TEST

August 23, 2023

Project title: RLF Cell 5N / Lab Testing / Miss
Borehole number: BHC11
Sample depth: 9.14-9.75

Flow volume vs. Time

BOREHOLE NUMBER - BHC11



Project number : 111-53107-10
Prepared by : LL

WSP Canada Inc.

Checked by : AH



HYDRAULIC CONDUCTIVITY TEST
ASTM D 5084 (CONSTANT HEAD - Method A)

SAMPLE IDENTIFICATION

PROJECT NUMBER	111-53107-10	SAMPLE	-
PROJECT TITLE	RLF Cell 5N / Lab Testing / Miss	SAMPLE DEPTH, m	2.29-2.59
BOREHOLE NUMBER	BHC14-4	DATE	August 10, 2023

SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

SAMPLE HEIGHT, cm	5.52	UNIT WEIGHT, kN/m ³	21.12
SAMPLE DIAMETER, cm	6.88	DRY UNIT WEIGHT, kN/m ³	18.10
SAMPLE AREA, cm ²	37.15	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	205.24	VOLUME OF SOLIDS, cm ³	140.26
TOTAL MASS, g	441.96	VOLUME OF VOIDS, cm ³	64.98
DRY MASS, g	378.71	VOID RATIO	0.46
WATER CONTENT, %	16.7		

SATURATION STAGE

CELL PRESSURE, kPa	420.00	EFFECTIVE CONSOLIDATION STRESS, kPa	10
HEAD PRESSURE, kPa	410.00	DURATION, min	8,243
BACK PRESSURE, kPa	410.00	B COEFFICIENT	0.96

CONSOLIDATION STAGE

CELL PRESSURE, kPa	510.00	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	410.00	DURATION, min	1,366
BACK PRESSURE, kPa	410.00	VOLUME CHANGE, cm ³	6.20
		DRAINAGE	Top and Bottom

SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

SAMPLE HEIGHT, cm	5.47	SAMPLE AREA, cm ²	36.41
SAMPLE DIAMETER, cm	6.81	SAMPLE VOLUME, cm ³	199.08

HYDRAULIC CONDUCTIVITY STAGE

CELL PRESSURE, kPa	521	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	421	DURATION, min	4324
BACK PRESSURE, kPa	410	HYDRAULIC GRADIENT, $\frac{h}{L}$	21

SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

SAMPLE HEIGHT, cm	5.47	UNIT WEIGHT, kN/m ³	22.33
SAMPLE DIAMETER, cm	6.81	DRY UNIT WEIGHT, kN/m ³	18.66
SAMPLE AREA, cm ²	36.41	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	199.08	VOLUME OF SOLIDS, cm ³	140.26
TOTAL MASS, g	453.32	VOLUME OF VOIDS, cm ³	58.82
DRY MASS, g	378.71	VOID RATIO	0.42
WATER CONTENT, %	19.7		

TEST RESULTS

ELAPSED TIME TO STEADY STATE FLOW (min)	0.0
DURATION OF STEADY STATE FLOW (min)	4324
INFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	2.2
OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	2.0
INFLOW TO OUTFLOW RATIO	1.1
HYDRAULIC CONDUCTIVITY (INFLOW) (m/s)	1.14E-10
HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s)	1.03E-10
HYDRAULIC CONDUCTIVITY, K, m/s	1.08E-10
HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, K₂₀, m/s	1.01E-10

NOTES:

Effective consolidation stress assigned, by client according to ASTM D 5084.

PERMEANT FLUID	Deaired tap water
AVERAGE TEST TEMPERATURE	23.0 °C

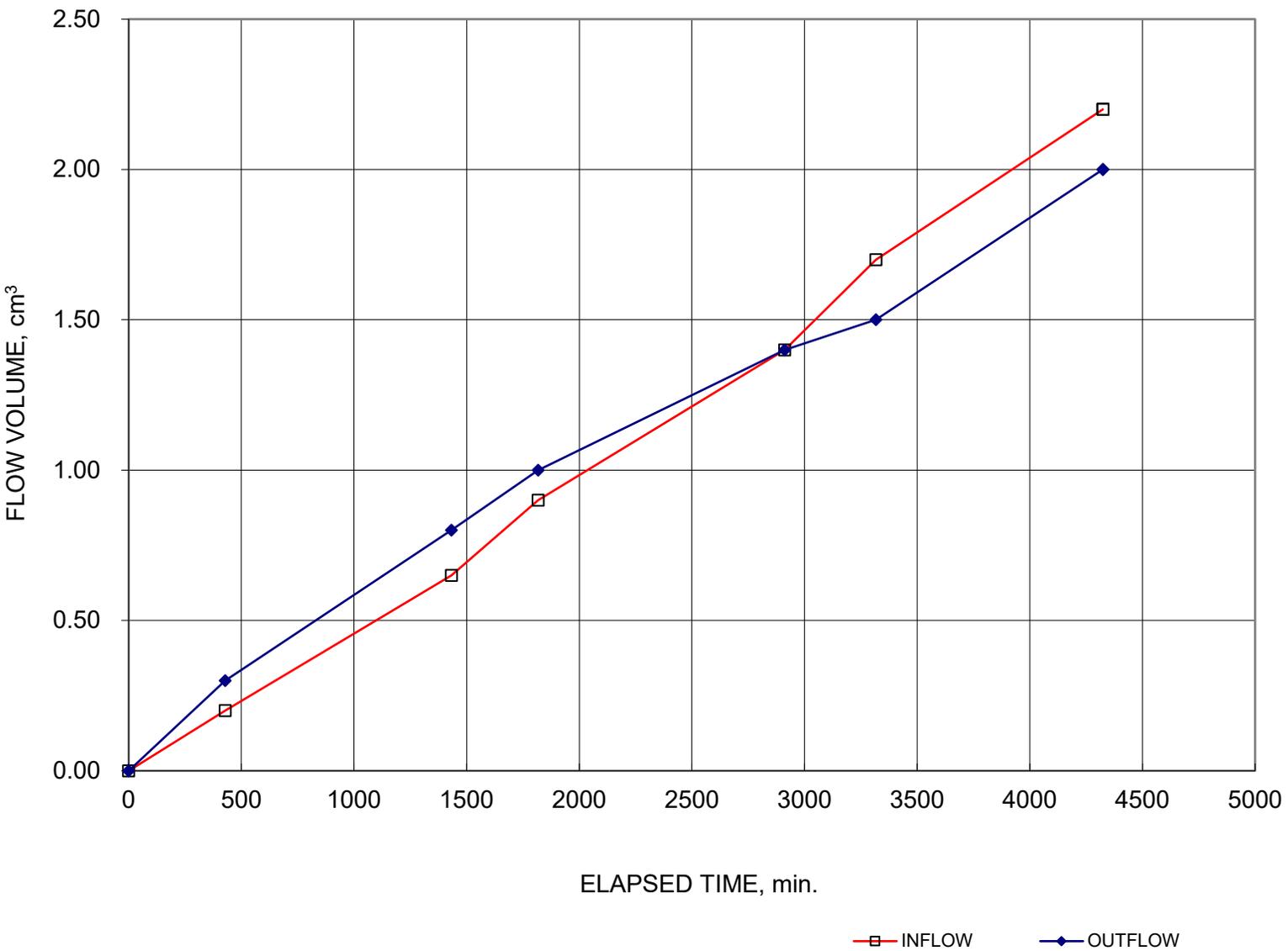
HYDRAULIC CONDUCTIVITY TEST

August 10, 2023

Project title: RLF Cell 5N / Lab Testing / Miss
Borehole number: BHC14-4
Sample depth: 2.29-2.59

Flow volume vs. Time

BOREHOLE NUMBER - BHC14-4



Project number : 111-53107-10
Prepared by : LL

WSP Canada Inc.

Checked by : AH



HYDRAULIC CONDUCTIVITY TEST
ASTM D 5084 (CONSTANT HEAD - Method A)

SAMPLE IDENTIFICATION

PROJECT NUMBER	111-53107-10	SAMPLE	-
PROJECT TITLE	RLF Cell 5N / Lab Testing / Miss	SAMPLE DEPTH, m	-
BOREHOLE NUMBER	BHC14-9	DATE	August 10, 2023

SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

SAMPLE HEIGHT, cm	5.96	UNIT WEIGHT, kN/m ³	20.79
SAMPLE DIAMETER, cm	6.92	DRY UNIT WEIGHT, kN/m ³	17.07
SAMPLE AREA, cm ²	37.61	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	223.97	VOLUME OF SOLIDS, cm ³	144.39
TOTAL MASS, g	474.84	VOLUME OF VOIDS, cm ³	79.58
DRY MASS, g	389.85	VOID RATIO	0.55
WATER CONTENT, %	21.8		

SATURATION STAGE

CELL PRESSURE, kPa	350.00	EFFECTIVE CONSOLIDATION STRESS, kPa	10
HEAD PRESSURE, kPa	340.00	DURATION, min	5,431
BACK PRESSURE, kPa	340.00	B COEFFICIENT	0.96

CONSOLIDATION STAGE

CELL PRESSURE, kPa	440.00	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	340.00	DURATION, min	1,289
BACK PRESSURE, kPa	340.00	VOLUME CHANGE, cm ³	4.60
		DRAINAGE	Top and Bottom

SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

SAMPLE HEIGHT, cm	5.91	SAMPLE AREA, cm ²	37.09
SAMPLE DIAMETER, cm	6.87	SAMPLE VOLUME, cm ³	219.39

HYDRAULIC CONDUCTIVITY STAGE

CELL PRESSURE, kPa	452	EFFECTIVE CONSOLIDATION STRESS, kPa	100
HEAD PRESSURE, kPa	352	DURATION, min	11485
BACK PRESSURE, kPa	340	HYDRAULIC GRADIENT, $\frac{h}{L}$	21

SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

SAMPLE HEIGHT, cm	5.91	UNIT WEIGHT, kN/m ³	20.91
SAMPLE DIAMETER, cm	6.87	DRY UNIT WEIGHT, kN/m ³	17.43
SAMPLE AREA, cm ²	37.09	SPECIFIC GRAVITY, assumed	2.70
SAMPLE VOLUME, cm ³	219.39	VOLUME OF SOLIDS, cm ³	144.39
TOTAL MASS, g	467.82	VOLUME OF VOIDS, cm ³	75.00
DRY MASS, g	389.85	VOID RATIO	0.52
WATER CONTENT, %	20.0		

TEST RESULTS

ELAPSED TIME TO STEADY STATE FLOW (min)	0.0
DURATION OF STEADY STATE FLOW (min)	11485
INFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	7.7
OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm ³)	6.4
INFLOW TO OUTFLOW RATIO	1.2
HYDRAULIC CONDUCTIVITY (INFLOW) (m/s)	1.46E-10
HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s)	1.21E-10
HYDRAULIC CONDUCTIVITY, K, m/s	1.33E-10
HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, K₂₀, m/s	1.24E-10

NOTES:

Effective consolidation stress assigned, by client according to ASTM D 5084.

PERMEANT FLUID	Deaired tap water
AVERAGE TEST TEMPERATURE	23.0 °C

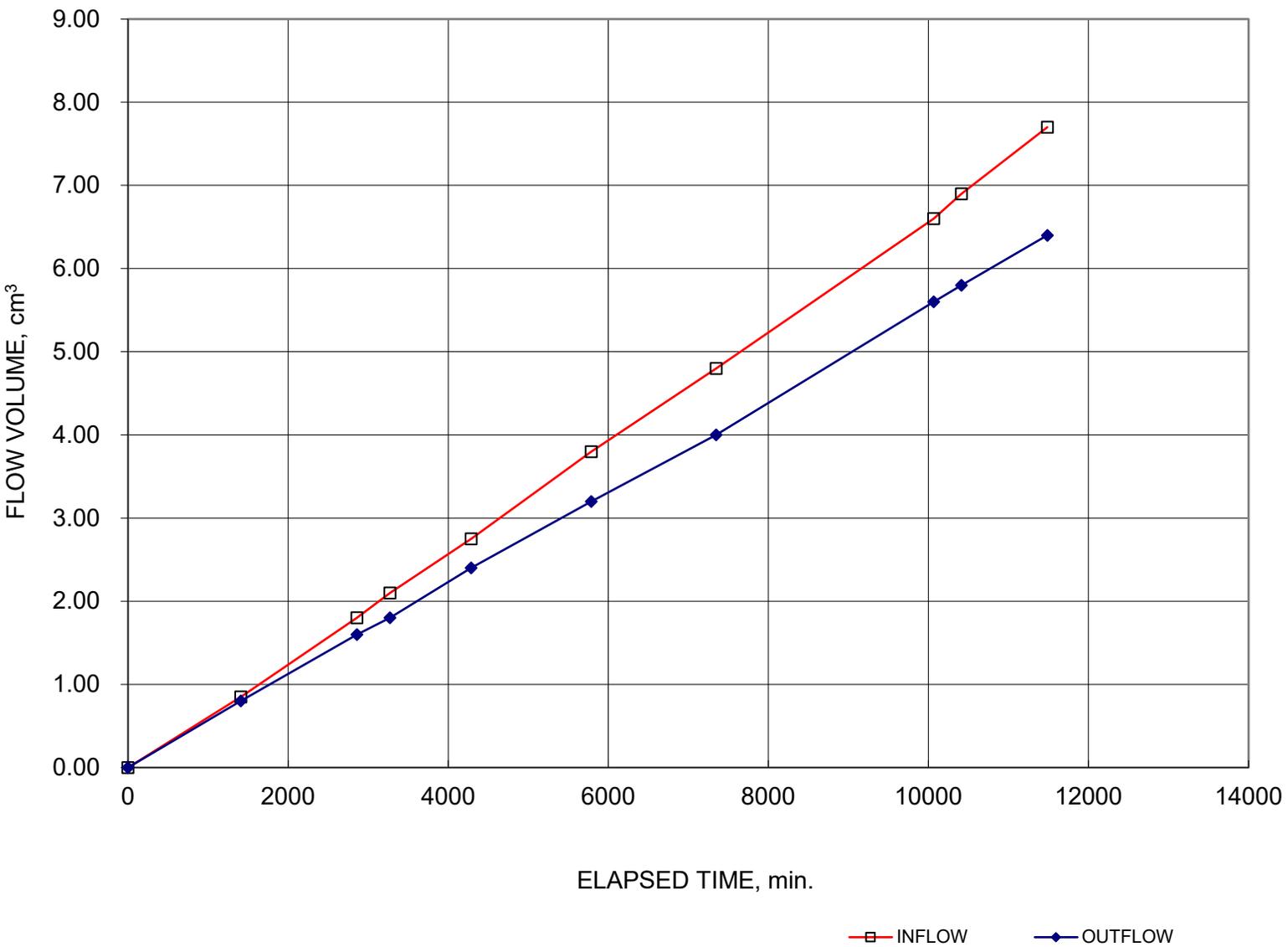
HYDRAULIC CONDUCTIVITY TEST

August 10, 2023

Project title: RLF Cell 5N / Lab Testing / Miss
Borehole number: BHC14-9
Sample depth: -

Flow volume vs. Time

BOREHOLE NUMBER - BHC14-9



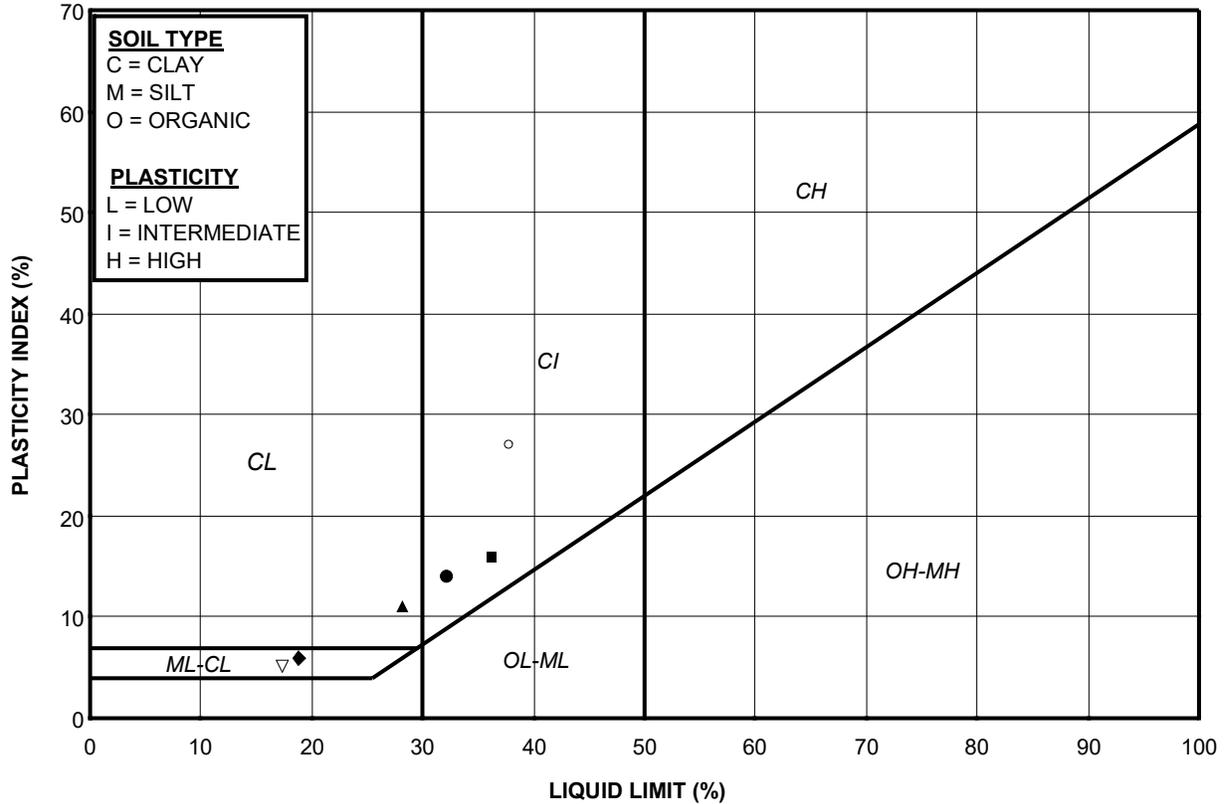
Project number : 111-53107-10
Prepared by : LL

WSP Canada Inc.

Checked by : AH

PLASTICITY CHART

FIGURE



LEGEND

SYMBOL	SAMPLE ID	DEPTH(m)	Wl(%)	Wp(%)	Ip(%)
●	C1-8A 23-498		32	17.7	14.3
■	C2-5A 23-499		36.1	20.1	16
◆	C3-18A 23-500		18.8	12.85	5.95
▲	C5-14A 23-501		28.2	17.05	11.15
▽	C5-21A 23-502		17.3	12.1	5.2
○	C6-8A 23-503		37.5	10.15	27.35

Project Number: CA-WSP-111-53107-10

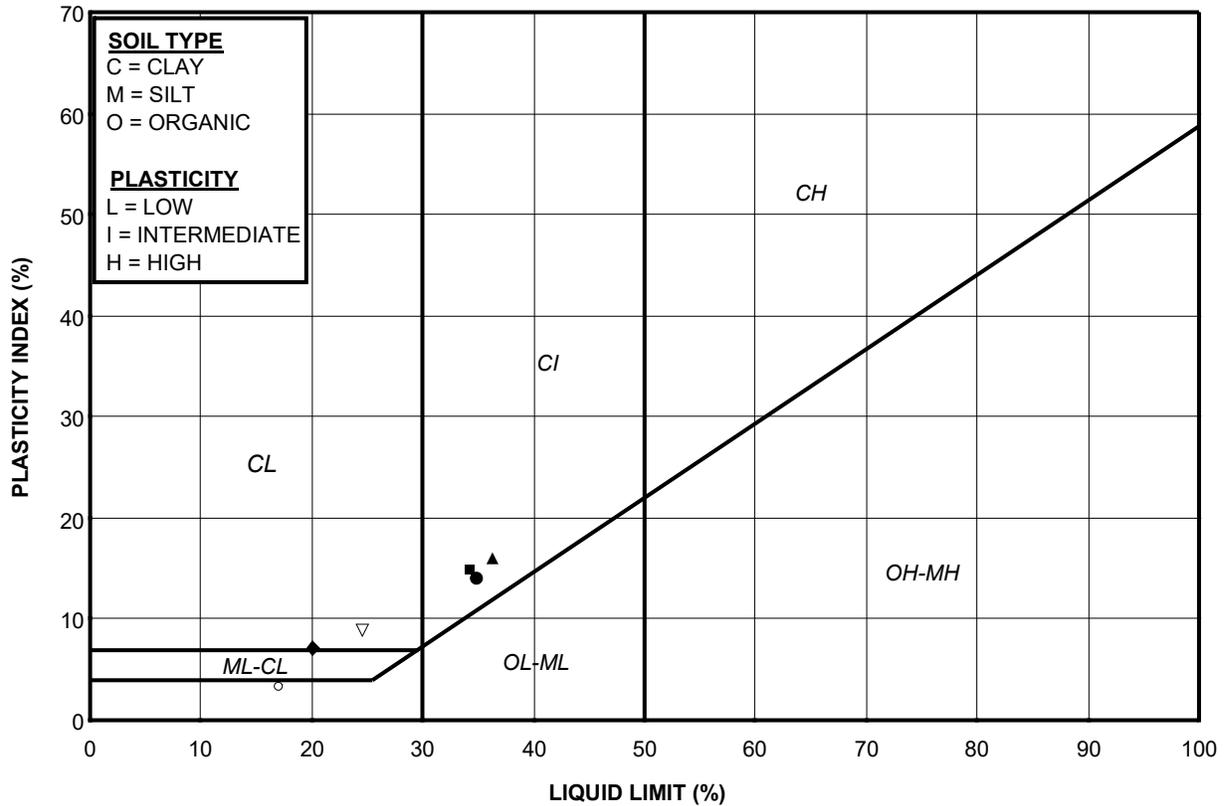
Checked By: *Dall*

WSP Canada Inc.

Date: 23-Aug-23

PLASTICITY CHART

FIGURE



LEGEND

SYMBOL	SOURCE	SAMPLE ID	DEPTH(m)	Wl(%)	Wp(%)	Ip(%)
●		C9-6B,	23-504	34.7	20.5	14.2
■		C9-11A,	23-506	34.2	19.2	15
◆		C9-16A,	23-507	20	12.85	7.15
▲		C13-8A,	23-508	36.3	20.25	16.05
▽		C14-10A,	23-509	24.6	15.65	8.95
○		C14-14A,	23-510	16.7	13.05	3.65

Project Number: CA-WSP-111-53107-10

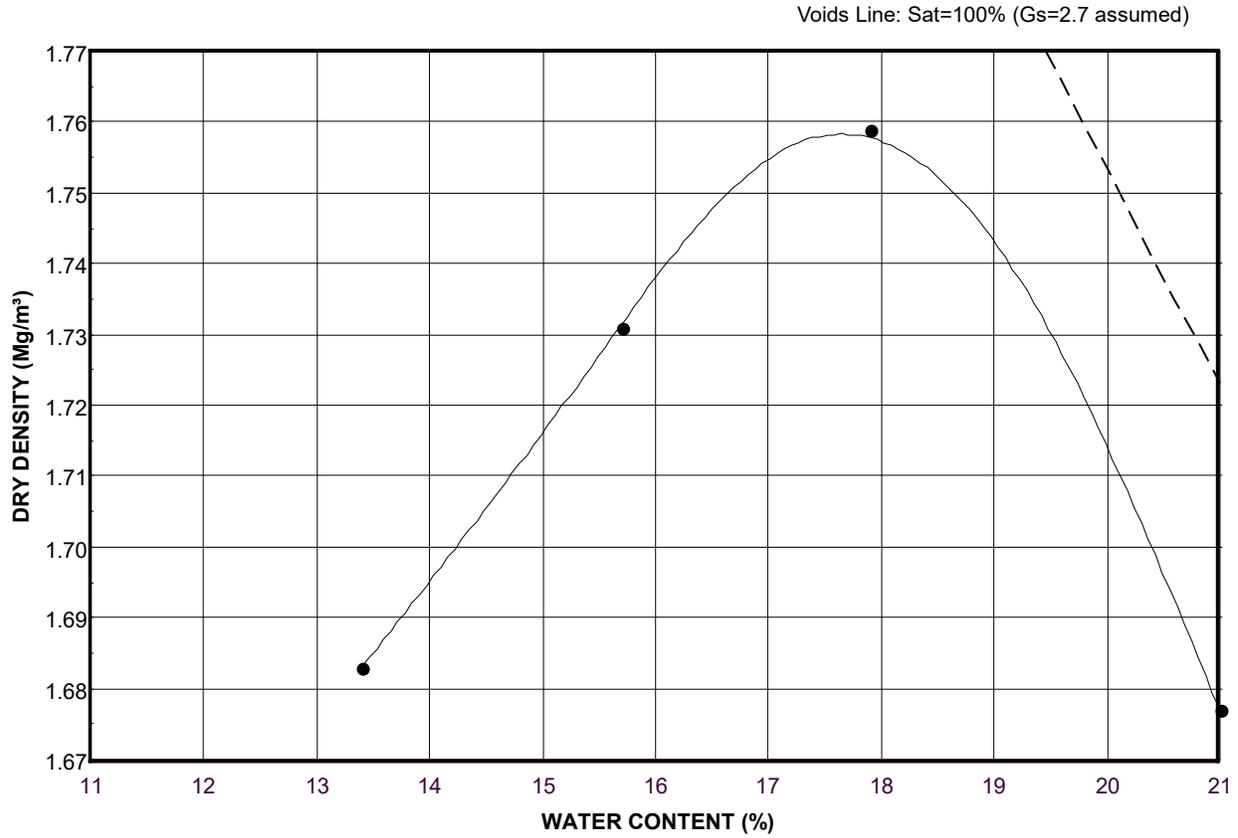
Checked By: *DALL*

WSP Canada Inc.

Date: 24-Aug-23

LABORATORY COMPACTION TEST

BHC3-PTB1



Standard
Proctor Test Results

Material:
Silty Clay

Source:

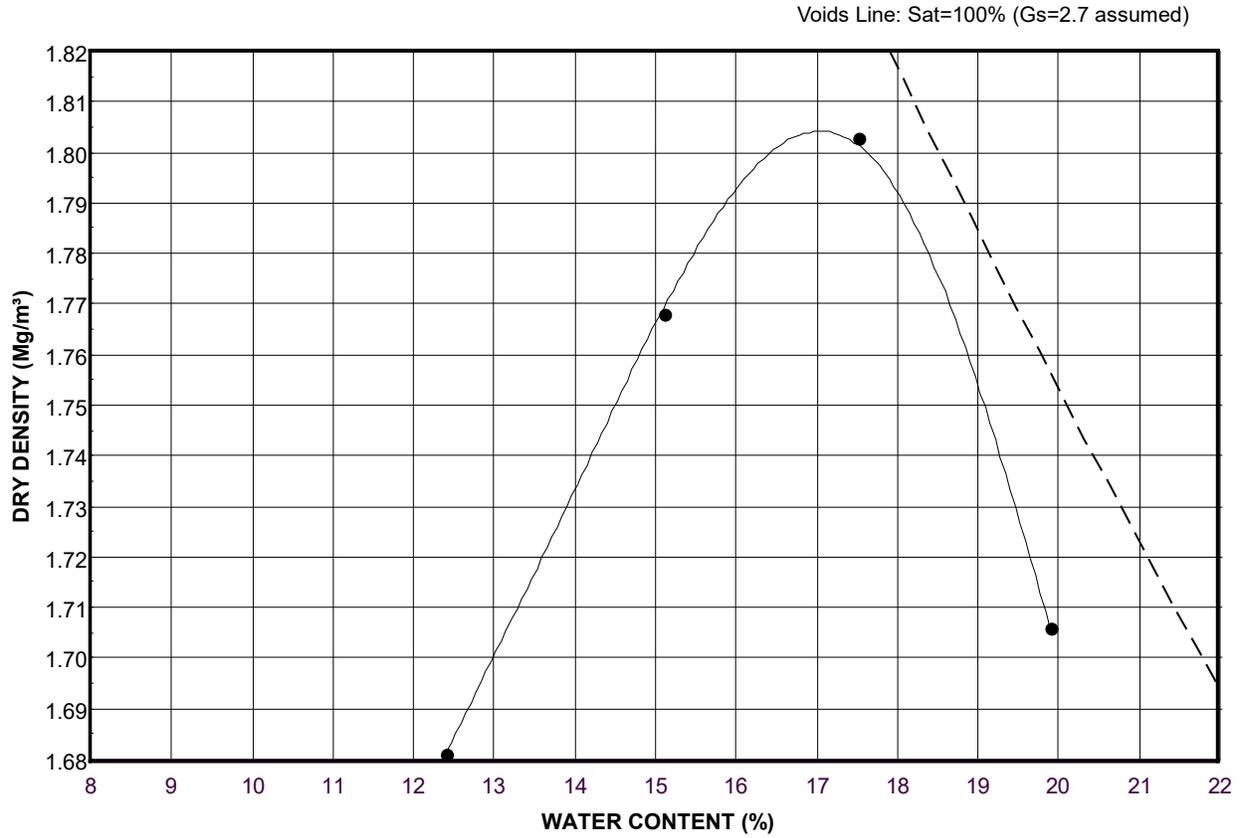
Max Dry Density:
1.758 Mg/m³

Optimum Water
Content: 17.8%

Natural Water
Content:

LABORATORY COMPACTION TEST

BHC10-PTG1



Standard
Proctor Test Results

Material:
Silty Clay

Source:

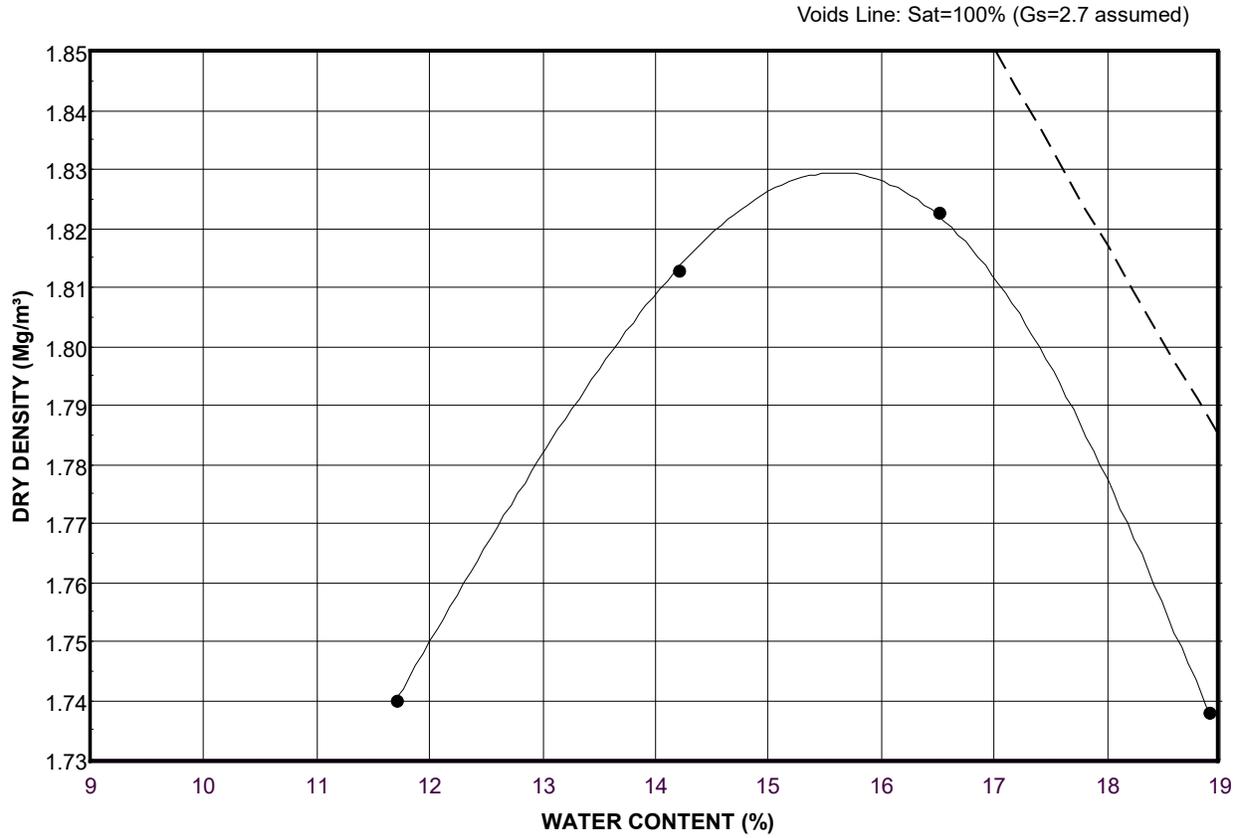
Max Dry Density:
1.804 Mg/m³

Optimum Water
Content: 17.1%

Natural Water
Content:

LABORATORY COMPACTION TEST

BHC15-PTB2



Standard
Proctor Test Results

Material:
Silty Clay

Source:

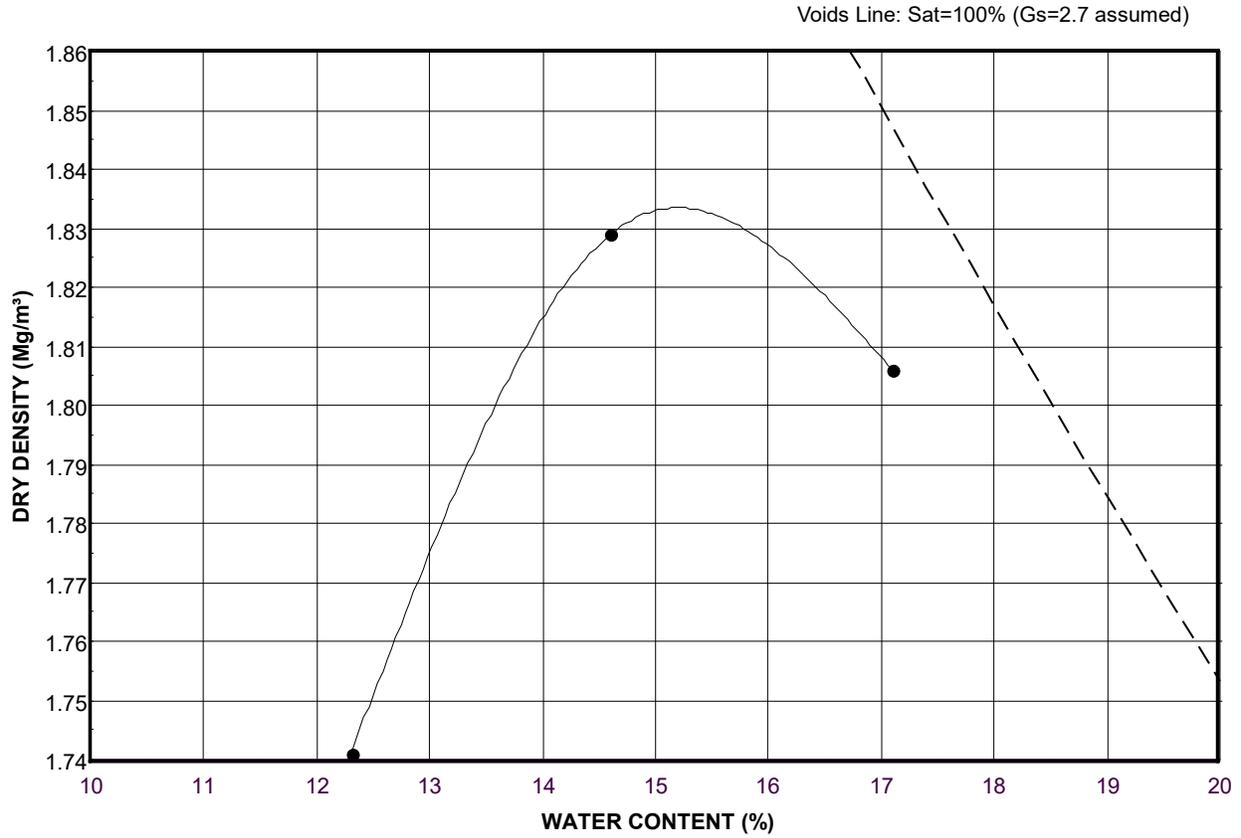
Max Dry Density:
1.829 Mg/m³

Optimum Water
Content: 15.8%

Natural Water
Content:

LABORATORY COMPACTION TEST

BHC16-PTG2



Standard
Proctor Test Results

Material:
Silty Clay

Source:

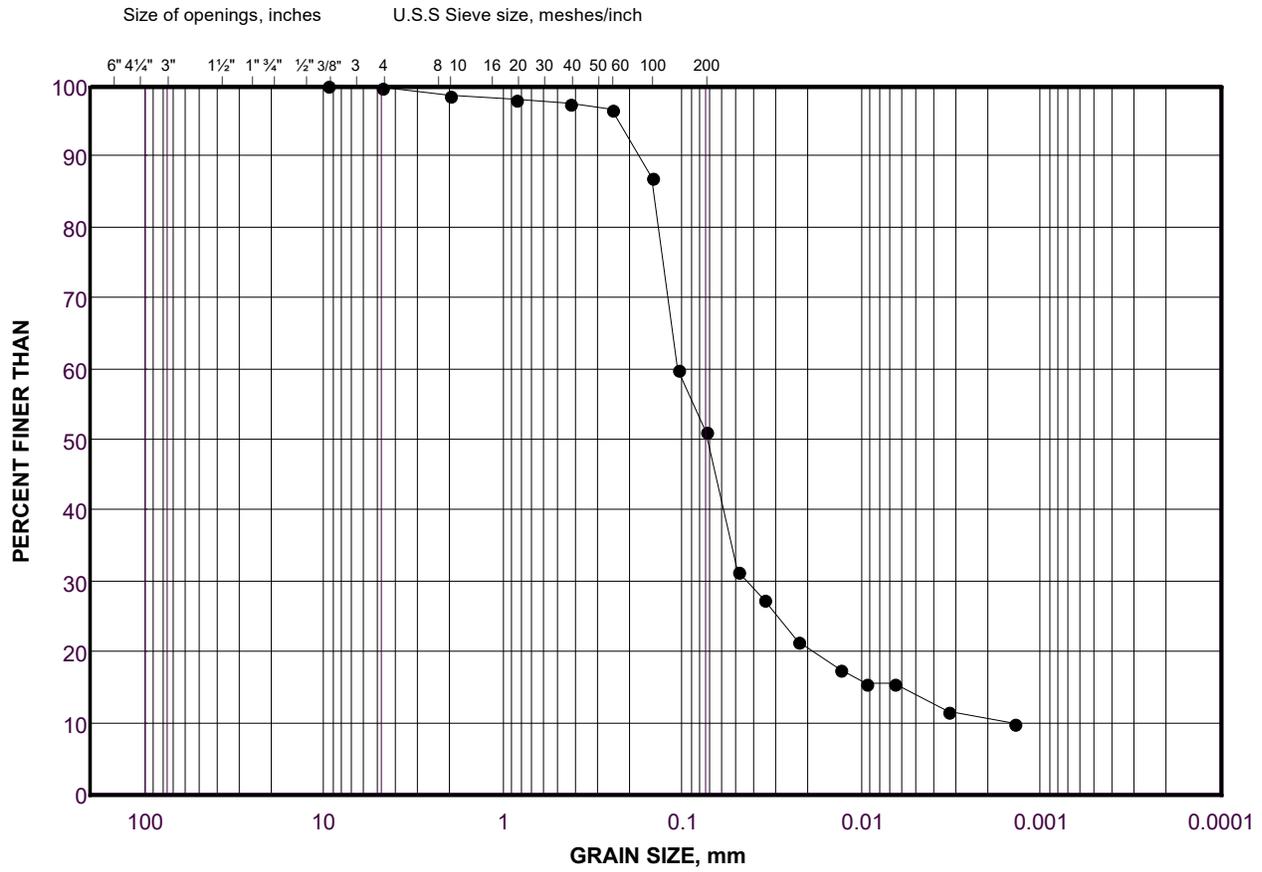
Max Dry Density:
1.833 Mg/m³

Optimum Water
Content: 15.4%

Natural Water
Content:

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
●	C1-13B	

Project Number: CA-WSP-111-53107-10

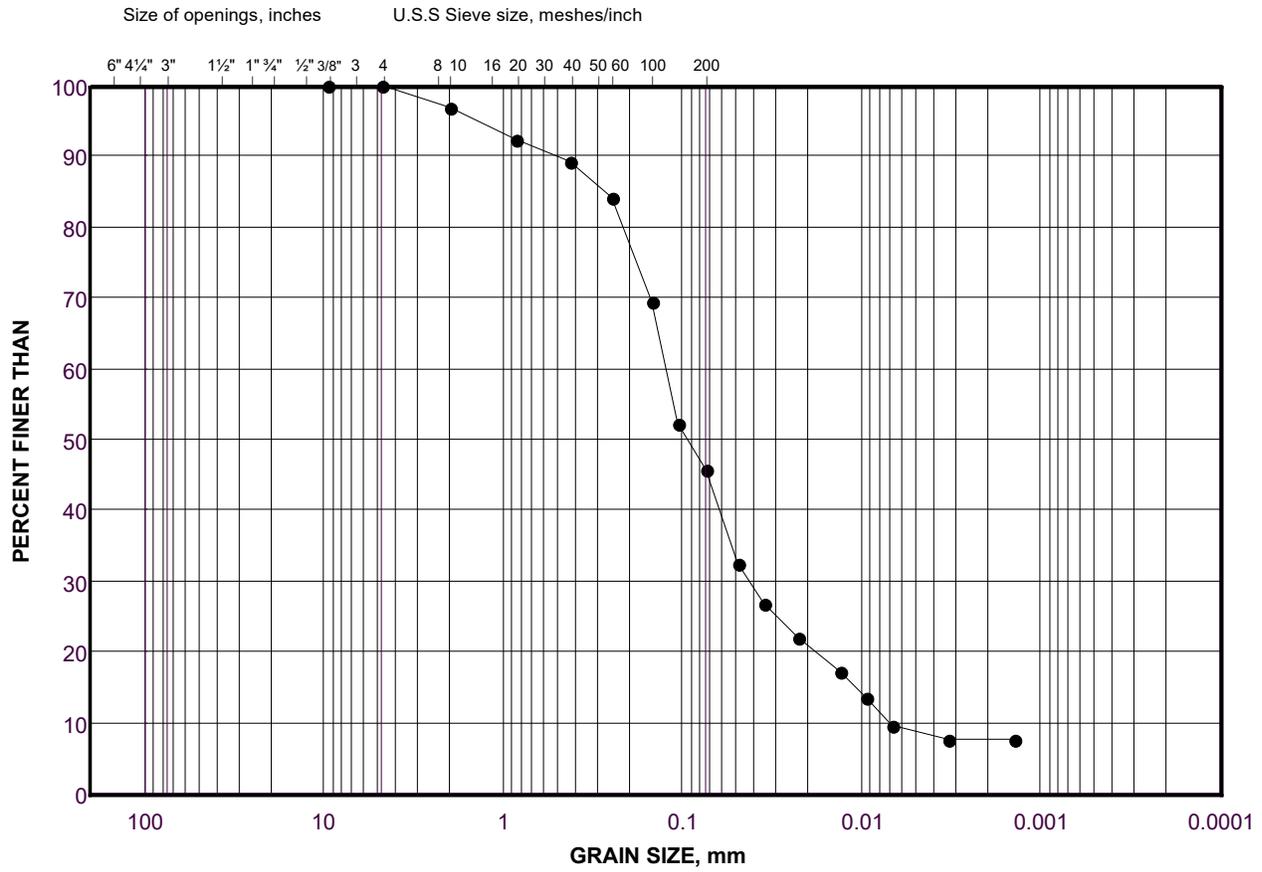
Checked By: *DALL*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			
SIZE						

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
●	C2-14A	

Project Number: CA-WSP-111-53107-10

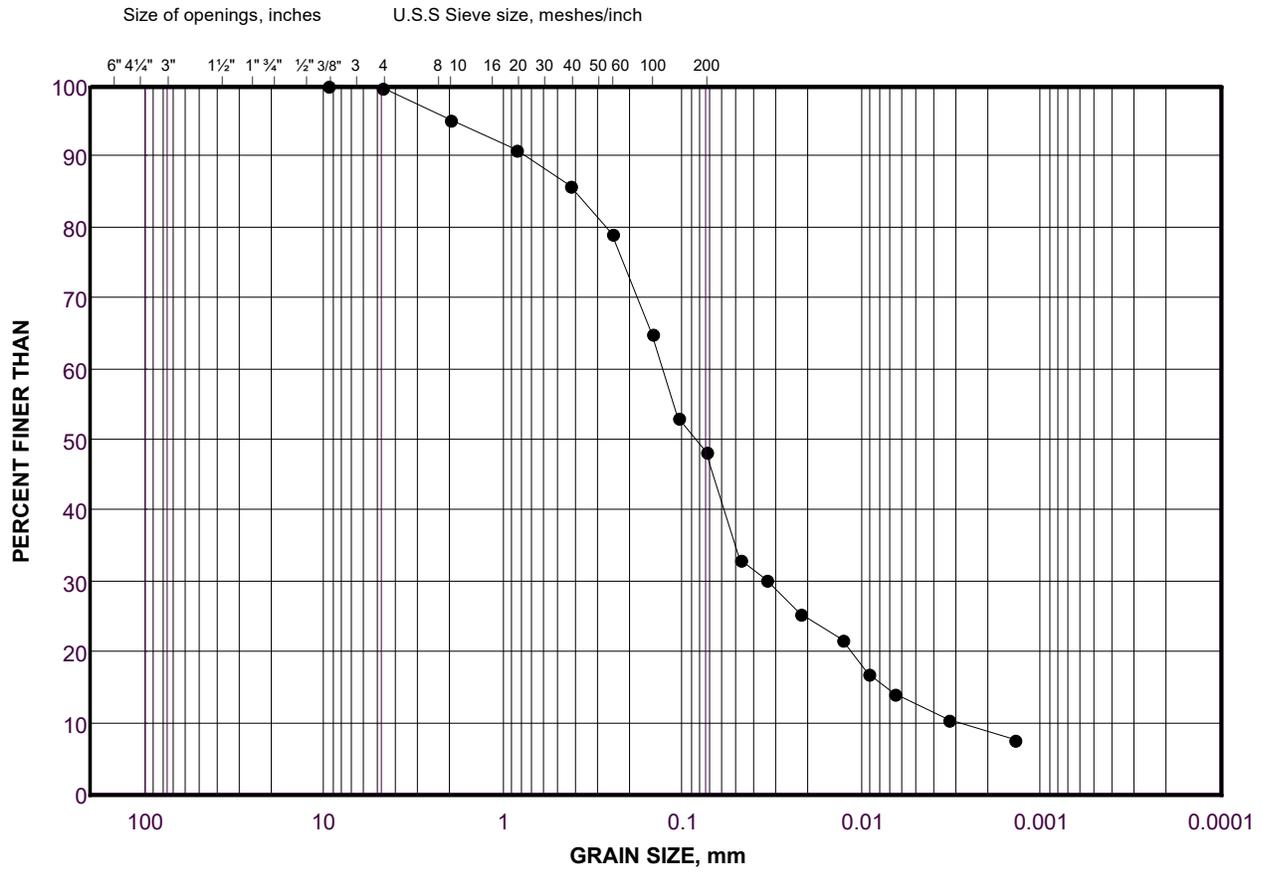
Checked By: *Dall*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
•	C2-14B	

Project Number: CA-WSP-111-53107-10

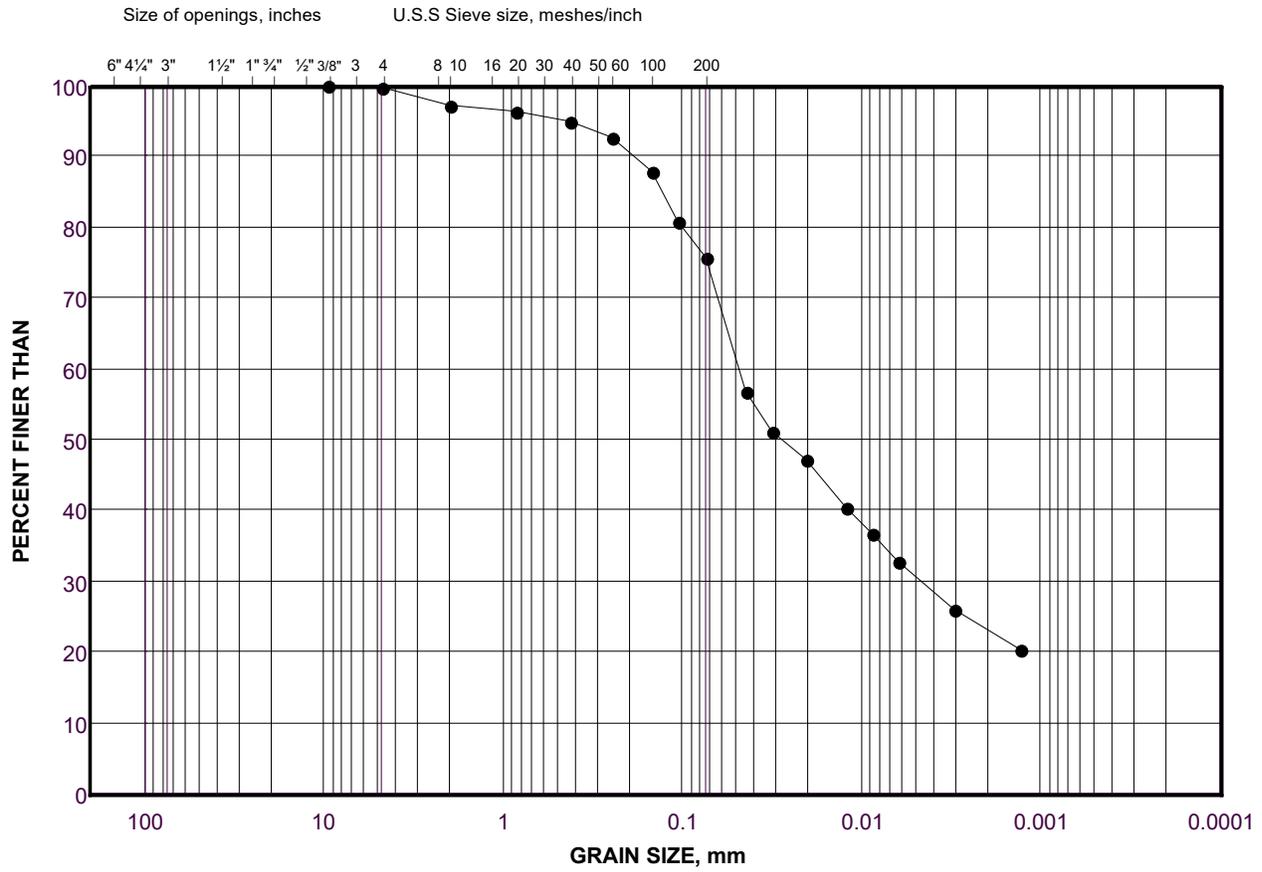
Checked By: *DALL*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
•	C3-15C	

Project Number: CA-WSP-111-53107-10

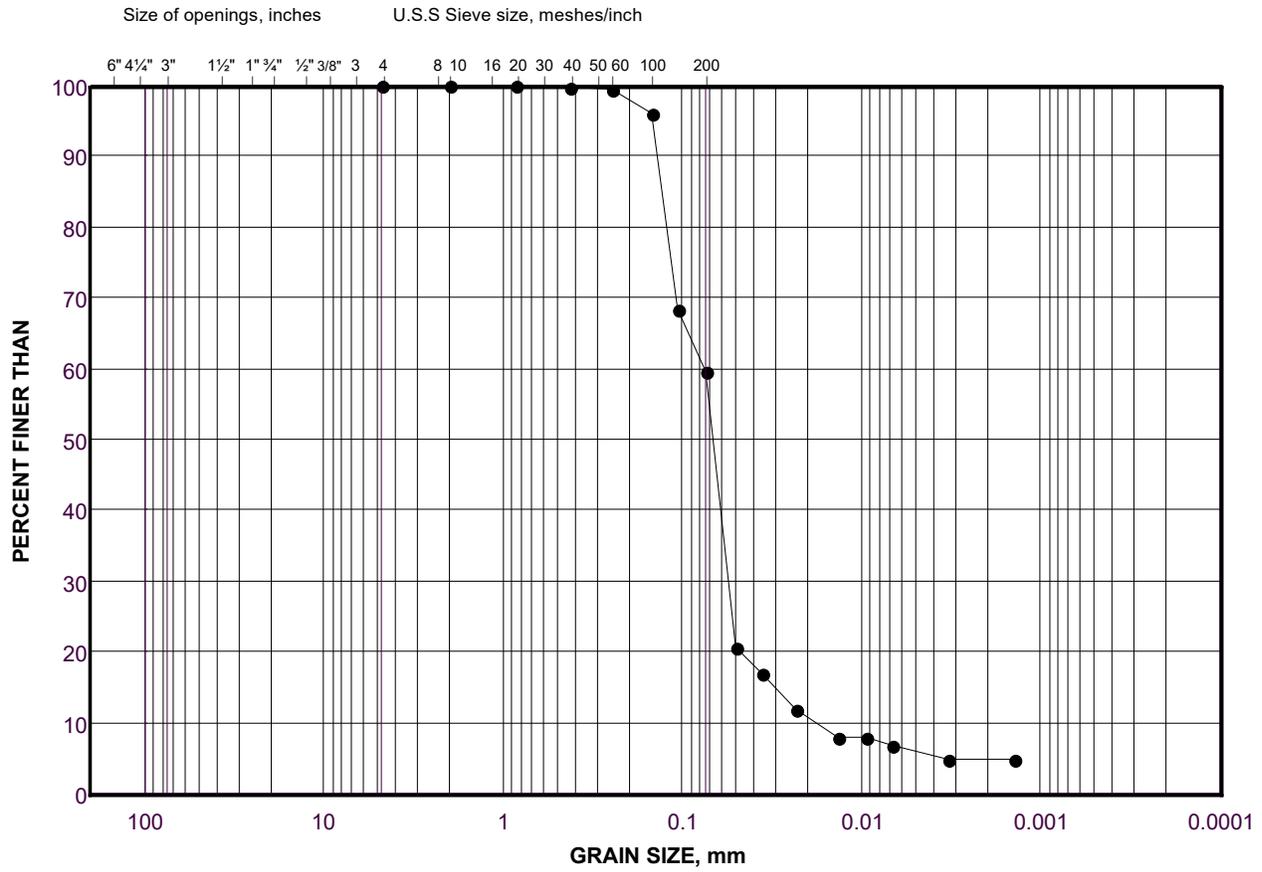
Checked By: *DALL*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
•	C3-16A	

Project Number: CA-WSP-111-53107-10

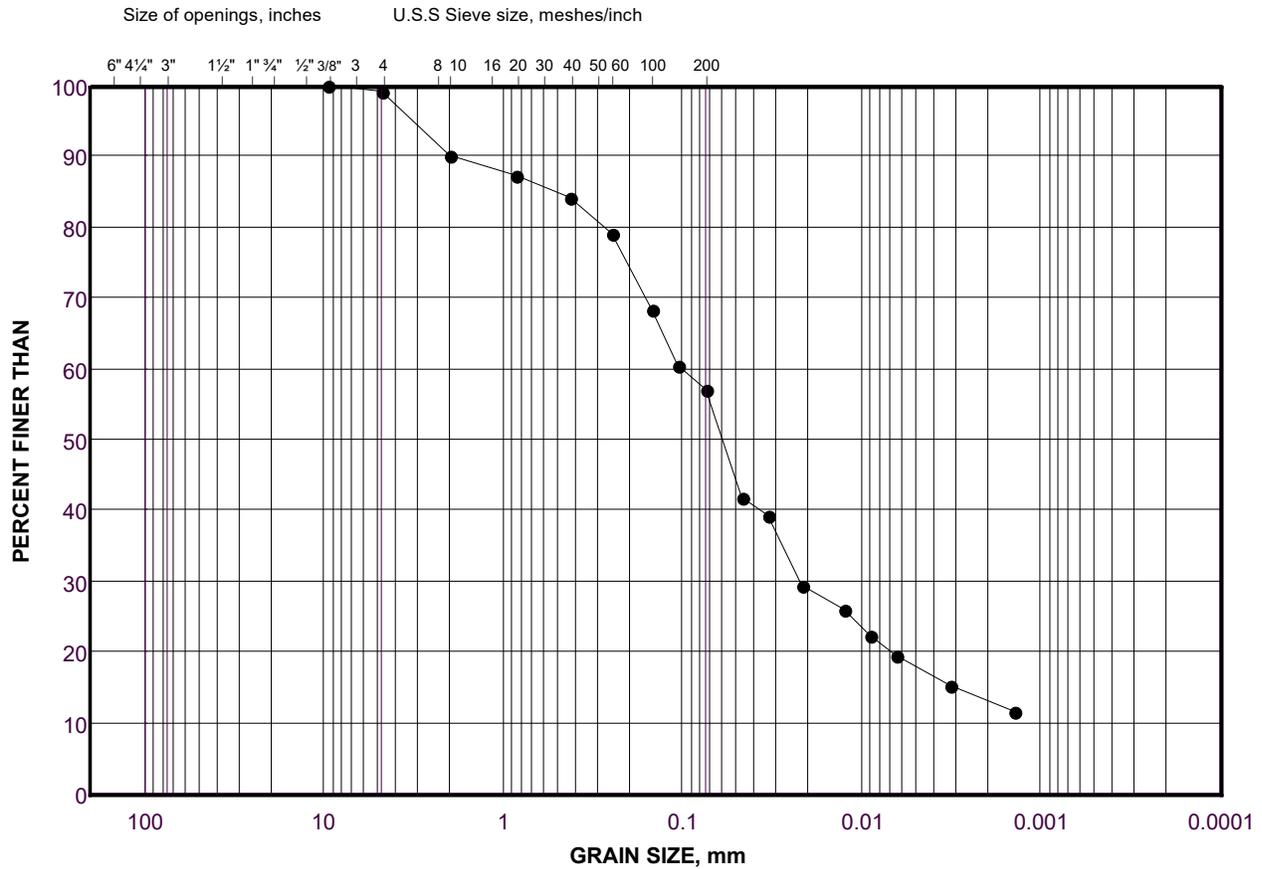
Checked By: *Dall*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL

SAMPLE

DEPTH(m)



C5-19B

Project Number: CA-WSP-111-53107-10

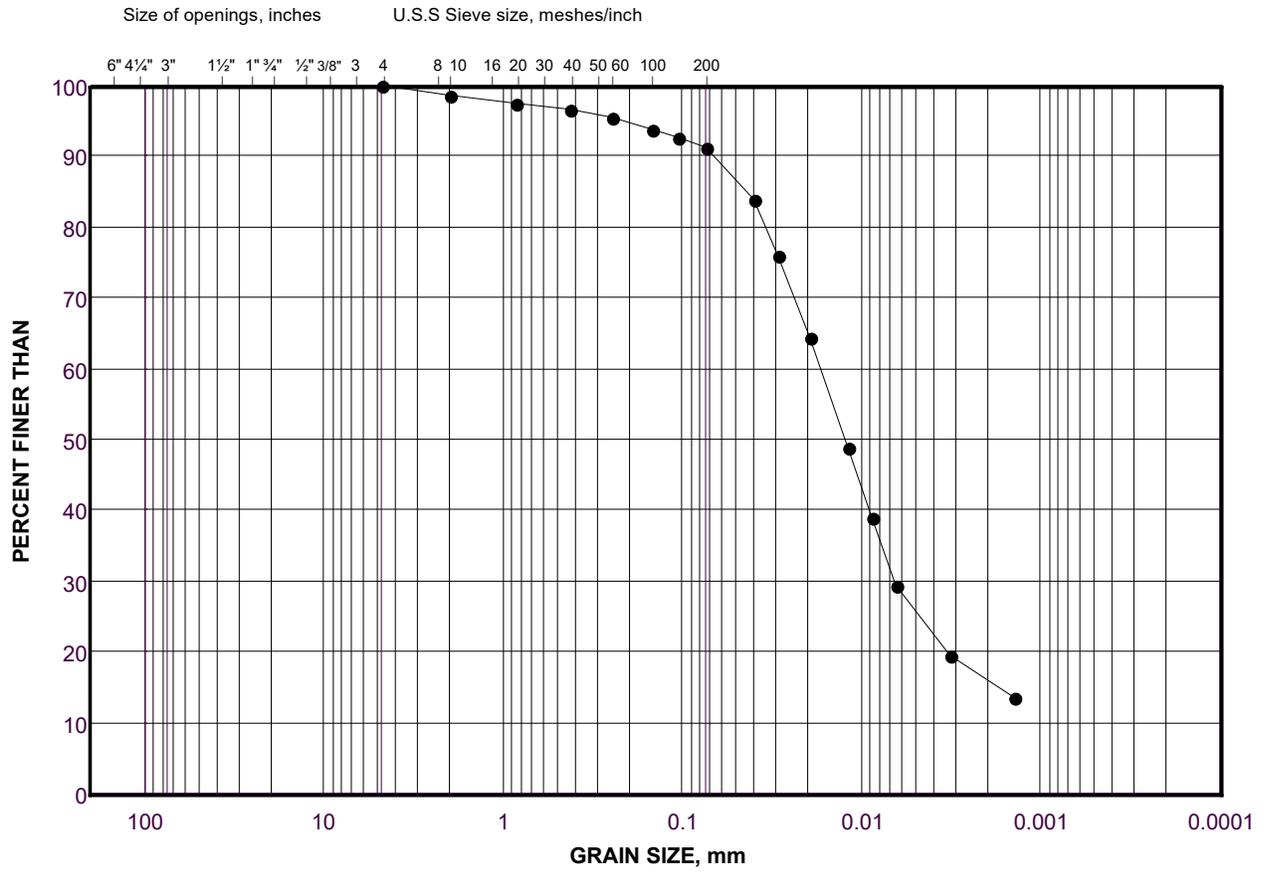
Checked By:

WSP Canada Inc.

Date: 25-Aug-23

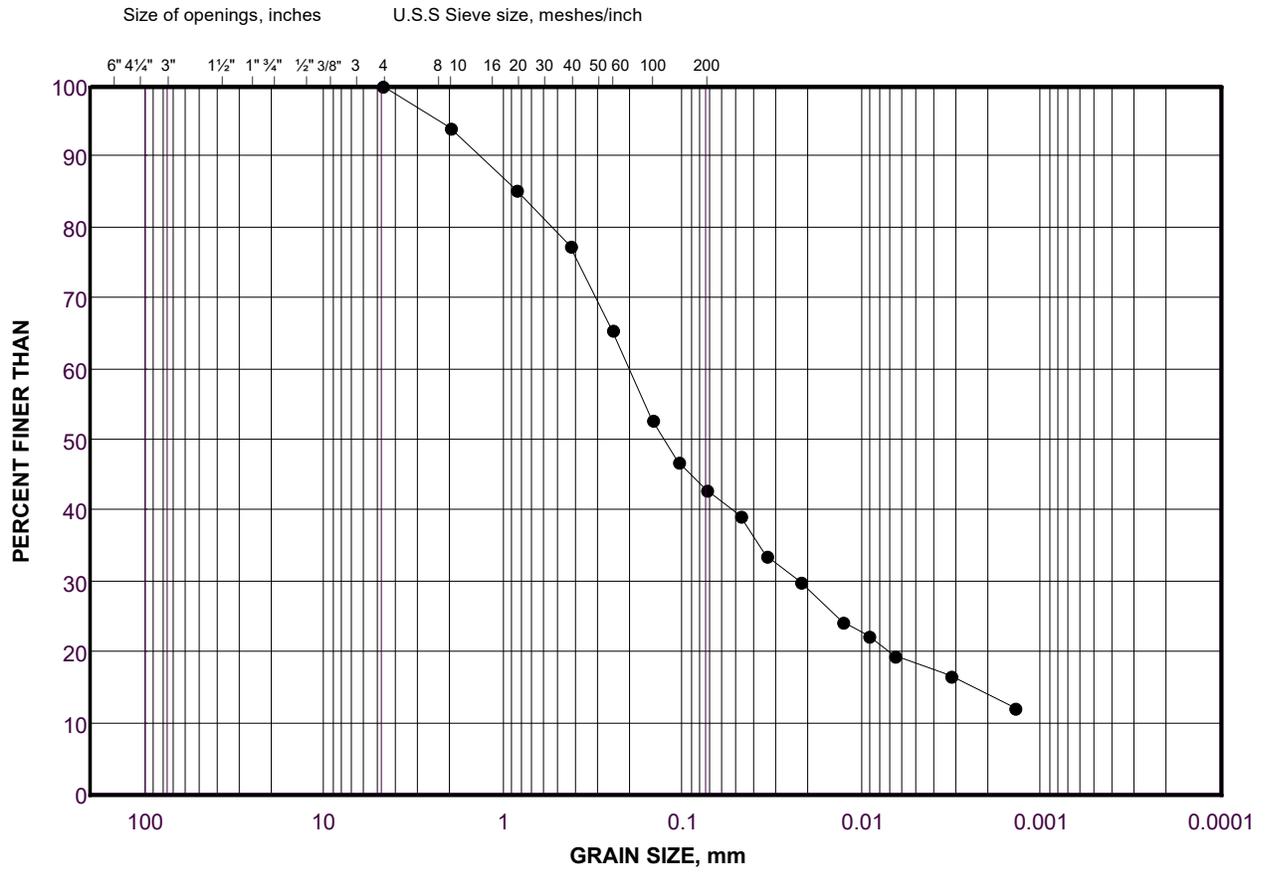
GRAIN SIZE DISTRIBUTION

FIGURE



GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL



SAMPLE

C9-15B

DEPTH(m)

Project Number: CA-WSP-111-53107-10

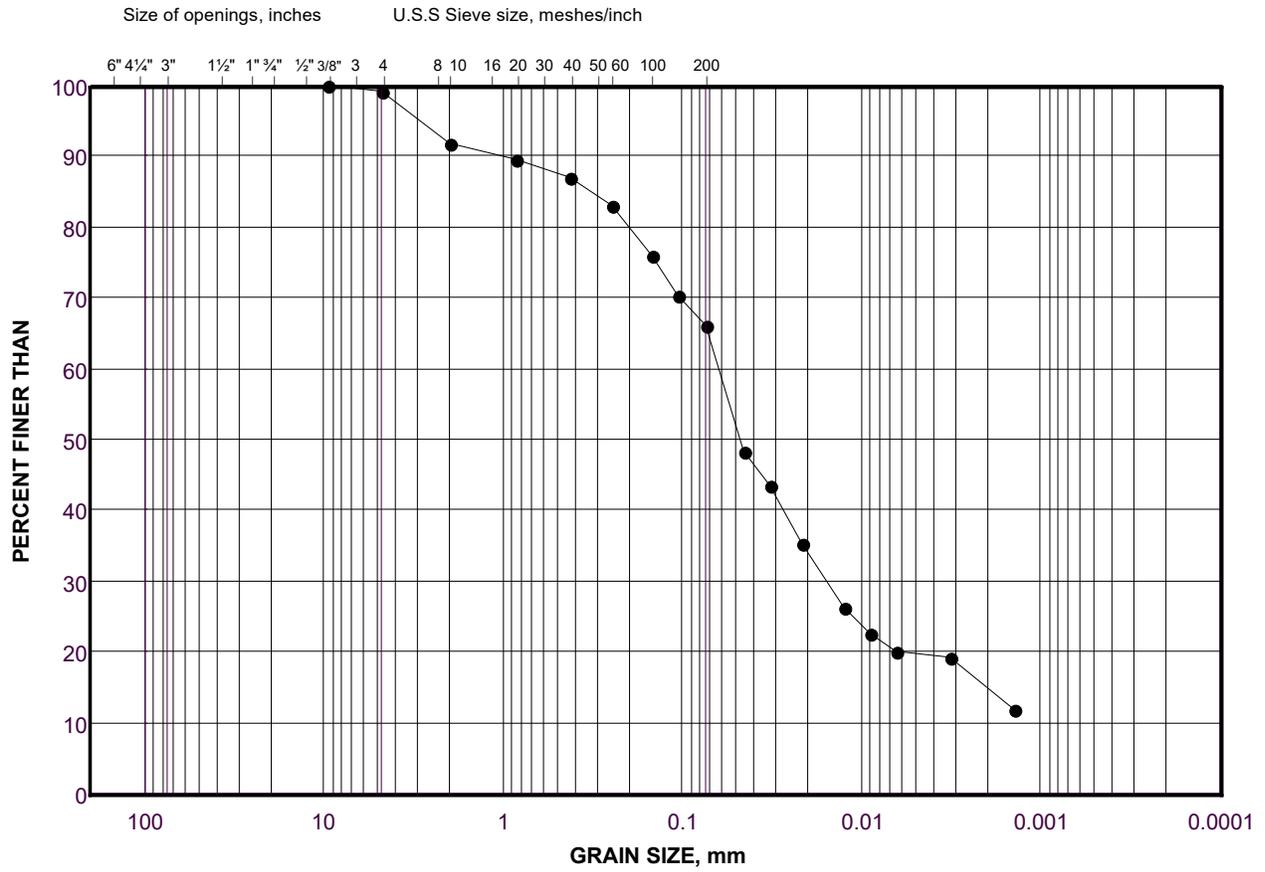
Checked By:

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
●	C10-14	

Project Number: CA-WSP-111-53107-10

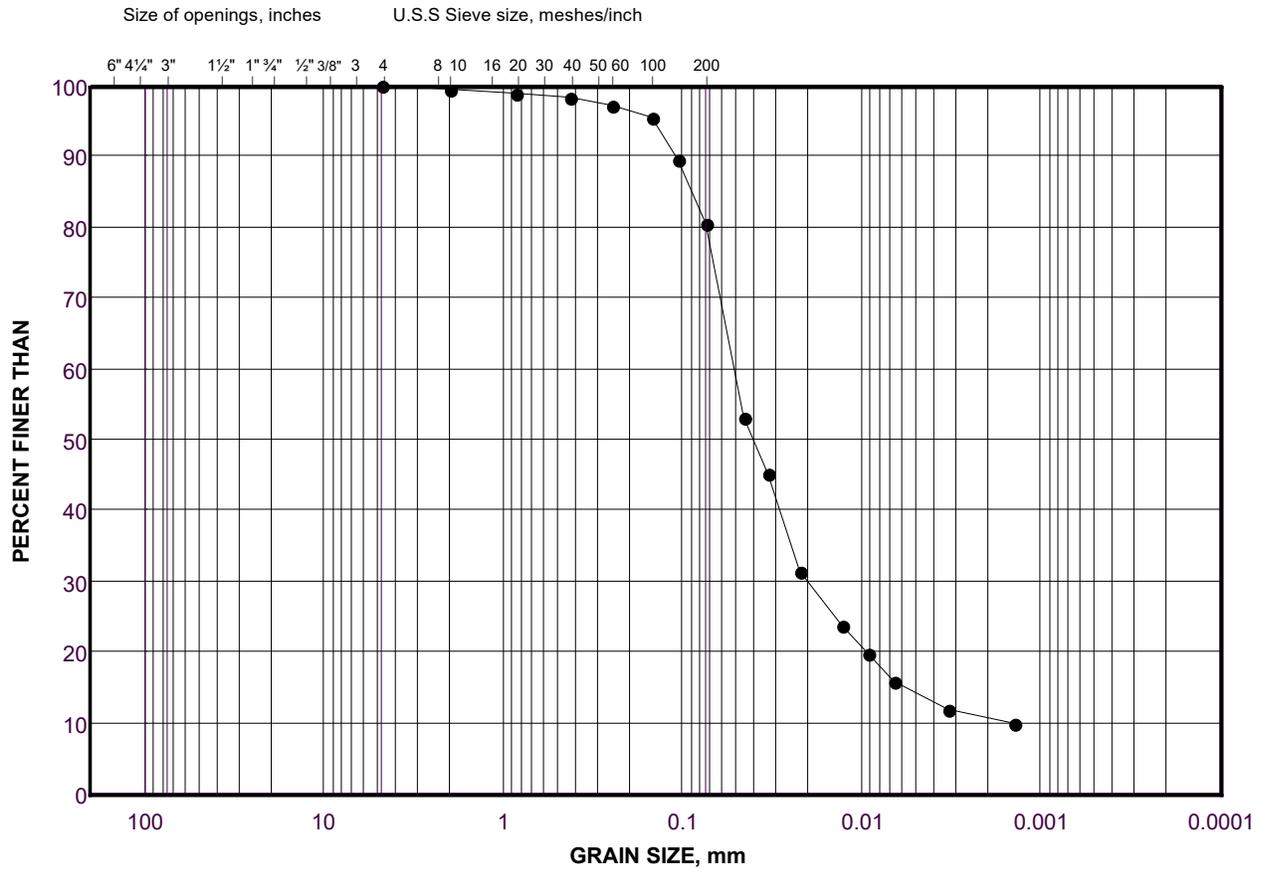
Checked By: *Dall*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
●	C11-6	

Project Number: CA-WSP-111-53107-10

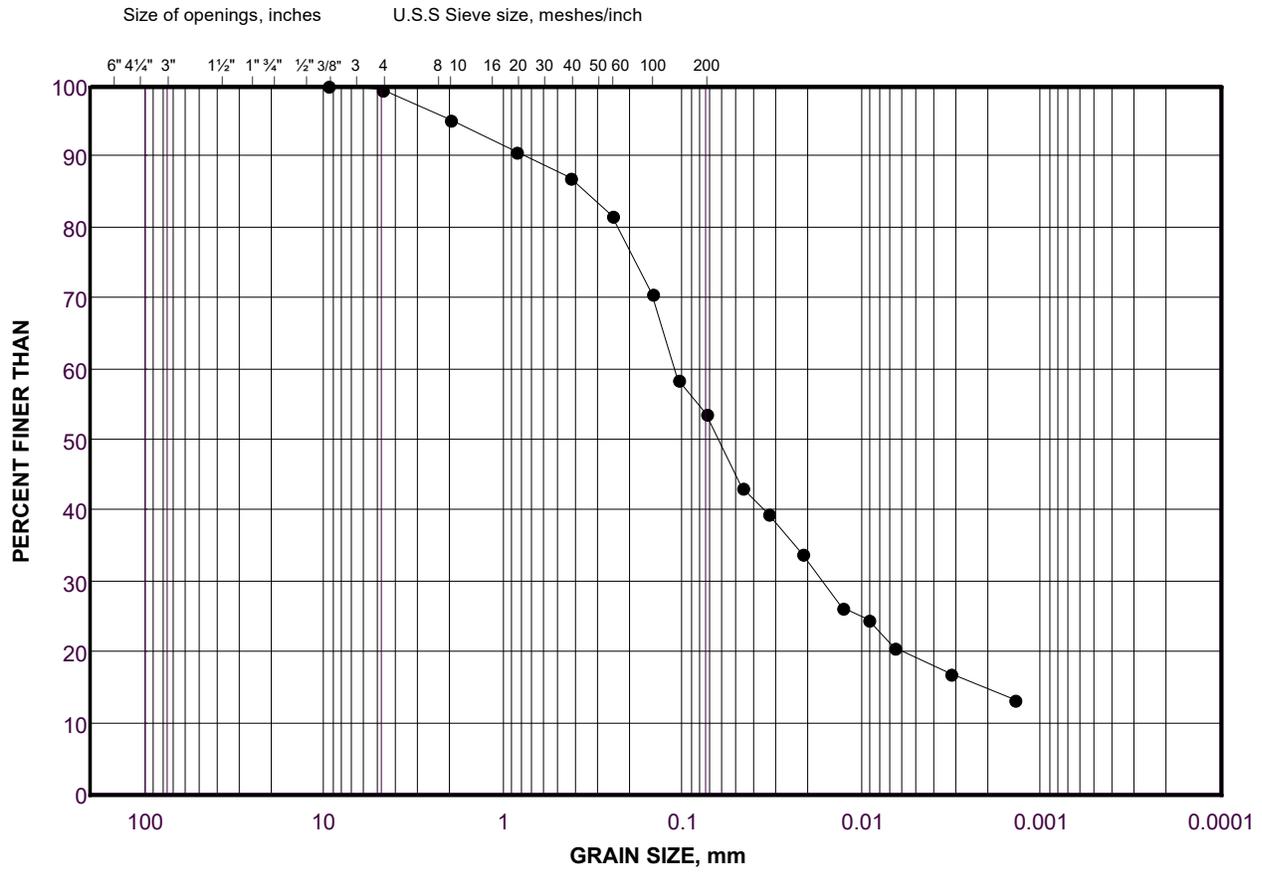
Checked By: *DALL*

WSP Canada Inc.

Date: 25-Aug-23

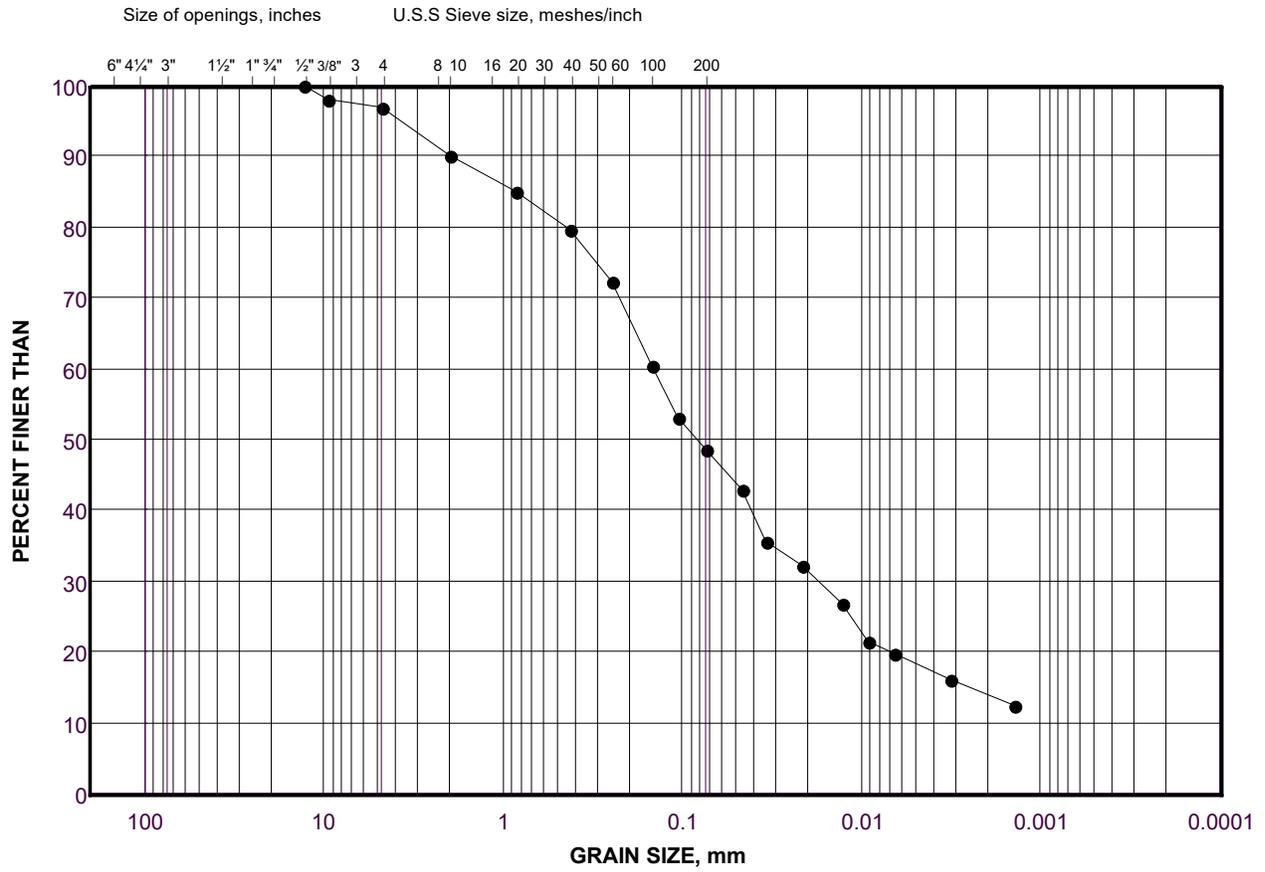
GRAIN SIZE DISTRIBUTION

FIGURE



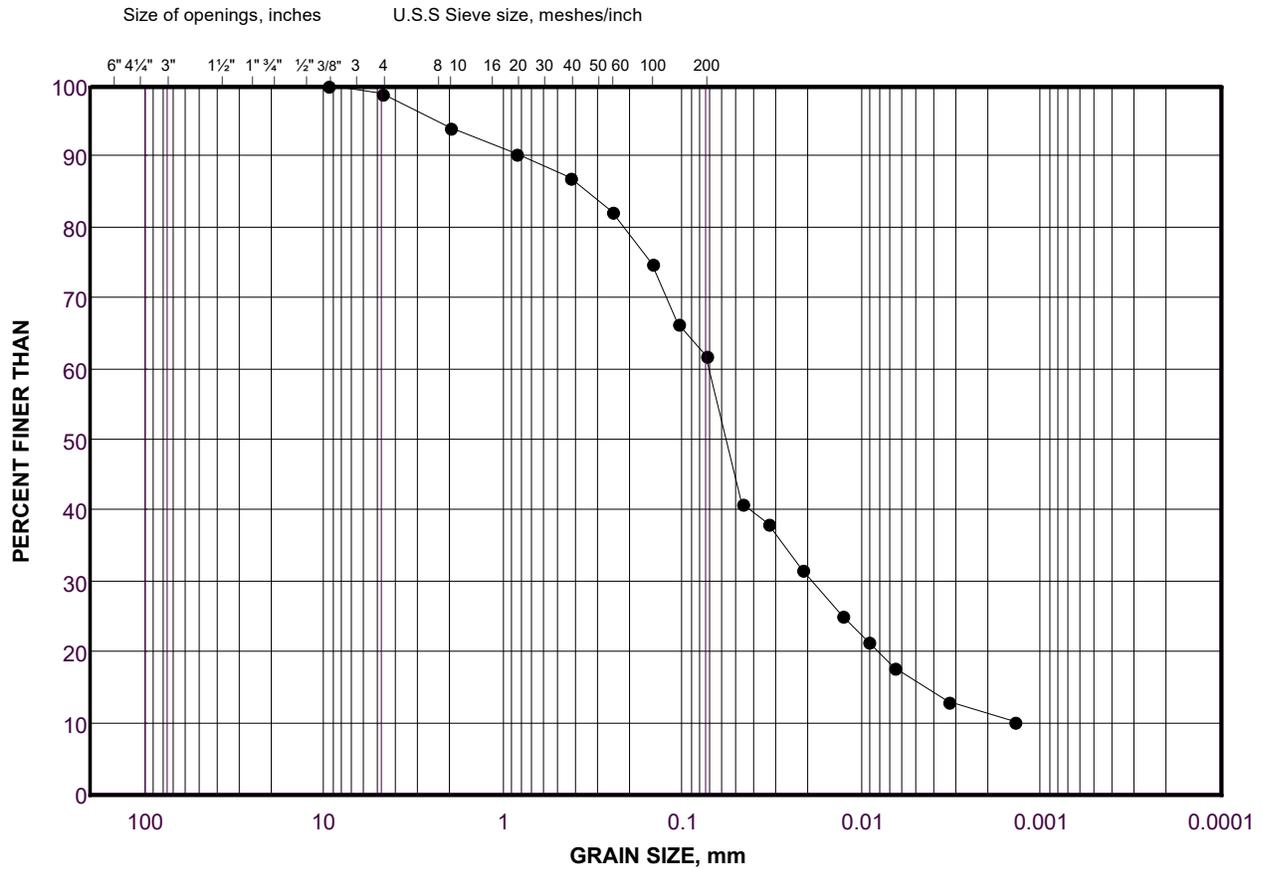
GRAIN SIZE DISTRIBUTION

FIGURE



GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			
SIZE						

LEGEND

SYMBOL

SAMPLE

DEPTH(m)



C13-16 A

Project Number: CA-WSP-111-53107-10

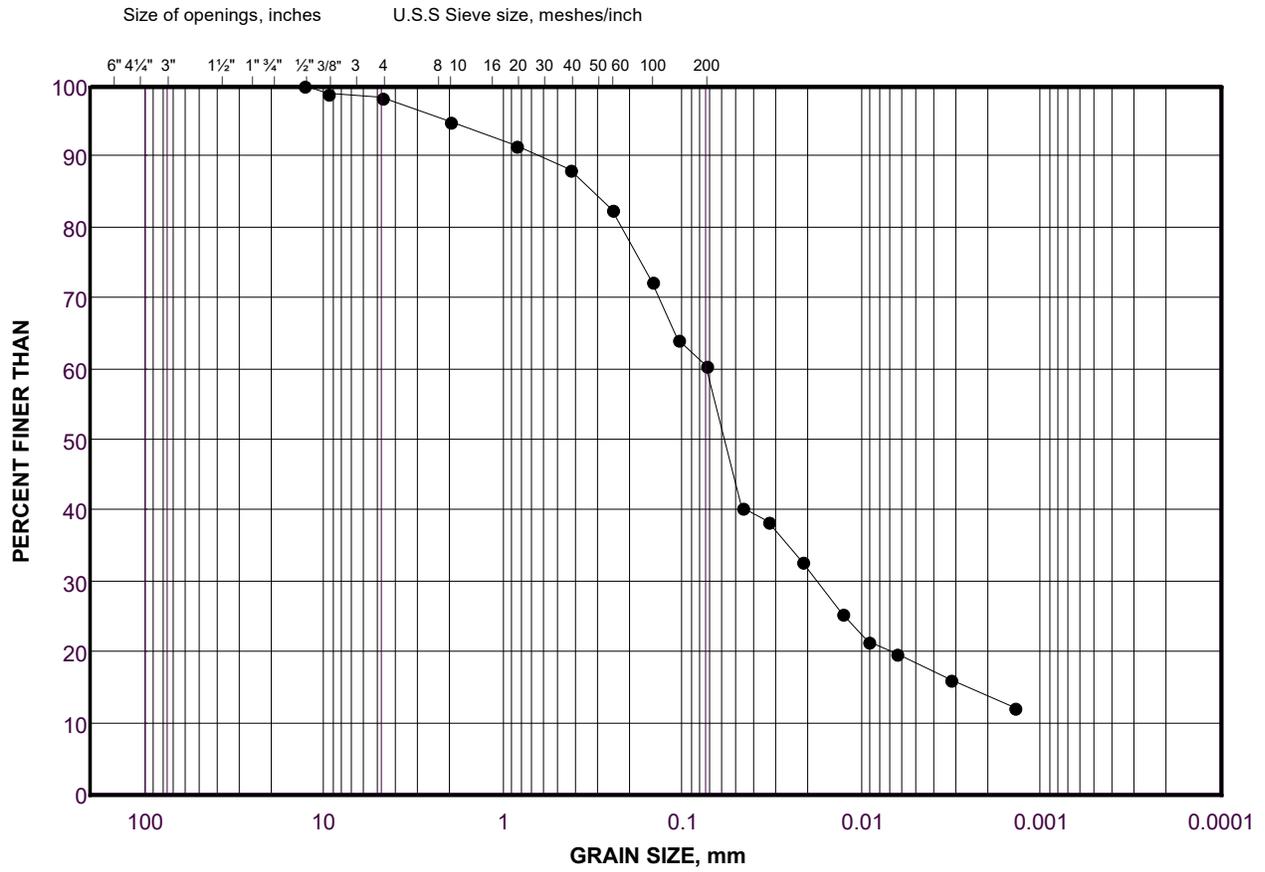
Checked By: *Dall*

WSP Canada Inc.

Date: 25-Aug-23

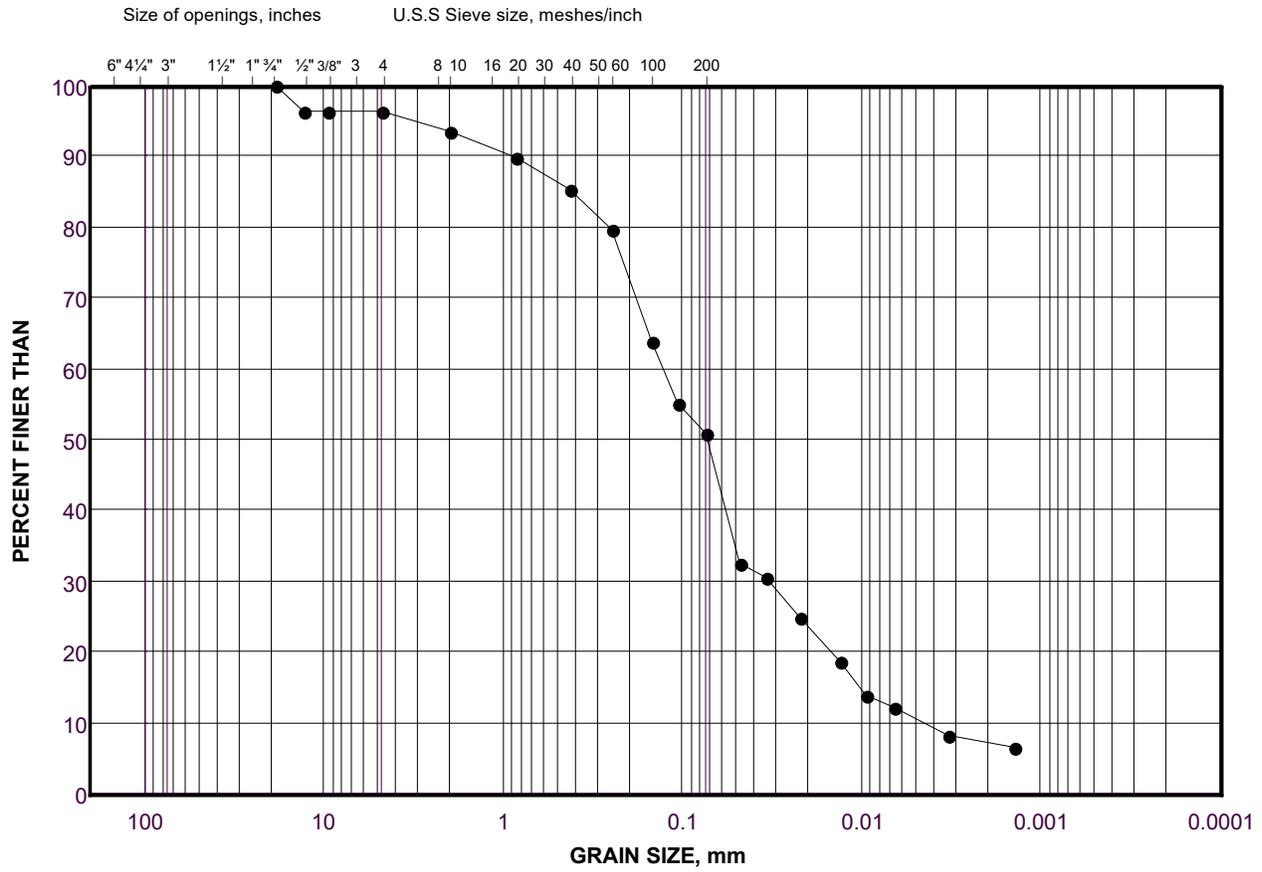
GRAIN SIZE DISTRIBUTION

FIGURE



GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
•	C14-13A	

Project Number: CA-WSP-111-53107-10

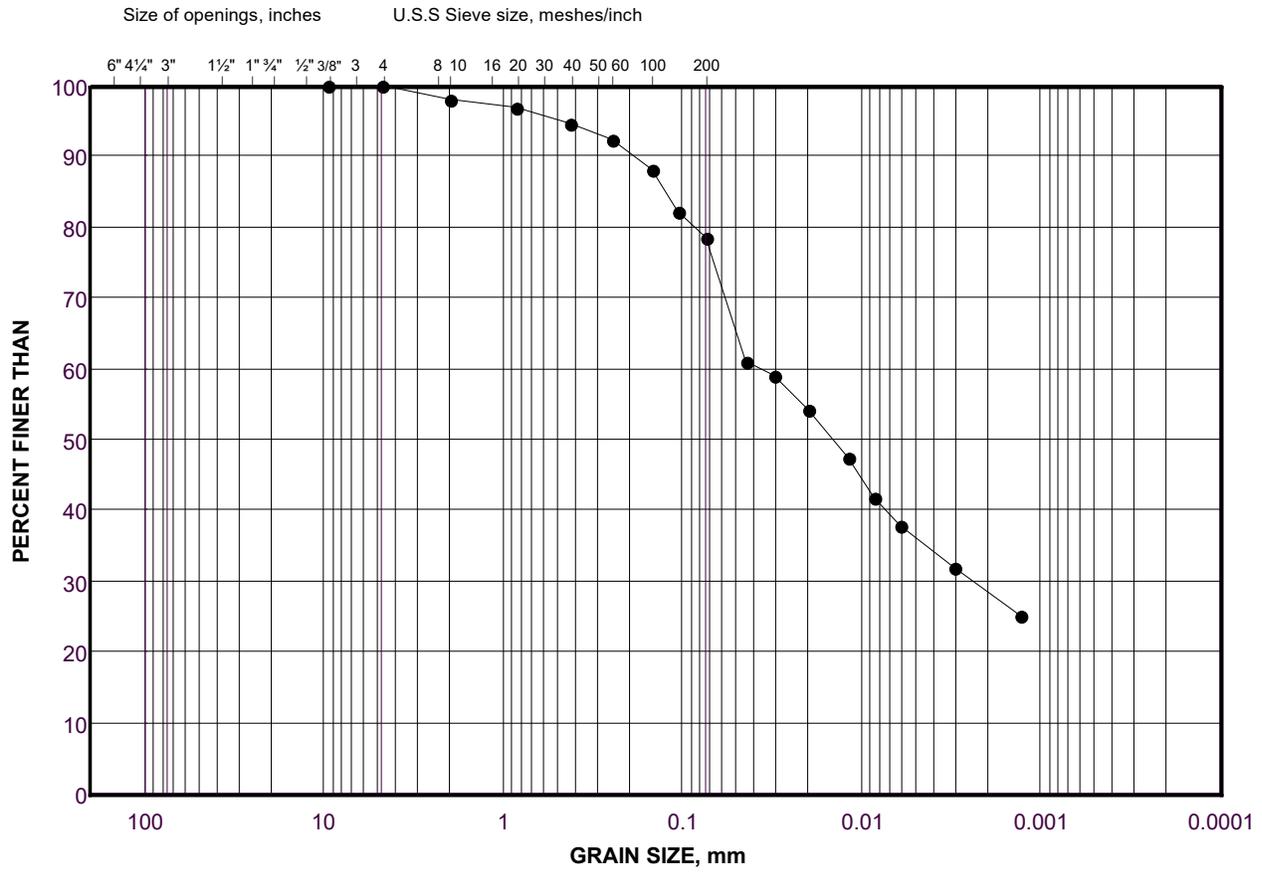
Checked By: *DALL*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL



SAMPLE

C15-10B

DEPTH(m)

Project Number: CA-WSP-111-53107-10

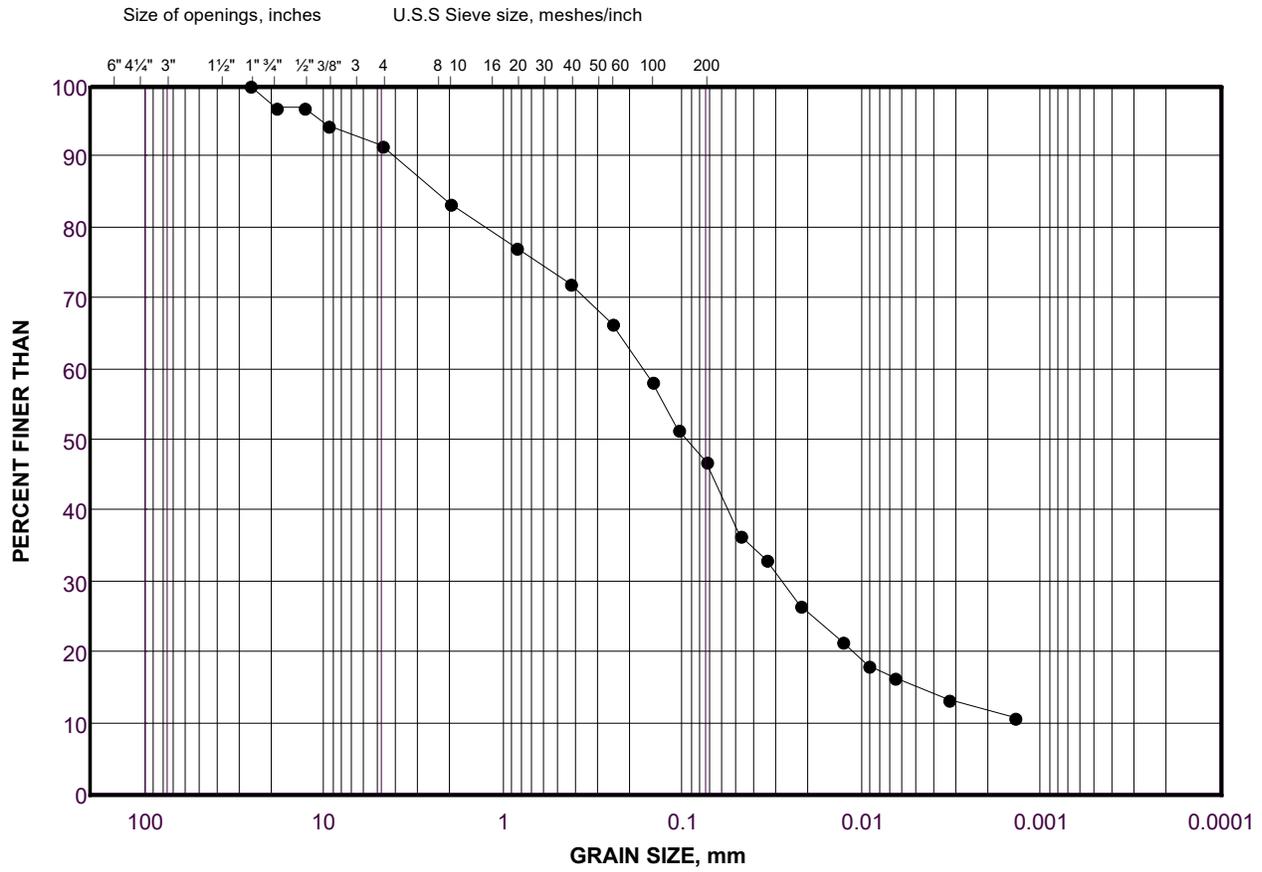
Checked By:

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	SAMPLE	DEPTH(m)
•	C17-7A	

Project Number: CA-WSP-111-53107-10

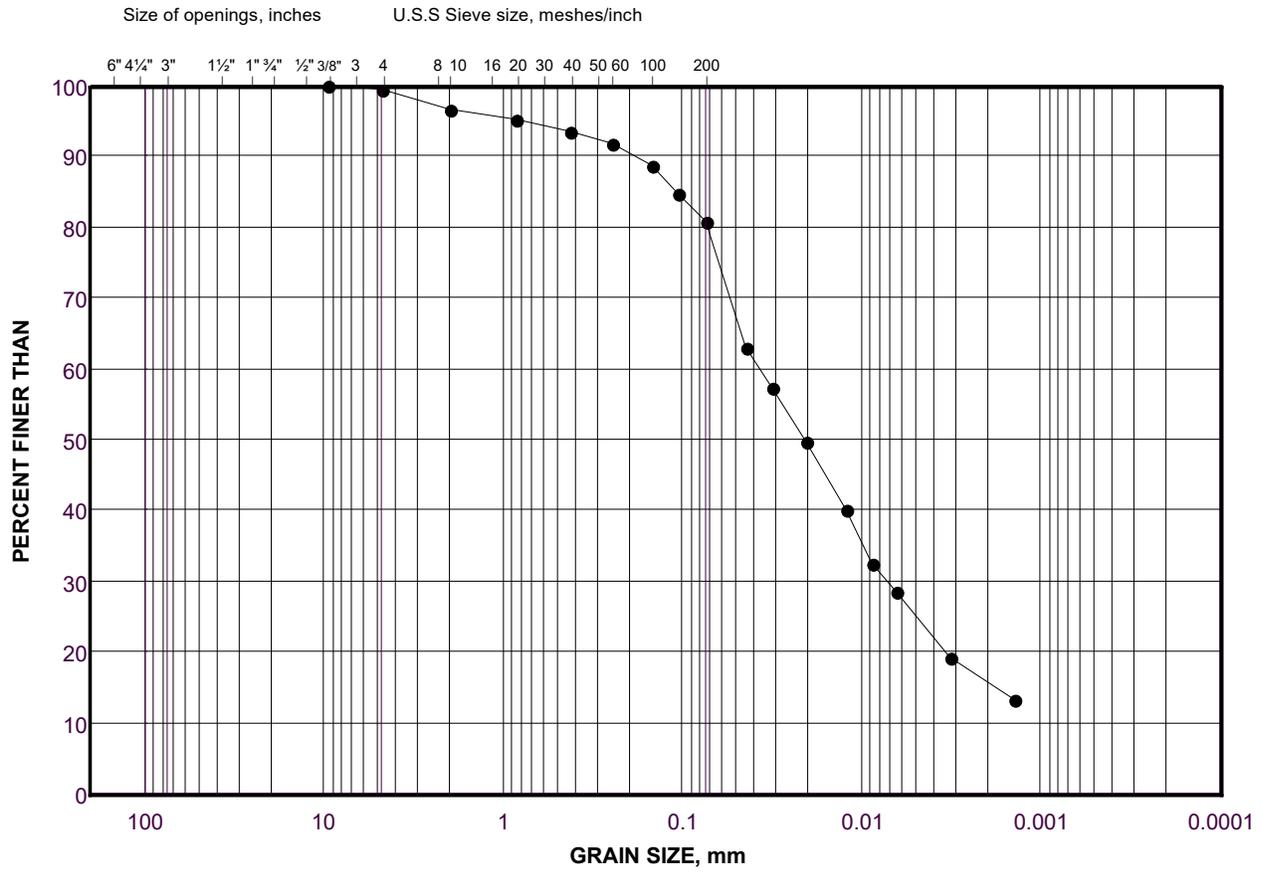
Checked By: *Dall*

WSP Canada Inc.

Date: 25-Aug-23

GRAIN SIZE DISTRIBUTION

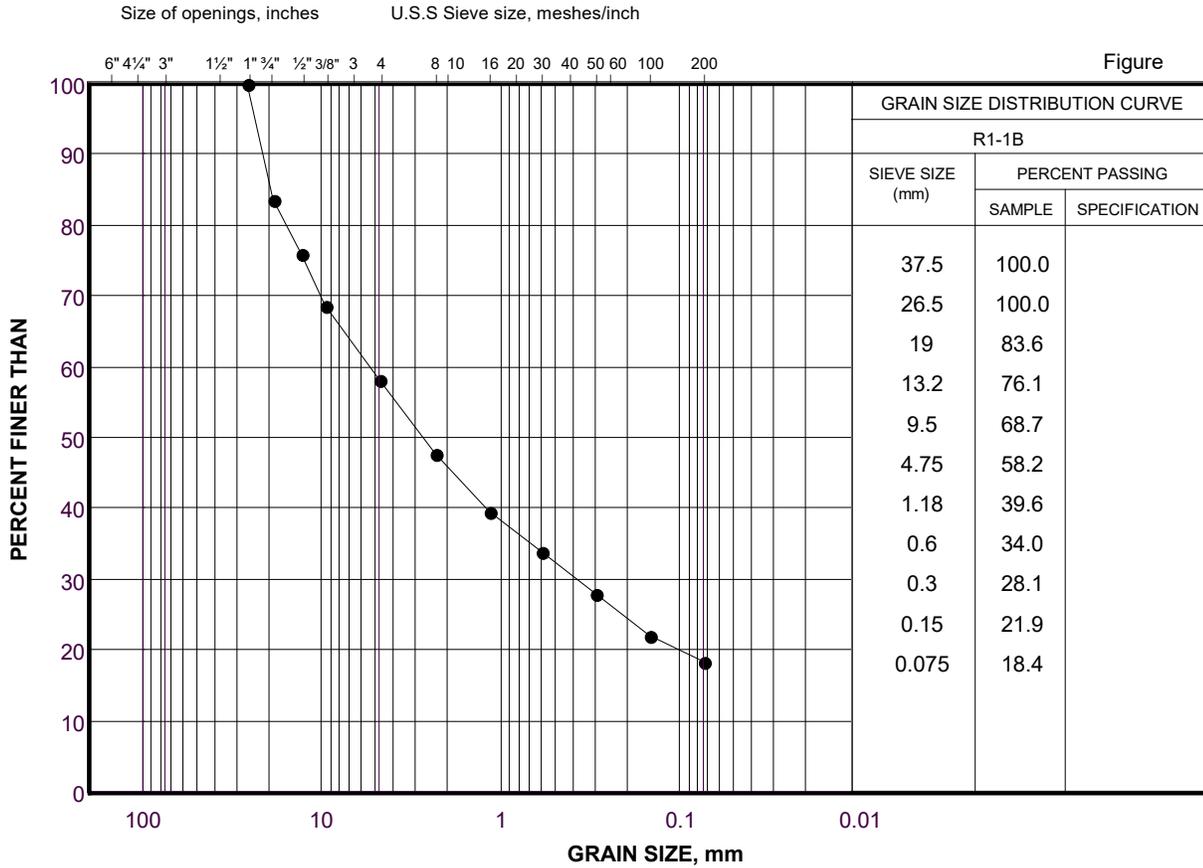
FIGURE





SIEVE ANALYSIS REPORT

Client: Essex Windsor Solid Waste Authority Date: August 24, 2023
 Project Number: CA-WSP-111-53107-10 Name: EWSWA Regional LF Cell 5N Design 2023
 Date Received: July 31, 2023 Date Tested: August 2, 2023
 Source of Material: _____ Lab Sample No.: 23-511
 Type of Material: R1- 1B Intended Use: _____
 Specification Standards: _____
 Remarks: _____



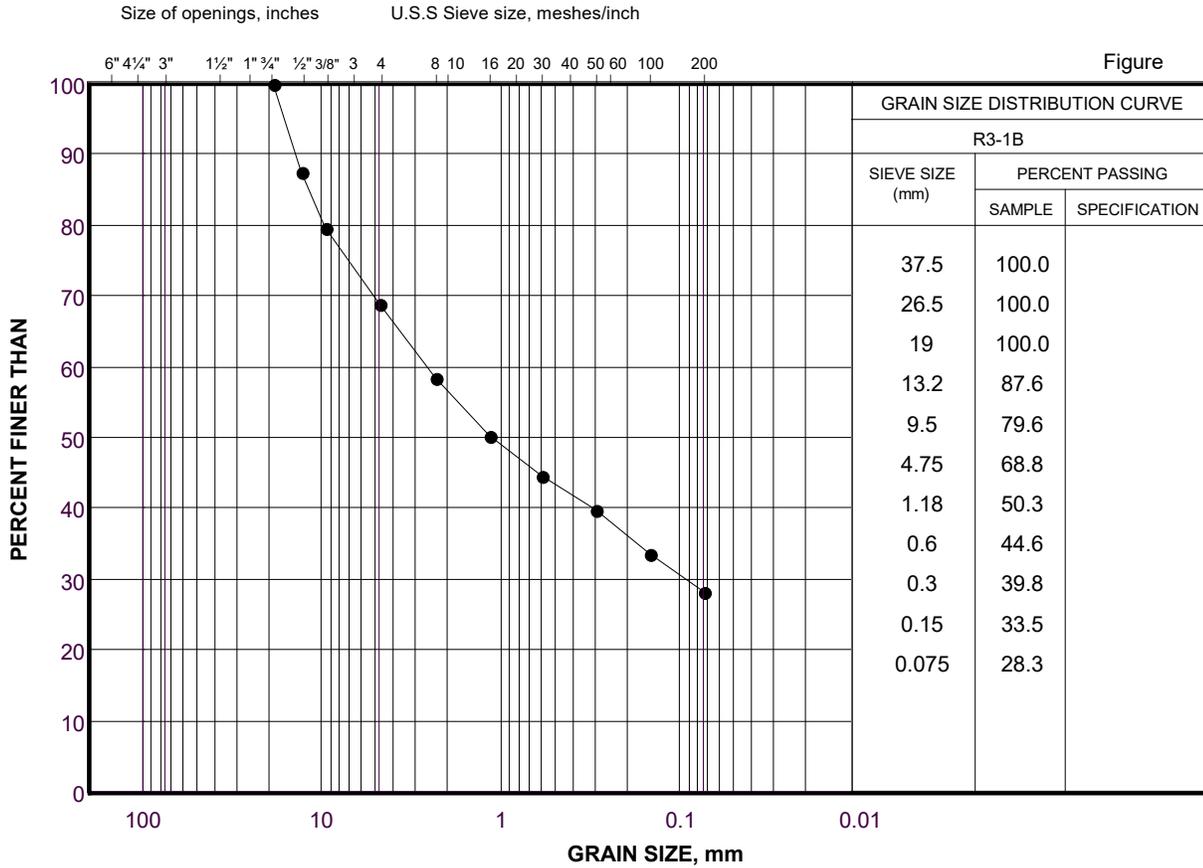
COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	GRAVEL SIZE		SAND SIZE			FINE GRAINED

Dall



SIEVE ANALYSIS REPORT

Client: Essex Windsor Solid Waste Authority Date: August 24, 2023
 Project Number: CA-WSP-111-53107-10 Name: EWSWA Regional LF Cell 5N Design 2023
 Date Received: July 31, 2023 Date Tested: August 2, 2023
 Source of Material: _____ Lab Sample No.: 23-512
 Type of Material: R3-1B Intended Use: _____
 Specification Standards: _____
 Remarks: _____



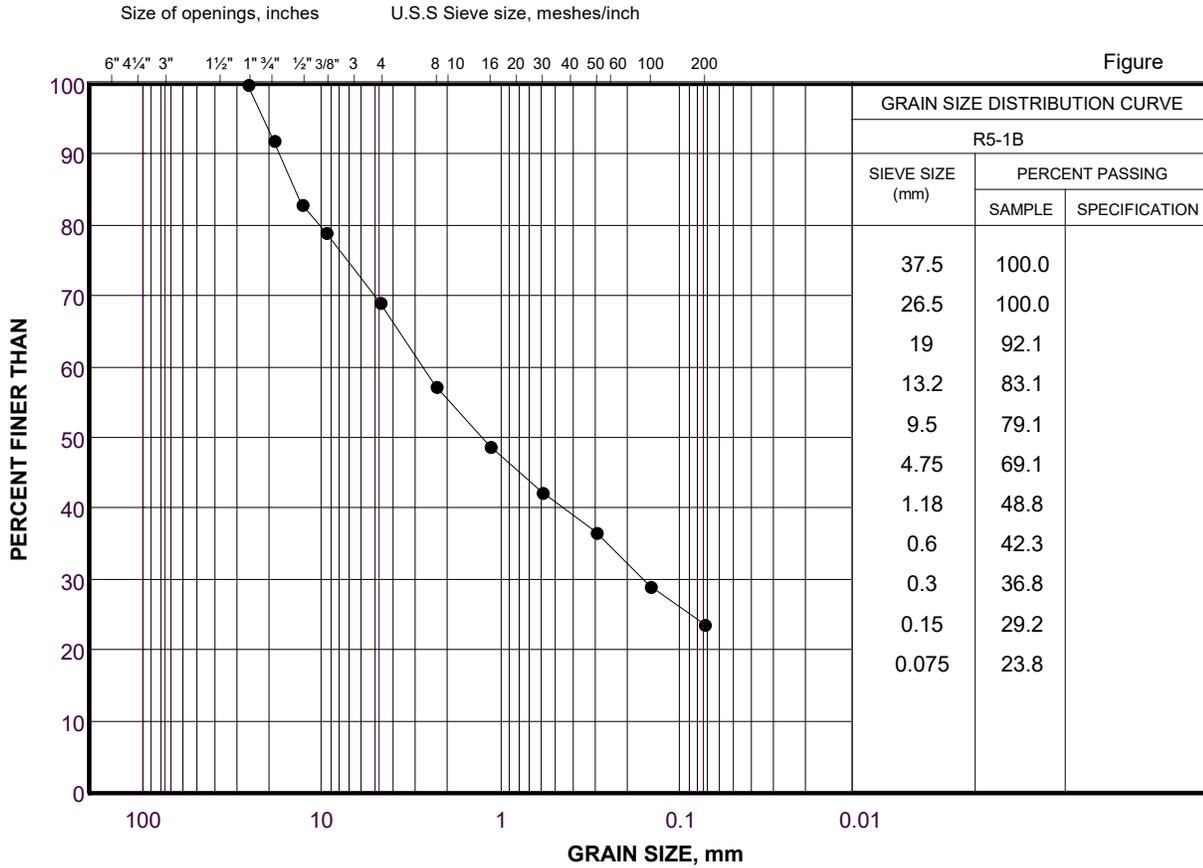
COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	GRAVEL SIZE		SAND SIZE			FINE GRAINED

Dall



SIEVE ANALYSIS REPORT

Client: Essex Windsor Solid Waste Authority Date: August 24, 2023
 Project Number: CA-WSP-111-53107-10 Name: EWSWA Regional LF Cell 5N Design 2023
 Date Received: July 31, 2023 Date Tested: August 2, 2023
 Source of Material: _____ Lab Sample No.: 23-513
 Type of Material: R5-1B Intended Use: _____
 Specification Standards: _____
 Remarks: _____



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
	GRAVEL SIZE		SAND SIZE			FINE GRAINED

D.A.L.



SUMMARY OF WATER CONTENT ¹ / ATTERBERG LIMITS² DETERMINATIONS

¹ASTM D2216 / ²ASTM D4318

PROJECT NUMBER	111-53107-10
PROJECT NAME	EWSWA Regional LF Cell 5N Desigr
DATE	17 August, 2023

Borehole No.	Sample No.	Depth (ft)	Depth (m)	Water Content (%)	Atterberg Limits		
					LL	PL	PI
C6-13A		30.0-31.0	9.14-9.45	19.7	30.0	15.9	14.1
C11		30.0-32.0	9.14-9.75	28.6			
C14-4		7.5-8.5	2.29-2.59	16.7	41.7	19.4	22.3
C14-9				21.8			
C48-A				19.7			



MEMO

TO: Ishrak Hasan, P.Eng. (WSP)
FROM: Radwan Tamr, M.S, P.Eng. (WSP)
SUBJECT: EWSWA Cell 5 North Construction Specifications
DATE: April 10, 2024

The following information is provided as input to the Project Design Specifications and other construction considerations for the project.

1. Sand Management Procedures: The flowing procedures have been used previously at the Site and remain applicable for Cell 5N construction.
 - a. Sand Definition –
 - For the purposes of Site characterization, sand is soil comprised of particles ranging from 0.06 mm to 2 mm in size, as based on the M.I.T. Classification System. At the Essex-Windsor Regional Landfill Site, the sand is typically mixed with finer particle size material, such as silt (0.002 mm to 0.06 mm size) and clay (<0.002 mm size). Sand is occasionally mixed with coarser grained material, such as gravel (>2 mm size). For the purposes of sand management in the Construction Specifications, a sand layer or lens shall contain over 35% sand or relatively coarser particles.
 - b. Detection –
 - The base of the cell excavation shall be examined by a qualified hydrogeologist/geotechnical engineer for visual evidence of sand layers/lenses, and a detailed record of the observations shall be maintained for the record.
 - For detection and/or confirmation of sand layers, boreholes should be advanced within the landfill cell footprint at an approximate 30 m grid or closer spacing if required, as determined by engineering staff. Boreholes should be drilled either to a depth of 10 m below original ground surface where the excavation base is less than 9 m below original ground surface, or to a depth of 1 m below the base of the excavation where the excavation base is greater than 9 m below the original ground surface. Each borehole should be sealed on completion using bentonite grout beyond the extent of the excavation, or recompacted approved clay.
 - c. Removal -
 - Within Permanent Sidewalls: if sand layers or lenses are detected within 2 m of the final sidewall grades during construction, the entire thickness of the sand should be removed to a distance of at least 2 m from the outside sidewalls. In addition, the underlying soil should be over-excavated by 0.5 m vertically below the base of the sand layer/lens, and at least 0.5 m horizontally beyond the extent of the sand. All removed materials shall be replaced by approved recompacted clay to the design elevation.



- Within Cell Floor: if sand layers or lenses are detected within 1 m of the final cell floor grade, the entire thickness of sand should be removed to a maximum depth of 1 m below final cell floor grade. The underlying soil should be over-excavated by 0.5 m vertically below the base of the sand layer/lens (to a maximum of 1 m below final cell floor grade) and at least 0.5 m horizontally beyond the extent of the sand. All removed materials shall be replaced by approved recompacted clay to the design base elevation.
2. Gray Clay Liner Material: Gray clay shall be deemed acceptable by the Geotechnical Engineer before use, based on appropriate QC testing, and clay shall be workable for placement and re-compaction to achieve a minimum hydraulic conductivity of 1E-9 m/s according to the project design standards. Gray clay typical properties are as follows.

PHYSICAL PROPERTY	TEST RESULT
Maximum Dry Density	1,661 kg/m ³ to 1,666 kg/m ³
Optimum Moisture Content	17.2 % to 18.1 %
In-Situ Moisture Content	11 % to 22 %
Liquid Limit	34 % to 42 %
Plastic Limit	17 % to 20 %
Plasticity Index	17 % to 22 %
Percent Gravel	0 % to 1 %
Percent Sand	7 % to 17 %
Percent Silt	39 % to 51 %
Percent Clay	32 % to 54 %

- Gray clay used for recompacted clay construction in Cell 5N shall be placed in maximum 300 mm thick lifts, and shall be recompacted to 95% standard Proctor maximum dry density (ASTM D698), at a moisture content of -1 % to +2 % of optimum, to achieve the target hydraulic conductivity criterion.
 - As placed density, moisture content and hydraulic conductivity shall be verified by sufficient quality control (QC) tests, prior to coverage, all in accordance with the frequency and standards in the Construction Specifications.
3. Manhole Construction Next to Slope: The following recommendations/considerations are provided for proposed manhole construction close to the northern permanent slope.

- Excavations shall be constructed in accordance with the most recent version (O. Reg. 123/08) of the Occupational Health and Safety Act (OHSA). In general, the soils within the slope comprise stiff clay and silt, overlying very stiff to hard glacial till. Thin sand seams may be present. Based on OHSA criteria, and for the purposes of construction, the clay soils may be classified as Type 2. Zones of saturated sand materials may degrade the classification to Type 4 in some sections, unless adequate drainage control and/or dewatering is provided.
 - Based on undrained shear strength data for the firm to stiff clayey soils in the slope (i.e., $c_u = 75$ to 100 kPa approximately), OHSA regulated 1:1 maximum unsupported slopes should not be exceeded, in order to maintain a factor of safety of at least 1.5 against rotational failures and sliding. Flatter slopes or temporary support may be necessary if relatively weak layers, wet layers, erosion or slope undermining occurs at the time of the work. The Contractor should be fully responsible for maintaining safe, stable excavation slopes and working conditions, and full-time geotechnical inspections are required to confirm excavation stability and shoring requirements (if any). In no circumstances shall excavations encroach upon or undermine foundation stability of the existing maintenance building, and appropriate grading, reinforcement and/or drainage measures shall be used to control stability conditions as needed.
 - Stockpiles of excavated materials should be kept at least 10 m from the excavation edges, and equipment shall approach no closer than 3 m, or as otherwise directed by the Geotechnical Engineer.
 - The potential for wet sand layers in the manhole excavation is a concern for erosion, undermining and general slope instability. If wet layers are relatively thin and discontinuous, the effect on overall slope stability should be minor. In this case, groundwater seepage can be managed using filtered sumps within the excavation. The Contractor should use progressive excavation and pumping techniques to maintain dry, stable conditions in the excavation at all times. In the event that thicker layers of wet sand are detected either by pre-construction drilling and/or excavations, or during construction, more aggressive dewatering using well-points should be considered. Dewatering should extend to at least 2 m below the bottom of the manhole subgrade. A specialty dewatering contractor should be engaged to install and operate the systems. The anticipated dewatering rate and duration will depend on final design and construction procedures. The Contractor shall be responsible for facilitating all dewatering requirements, including permits or EASR submissions to complete the work.
 - Backfill placed around the lower $\sim 1/3$ of the manhole shaft, and extending laterally to a maximum of 5 m from the shaft all around, should consist of approved granular material (e.g. SSM or Granular B) compacted in 300 mm maximum lifts to 98 % of SPMDD (per ASTM D698). Suitable native clay may be used in the remainder of the excavation, and should be compacted to 95% SPMDD at a controlled moisture content of -1 % to +2 % of optimum.
4. Cell Dewatering: Relatively minor and temporary seepage from thin sand seams and layers is expected within the cell excavation, and should be controllable using grading, and filtered sumps and pumps. Surface water inflow and runoff can also be controlled in this manner, but preferably it should be directed away from the excavations. To minimize potential problems, the excavation should be graded to promote drainage towards the low end of the cell during construction.

SULZER

Sulzer Pumps

SHOP DRAWINGS FOR APPROVAL



PROJECT NAME: ESSEX-WINDSOR REGIONAL LANDFILL
PROJECT NUMBER: CONTRACT NO. 7 - CELL 4
OWNER: ESSEX-WINDSOR SOLID WASTE AUTHORITY
ENGINEER: WSP INC
CONTRACTOR: SLR CONTRACTING
EQUIPMENT SUPPLIER: SULZER PUMPS WASTEWATER
1401 MEYERSIDE DRIVE UNIT 2
MISSISSAUGA, ONTARIO L5T 1G8

SULZER ABS PROJECT REFERENCE #70486
SUBMISSION NUMBER: SD70486-1
DATE: JUL 20, 2015
REV: 1

	PROJECT No. <u>111-53107</u>
DRAWING REVIEW	
<input checked="" type="checkbox"/> NO EXCEPTIONS TAKEN	DATE <u>Jul 22/15</u>
<input type="checkbox"/> MAKE CORRECTIONS NOTED	REVIEWED BY <u>[Signature]</u>
<input type="checkbox"/> REVISE AND RESUBMIT	SUBMISSION No. <u>2</u>
<input type="checkbox"/> REJECTED/RESUBMIT	
<small>This stamp signifies the review of shop drawings by WSP Canada Inc. for general conformance with the Contract drawings and specifications. Application of this stamp and associated comments do not waive the responsibility of the Contractor to ensure that the supplied products and systems are fabricated, transported, installed, commissioned, tested, and maintained in accordance with the Contract documents and are suitable for purpose, fit based on field measurements, and are in compliance with applicable Codes.</small>	

PROJECT NAME: ESSEX-WINDSOR REGIONAL LANDFILL

PROJECT NUMBER: # CONTRACT NO. 7 - CELL 4

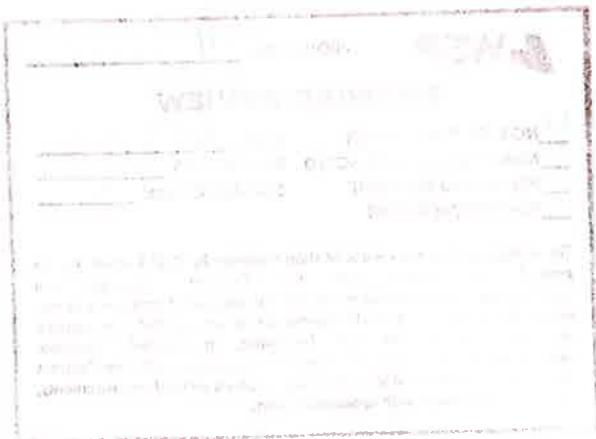
CONTRACTOR: SLR CONTRACTING

OWNER: ESSEX-WINDSOR SOLID WASTE AUTHORITY

ABS REFERENCE #: 70486

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Sulzer Pumps Wastewater Canada Inc
 1401 Meyerside Drive, Unit #2
 Mississauga, Ontario L5T 1G8
 ☎: (905) 670-4677
 📠: (905) 670-3709



SCOPE OF SUPPLY

Project Information

Project Name: ESSEX-WINDSOR REGIONAL LANDFILL - CONTRACT NO. 7 - CELL 4
 Project Number:
 Owner: ESSEX-WINDSOR SOLID WASTE AUTHORITY
 Engineer: WSP INC
 Contractor: SLR CONTRACTING
 ABS Reference # 70486
 Purchase Order # 1525-001
 Date: July 20, 2015
 Revision: 1

Item #	Rev	Qty	Description 1	Part #
1.1	0	2	SULZER ABS SUBMERSIBLE PUMP MODEL XFP101G-CB1.4-PE185/2, 18.5 KW - 3540 RPM, 600/60/3, 20M CABLE EXPLOSION PROOF CLASS 1 DIV 1 GROUP C & D PREMIUM EFFICIENCY MOTOR, CLOSED LOOP COOLING JACKET THERMAL & SEAL LEAK PROTECTION, COMPLETE WITH CONTRABLOCK IMPELLER, DN100 DISCHARGE, DOUBLE MECHANICAL SEALS, VITON PRIMARY SEAL AND ORINGS, IMPELLER/WEAR PLATE HARDENING	TBA
1.2	0	2	GUIDE RAIL ASSY, 4" HD, INT EL	TBA
1.3	0	2	KIT, HRDWR, 8X5/8-11X3, SS, W/GSKT	TBA
1.4	0	2	BRKT, UPPER GUIDE, 2", 304 SS	41686057
1.5	0	4	BRKT, INTER, 2" X 4", 304 SS, 9.56" CL	41686054
1.6	0	2	45FT, 316SS LIFTING CHAIN	64826018
1.7	0	1	GRAB LINK 9/32" ALLOY STEEL	14806053
1.8	0	2	PERFORMANCE TEST, HI, NON-WITNESS	85016003
1.9	0	1	ABS START UP / COMMISSIONING	85016041
2.0	0	2	WARRANTY, 18/1 YEAR FULL	85066034
2.1	0	1	START UP & COMMISSIONING TLSR	81066057
2.2	0	1	CONTROL PANEL COMPLETE WITH: EEMAC 4X, STAINLESS STEEL, 316 GRADE, 575/3/60, DUPLEX, HEAT AND SEAL, 18.5KW COMPLETE WITH: INNER DOOR, MAIN CIRCUIT BREAKER, CO-ORDINATED MOTOR STARTERS, CIRCUIT BREAKER FOR TRANSFORMER, PRIMARY AND SECONDARY FUSING, TRANSFORMER, 3KVA, CONTACTORS, ALTERNATOR, TERMINALS, RUN LIGHTS, HIGH LEVEL LIGHT, H-O-A SWITCHES, ACKNOWLEDGE, TEST AND RESET PUSH BUTTONS, GLOBE WITH FLASHER, 600V/3/60 LIGHTNING ARRESTOR SURGE SUPPRESSOR C/W FUSED PRIMARY, TVSS, TPS TK-ST160-3Y600, AB SOFT STARTER, SMC-3 SERIES, 575V, 23KW, 1000VA UPS- POWERWARE-9130, COMPACT LOGIX 1769-L32E, COMPACT LOGIX 1769-PA2 POWER SUPPLY, COMPACT LOGIX 1769-IA16, COMPACT LOGIX 1769-OW16, COMPACT LOGIX 1769-IF8, 1769-IR6, THREE FLOAT DUPLEX LOGIC- WITH INTRINSICALLY SAFE CIRCUITRY-MANUAL RESET THE ALARM, SUBMERSIBLE PRESSURE TRANSDUCER - 20M CABLE, INTRINSICALLY SAFE BARRIER FOR SUBMERSIBLE PRESS TRANSDUCER, MAGELIS 5.7" COLOR TOUCH CABLE/DC POWER SUPPLY, 200W HOFFMAN BLOWER HEATER, 800F INDUSTRIAL GRADE LED LIGHTS 800F OPERATORS, DRY CONTACTS FOR REMOTE ALARM, POWER FAILURE, CONTROL, ALARM AND DRY CONTACTS, LOW LEVEL ALARM- MANUAL ALARM RESET- AUTO RESET PUMP, PADLOCK HASP, LIGHTING PANEL, GFI DUPI EX RECEPTACLE 15A, CONTROL RELAYS	TBA
2.3	0	2	FLOATS, 65FT	TBA
2.4	0	2	ANTI SWAY RINGS	TBA
2.5	0	1	FLOAT BRACKET, SS	TBA

COMMENTS AND CLARIFICATIONS

Project Information

Project Name:	ESSEX-WINDSOR REGIONAL LANDFILL - CONTRACT NO. 7 - CELL 4
Project Number:	0
Owner:	ESSEX-WINDSOR SOLID WASTE AUTHORITY
Engineer:	WSP INC
Contractor:	SLR CONTRACTING
ABS Reference #	70486
Purchase Order #	1525-001
Date:	July 20, 2015
Revision:	1

Notes:

- TO BE SUPPLIED BY CONTRACTOR*
- Thermal and seal protection are to be connected and operable for warranty
 - Not Included: anchor bolts, guide pipe, increasers, valves, piping, junction box, VFD, water proofing, pipe supports and anchors, metal fabrications, access cover, pipe couplings, wall sleeves, field testing, anything not listed in scope
 - Pump listed above is equipped with single guide bar.
 - Mechanical seals are made of Silicon carbide material.
 - Proposed pumps are not equipped with analogue sensor for temperature monitoring.
 - Proposed pumps are coated with Coal Tar Epoxy 200um on pump and guide rail assembly.
 - The proposed pumps motors are 23kW 26.9fla, not 17.2kW. Overload protect with adjusted in supplied control panel.
 - Motor cooling jackets included to pump out invert pipe without the motor submerged.

18.5

Revision 1

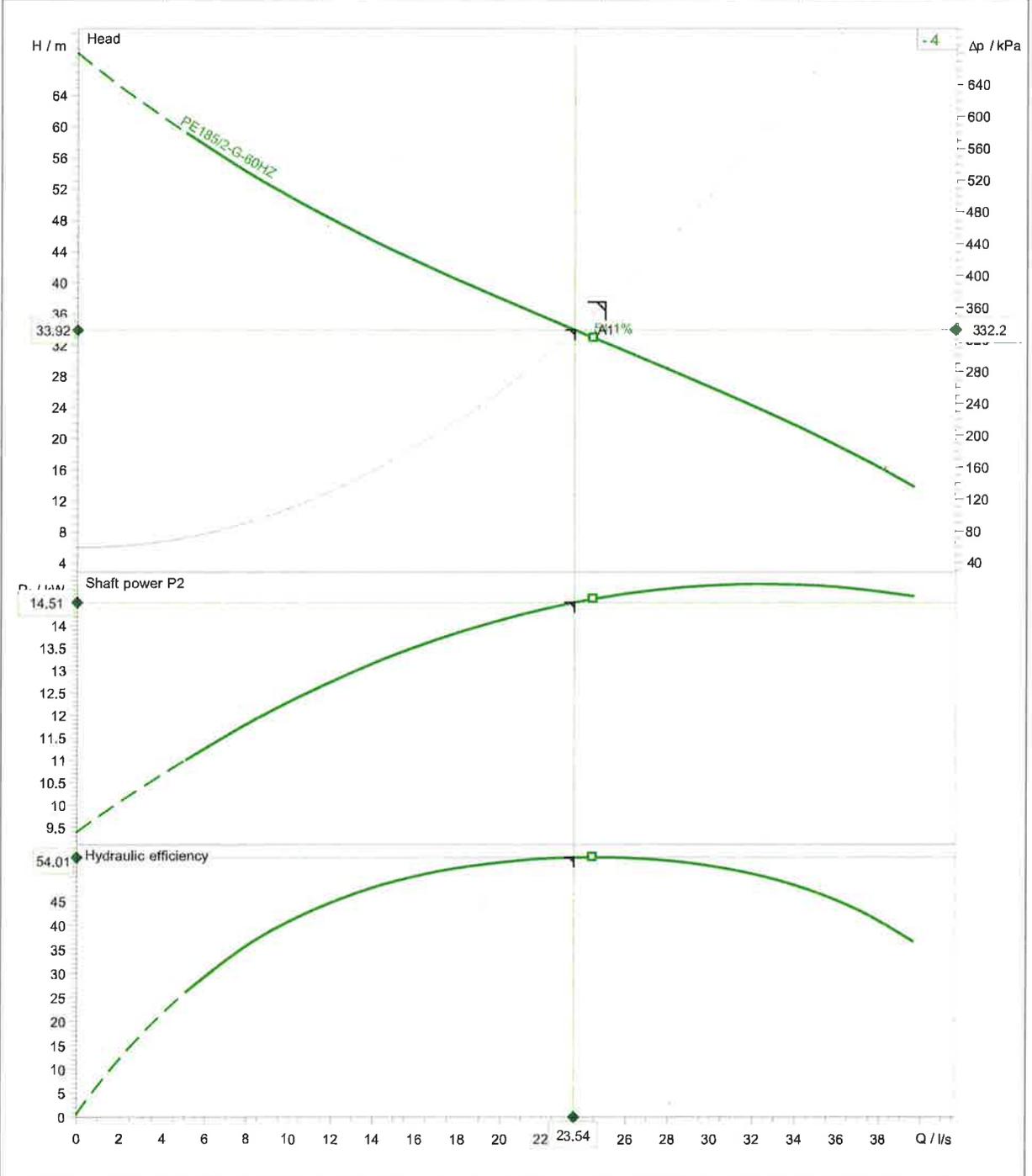
- Motor size changed to 18.5 KW as per Engineer's comments.
- Pump will deliver 23.5 L/s @ 33.9 m TDH.

Curve number	Pump performance curves
Reference curve XFP101G CB1 60HZ	



XFP101G CB1 60HZ

			Discharge DN100	Frequency 60 Hz
Density 998.2 kg/m ³	Viscosity 1 mm ² /s	Testnorm Hydraulic Institute	Rated speed 3560 1/min	Date 7/20/2015
Flow 23.5 l/s	Head 33.9 m	Rated power 14.5 kW	Hydraulic efficiency 54 %	NPSH 0 m

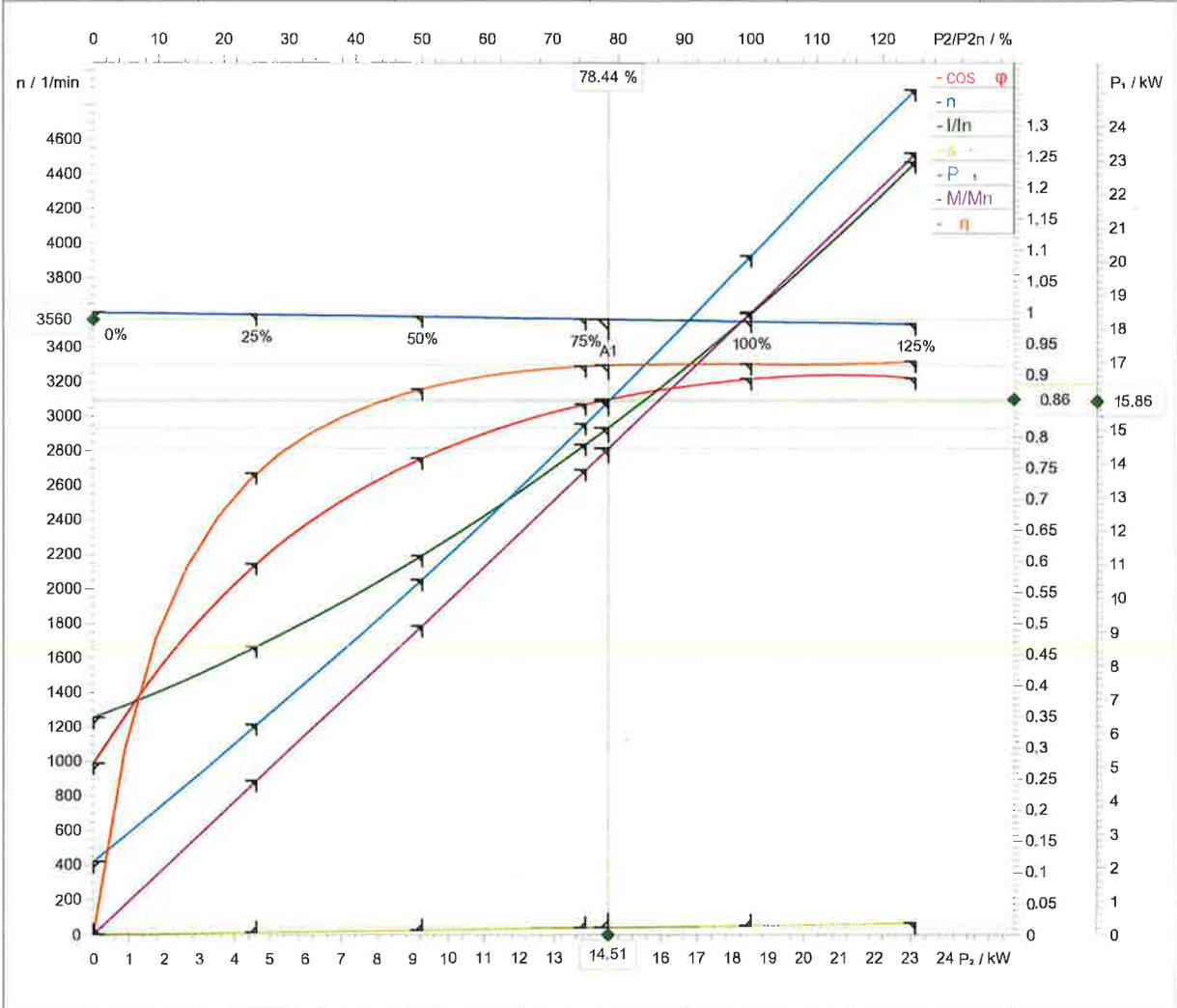


Impeller size 185 mm	N° of vanes 1	Impeller Contrablock impeller, 1 vane	Solid size 50 mm	Revision
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Sulzer reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

Spaix® 4, Version 4.1.5 - 2015/04/08 (Build 932)
Data version Mar-2015

Rated power 18.5 kW	Service factor 1.3	Nominal Speed 3550 1/min	Number of poles 2	Rated voltage 600 V	Date 7/20/2015
------------------------	-----------------------	-----------------------------	----------------------	------------------------	-------------------



Symbol	No loac	25 %	50 %	75 %	100 %	125 %
P_2 / kW	0	4.625	9.25	13.8	18.5	23.12
P_1 / kW	2.169	6.238	10.55	15.1	20.18	25.1
I / A	7.59	10.08	13.26	17.1	21.73	27.02
cos ϕ	0.2751	0.5957	0.7655	0.8524	0.8933	0.894
n / 1/min	3600	3588	3575	3562	3547	3532
s / %	0	0.3372	0.6867	1.063	1.468	1.89
M / Nm	0	12.31	24.71	37.2	49.8	62.52
η / %	0	74.14	87.68	91.35	91.7	92.13

Tolerance according to VDE 0530 T1 12.84 for rated power

Starting current 217 A	Starting torque 153 Nm	Moment of inertia 0.0901 kg m ²	No. starts per hour 15
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TECHNICAL DATA

4" ABS XFP PUMP

XFP 101G-CB1
2 Pole, 3 Phase, PE3

Date: 07/12
Dwg: DS-E01-035 Rev: 2

Submersible Motor Specifications, PE3 Frame

Motor Design	NEMA design B, squirrel cage induction	
Motor Type	Fully enclosed Premium Efficiency submersible, IP68 protection rating	
Motor Efficiency Standard and Rating	IEC 60034-30, IE3 rating	
Motor Efficiency Test Protocol	IEC 60034-2-1	
Insulation Materials	Class H, 180°C (356°F), copper windings	
Motor Filling Medium	Air	
Temperature Rise	Class A	
Maximum Fluid Temperature	40°C (104°F) continuous, 50°C (122°F) intermittent	
Optional Cooling System Included	Closed-loop, non-toxic glycol/water mixture (1/3 / 2/3)	
Motor Protection	Thermal	Normally closed bimetallic switch in each phase, connected in series, 140°C (284°F), +/- 5 °C opening temperature
	Leakage	ABS Seal minder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium	Air	
Bearing Type	Upper	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types	Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*	
Maximum Starts per Hour	15, evenly spaced	
Inverter Duty Rating	Motors meet NEMA MG1, part 31 requirements	
Maximum Submergence	20 meters (65 feet)	
Available Voltages	208, 230, 460, 600	
Voltage Tolerance from Rated	+/-10%	
Agency Approvals	Factory Mutual, CSA	
Explosion Proof Rating	NEC 500 Class 1, Division 1, Group C & D, Class T3C max surface temp	



ABS submersible sewage pump XFP
Part of the ABS EffeX range



Premium Efficiency
without Compromise

*Output filters will be required on VFDs

Motor Ratings, PE3 Frame

Motor Model	Input Power (P1)	Rated Power Output (P2)	Nominal RPM	Rated Voltage	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	NEMA Service Factor	Motor Efficiency at % Load			Power Factor at % Load		
									100	75	50	100	75	50
PE 185/2	20.2 kW	18.5 kW 24.8 HP	3545	208	62.7	625	L	1.3	91.7	91.4	87.7	.893	.852	.766
				230	56.7	565								
				460	28.3	283								
				600	21.7	217								
PE 200/2	21.8 kW	20 kW 26.8 HP	3540	208	67.4	625	K	1.3	91.7	91.8	88.7	.898	.864	.784
				230	61	565								
				460	30.5	283								
				600	23.4	217								
PE 230/2	25.1 kW	23 kW 30.8 HP	3550	208	77.7	816	L	1.3	91.6	90.9	87.4	.897	.859	.784
				230	70.3	738								
				460	35.1	369								
				600	26.9	283								
PE 300/2	32.5 kW	30 kW 40.2 HP	3540	208	101	822	J	1.3	92.4	92.6	88.0	.890	.865	.805
				230	91.6	743								
				460	45.8	372								
				600	35.1	285								



Specifications subject to change without notice
Page 1 of 2



TECHNICAL DATA

4" ABS XFP PUMP

XFP 101G-CB1
2 Pole, 3 Phase, PE3

Date: 07/12
Dwg: DS-E01-035 | Rev: 2

Cable Data, PE3 Frame

Motor	Motor Voltage	Cable Qty	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")		
Power Cable	PE 185/2	208 or 230 volt	1	G-GC 6-3	26.6mm (1.05") diameter	
		460 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter	
		600 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter	
	PE 200/2	208 volt	1	G-GC 4-3	30.2mm (1.19") diameter	
		230 volt	1	G-GC 6-3	26.6mm (1.05") diameter	
		460 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter	
	PE 230/2	600 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter	
		208 volt	1	G-GC 4-3	30.2mm (1.19") diameter	
		230 volt	1	G-GC 6-3	26.6mm (1.05") diameter	
	PE 300/2	460 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter	
		600 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter	
		208 or 230 volt	1	G-GC 2-3	34.1mm (1.34") diameter	
Control Cable	All	Std**	208 or 230 volt	1	SOOW 16/4	10.7mm (0.42") diameter
			460 volt G-GC	1	SOOW 16/4	10.7mm (0.42") diameter
			460 or 600 volt SOOW	Included in Power Cable		
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths			

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table
** See motor protection on page 1.

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges			
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 37mm (1.46") deep [including raised flange face]			
Volute pressure rating	10 bar (145 psi)			
Impeller Type	Semi-open, 1-vane, ContraBlock w/ Seal Protection System (Impeller and bottom wear plate hardened)			
Impeller Size	.1	.2	.3	.4
Solids Passage Size	50mm (2")	50mm (2")	50mm (2")	50mm (2")
Impeller DIA	215mm (8.5")	205mm (8.1")	197mm (7.8")	185mm (7.3")
Min Recommended Flow, GPM	140	130	120	110

Materials of Construction

	Standard	Optional
Motor and Intermediate Housing	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Optional Cooling Jacket	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	Duplex Stainless Steel 1.4470 (AISI 329)*
Volute	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	Duplex Stainless Steel 1.4470 (AISI 329)
Cable Entry Casting	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft	Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware	Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop	Stainless Steel 1.4401 (AISI 316 SS)	
Q-Rings and Cable Glands	Nitrile (Buna-N)	
Tandem	Lower: Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	VITON
Mechanical Seal	Upper: Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal	Nitrile (Buna-N) covered steel	
Coating	Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

* Selected impeller sizes available in stainless steel. Consult factory for specific sizes.

Two part Coal Tar epoxy 200 µm. See Rustoleum Data sheet for details.

General Data

	PE 185/2	PE 200/2	PE 230/2	PE 300/2
Overall Height	1212mm (47.7")	1212mm (47.7")	1212mm (47.7")	1212mm (47.7")
Pump Weight	285 kg (629 lb)	285 kg (629 lb)	285 kg (629 lb)	295 kg (651 lb)



Specifications subject to change without notice
Page 2 of 2

RUST-OLEUM®

HIGH PERFORMANCE INDUSTRIAL COAL TAR EPOXY

DESCRIPTION AND USES

A two-component, high solids polyamide converted epoxy blended with a refined coal tar pitch. Meets Corps of Engineers Specs C-200, C-200A, Steel Tank Institute Corrosion Control System STI-P3, AWWA Spec C210-84, and SSPC-Paint 16.

Designed for use on steel or concrete surfaces in severe industrial or marine environments. Provides outstanding resistance to abrasion, strong chemicals and immersion in fresh or salt water. Not for use in potable water tanks; may impart an odor to liquids. Ideal for use on a variety of surfaces exposed to extremely corrosive environments. Not recommended for exposure to strong acids or immersion in strong solvents.

PRODUCTS

1.25-Gallon Kit

C9578402 Coal Tar Epoxy base component (Full gallon)
C9502504 Coal Tar Epoxy activator (Full quart)

5-Gallon Kit

C9578380 Coal Tar Epoxy base component (Partial fill pail)
C9502402 Coal Tar Epoxy activator (Full gallon)

COMPANION PRODUCTS

RECOMMENDED PRIMERS

C9578 is a self-priming product.

COMPATIBLE PRIMERS

HS9369 or HS9381 Epoxy primers.

PRODUCT APPLICATION

SURFACE PREPARATION

ALL SURFACES: Remove all dirt, grease, oil, salt and chemical contaminants by washing the surface with Pure Strength® Cleaner/Degreaser item #3599402, commercial detergent or other suitable cleaner. Mold and mildew areas must be cleaned with a chlorinated cleaner or bleach solution. Rinse thoroughly with fresh water and allow to fully dry. All surfaces must be dry at time of application.

STEEL: For immersion service, abrasive blasting to a minimum Near White Grade (SSPC-SP-10, NACE 2) with a 2-3 mil (50-75µ) surface profile is recommended for optimal performance. All weld spatter must be removed along weld seams, rough welds should be ground smooth, and all sharp edges should be ground to a smooth radius.

For non-immersion service, abrasive blasting to a minimum Commercial Grade (SSPC-SP-6, NACE 3) with a 2-3 mil (50-75µ) surface profile is recommended for optimal performance. Abrasive blast cleaned steel requires two coats.

PREVIOUSLY COATED: Previously coated surfaces must be sound and in good condition. Smooth, hard, or glossy finishes should be scarified by sanding to create a surface profile. The Rust-Oleum® Industrial Coal Tar Epoxy Finish is compatible with most coatings, but a test patch is suggested. **WARNING!** If you scrape, sand or remove old paint, you may release lead dust. **LEAD IS TOXIC.** Contact the U.S. EPA/Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead.

CONCRETE AND MASONRY (IMMERSION): Hand or power tool clean to remove all loose or unsound concrete, masonry, or previous coating. Very dense, non-porous concrete should be acid etched or abrasive blasted to remove the laitance layer and create a surface profile of 1.5-3 mils. Allow new concrete to cure for 30 days before coating.



PRODUCT APPLICATION (cont.)

APPLICATION

Apply only when air and surface temperatures are between 50-100°F (10-38°C) and surface is at least 5°F above dew point. For immersion service and severe environments, a total dry film thickness of 16-20 mils is required. It is strongly recommended this be achieved as a two-coat application of 8-10 mils per coat. Conventional or airless spray preferred.

EQUIPMENT RECOMMENDATIONS

BRUSH/ROLLER: For small touch-up or striping of weld seams.

CONVENTIONAL SPRAY: Pressure pot with dual regulator, minimum 3/8 inch I.D. fluid hose not greater than 50 feet in length. Use a 0.086 inch I.D. fluid tip with the appropriate air cap. Thin as needed up to 16% with 160 Thinner for all air atomized spray applications.

AIRLESS SPRAY:

Pump Ratio	Pump Output	Fluid Hose
30:1	3.0 GPM	1/2 inch I.D.
Fluid Pressure	Fluid Tip	Filter Mesh
2,100-2,500	0.023-0.035	30

THINNING

Normally not necessary. If desired, thin as needed up to 16% with 160 Thinner.

MIXING

Power mix base component before adding activator, then combine at a 4:1 ratio by volume and power mix together. Thoroughly mix for at least two minutes. Note: both components will thicken in viscosity when cold. The material should be warmed to room temperature before mixing for best results.

CLEAN UP

160 Thinner or MEK

PERFORMANCE CHARACTERISTICS

TABER ABRASION

METHOD: ASTM D4060, CS-17 wheels, 1,000 gram load, 1,000 cycles

TEST SAMPLE: Blast cleaned steel, 2 coats of material

RESULT: 130 mg. loss

PULL OFF ADHESION

METHOD: ASTM D4541

TEST SAMPLE: Blast cleaned steel, 2 coats of material

RESULT: >1,400 psi (pneumatic)

IMPACT RESISTANCE (direct)

METHOD: ASTM D2794, Gardner Impactor (1/2 inch diameter)

TEST SAMPLE: Blast cleaned steel, 2 coats of material

RESULT: 100 in.-lbs.

SALT FOG EXPOSURE

METHOD: ASTM B117, 2,000 hour exposure

TEST SAMPLE: Blast cleaned steel, 2 coats of material

RESULT: No blistering, rusting or delamination. No measurable undercutting at scribe.

For chemical and corrosion resistance, see the Rust-Oleum Industrial Brands Catalog (Form #206275).



PHYSICAL PROPERTIES

		COAL TAR EPOXY
Resin Type		Polyamide converted epoxy blended with refined coal tar
Solvents		Xylene, methanol
Weight*	Per Gallon	10.6-11.3 lbs.
	Per Liter	1.3-1.4 kg.
Solids*	By Weight	77%
	By Volume	74 ± 2%
Volatile Organic Compounds*		222 g./l. (1.8 lbs./gal.), as supplied 309 g./l. (2.6 lbs./gal.), when thinned 16% (20 oz./gal.) 327 g./l. (2.7 lbs./gal.), when thinned 20% (25 oz./gal.)
Recommended Dry Film Thickness (DFT) Per Coat		8-10 mils (200-250µ), minimum Coating may be applied up to 20 mils (500µ) DFT
Wet Film to Achieve DFT		11-13 mils (275-325µ), coating may be applied up to 27 mils (625µ) wet
Theoretical Coverage at 1 mil DFT (25µ)		1,186 sq. ft./gal. (29.2 m ² /l.)
Practical Coverage at Recommended DFT (assumes 15% material loss)		100-126 sq. ft./gal. (2.5-3.1 m ² /l.)
Mixing Ratio		4:1 base to activator by volume
Induction Period		None
Pot Life @ 70-75°F (21-24°C)		3 hours
Dry Times at 70-80°F (21-27°C) and 50% rel. hum.	Tack-free	3-4 hours
	Handle	18-36 hours
	Recoat	Before 24 hours (If recoat time is exceeded, brush blast surface of previous coating to create a surface profile)
Force Cure		2 hours at 225°F (107°C)
Dry Heat Resistance		350°F (177°C), color shift may occur above 150°F (65°C)
Shelf Life		12 months, both components
Safety Information	Flash Point	70°F (24°C), Setflash
	Contains	No lead has been deliberately added
	Warning!	FLAMMABLE LIQUID AND VAPOR. VAPOR HARMFUL. MAY CAUSE CANCER. HARMFUL IF INHALED. CAUSES EYE AND SKIN IRRITATION. POISON. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. MAY CAUSE ALLERGIC SKIN AND RESPIRATORY REACTION. IN CONFINED AREAS WORKERS MUST WEAR FRESH AIRLINE REPSIRATORS. USERS SHOULD WEAR GLOVES AND PROTECTIVE CLOTHING. FOR INDUSTRIAL OR COMMERCIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN. SEE THE PRODUCT MATERIAL SAFETY DATA SHEET (MSDS) AND LABEL WARNINGS FOR ADDITIONAL SAFETY INFORMATION.

* Activated material

Calculated values are shown and may vary slightly from the actual manufactured material.

The technical data and suggestions for use contained herein are correct to the best of our knowledge, and offered in good faith. The statements of this literature do not constitute a warranty, express, or implied, as to the performance of these products. As conditions and use of our materials are beyond our control, we can guarantee these products only to conform to our standards of quality, and our liability, if any, will be limited to replacement of defective materials. All technical information is subject to change without notice.



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An RPM Company

Phone: 847-367-7700
www.rustoleum.com

Form: 1048990
Rev.: 12/05
Printed in USA

SULZER

Massblatt XFP 101G-CB1 Nassinstallation
 Dimension sheet WET-WELL Installation
 Dimensioni Installazione sommersa
 Hoja de dimensiones instalacion sumergida
 Plan d'encombrement Installation noyee

No: AN-M.22.584 - 04
 Drawn: 05/08/10 D.Whelan
 Issue Date: 09/05/2013
 Änderungen vorbehalten
 Technical changes reserved
 Con riserva di modifiche
 Con reserva de modificaciones
 Sous réserve de modification

50 Hz

Typ Type Tipo	Gewicht Weight Poids N.C.J. (kg)	Gewicht Weight Poids W.C.J. (kg)	Height H (mm)
PE 150/2	335	375	1212
PE 185/2	335	375	1212
PE 250/2	355	395	1212

60 Hz

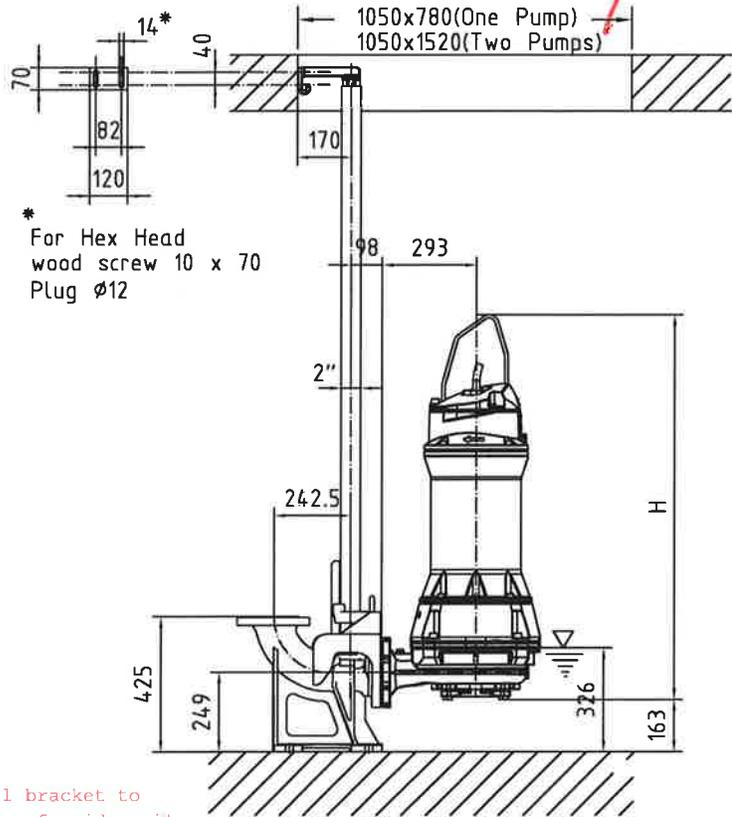
Typ Type Tipo	Gewicht Weight Poids N.C.J. (kg)	Gewicht Weight Poids W.C.J. (kg)	Height H (mm)
PE 185/2	361	395	1212
PE 200/2	345	401	1212
PE 230/2	371	431	1212
PE 300/2	381	415	1212

N.C.J. = No Cooling Jacket
 W.C.J. = With Cooling Jacket

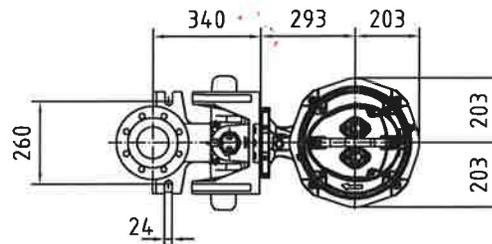
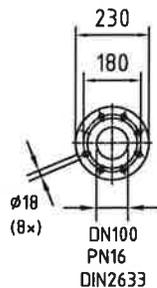
S.I.

1600 x
 1600 OPENING
 IN CHAMBER
 IS OK

min. Schachtöffnung
 min. Sump opening
 Dimensioni min. botola
 min. apertura del pozo
 Largeur min. du puisard



Note: One intermediate guide rail bracket to be installed at 20 ft from bottom of guide rail and another bracket at 30ft height.



Gewicht: Beinhaltet Pumpe, Halterung (Fösstäck) und Kabel (50 Hz = 10 m; 60 Hz = 15 m)
 Weight: includes pump, slider bracket and cable (50 Hz = 10 m; 60 Hz = 15 m)
 Peso: include bomba, pezzo intermedio a cava (50 Hz = 10 m; 60 Hz = 15 m)
 Peso: incluye bomba, soporte deslizante y cable (50 Hz = 10 m; 60 Hz = 15 m)
 Poids : incluant la pompe, le coulisseau et le câble (50 Hz = 10 m; 60 Hz = 15 m)

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
 General tolerances for castings in acc. to DIN1680-GTB16
 Tolleranze generali delle fusioni secondo DIN1680-GTB16
 Tolerancias generales para la fundición seg. de DIN1680-GTB16
 Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 101G-CB1 Nassinstallation
 Dimension sheet WET-WELL Installation
 Dimensioni Installazione sommersa
 Hoja de dimensiones instalación sumergida
 Plan d'encombrement Installation noyee

No: AN-M.22.584 - 04
 Drawn: 05/08/10 D.WheLAN
 Issue Date: 09/05/2013
 Änderungen vorbehalten
 Technical changes reserved
 Con riserva di modifiche
 Con reserva de modificaciones
 Sous réserve de modification

50 Hz

Typ Type Tipo	Gewicht Weight Poids N.C.J. (lbs)	Gewicht Weight Poids W.C.J. (lbs)	Height H (")
PE 150/2	739	827	4.7
PE 185/2	739	827	4.7
PE 250/2	783	871	4.7

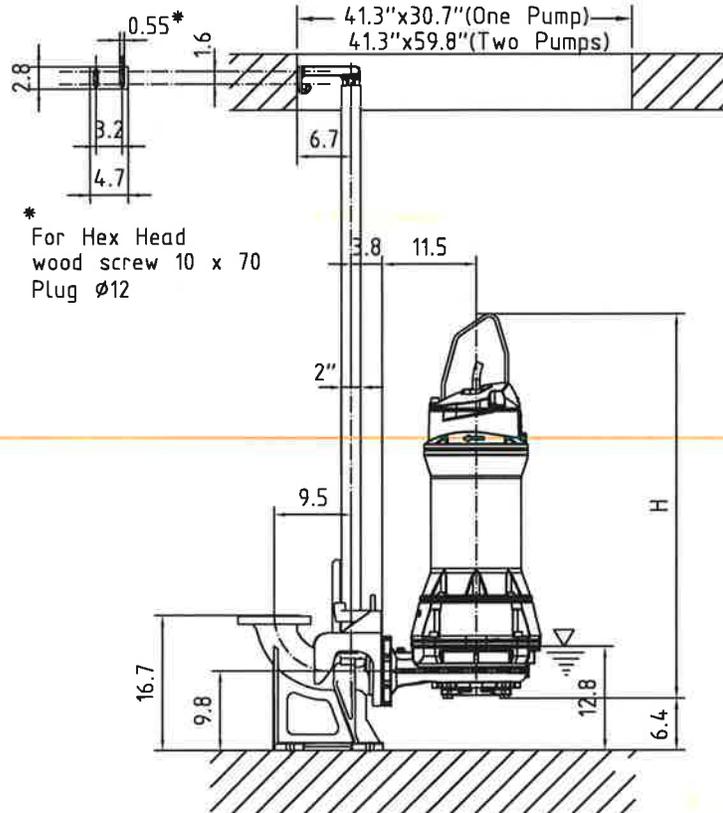
U.S.

min. Schachtöffnung
 min. Sump opening
 Dimensioni min. botola
 min. apertura del pozo
 Larqueur min. du puisard

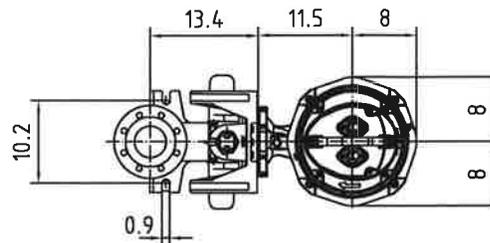
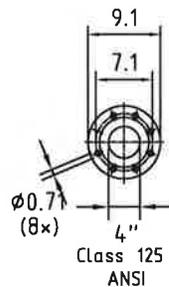
60 Hz

Typ Type Tipo	Gewicht Weight Poids N.C.J. (lbs)	Gewicht Weight Poids W.C.J. (lbs)	Height H (")
PE 185/2	796	871	4.7
PE 200/2	761	884	4.7
PE 230/2	818	893	4.7
PE 300/2	840	915	4.7

N.C.J. = No Cooling Jacket
 W.C.J. = With Cooling Jacket

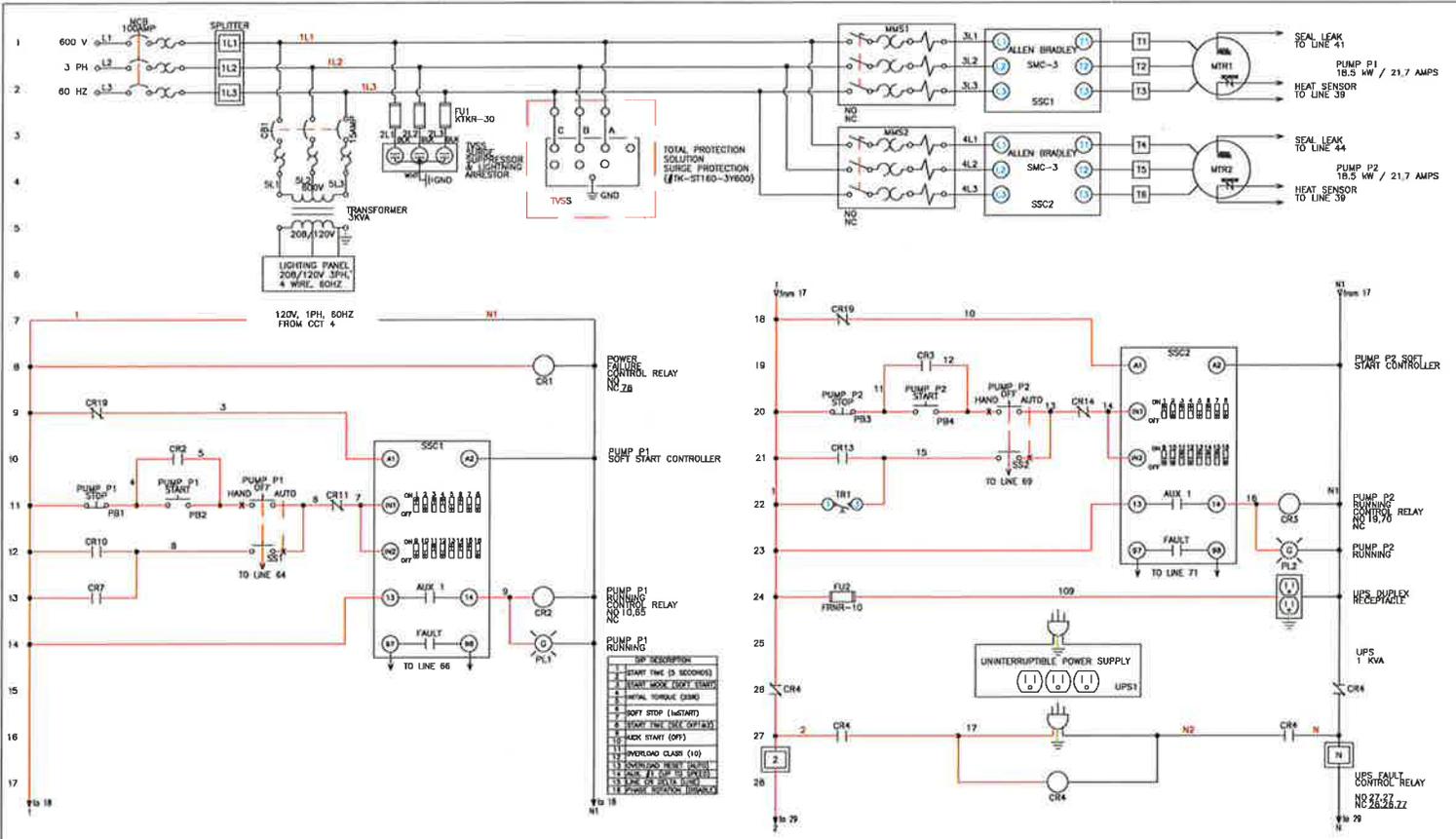


* For Hex Head
 wood screw 10 x 70
 Plug $\phi 12$



Gewicht: Beinhaltet Pumpe, Halterung (Fösstäck) und Kabel (50 Hz = 10 m; 60 Hz = 15 m)
 Weight: includes pump, slider bracket and cable (50 Hz = 10 m; 60 Hz = 15 m)
 Peso: include pompa, pezzo intermedia a cavo (50 Hz = 10 m; 60 Hz = 15 m)
 Peso: Incluye bomba, soporte deslizante y cable (50 Hz = 10 m; 60 Hz = 15 m)
 Poids : incluant la pompe, le coulisseau et le câble (50 Hz = 10 m; 60 Hz = 15 m)

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
 General tolerances for castings in acc. to DIN1680-GTB16
 Tolleranze generali delle fusioni secondo DIN1680-GTB16
 Tolerancias generales para la fundición seg. de DIN1680-GTB16
 Tolérance générale de la fonderie selon DIN1680-GTB16

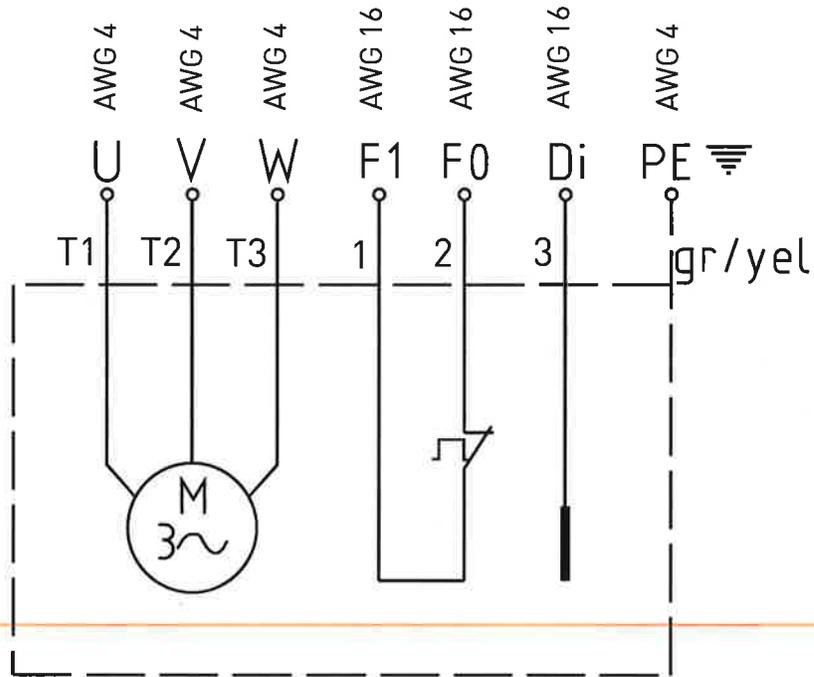


SULZER
 1401 Waveridge Drive, Unit #2
 Mississauga, Ontario L3T 1G8

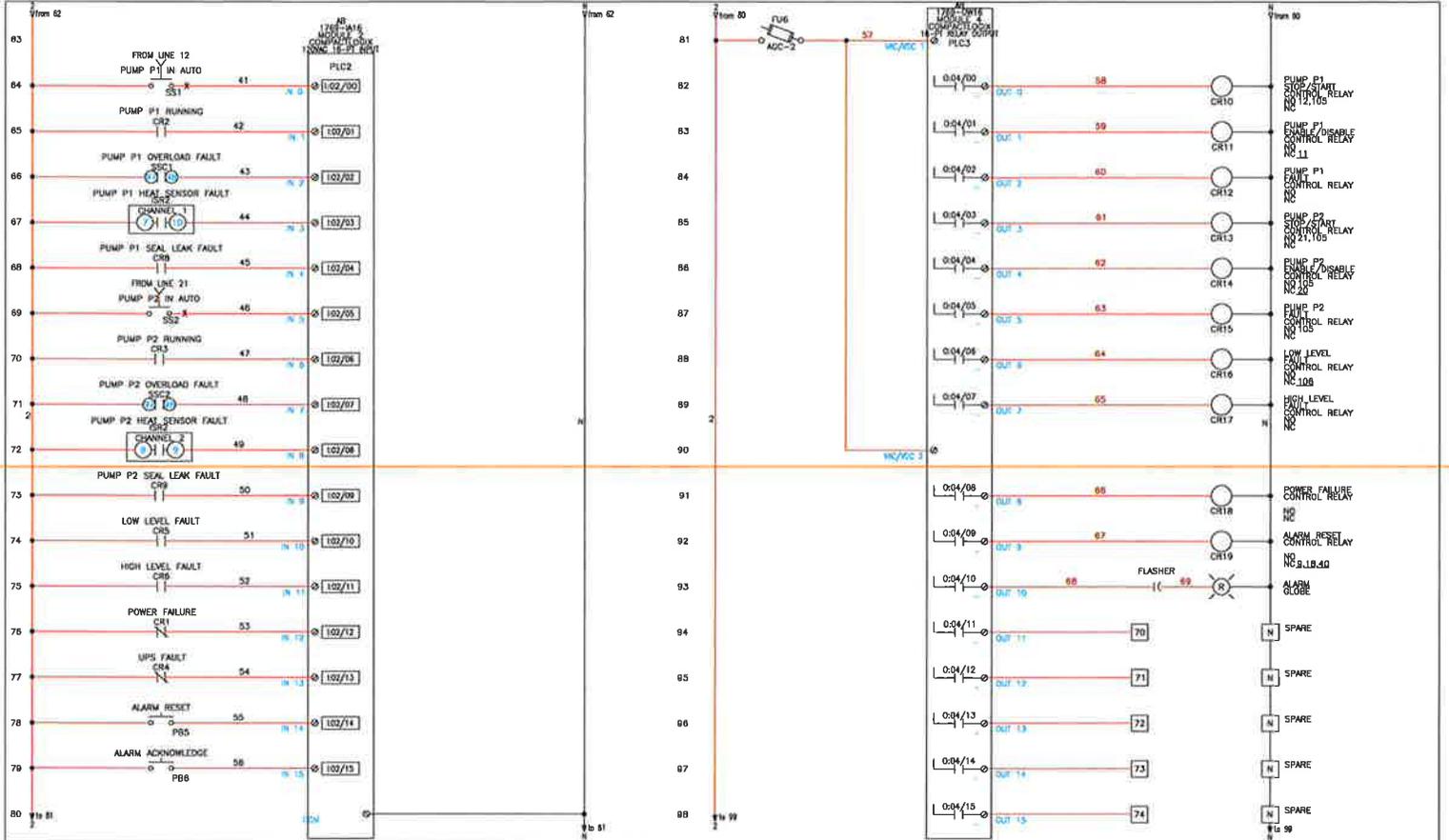
REV	DESCRIPTION	BY	DATE	REV'D	DATE	DESIGNED	DRAWN	SCALE	SHT. NO.	TITLE	DWG. NO.	REV
2	UPDATED MOTOR SIZES	JM	20JUL15			S. ENE	S. ENE	N.T.S.	1	DUPLEX PUMP CONTROL SYSTEM	T2582-00.301	2
1	CHANGES AS PER CUSTOMER	SE	30JUN15			S. ENE	S. ENE		1			
					JUNE 17, 2015				1			

WIRING DIAGRAM

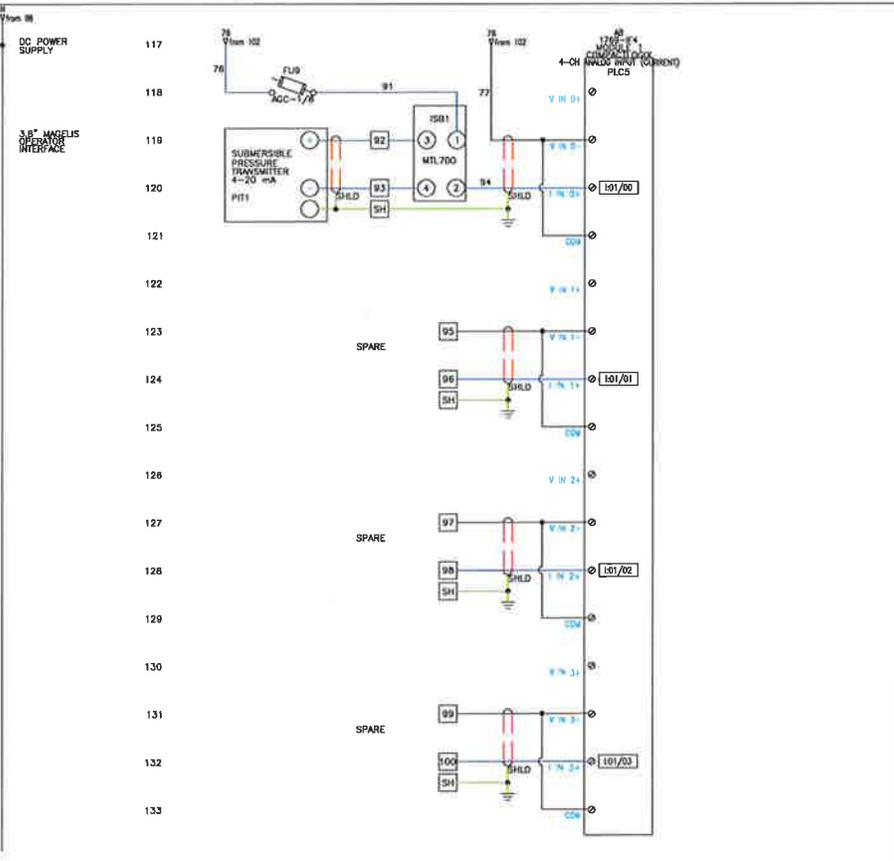
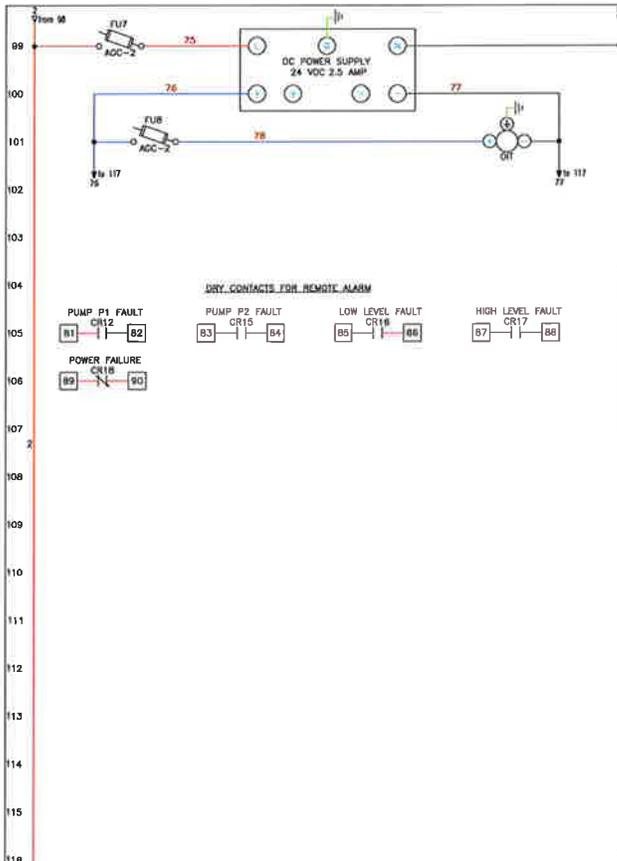
POWER & CONTROL CABLE - SOOW 8/4+16/3



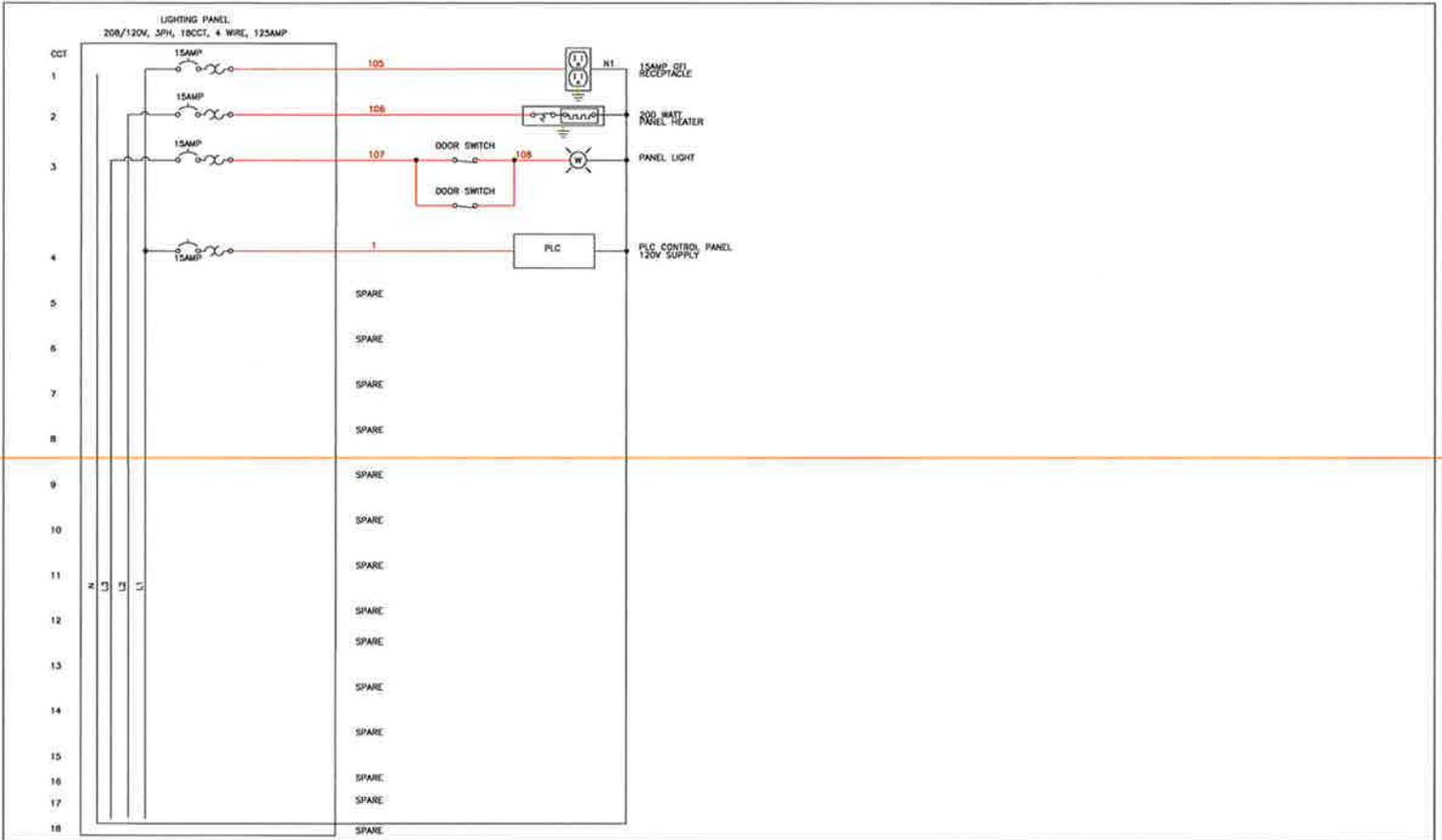
NOTE
 U,V,W = T1,T2,T3 (LIVE)
 F1 = 1 (THERMAL SENSOR)
 F0 = 2 (THERMAL SENSOR)
 Di = 3 (SEAL MONITOR)
 PE = GROUND



SULZER 1401 Mapleville Drive, Unit #2 Markham, Ontario L3T 1G8		REV 2 UPDATED MOTOR SIZES 1 CHANGES AS PER CUSTOMER		DESIGNED S. ENE SE 30JUN15		REV'D REF ESSEX, WINDSOR, REGIONAL LANDFILL S. ENE DRAWN S. ENE		SCALE N.T.S. G&D REF. AB500301-3		TITLE DUPLIX PUMP CONTROL SYSTEM	
REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE	DATE	JUNE 17, 2015	SHT NO. 3 OF 7	DWG NO. T2582-00301

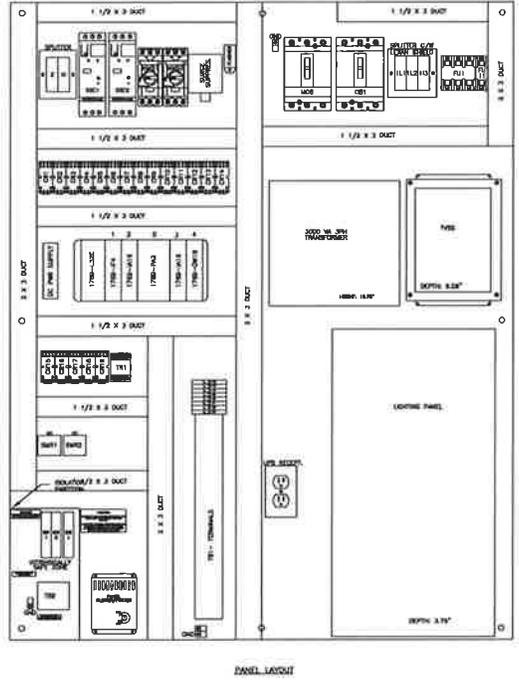
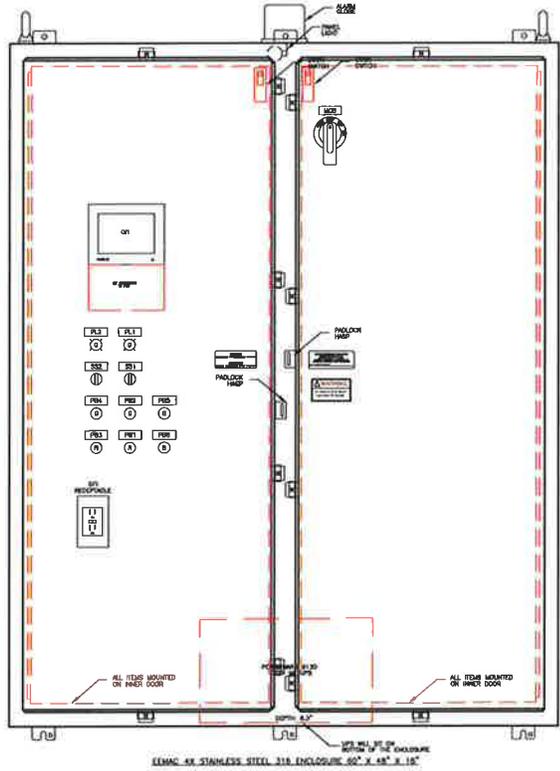


SULZER 1401 Mayfield Drive, Unit #2 Markham, Ontario L3T 1G8				REV'D REF ESSEX, WINDSOR, REGIONAL LANDFILL		TITLE	
		2 UPDATED MOTOR SIZES		JM 20JUL15 DESIGNED S. ENE		SCALE N.T.S.	
		1 CHANGES AS PER CUSTOMER		SE 30JUN15 DRAWN S. ENE		CAB REF. ABS00301-4	
REV DESCRIPTION BY DATE		REV DESCRIPTION BY DATE		DATE JUNE 17, 2015		SHEET NO. 4 OF 7	
						DWG NO. T2582-00301	
						REV 2	

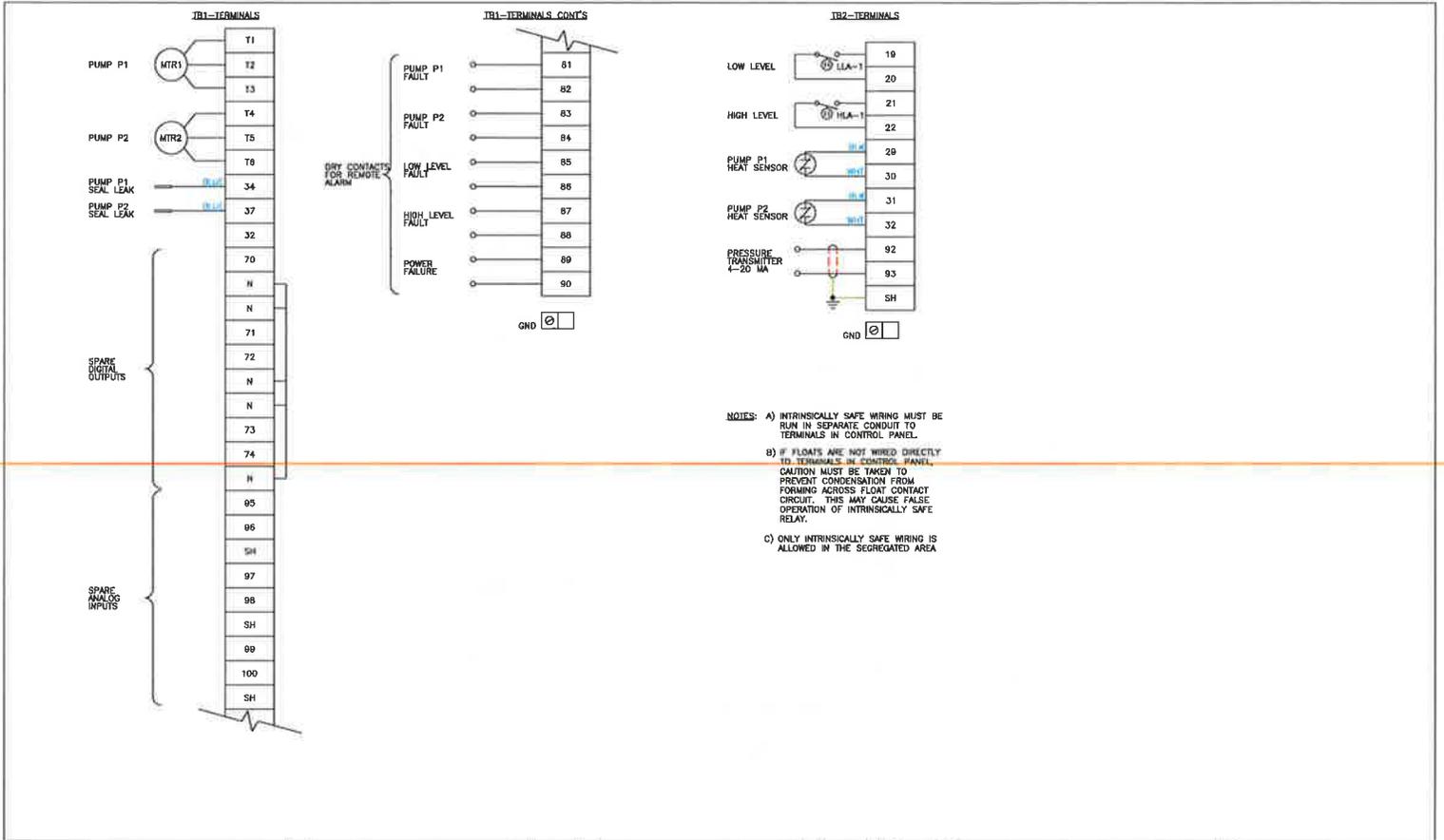


 1401 Weyburn Drive, Unit #2 Mississauga, Ontario L4T 1G8						REV'D	REF	ESSEX, WINDSOR, REGIONAL LANDFILL	TITLE						
						DESIGNED	S. ENE	SCALE	N.T.S.						
						DRAWN	S. ENE	CAD REF.	ABS0301-5						
REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE	DATE	JUNE 17, 2015	SHT NO.	5 OF 7	DWG NO.	T2582-00301	REV	2

NAMEPLATE LEGEND	
ITEM	DESCRIPTION
MCB	MAIN CIRCUIT BREAKER
PL1	PUMP P1 / RUNNING
PL2	PUMP P2 / RUNNING
SS1	PUMP P1 / HAND-OFF-AUTO
SS2	PUMP P2 / HAND-OFF-AUTO
PB1	PUMP P1 / STOP
PB2	PUMP P2 / START
PB3	PUMP P2 / STOP
PB4	PUMP P2 / START
PB5	ALARM / RESET
PB6	ALARM / ACKNOWLEDGE

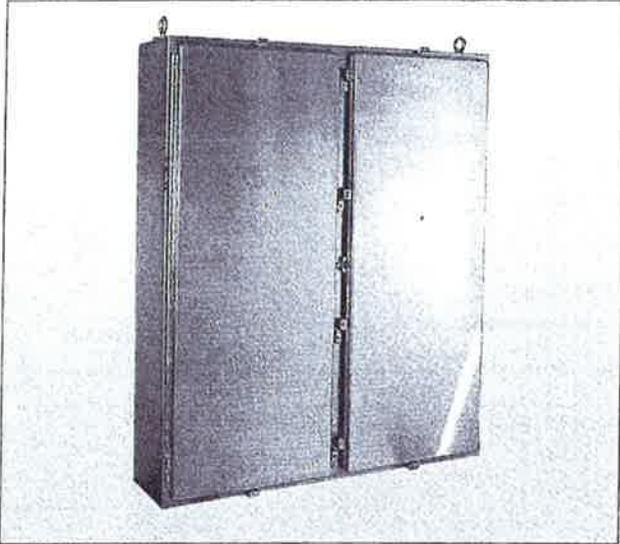


REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	DATE	SCALE	SHT NO.	OF	REV	TITLE
				2	UPDATED MOTOR SIZES	JM	20JUL15		DESIGNED	S. ENE	SCALE: 1/8" = 1"				DUPLEX PUMP CONTROL SYSTEM
				1	CHANGES AS PER CUSTOMER	SE	30JUN15		DRAWN	S. ENE	CAD REF: ABS00301-6				
										JUNE 17, 2015		6	OF 7		T2582-00.301



SULZER 1401 Heyworth Drive, Unit #2 Markham, Ontario L3T 1S8		REV		DESCRIPTION		BY		DATE		REV		DESCRIPTION		BY		DATE		DATE		JUNE 17, 2015		SHT NO. 7 OF 7		TITLE DUPLIX PUMP CONTROL SYSTEM											
		2		UPDATED MOTOR SIZES		JM		20JUL15		DESIGNED		S. ENE		SCALE		N.T.S.						CAB REF. ABS00301-7		DRAWN		S. ENE		DATE		JUNE 17, 2015		SHT NO. 7 OF 7		TITLE DUPLIX PUMP CONTROL SYSTEM	
		1		CHANGES AS PER CUSTOMER		SE		30JUN15		DRAWN		S. ENE		SCALE		N.T.S.						CAB REF. ABS00301-7		DRAWN		S. ENE		DATE		JUNE 17, 2015		SHT NO. 7 OF 7		TITLE DUPLIX PUMP CONTROL SYSTEM	
		REV		DESCRIPTION		BY		DATE		REV		DESCRIPTION		BY		DATE		DATE		JUNE 17, 2015		SHT NO. 7 OF 7		DRAWN		S. ENE		DATE		JUNE 17, 2015		SHT NO. 7 OF 7		TITLE DUPLIX PUMP CONTROL SYSTEM	

REV 2
T2582-00301



PANEL INCLUDED

NOTE: See accessories section for optional floor mounting feet.

N4X-DD-SS SERIES **NEMA/EEMAC TYPE 4,4X**

Water and dust tight stainless steel double door enclosure

APPLICATION

Ralston's N4X-DD-SS enclosures are applied indoors and outdoors to house such items as: electronic and electrical controls, instrumentation systems, pneumatic, hydraulic, and machine tool controls.

These enclosures are designed to provide protection against dust, dirt, oil, and water. They are for areas such as dairies and breweries where they are subject to frequent high pressure hosing and generally wet conditions. (Not submersible)

CONSTRUCTION

All N4X-DD-SS enclosures are made from 12 ga. ~~#304~~³¹⁶ stainless steel with a #4 brush finish. All seams are continuously welded and ground to a smooth finish. The N4X-DD-SS enclosure has a folded lip around the door opening to provide complete and maximum gasket contact, and to prevent liquids from dripping into the enclosure when doors are open.

Each enclosure is equipped with 1/4-20 grounding studs, and two 5/8 eye bolts complete with solid rubber seals and reinforcing support angles welded to the top of the enclosure. The N4X-DD-SS enclosures is equipped with wall mounting brackets and body stiffeners. Each enclosure comes complete with a removable full length 12 ga. back panel mounted on 3/8 collar studs and has two support brackets welded to the bottom of the enclosure to aid in panel installation.

Each enclosure door is equipped with neoprene gasket, a removable print pocket, 1/4-20 grounding studs, stainless steel door clamping hardware on three sides and padlocking hasp. Each door rests on a removable centre mullion which also provides for easy panel installation. Doors are easily removed by pulling the pin on the continuous stainless steel piano hinge.

FINISH

All enclosures are made from #304 stainless steel with a #4 brush finish. Inner back panels are cold rolled steel painted with high gloss white powder coating.

STANDARDS

N4X-DD-SS enclosures are built to the requirements of NEMA/EEMAC type 12 specifications for industrial use, NEMA/EEMAC type 13 for oil and dust tight enclosures, and to NEMA/EEMAC type 4, 4X for water tight enclosures.

N4X-DD-SS enclosures CSA certified and UL 508 approved as a type 4X, 4, 12 and 13 enclosure.

SPECIAL ORDERS

Custom units of special sizes or with punching can be supplied to order.

Type CBL Bolt-On Loadcentres

Non-Combination (Main Lug Only) Single & Three Phase Aluminum Bus

Single Phase 120/240VAC Type 1 (Indoor) Loadcentres

- ◆ CSA Certified only (Not UL Approved)
- ◆ Utilize Type BAB, QBHW, QBA, DNBA, or QBGF circuit breakers as branch circuit breakers.

Product Selection

Table 41. Single Phase 3 Wire 120/240VAC Aluminum Bus Loadcentres

Maximum Ampere Rating	Catalogue Number	Max. No. 1" Spaces	Max. No. 1/2" Spaces	Cover Style	Dimensions (Inches / mm)			Wire Size Range for Main Cu/Al
					H	W	D	
125	CBL118	18	36	Flush/Surface	27 / 685.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
125	CBL130	30	60	Flush/Surface	34-1/8 / 866.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
125	CBL142	42	84	Flush/Surface	39 / 990.6	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
225	CBL218	18	36	Flush/Surface	27 / 685.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
225	CBL230	30	60	Flush/Surface	34-1/8 / 866.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
225	CBL242	42	84	Flush/Surface	39 / 990.6	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM

Three Phase 240VAC Type 1 (Indoor) Loadcentres

- ◆ CSA Certified only (Not UL Approved)
- ◆ Utilize Type BAB, QBHW, QBA, DNBA, or QBGF circuit breakers as branch circuit breakers.

Product Selection

Table 42. Three Phase 4 Wire 240VAC Aluminum Bus Loadcentres

Maximum Ampere Rating	Catalogue Number	Max. No. 1" Spaces	Max. No. 1/2" Spaces	Cover Style	Dimensions (Inches / mm)			Wire Size Range for Main Cu/Al
					H	W	D	
125	3CBL118	18	36	Flush/Surface	27 / 685.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
125	3CBL130	30	60	Flush/Surface	34-1/8 / 866.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
125	3CBL142	42	84	Flush/Surface	39 / 990.6	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
225	3CBL218	18	36	Flush/Surface	27 / 685.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
225	3CBL230	30	60	Flush/Surface	34-1/8 / 866.8	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM
225	3CBL242	42	84	Flush/Surface	39 / 990.6	14-1/4 / 361.9	3-3/4 / 95.3	#6-300MCM



CBL130

SYSTEM FEATURES



- Providing the highest level of protection with the lowest let-through voltage in the industry
- Fail-Safe Design
- Optional Component Level Fusing
- Single pulse tested at independent 3rd party lab
- Form C dry relay contacts and audible alarm with silence button
- Two suppression technologies: MOV and all mode Enhanced Transient Filter
- UL 1283 Tracking Filter
- Ultra, Compact Footprint – efficiency and performance
- 30-Year Unlimited Free Replacement Warranty
- Weatherproof Nema 4 steel enclosure

PRODUCT SPECIFICATIONS

GENERAL SPECIFICATIONS

Maximum Rated Surge Current: 160kA per phase; 80kA per mode
Application: ANSI/IEEE C62.41 Location C, B & A. Ideal for distribution panels, branch panels and critical loads
Design: Optimum performing parallel hybrid with component level fusing
Warranty: 30-Year Unlimited Free Replacement
Safety Listing: UL 1449 3rd Ed., Type 1 for Type 1 & Type 2 locations and UL 1283

ELECTRICAL SPECIFICATIONS

Modes of Protection: All Modes. L-N, L-L, L-G, & N-G
Input Power Frequency: 40-440Hz (47-64 Hz with enhanced filter option)
Response Time: < 1 nanosecond
Standard Monitoring: Status indicator lights (one per phase & one service LED); Form C dry relay contacts for suppressor status; Audible alarm with silence button
Short Circuit Current Rating: 200 kAIC on all units.
 No upstream over-current protection required on CLF unit. Non CLF units require 60A Max fuse or breaker.

MECHANICAL SPECIFICATIONS

Dimensions (approx.): 11.50" H x 8.28" W x 6.28" D (292 mm H x 210 mm W x 160 mm D)
Enclosure: Steel. Weather-proof. NEMA 4 (IP 56)
Connection: Hardwired via internal lugs #10 AWG-#2 AWG (5.26 mm² -26.7 mm²)
Mounting: Multi-point mounting feet
Operating Environment: -40° C to 70° C (-40° F to 160° F)
 5% to 95% non-condensing humidity
Weight: 24 lbs. (10.9 kg)

AVAILABLE CONFIGURATIONS

Model Number	Description
TK-ST160-1P120	120VAC, 1ø 2-wire + grd
TK-ST160-1P240	240VAC, 1ø 2-wire + grd
TK-ST160-1S240	120/240VAC, 1ø SPLIT-PHASE, 3-wire +grd
TK-ST160-3Y208	120/208VAC, 3ø WYE, 4-wire + grd
TK-ST160-3Y380	220/380VAC, 3ø WYE, 4-wire + grd
TK-ST160-3Y400	230/400VAC, 3ø WYE, 4-wire + grd
TK-ST160-3Y415	240/415VAC, 3ø WYE, 4-wire + grd
TK-ST160-3Y480	277/480VAC, 3ø WYE, 4-wire + grd
TK-ST160-3Y600	347/600VAC, 3ø WYE, 4-wire + grd
TK-ST160-3D240	120/240VAC, 3ø high-leg DELTA, 4-wire + grd (B phase must be 208V)
TK-ST160-240NN	240VAC, 3ø DELTA, 3-wire + grd
TK-ST160-380NN	380VAC, 3ø DELTA, 3 wire + grd
TK-ST160-480NN	480VAC, 3ø DELTA, 3-wire + grd
TK-ST160-600NN	600VAC, 3ø DELTA, 3-wire + grd

AVAILABLE OPTIONS *Order as a Suffix Example: TK-ST160-3Y208-FL*

- Enhanced Transient Filter (ETF): add suffix "-F"
- Component Level Fusing (CLF): add suffix "-L"
- Surge Counter: add suffix "-B"
- NEMA 4X Stainless Steel Enclosure: add suffix "-XX"

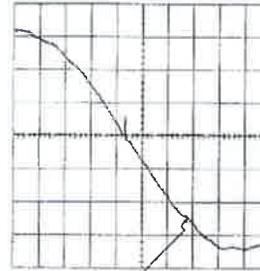
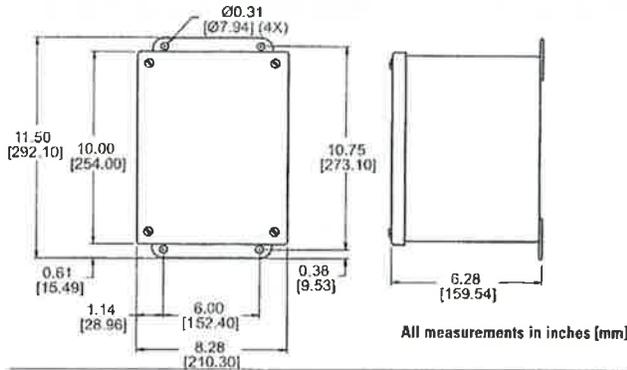
Order as a Separate Item (30 Year Warranty)

- Non-Fused Disconnect Switch:
 DN-200KAIC-60A-3/4 (for Nema 4 steel)
 DN-200KAIC-60A-XX-3/4 (for Nema 4 stainless steel)

EMI / RFI FILTER ATTENUATION -- MIL STANDARD 220B

Frequency	Attenuation
1kHz	2 dB
10kHz	17 dB
100kHz	40 dB
1MHz	18 dB
10MHz	6 dB
100MHz	1 dB
Max. Attenuation Frequency	41 dB @ 106 kHz





Peak Let-Through Voltage Level - 40V
Reference Level Zero Crossing of AC Sine Wave

For 120/208V Configuration

ANSI/IEEE C62.41.1
Category A1 Ring Wave
2080V, 67A Test Plot

L-N Mode, Dynamic,
180° Phase Angle,
6" Leads, Positive Polarity
1 msec/div Horizontal
500 Mega samples/sec
55V/div Vertical

Model Number	System Voltage	System Configuration	Protection Mode	MCOV	ANSI/IEEE C62.41.1-2002, C62.41.2-2002, & C62.45-2002 Measured Limited Voltage			UL Voltage Ratings UL 1449 2 nd Edition/ UL 1449 3 rd Edition Voltage Protection Ratings
					ETF Models A1 Ring Wave 2kV, 67A 180° Phase Angle	All Models B3/C1 Impulse Wave 6kV, 3kA 90° Phase Angle	All Models C3 Impulse Wave 20kV, 10kA 90° Phase Angle	
TK-ST160-1P120	120V	1-Phase 2-wire+grnd	L-N	150V	40V	651V	960V	400/700
			L-G	150V	76V	640V	1010V	400/700
			N-G	150V	54V	646V	860V	400/700
TK-ST160-1P240	240V	1-Phase 2-wire+grnd	L-N	320V	42V	978V	1437V	800/1000
			L-G	320V	61V	969V	1523V	800/1000
			N-G	320V	50V	979V	1340V	800/1000
TK-ST160-1S240	120/240V	1-Phase 3-wire+grnd	L-N	150V	40V	651V	960V	400/700
			L-G	150V	76V	640V	1010V	400/700
			L-L	300V	46V	1041V	1310V	800/1200
TK-ST160-3Y208	120/208V	3-Phase WYE 4-wire+grnd	N-G	150V	54V	646V	860V	400/700
			L-N	150V	40V	651V	960V	400/700
			L-G	150V	76V	640V	1010V	400/700
TK-ST160-3Y380	220/380V	3-Phase WYE 4-wire+grnd	L-L	300V	46V	1041V	1310V	800/1200
			N-G	150V	54V	646V	860V	400/700
			L-N	320V	42V	988V	1437V	800/1000
TK-ST160-3Y400	230/400V	3-Phase WYE	L-G	320V	61V	979V	1523V	800/1000
			L-L	640V	60V	1792V	2190V	1500/1800
			N-G	320V	50V	967V	1340V	800/1000
TK-ST160-3Y415	240/415V	3-Phase WYE 4-wire+grnd	L-N	320V	42V	968V	1437V	800/1000
			L-G	320V	61V	979V	1523V	800/1000
			L-L	640V	60V	1792V	2190V	1500/1800
TK-ST160-3Y480	277/480V	3-Phase WYE 4-wire+grnd	N-G	320V	50V	967V	1340V	800/1000
			L-N	420V	56V	1295V	1710V	1200/1500
			L-G	420V	99V	1295V	1783V	1200/1500
TK-ST160-3Y600	347/600V	3-Phase WYE 4-wire+grnd	L-L	840V	76V	2130V	2893V	2000/2500
			N-G	420V	88V	1292V	1610V	1200/1500
			L-N	150V	40V	654V	960V	400/700
TK-ST160-3D240	120/240V	3-Phase high-leg DELTA 4-wire+grnd	H-N	320V	42V	984V	1437V	800/1000
			L-G	150V	76V	645V	1010V	400/700
			H-G	320V	61V	988V	1523V	800/1000
TK-ST160-240NN	240V	3-Phase DELTA 3-wire+grnd	L-L	320V	46V	1044V	1310V	800/1000
			H-L	470V	46V	1250V	1640V	1500/1500
			N-G	150V	54V	654V	860V	400/700
TK-ST160-380NN	380V	3-Phase DELTA 3-wire+grnd	L-G	550V	912V	1689V	1870V	1500/1800
			L-L	550V	39V	1697V	1950V	1500/1800
			L-G	550V	912V	1689V	1870V	1500/1800
TK-ST160-480NN	480V	3-Phase DELTA 3-wire+grnd	L-L	550V	39V	1697V	1950V	1500/1800
			L-G	550V	912V	1689V	1870V	1500/1800
			L-L	550V	36V	2217V	2410V	2000/2500
TK-ST160-600NN	600V	3-Phase DELTA 3-wire+grnd	L-L	750V	1253V	2202V	2420V	2000/2500
			L-L	750V	36V	2217V	2410V	2000/2500

ETF = Enhanced Transient Filter (-F suffix). All tests performed with 6" (152 mm) lead length, positive polarity.
All voltages are peak values (±10%) measured from the zero reference point at the phase angles referenced above using a 10 µs/div display rate and 500 Mega samples/sec sampling rate.
Specifications subject to change without notice. See web site www.TPSSurge.com for latest revisions.



E F F I C I E N C Y

EFFICIENCY = 94.09
AS PER STANDARD
CSA 802, NEMA TP-1
ENERGY EFFICIENCY

NO-LOAD LOSSES: 35W

TOTAL LOSSES: 309 W

STYLE:	TYPE:	INSUL. CLASS:
NEMA1	TWM	220 C
K.V.A.	P.H.	HZ.
3	3	60
H.T.	H.V.	B.T.
600V	600V	120/208V
		L.V.
		NET WT.
		55LB

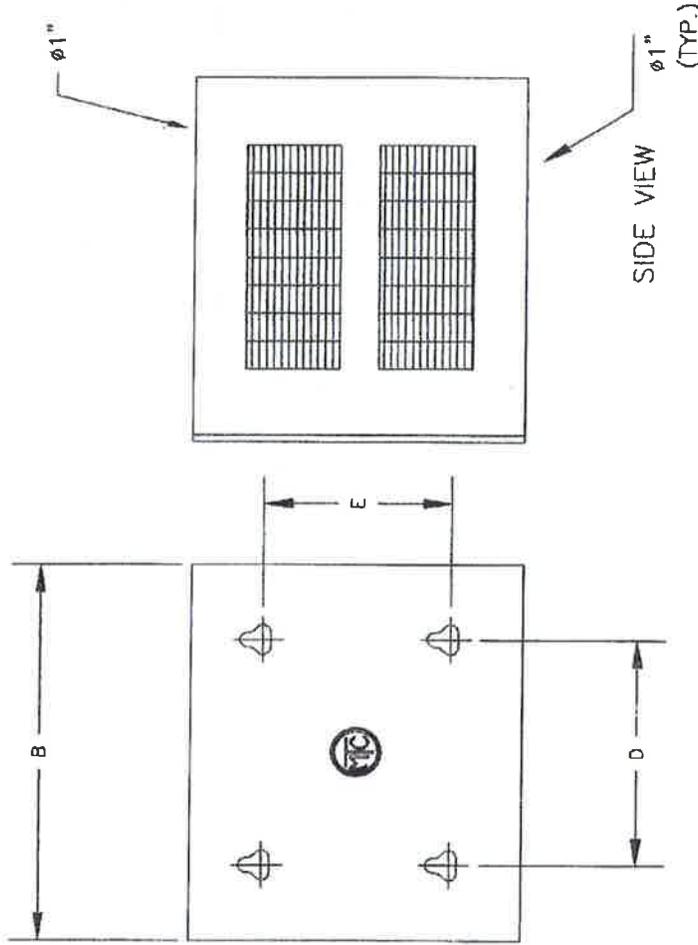
TEMP. RISE	BIL	CONNECTION
150 C	10 KV	Dy1(TT-1)
COPPER WINDINGS		NOISE LEVEL
% Z = 5.6		40 dB

MODEL NUMBER

MT3A1

SPECIAL REQUEST

DRAWN BY:	JOB No.:
L.C.	
CHECKED BY:	
R.C.	
APPROVED BY:	SCALE:
	NOT TO SCALE



CSA CERTIFIED-ASA 61 GRAY
 Dimensions are in inches

KVA	A	B	C	D	E
3	11	11.375	10.75	9.375	8

LIMITRON®

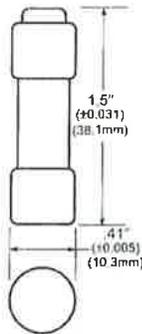
KTK-R

Fast-Acting Fuses

13/32" x 1-1/2", Class CC - 600 Volt, 1/10 - 30 Amps



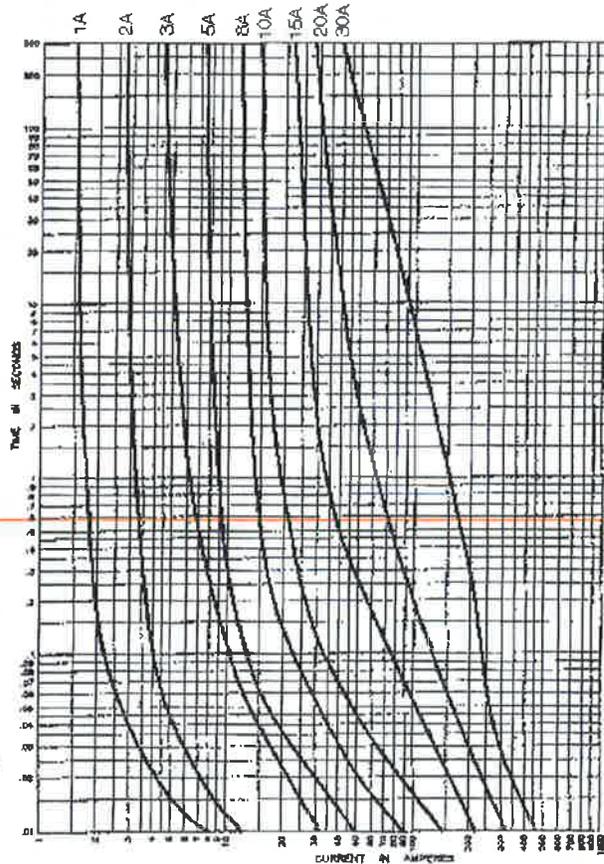
Dimensional Data



Catalog Symbol: KTK-R
Fast-Acting Branch Circuit Fuse:
 1/10 TO 30A
Voltage Rating:
 600Vac (or less): 0-30A
Interrupting Rating:
 ac: 200,000A RMS Sym.
 UL Listed, STD. 248-4, Class CC,
 (Guide #JDDZ, File #E4273)
 CSA Certified, C22.2 NO. 248.4, (File #53787—Class
 #1422-02)

- LIMITRON® fast-acting fuse.
- Melamine tube. Nickel-plated brass endcaps.
- U.L. Listed for branch circuit protection.
- Rejection type; for both standard holders or those which reject other type fuses.

Time-Current Characteristic Curves—Average Melt



Electrical Ratings (Catalog Symbol and Amperes)

600Vac - UL Listed & C.S.A.

KTK-R-1/10	KTK-R-6/10	KTK-R-3-1/2	KTK-R-10
KTK-R-1/8	KTK-R-3/4	KTK-R-4	KTK-R-12
KTK-R-2/10	KTK-R-1	KTK-R-5	KTK-R-15
KTK-R-1/4	KTK-R-1-1/2	KTK-R-6	KTK-R-20
KTK-R-3/10	KTK-R-2	KTK-R-7	KTK-R-25
KTK-R-4/10	KTK-R-2-1/2	KTK-R-8	KTK-R-30
KTK-R-1/2	KTK-R-3	KTK-R-9	-

Carton Quantity and Weight

Ampere Ratings	Carton Qty.	Weight*	
		Lbs.	Kg.
1/10-30	10	.180	.082

*Weight per carton.

Recommended fuseblocks/fuseholders for Class CC 600V fuses
See Data Sheets listed below

- Open fuseblocks - 1105
- Finger-safe fuseholders - 1109, 1102, 1103, 1151
- Panel-mount fuseholders - 2114, 2113
- In-line fuseholders - 2126

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

The only controlled copy of this Data Sheet is the electronic read-only version located on the Bussmann Network Drive. All other copies of this Data Sheet are by definition uncontrolled. This bulletin is intended to clearly present comprehensive product data and provide technical information that will help the end user with design applications. Bussmann reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Bussmann also reserves the right to change or update, without notice, any technical information contained in this bulletin. Once a product has been selected, it should be tested by the user in all possible applications.

Fusetron®
Dual-Element, Time-Delay Fuses
Class RK5 - 250 Volt

FRN-R
1/10-60A



Catalog Symbol: FRN-R
Current-Limiting
Dual-Element, Time-Delay – 10 seconds (minimum) at 500% rated current (8 seconds for 0-30A sizes)
Ampere Rating: 1/10 to 60 Amperes
Voltage Rating: 250Vac (or less)
Interrupting Rating: 200,000A RMS Sym.
DC Ratings: 20,000 AIC @ 125Vdc
Agency Information:
UL Listed, Std. 248-12, Class RK-5, Guide JDDZ, File E4273
CSA Certified, C22.2 No. 248.12, Class 1422-01, File 53787

Catalog Numbers

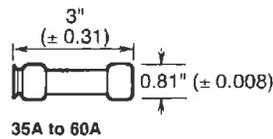
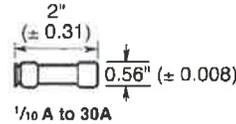
FRN-R-1/10	FRN-R-1 1/10	FRN-R-8
FRN-R-1/20	FRN-R-2	FRN-R-9
FRN-R-1/30	FRN-R-2 1/2	FRN-R-10
FRN-R-1/40	FRN-R-2 1/2	FRN-R-12
FRN-R-1/50	FRN-R-2 3/4	FRN-R-15
FRN-R-1/60	FRN-R-3	FRN-R-17 1/2
FRN-R-1/75	FRN-R-3 1/2	FRN-R-20
FRN-R-1/90	FRN-R-3 1/2	FRN-R-25
FRN-R-1/100	FRN-R-4	FRN-R-30
FRN-R-1/125	FRN-R-4 1/2	FRN-R-35
FRN-R-1	FRN-R-5	FRN-R-40
FRN-R-1 1/4	FRN-R-5 1/2	FRN-R-45
FRN-R-1 1/2	FRN-R-6	FRN-R-50
FRN-R-1 3/4	FRN-R-6 1/2	FRN-R-60
FRN-R-2	FRN-R-7	---
FRN-R-2 1/2	FRN-R-7 1/2	---

Carton Quantity and Weight

Ampere Ratings	Carton Qty.	Weight*	
		Lbs.	Kg.
0-15	10	0.40	0.181
17.5-30	10	0.50	0.227
35-60	10	1.00	0.453

*Weight per carton.

Dimensional Data



General Information:

- Provides motor overload, ground fault and short-circuit protection.
- Helps protect motors against burnout from overloads.
- Helps protect motors against burnout from single phasing on three phase systems.
- Simplifies and improves blackout prevention (selective coordination).
- Dual-element fuses can be applied in circuits subject to temporary motor overloads and surge currents to provide both high performance short-circuit and overload protection.
- The overload element provides protection against low level overcurrent of overloads and will hold an overload which is five times greater than the ampere rating of the fuse for a minimum of ten seconds.

Fuse Reducers For Class R Fuses

Equipment Fuse Clips	Desired Fuse (Case) Size	Catalog Number (Pairs) 250V
60A	30A	No. 263-R
100A	30A	No. 213-R
	60A	No. 216-R
200A	60A	No. 226-R

Fuseblocks for Class R Fuses

(Clip Retaining Spring Standard, Suffix "R")
See Data Sheet 1110

Amps	Poles	Basic Catalog Number	Terminal Type (Suffix No.)				
			Screw w/ Pres. Plate	Box Lug w/ Clip		Quick-Connect	
				SR	CR		QR
7 1/2	1	R25030-1	SR	PR	CR	COR	QR
10	2	R25030-2	SR	PR	CR	COR	---
30	3	R25030-3	SR	PR	CR	COR	---
31	1	R25060-1	SR	---	CR	---	---
40	2	R25060-2	SR	---	CR	---	---
60	3	R25060-3	SR	---	CR	---	---

Table 7.37: H-Frame 150 A and J-Frame 250 A Thermal-Magnetic Current-Limiting Circuit Breakers (600 Vac, 250 Vdc) With Factory Sealed Trip Unit Suitable for Reverse Connection▲



HD and HG 2P



H-Frame



J-Frame

Current Rating @ 40°C	Fixed AC Magnetic Trip		Cat. No. ■ ◆	Interrupting Rating (2nd Letter of Catalog Number)								Terminal Wire Range								
	Hold	Trip		D				G					J				L			
				80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated		80% Rated	100% Rated	80% Rated	100% Rated				
H-Frame, 150A 2P, 600 Vac 50/60 Hz, 250 Vdc																				
15 A	350 A	750 A	H(JL26015(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00	AL150HD 14-3/0 AWG Al or Cu								
20 A	350 A	750 A	H(JL26020(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
25 A	350 A	750 A	H(JL26025(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
30 A	350 A	750 A	H(JL26030(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
35 A	400 A	850 A	H(JL26035(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
40 A	400 A	850 A	H(JL26040(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
45 A	400 A	850 A	H(JL26045(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
50 A	400 A	850 A	H(JL26050(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
60 A	800 A	1450 A	H(JL26060(C))	870.00	1044.00	1269.00	1523.00	1559.00	1871.00	2364.00	2837.00									
70 A	800 A	1450 A	H(JL26070(C))	1062.00	1274.00	1497.00	1797.00	1721.00	2066.00	2613.00	3137.00									
80 A	800 A	1450 A	H(JL26080(C))	1062.00	1274.00	1497.00	1797.00	1721.00	2066.00	2613.00	3137.00									
90 A	800 A	1450 A	H(JL26090(C))	1062.00	1274.00	1497.00	1797.00	1721.00	2066.00	2613.00	3137.00									
100 A	900 A	1700 A	H(JL26100(C))	1062.00	1274.00	1497.00	1797.00	1721.00	2066.00	2613.00	3137.00									
110 A	900 A	1700 A	H(JL26110(C))	2072.00	2486.00	3059.00	3671.00	4449.00	5339.00	5534.00	6641.00									
125 A	900 A	1700 A	H(JL26125(C))	2072.00	2486.00	3059.00	3671.00	4449.00	5339.00	5534.00	6641.00									
150 A	900 A	1700 A	H(JL26150(C))	2072.00	2486.00	3059.00	3671.00	4449.00	5339.00	5534.00	6641.00									

H-Frame 150A 3P, 600 Vac 50/60 Hz, 250 Vdc																				
Current Rating @ 40°C	Adjustable AC Magnetic Trip		Cat. No. ■ ◆	Interrupting Rating (2nd Letter of Catalog Number)								Terminal Wire Range								
	Low	High		D				G					J				L			
				80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated		80% Rated	100% Rated	80% Rated	100% Rated				
15 A	350 A	750 A	H(JL36015(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00	AL150HD 14-3/0 AWG Al or Cu								
20 A	350 A	750 A	H(JL36020(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
25 A	350 A	750 A	H(JL36025(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
30 A	350 A	750 A	H(JL36030(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
35 A	400 A	850 A	H(JL36035(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
40 A	400 A	850 A	H(JL36040(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
45 A	400 A	850 A	H(JL36045(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
50 A	400 A	850 A	H(JL36050(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
60 A	800 A	1450 A	H(JL36060(C))	1088.00	1305.00	1493.00	1791.00	1949.00	2339.00	2849.00	3419.00									
70 A	800 A	1450 A	H(JL36070(C))	1328.00	1592.00	1701.00	2042.00	2099.00	2519.00	3149.00	3779.00									
80 A	800 A	1450 A	H(JL36080(C))	1328.00	1592.00	1701.00	2042.00	2099.00	2519.00	3149.00	3779.00									
90 A	800 A	1450 A	H(JL36090(C))	1328.00	1592.00	1701.00	2042.00	2099.00	2519.00	3149.00	3779.00									
100 A	900 A	1700 A	H(JL36100(C))	1328.00	1592.00	1701.00	2042.00	2099.00	2519.00	3149.00	3779.00									
110 A	900 A	1700 A	H(JL36110(C))	2600.00	3120.00	3599.00	4319.00	5174.00	6209.00	6749.00	8099.00									
125 A	900 A	1700 A	H(JL36125(C))	2600.00	3120.00	3599.00	4319.00	5174.00	6209.00	6749.00	8099.00									
150 A	900 A	1700 A	H(JL36150(C))	2600.00	3120.00	3599.00	4319.00	5174.00	6209.00	6749.00	8099.00									

Current Rating @ 40°C	Adjustable AC Magnetic Trip		Cat. No. ■ ◆	Interrupting Rating (2nd Letter of Catalog Number)								Terminal Wire Range								
	Low	High		D				G					J				L			
				80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated		80% Rated	100% Rated	80% Rated	100% Rated				
J-Frame 250A 2P, 600 Vac 50/60 Hz, 250 Vdc																				
150 A	750 A	1500 A	J(JL26150(C))	2175.00	2610.00	3212.00	3864.00	4671.00	5606.00	5811.00	6972.00	AL175JD 4-4/0 AWG Al or Cu								
175 A	875 A	1750 A	J(JL26175(C))	2175.00	2610.00	3212.00	3864.00	4671.00	5606.00	5811.00	6972.00									
200 A	1000 A	2000 A	J(JL26200(C))	2175.00	2610.00	3212.00	3864.00	4671.00	5606.00	5811.00	6972.00									
225 A	1125 A	2250 A	J(JL26225(C))	2175.00	2610.00	3212.00	3864.00	4671.00	5606.00	5811.00	6972.00									
250 A	1250 A	2500 A	J(JL26250(C))	2988.00	3585.00	4251.00	5102.00	6225.00	7469.00	7194.00	8633.00									
J-Frame 250A 3P, 600 Vac 50/60 Hz, 250 Vdc																				
150 A	750 A	1500 A	J(JL36150(C))	2730.00	3276.00	3779.00	4535.00	5432.00	6519.00	7086.00	8504.00	AL175JD 4-4/0 AWG Al or Cu								
175 A	875 A	1750 A	J(JL36175(C))	2730.00	3276.00	3779.00	4535.00	5432.00	6519.00	7086.00	8504.00									
200 A	1000 A	2000 A	J(JL36200(C))	2730.00	3276.00	3779.00	4535.00	5432.00	6519.00	7086.00	8504.00									
225 A	1125 A	2250 A	J(JL36225(C))	2730.00	3276.00	3779.00	4535.00	5432.00	6519.00	7086.00	8504.00									
250 A	1250 A	2500 A	J(JL36250(C))	3749.00	4499.00	5001.00	6002.00	7238.00	8685.00	8993.00	10791.00									

- ▲ See page 7-23 for circuit breakers with field interchangeable trip units.
- ◆ To complete catalog number, replace the blank with the appropriate rating (D, G, J, L).
- ◆ For 100% rated circuit breakers add a "C" in the 9th character place (for example, HDL26015C or JDL26150C).

Table 7.38: H- and J-Frame Termination Options

Termination Letter	Description
A - I-Line (See Section 9)	For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.
F = No Lugs (Includes terminal nut kit on both ends)*	
L = Lugs both ends	
M = Lugs ON end Terminal Nut Kit OFF end	
P = Lugs OFF end Terminal Nut Kit ON end	
N = Plug-in ▼	
D = Drawout ▼	
S = Rear Connected ▼	

H, G, L, 3, 6, 1, 0, 0

Termination Letter



- * Add TS suffix for circuit breaker without terminal nut kit.
- ▼ For N and D pricing, add termination pricing on page 7-42 to price. For S pricing, add termination pricing on page 7-38 to price.

Table 7.39: H- and J-Frame Interrupting Ratings

Voltage	Interrupting Rating			
	D	G	J	L
240 Vac	25 kA	65 kA	100 kA	125 kA
480 Vac	18 kA	35 kA	65 kA	100 kA
600 Vac	14 kA	18 kA	25 kA	50 kA

Accessories	Page 7-36
Optional Lugs	Page 7-39
Dimensions	Page 7-55
Enclosures	Page 7-56

7 MINIATURE AND MOLDED CASE CIRCUIT BREAKERS

Product data sheet
Characteristics

GV3P32

TeSys GV3-Circuit breaker-thermal-magnetic - 23...32A - EverLink BTR connectors

Product availability: Stock - Normally stocked in distribution facility



Main

Commercial Status	Commercialised
Range of product	TeSys GV3
Device short name	GV3P
Product or component type	Circuit breaker
Circuit breaker application	Motor protection
Poles description	3P
Network type	AC
Utilisation category	Category A conforming to IEC 60947-2 AC-3 conforming to IEC 60947-4-1
Network frequency	50/60 Hz conforming to IEC 60947-4-1
Breaking capacity	Icu = 12 kA at 500 V AC 50/60 Hz conforming to IEC 60947-2 Icu = 100 kA at 400/415 V AC 50/60 Hz conforming to IEC 60947-2 Icu = 100 kA at 230/240 V AC 50/60 Hz conforming to IEC 60947-2 Icu = 6 kA at 690 V AC 50/60 Hz conforming to IEC 60947-2 Icu = 50 kA at 440 V AC 50/60 Hz conforming to IEC 60947-2
[Ics] rated service short-circuit breaking capacity	50 % at 690 V AC 50/60 Hz conforming to IEC 60947-2 50 % at 500 V AC 50/60 Hz conforming to IEC 60947-2 100 % at 400/415 V AC 50/60 Hz conforming to IEC 60947-2 100 % at 440 V AC 50/60 Hz conforming to IEC 60947-2 100 % at 230/240 V AC 50/60 Hz conforming to IEC 60947-2
Thermal protection adjustment range	23...32 A
Trip unit technology	Thermal-magnetic
Magnetic tripping current	448 A

Complementary

Mounting mode	By clips By screws
Mounting support	Plate Rail
Mounting position	Horizontal Vertical
Motor power kW	22 kW at 690 V AC 50/60 Hz 18.5 kW at 500 V AC 50/60 Hz 15 kW at 400/415 V AC 50/60 Hz
Control type	Rotary knob
[Ue] rated operational voltage	690 V AC 50/60 Hz conforming to IEC 60947-2
[Ui] rated insulation voltage	690 V AC 50/60 Hz conforming to IEC 60947-2
[Ith] conventional free air thermal current	32 A conforming to IEC 60947-4-1
[Uimp] rated impulse withstand voltage	6 kV conforming to IEC 60947-2
Power dissipation per pole	8 W
Mechanical durability	50000 cycles
Electrical durability	50000 cycles for AC-3 at 440 V In

The information provided in this documentation contains general descriptions and/or technical characteristics of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric Industries SAS nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein.

Operating rate	25 cyc/h
Rated duty	Continuous conforming to IEC 60947-4-1
Connections - terminals	EverLink BTR screw connectors 2 cable(s) 0...0.04 in ² (1...25 mm ²) - cable stiffness : flexible - with cable end EverLink BTR screw connectors 2 cable(s) 0...0.04 in ² (1...25 mm ²) - cable stiffness : flexible - without cable end EverLink BTR screw connectors 2 cable(s) 0...0.04 in ² (1...25 mm ²) - cable stiffness : solid
Tightening torque	44.25...70.8 lbf.in (5...8 N.m) - on EverLink BTR screw connectors- cable 0.05 in ² (35 mm ²) 44.25 lbf.in (5 N.m) - on EverLink BTR screw connectors- cable 0.04 in ² (25 mm ²)
Mechanical robustness	Vibrations 4 Gn, 5...300 Hz conforming to IEC 60068-2-6 Shocks opened 30 Gn for 11 ms conforming to IEC 60068-2-27 Shocks closed 15 Gn for 11 ms conforming to IEC 60068-2-27
Suitability for isolation	Yes conforming to IEC 60947-1
Phase failure sensitivity	Yes conforming to IEC 60947-4-1
Height	5.2 in (132 mm)
Width	2.17 in (55 mm)
Depth	5.35 in (136 mm)
Product weight	2.12 lb(US) (0.96 kg)

Environment

Standards	EN/IEC 60947-1 EN/IEC 60947-2 EN/IEC 60947-4-1 UL 508 type E CSA C22.2 No 14-05 type E
Product certifications	ATEX BV CCC CSA DNV GL GOST LROS (pending) RINA UL
Protective treatment	TH
IP degree of protection	IP20 conforming to IEC 60529
IK degree of protection	IK09
Ambient air temperature for operation	-4...140 °F (-20...60 °C)
Ambient air temperature for storage	-40...176 °F (-40...80 °C)
Fire resistance	1760 °F (960 °C) conforming to IEC 60695-2-1
Operating altitude	9842.52 ft (3000 m)

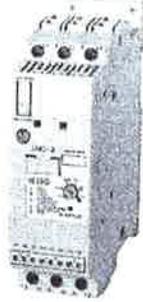
Ordering and shipping details

Category	22366 - MAN STR PROTECTORS-GV1/GV3
Discount Schedule	I11
GTIN	00785901492337
Nbr. of units in pkg.	1
Package weight(Lbs)	2.24
Product availability	Stock - Normally stocked in distribution facility
Returnability	Y
Country of origin	FR

Contractual warranty

Period	18 months
--------	-----------

Bulletin 150
SMC™-3 Smart Motor Controllers
 Product Overview/Modes of Operation/Features



Bulletin 150 — Smart Motor Controllers — SMC™-3 Smart Motor Controller

The SMC-3 is a compact, simple to use, solid-state motor controller designed to operate 3-phase motors. It features a built-in overload relay and a built-in SCR bypass contactor on all three phases, allowing a smaller footprint than other soft starters on the market. This product is designed for many applications, including compressors, chillers, pumps, conveyors, and crushers. Modes of operation for the controller are as follows:

- Soft Start
- Current Limit Start
- Soft Stop
- Kick Start

The controllers offer two voltage ranges: 200...480V AC and 200...600V AC. All voltage ranges will operate at either 50 or 60 Hz.

- 1...480 A Range
- Built-In Electronic Motor Overload Protection
- Built-In SCR/Run Bypass
- Delta Compatibility

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4

This catalog is based on the **minimum** information needed to select an SMC soft starter for applications with low starting torque requirements. For product selection involving loads with high starting torque requirements (large fan, rock crusher, chipper, etc.), use of the free tools available from the Rockwell Automation Website is recommended:

http://www.ab.com/industrialcontrols/products/solid-state_motor_control/software/

Standards Compliance

UL 508
 CSA C22.2 No.14
 EN/IEC 60947-1
 EN/IEC 60947-4-2

Certifications

cULus Listed (Open Type) (File No. E96956, Guides NMFT, NMFT7)
 CSA Certified (File No. LR 1234)
 CE Marked (Open Type) per EMC and Low Voltage Directive
 CCC Certified

Modes of Operation

- Soft Start
- Current Limit Start
- Selectable Kickstart
- Soft Stop

Note: For detailed information about the different modes of operation, see page 4-109

Description of Features

Electronic Motor Overload Protection

The SMC-3 controller incorporates, as standard, electronic motor overload protection. This motor overload protection is accomplished electronically with the use of current transformers on each of the three phases. The controller's overload protection is programmable, providing the user with flexibility. The overload trip class selection consists of either OFF, 10, 15, or 20. The trip current is easily selected by adjusting the rotary potentiometer to the motor full-load current rating. Trip reset is selectable to either automatic or manual mode.

Note: Trip rating is 120% of dial setting.

Over-temperature

The SMC-3 monitors the SCR temperature by means of internal thermistors. When the power poles maximum rated temperature is reached, the microcomputer switches off the SMC, a TEMP fault is indicated via LED, and the 97/98 fault contact closes.

Phase Reversal Protection

When enabled via a DIP switch, 3-phase input power will be verified before starting. If input power phasing is detected to be incorrect, the start will be aborted and a fault indicated.

Phase Loss/Open Load

The unit will not attempt a start if there is a single-phase condition on the line. This protects from motor burnout during single-phase starting.

Phase Imbalance

The unit monitors for imbalance between phase currents. To prevent motor damage, the unit will trip if the difference between the minimum phase current and the maximum phase current exceeds 65% for 3 s, and a fault will be indicated.

Shorted SCR

Prior to every start and during starting, the unit will check all SCRs for shorts and unit load connections to the motor. If there is a shorted SCR in the SMC-3 and/or open load, the start will be aborted and a shorted SCR or open load fault will be indicated. This prevents damage from phase imbalance.

Push to Test

The unit with control wiring can be tested for fault conditions by using the Push to Test function. Hold down the Reset button for 7 s to activate the fault Aux (97, 98) and shut down the SMC-3. To clear, either push the Reset button or cycle control power to the device.

LED Description (Number of Flashes)

1. Overload
2. Overtemperature
3. Phase Reversal
4. Phase Loss/Open Load
5. Phase Imbalance
6. Shorted SCR
7. Test

Bulletin 150
SMC™-3 Smart Motor Controllers
 Product Selection

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors,
 Continued

Rated Voltage [V AC]	Motor Current [A]*	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers§
					Cat. No.	Cat. No.
500/575	1...3	1.5	0.75...2	100...240V AC, 50/60 Hz	150-C3NCD	150-C3FCD
				24V AC/DC	150-C3NCR	—
	3...9	5.5	3...7.5	100...240V AC, 50/60 Hz	150-C9NCD	150-C9FCD
				24V AC/DC	150-C9NCR	—
	5.3...16	7.5	5...10	100...240V AC, 50/60 Hz	150-C16NCD	150-C16FCD
				24V AC/DC	150-C16NCR	—
	6.3...19	11	7.5...15	100...240V AC, 50/60 Hz	150-C19NCD	150-C25FCD
				24V AC/DC	150-C19NCR	—
	9.2...25	15	7.5...20	100...240V AC, 50/60 Hz	150-C25NCD	150-C25FCD
				24V AC/DC	150-C25NCR	—
	10...30	18.5	10...25	100...240V AC, 50/60 Hz	150-C30NCD	150-C30FCD
				24V AC/DC	150-C30NCR	—
	12.3...37	22	15...30	100...240V AC, 50/60 Hz	150-C37NCD	150-C37FCD
				24V AC/DC	150-C37NCR	—
	14.3...43	22	15...40	100...240V AC, 50/60 Hz	150-C43NCD	150-C43FCD
				24V AC/DC	150-C43NCR	—
	20...60	37	20...50	100...240V AC, 50/60 Hz	150-C60NCD	150-C60FCD
				24V AC/DC	150-C60NCR	—
	28.3...85	55	30...75	100...240V AC, 50/60 Hz	150-C85NCD	150-C85FCD
				24V AC/DC	150-C85NCR	—
27...108	75	60...100	100...240V AC, 50/60 Hz	150-C108NCD	150-C108FCD	
			24V AC/DC*	150-C108NCR	—	
34...135	90	75...125	100...240V AC, 50/60 Hz	150-C135NCD	150-C135FCD	
			24V AC/DC*	150-C135NCR	—	
67...201	75...132	100...200	100...240V AC, 50/60 Hz	150-C201NCD	150-C201FCD	
			24V AC/DC*	150-C201NCR	—	
84...251	90...160	125...250	100...240V AC, 50/60 Hz	150-C251NCD	150-C251FCD	
			24V AC/DC*	150-C251NCR	—	
106...317	100...200	200...300	100...240V AC, 50/60 Hz	150-C317NCD	150-C317FCD	
			24V AC/DC*	150-C317NCR	—	
120...361	132...250	200...350	100...240V AC, 50/60 Hz	150-C361NCD	150-C361FCD	
			24V AC/DC*	150-C361NCR	—	
160...480	200...315	250...500	100...240V AC, 50/60 Hz	150-C480NCD	150-C480FCD	
			24V AC/DC*	150-C480NCR	—	

* Motor FLA rating should fall within specified current range for unit to operate properly.

§ These controllers require a separate 100...240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

* Separate 120V or 240V single phase is required for fan operation.

1769 CompactLogix Controllers Overview

This chapter introduces the 1769 CompactLogix controllers. These controllers offer state-of-the-art control, communication, and I/O elements in a distributed control package.

About the 1769 CompactLogix Controller

The 1769 CompactLogix controller offers state-of-the-art control, communication, and I/O elements in a distributed control package.

Figure 1 - CompactLogix Controller and 1769 I/O Modules

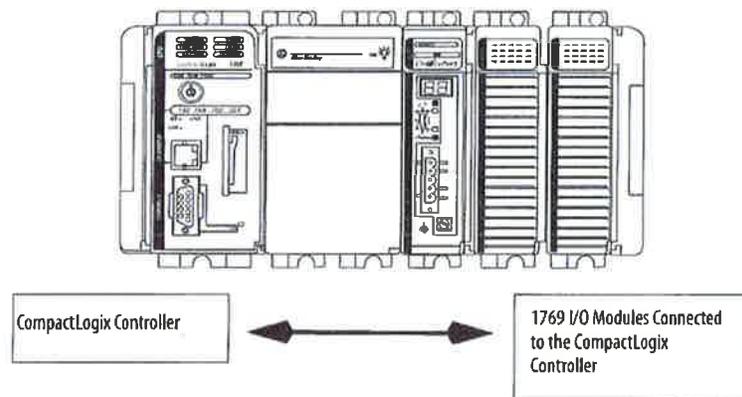


Table 1 - CompactLogix Controller Combinations

Controller	Available Memory	Communication Options	Number of Tasks Supported	Number of Local I/O Modules Supported
1769-L35CR	1.5 MB	1 port ControlNet - supports redundant media 1 port RS-232 serial (system or user protocols)	8	30
1769-L35E		1 port EtherNet/IP 1 port RS-232 serial (system or user protocols)		
1769-L32C	750 KB	1 port ControlNet 1 port RS-232 serial (system or user protocols)	6	16
1769-L32E		1 port EtherNet/IP 1 port RS-232 serial (system or user protocols)		
1769-L31	512 KB	1 port RS-232 serial (system or user protocols) 1 port RS-232 serial (system protocol only)	4	

Design a CompactLogix System

When designing a CompactLogix system, determine the network configuration and the placement of components in each location. To design your CompactLogix system, you must select the following:

- I/O devices
- A communication network
- Controllers
- Power supplies
- Software

Table 1 - Environmental Specifications - 1768 and 1769 CompactLogix Controllers and CompactLogix 5370 Controllers

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM- BB1B	1769-L24ER-QB1B, 1769-L24ER- QBFC1B, 1769- L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM	1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E- QBFC1B	1769-L31, 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L35E	1768-L43, 1768-L43S, 1768-L45, 1768-L45S
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Na, Operating Thermal Shock)	-20...60 °C (-4...140 °F)	0...60 °C (32...140 °F)				
Temperature, storage IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...85 °C (-40...185 °F)					
Temperature, surrounding air, max	60 °C (140 °F)					
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	5...95% noncondensing					
Vibration IEC 60068-2-6 (Test Fc, Operating)	2 g @ 10...500 Hz ⁽¹⁾	5 g @ 10...500 Hz	2 g @ 10...500 Hz	5 g @ 10...500 Hz		
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g ⁽¹⁾	20 g - DIN rail 30 g - Panel	30 g	20 g - DIN rail 30 g - Panel	30 g	
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g ^{(1), (2)}	30 g - DIN rail 40 g - Panel	50 g	30 g - DIN rail 40 g - Panel	50 g	
Emissions CISPR 11	Class A (IEC 61000-6-4)					
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges			4 kV contact discharges 8 kV air discharges	1769-L31 4 kV contact discharges 8 kV air discharges 1769-L32C, 1769- L35CR, 1769-L32E, 1769-L35E 6 kV contact discharges 8 kV air discharges	6 kV contact discharges 8 kV air discharges

(1) If you are mounting a CompactLogix™ 5370 L1 controller on a EN 50 022 - 35 x 15 mm (1.38 x 0.59 in.) DIN rail, you must first adhere a bumper on the back of the controller. Failure to install the bumper before mounting the controller results in the system failing to meet this specification. For more information, see the CompactLogix 5370 Controllers User Manual, publication 1769-UM021.

(2) If you are mounting a CompactLogix 5370 L1 controller on a EN 50 022 - 35 x 15 mm (1.38 x 0.59 in.) DIN rail, the Shock, nonoperating specification = 30 g.

1769 Compact I/O Power Supplies

Each 1769-L3x controller and additional bank of I/O modules requires a 1769 power supply. Place 1769 I/O modules to the left or right of the 1769 power supply. As many as eight I/O modules can be placed on each side of the power supply.

Each 1769 module also has a power supply distance rating (the number of modules from the power supply). Each module must be located within its distance rating. See the specifications for the module to determine its distance rating.

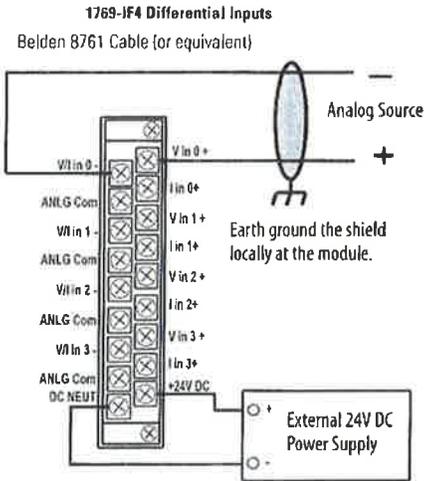
Technical Specifications - 1769 Compact I/O Power Supplies

Attribute	1769-PA2	1769-PB2	1769-PA4	1769-PB4
Input voltage range	85...265V AC	19.2...31.2V DC	85...265V AC or 170...265V AC, switch selectable	19.2...31.2V DC
Input voltage, nom	120V/220V AC	24V DC	120V/220V AC	24V DC
Power consumption	100 VA @ 120V AC 130 VA @ 240V AC	50 VA @ 24V DC	200 VA @ 120V AC 240 VA @ 240V AC	100 VA @ 24V DC
Power dissipation	8 W @ 60° C (140° F)	7.5 W @ 60° C (140° F)	18 W @ 60° C (140° F)	14.5 W @ 60° C (140° F)
Current capacity @ 5V	2.0 A	2.0 A	4.0 A	4.0 A
Current capacity @ 24V	0.8 A	0.8 A	2.0 A	2.0 A
Inrush current, max	25 A @ 132V AC	30 A @ 31.2V DC	25 A @ 132V AC	30 A @ 31.2V DC
Isolation voltage	265V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested @ 2596V DC for 1 s, AC power input to system and AC power input to 24V DC user power	75V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 1697V DC for 1 s, DC power input to system	265V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 2596V DC for 1 s, AC power input to system	75V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 1697V DC for 1 s, DC power input to system
Fuse type	Wickmann 19195-3.15A Littelfuse 02183.15MXP	Wickmann 19193-6.3A Littelfuse 021706.3MXP	Wickmann 19195-3.15A Littelfuse 02183.15MXP	Wickmann 19193-6.3A Littelfuse 021706.3MXP
Weight, approx.	525 g (1.16 lb)		630 g (1.39 lb)	
Dimensions (HxWxD), approx.	118 x 70 x 87 mm (4.65 x 2.76 x 3.43 in.)			
Module location	DIN rail or panel mount			
Mounting screw torque	1.16 N•m (10 lb•in) - use M4 or #8 screws			
Power supply distance rating	8 8 I/O modules can be connected on either side of the power supply for a maximum of 16 modules			
Wire category ⁽¹⁾	1 - on power ports	2 - on power ports	1 - on power ports	2 - on power ports
Wire size	14 AWG (2.5 mm ²) solid copper wire rated at 90 °C (194 °F) or greater, 1.2 mm (3/64 in.) insulation max			
North American temperature code	T3C			
IEC temperature code	—	T4	—	T4
Enclosure type rating	None (open-style)			

⁽¹⁾ Use this conductor category information for planning conductor routing as described in the system level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

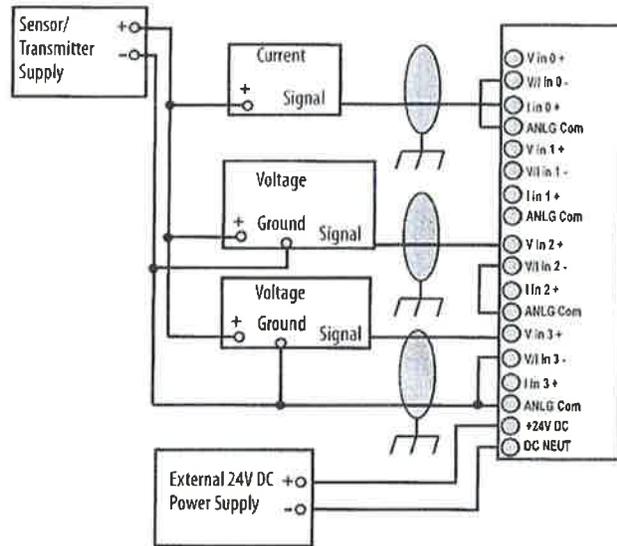
1769-IF4

Compact voltage/current analog input module



The external power supply must be rated Class 2, with a 24V DC range of 20.4...26.4V DC and 60 mA minimum. Series B and later modules support this option.

1769-IF4 Single-ended Sensor/Transmitter Inputs



1769-IF4 Mixed Transmitter Inputs

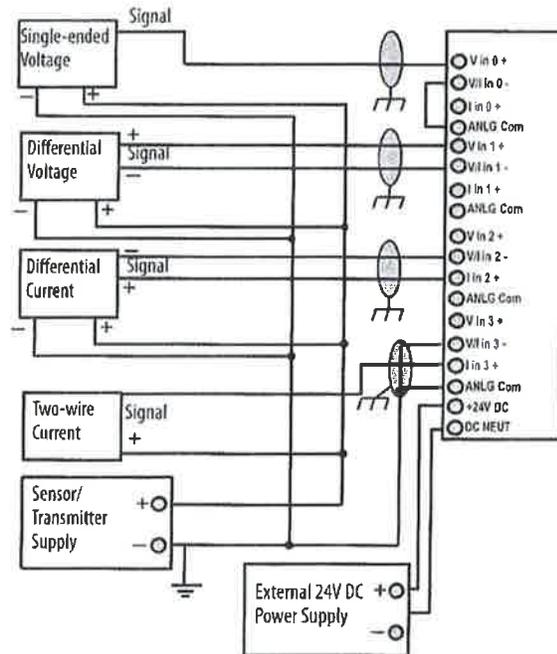


Table 6 - Technical Specifications - 1769-IF4

Attribute	1769-IF4
Inputs	4 differential or single-ended
Input range	±10V 0...10V 0...5V 1...5V 0...20 mA 4...20 mA
Full scale range ⁽¹⁾	±10.5V -0.5...10.5V -0.5...5.25V 0.5...5.25V 0...21 mA 3.2...21 mA
Current draw @ 5.1V	120 mA
Current draw @ 24V	60 mA
Heat dissipation, max	2.52 W
Converter type	Delta Sigma
Resolution ⁽²⁾	14 bits (unipolar) 14 bits plus sign (bipolar)
Rated working voltage ⁽³⁾	30V AC/30V DC
Common mode voltage range ⁽⁴⁾	±10V DC max per channel
Common mode rejection	> 60 dB @ 50 and 60 Hz with the 50 or 60 Hz filter selected, respectively
Normal mode rejection ratio	-50 dB @ 50 and 60 Hz with the 50 or 60 Hz filter selected, respectively
Input impedance	Voltage: 220 kΩ Current: 250 Ω
Accuracy ⁽⁵⁾	Voltage: ±0.2% full scale @ 25 °C (77 °F) Current: ±0.35% full scale @ 25 °C (77 °F)
Accuracy drift with temperature	Voltage: ±0.003% per °C Current: ±0.0045% per °C
Nonlinearity	±0.03%
Repeatability ⁽⁶⁾	±0.03%
Module error	Voltage: ±0.3% Current: ±0.5%
Overload at input terminals, max ⁽⁷⁾	Voltage: ±30V DC continuous, 0.1 mA Current: ±32 mA continuous, ±7.6V DC
Isolation voltage	500V AC or 710V DC for 1 minute (qualification test), group to bus 30V AC/30V DC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	300 g (0.65 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Optional 24V DC Class 2 power supply voltage range ⁽⁸⁾	20.4...26.4V DC
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)

Table 6 - Technical Specifications - 1769-IF4

Attribute	1769-IF4
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22...14 AWG) solid (22...16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL2 series B (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	10
Product code	35
Enclosure type rating	None (open-style)

- (1) The over- or under-range flag will come on when the normal operating range (over/under) is exceeded. The module will continue to convert the analog input up to the maximum full scale range. The flag automatically resets when within the normal operating range.
- (2) Resolution is dependent upon your filter selection. The maximum resolution is achieved with either the 50 or 60 Hz filter selected.
- (3) Rated working voltage is the maximum continuous voltage that can be applied at the input terminal, including the input signal and the value that floats above ground potential (for example, 10V DC input signal and 20V DC potential above ground).
- (4) For proper operation, both the plus and minus input terminals must be within $\pm 10V$ DC of analog common.
- (5) Includes offset, gain, nonlinearity, and repeatability error terms.
- (6) Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.
- (7) Damage may occur to the input circuit if this value is exceeded.
- (8) If the optional 24V DC Class 2 power supply is used, the 24V DC current draw from the bus is 0 mA.

Table 7 - Response Speed - 1769-IF4

Filter Frequency	Cut-off Frequency	Step Response	Channel Update
50 Hz	13.1 Hz	60 ms	22 ms
60 Hz	15.7 Hz	50 ms	19 ms
250 Hz	65.5 Hz	12 ms	6 ms
500 Hz	131 Hz	6 ms	4 ms

Table 8 - Certifications - 1769-IF4

Certification ⁽¹⁾	1769-IF4
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Enclosure

- (1) When marked. See the Product Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.

1769-IA16

Compact 120V AC input module

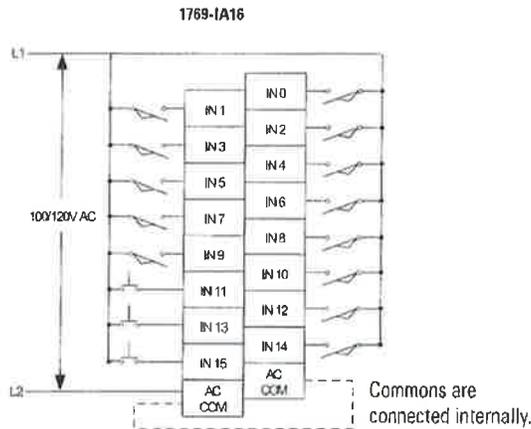


Table 4 - Technical Specifications - 1769-IA16

Attribute	1769-IA16
Inputs	16 (16 points/group, internally connected commons)
Voltage category	100/120V AC
Operating voltage range	79...132V AC, 47...63 Hz
Input delay, on	20 ms
Input delay, off	20 ms
Current draw @ 5.1V	115 mA
Heat dissipation, max	3.30 W
Off-state voltage, max	20V AC
Off-state current, max	2.5 mA
On-state voltage, min	79V AC
On-state current, min	5 mA @ 74V AC
On-state current, max	12 mA @ 120V AC
Inrush current, max ⁽¹⁾	250 mA
Input impedance, max	12 k Ω @ 50 Hz 10 k Ω @ 60 Hz
Isolation voltage	Verified by one of the following dielectric tests: 1517V AC for 1 s or 2145V DC for 1 s, input point to bus 132V AC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	280 g (0.61 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1
Module location	DIN rail or panel mount

Table 4 - Technical Specifications - 1769-IA16

Attribute	1769-IA16
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22...14 AWG) solid (22...16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
IEC input compatibility	Type 1+
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	82
Enclosure type rating	None (open-style)

(1) A current limiting resistor can be used to limit inrush current; however, the operating characteristics of the AC input circuit will be affected. If a 6.8 k Ω (2.5 W minimum) resistor is placed in series with the input, the inrush current is reduced to 35 mA. In this configuration, the minimum on-state voltage increases to 92V AC. Before adding the resistor in a hazardous environment, be sure to consider the operating temperature of the resistor and the temperature limits of the environment. The operating temperature of the resistor must remain below the temperature limit of the environment.

Table 5 - Certifications - 1769-IA16

Certification ⁽¹⁾	1769-IA16
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Enclosure

(1) When marked. See the Product Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.

1769-0W16

Compact AC/DC relay contact module

Simplified Output Circuit Diagram

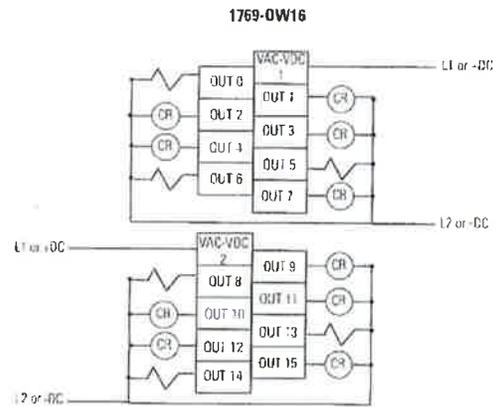
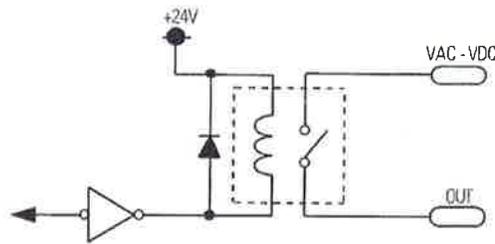


Table 98 - Technical Specifications - 1769-0W16

Attribute	1769-0W16
Outputs	16 normally open (8 points/group)
Operating voltage range	5...265V AC 5...125V DC
Delay, on	10 ms
Delay, off	10 ms
Current draw @ 5.1V	205 mA
Current draw @ 24V	180 mA
Heat dissipation, max	4.75 W
Off-state leakage, max	0 mA
On-state current, min	10 mA @ 5V DC
Current per point, max	2.5 A
Current per module, max	20 A
Isolation voltage	Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s, output point to bus 265V AC working voltage (IEC Class 2 reinforced insulation) Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s, group to group 265V AC working voltage (basic insulation) 150V AC working voltage (IEC Class 2 reinforced Insulation)
Weight, approx	450 g (0.99 lb)
Dimensions (HxWxD), approx	118 x 52.5 x 87 mm (4.65 x 2.07 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1.5
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules

Table 98 - Technical Specifications - 1769-0W16

Attribute	1769-0W16
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22...14 AWG) solid (22...16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	85
Enclosure type rating	None (open style)

Table 99 - Relay Contact Ratings - 1769-0W16

Volts, max	Continuous Amps per Point, max	Amperes ⁽¹⁾		Voltamperes		NEMA ICS 2-125
		Make	Break	Make	Break	
240V AC	2.5 A	7.5 A	0.75 A	1800VA	180VA	C300
120V AC		15 A	1.5 A			
125V DC	1.0 A	0.22 A ⁽²⁾		28VA		R150
24V DC	2.0 A	1.2 A ⁽²⁾		28VA		—

(1) Connecting surge suppressors across your external inductive load will extend the life of the relay contacts.

(2) For DC voltage applications, the make/break ampere rating for relay contacts can be determined by dividing 28VA by the applied DC voltage. For example, 28VA/48V DC = 0.58 A. For DC voltage applications less than 48V, the make/break ratings for relay contacts cannot exceed 2 A.

Table 100 - Certifications - 1769-0W16

Certification ⁽¹⁾	1769-0W16
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	C-Tick compliant for all applicable directives Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Enclosure

(1) When marked. See the Product Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.



INSTALLATION INSTRUCTIONS

Model AG65033/AG6503C3/AG65033L
Type 1 or Type 2 Surge Protection Device

IMPORTANT SAFETY INSTRUCTIONS • SAVE THESE INSTRUCTIONS

WARNING Risk of Electric Shock

- Thoroughly read instructions before installing unit.
- Installation and Service to be performed by a qualified licensed electrician.
- Intended for indoor or outdoor use.

- All wiring must comply with all state and local electrical codes including the National Electrical Code and/or Canadian Electrical Code.
- Suitable for use on a circuit capable of delivering not more than 50,000 rms symmetrical amperes.
- This unit contains no serviceable parts.
- This product does not protect against direct lightning strikes.

Type 1 installation:

A typical installation of a type 1 SPD will be connected between the secondary of the service transformer and the line side of the service panel. This installation is intended to be installed without overcurrent protection to the SPD.

Type 2 installation:

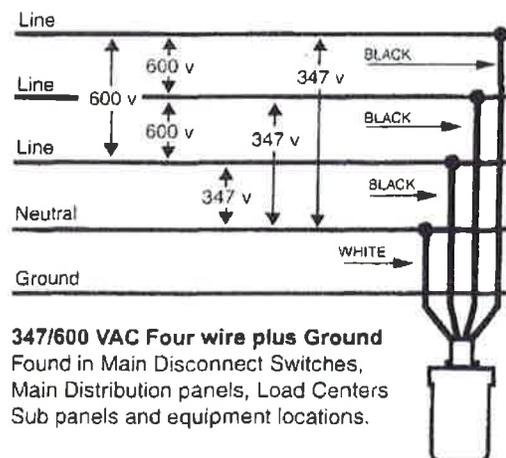
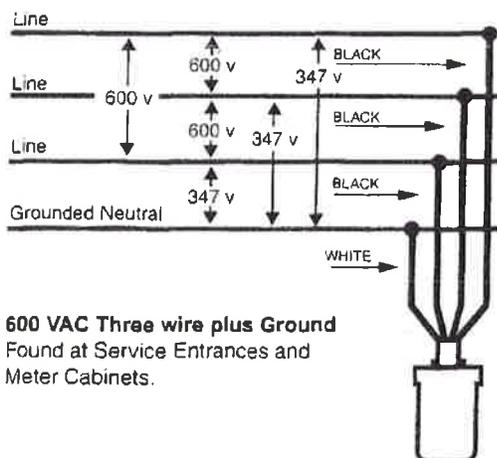
A typical installation of a type 2 SPD will be connected to the load side of the service panel and is intended to be installed with overcurrent protection to the SPD.

1. Determining location:
 - Ensure conductor lengths are as short and straight as possible for best performance. Do not coil excess wire. The SPD functions best if all bends in wires are rounded, ideally to a 4" radius. Hard 90 degree bend will reduce efficiency. Cut all leads to the correct length. Do not coil excess leads.
 - Install appropriate weatherproof fittings if the unit is to be mounted outside.
 - Bracket part number AG1BRKT is also available if needed.
2. Connect wires as shown within diagrams. If your application does not match one of the diagrams below consult your supplier.
3. Ensure all mounting and electrical connections are correct and securely fastened. Once energized the green indicator LED will be ON.

Maintenance:

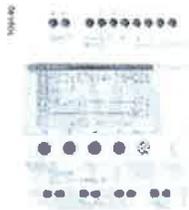
- AC Voltage SPD:
 - Periodically check SPD to ensure green indicator LED is ON. If green LED is OFF protection has diminished and the SPD should be replaced immediately.

347/600 VAC WYE 3 PHASE



Zelio Logic smart relays

Compact and modular smart relays



SR2 B121BD

Presentation

Zelio Logic smart relays are designed for use in small automated systems. They are used in both industrial and commercial applications.

■ For Industry:

- automation of small finishing, production, assembly or packaging machines.
- decentralised automation of ancillary equipment of large and medium-sized machines in the textile, plastics and materials processing sectors,
- automated systems for agricultural machinery (irrigation, pumping, greenhouses, ...)

■ For the commercial/building sectors:

- automation of barriers, roller shutters, access control.
- automation of lighting installations,
- automation of compressors and air conditioning systems.

Their compact size and ease of setting-up make them a competitive alternative to solutions based on cabled logic or specific cards.

Simple programming, ensured by the universal nature of LADDER and function block diagram FBD (1) languages, meets all automation requirements and also the needs of the electrician.

Compact smart relays are suitable for simple automated systems, up to 20 I/O.

If required, modular smart relays can be fitted with I/O extensions and a module for communication on the Modbus network, for greater performance and flexibility, from 10 to 40 I/O.

Programming

Programming can be carried out:

- independently, using the buttons on the smart relay (ladder language).
- on a PC, using "Zelio Soft" software.

When using a PC, programming can be carried out either in LADDER language, or in function block diagram language (FBD).

LCD display backlighting (2)

Backlighting of the display is programmable using "Zelio Soft" software and by direct action on the smart relay's 6 programming buttons.

Memory

The Zelio Logic smart relay has a backup memory which allows programs to be copied into another smart relay (examples: for building identical equipment, remote transmission of updates).

The memory also allows a backup copy of the program to be saved prior to exchanging the product.

When used with a smart relay without display or buttons, the copy of the program contained in the cartridge is automatically transferred into the smart relay at power-up.

Autonomy and backup

Autonomous operating time of the clock, ensured by a lithium battery, is 10 years. Data backup (preset values and current values) is provided by an EEPROM Flash memory (10 years).

I/O extensions

Zelio Logic smart relays can, if necessary, take the following I/O extensions:

- 6, 10 or 14 I/O, supplied with $\overline{\text{---}}$ 24 V via the smart relay,
- 6, 10 or 14 I/O, supplied with \sim 24 V via the smart relay,
- 6, 10 or 14 I/O, supplied with \sim 100... 240 V via the smart relay.

Communication module ▲

A module for communication on the Modbus network will be available for Zelio Logic modular smart relays. It is supplied with $\overline{\text{---}}$ 24 V via the smart relay.

Communication interface ▲▲

The "communication" products in the Zelio Logic range include:

- a communication interface connected between a smart relay and a modem,
- analogue or GSM modems,
- "Zelio Soft Com" software.

They are designed for monitoring or remote control of machines or installations which operate without personnel.

The communication interface, supplied with $\overline{\text{---}}$ 12/24 V, allows messages, telephone numbers and call conditions to be stored.



- 1 Modular smart relay (10 or 26 I/O)
- 2 I/O extension module (6, 10 or 14 I/O)

(1) FBD: Functional Block Diagram.
(2) LCD: Liquid Crystal Display

▲ Available 1st quarter 2004.
▲▲ Available 1st half 2004.

Environment characteristics			
Product certifications			UL, CSA, GL, C-TICK
Conformity with the low voltage directive	Conforming to 73/23/EEC		EN 61131-2
Conformity with the EMC directive	Conforming to 89/336/EEC		EN 61131-2 (Zone B) EN 61000-6-2, EN 61000-6-3 and EN 61000-6-4
Degree of protection	Conforming to IEC 60529		IP 20
Overvoltage category	Conforming to IEC 60664-1		3
Degree of pollution	Conforming to IEC/EN 61131-2		2
Ambient air temperature around the device	Operation	°C	-20...+55 (+40 in enclosure), conforming to IEC 60068-2-1 and IEC 60068-2-2
	Storage	°C	-40...+70
Maximum relative humidity			95 % without condensation or dripping water
Maximum operating altitude	Operation	m	2000
	Transport	m	3048
Mechanical resistance	Immunity to vibrations		IEC 60068-2-6, test Fc
	Immunity to mechanical shock		IEC 60068-2-27, test Ea
Resistance to electrostatic discharge	Immunity to electrostatic discharge		IEC 61000-4-2, level 3
Resistance to HF Interference (Immunity)	Immunity to electromagnetic radiated fields		IEC 61000-4-3, level 3
	Immunity to fast transients in bursts		IEC 61000-4-4, level 3
	Immunity to shock waves		IEC 61000-4-5
	Radio frequency in common mode		IEC 61000-4-6, level 3
	Voltage dips and breaks (~)		IEC 61000-4-11
	Immunity to damped oscillation wave		IEC 61000-4-12
Conducted and radiated emissions	Conforming to EN 55022/11 (Group 1)		Class B
Connection to screw terminals (Tightened using Ø 3.5 screwdriver)	Flexible cable with cable end	mm ²	1 conductor: 0.25...2.5, cable: AWG 24... AWG14 2 conductors: 0.25...0.75, cable: AWG 24... AWG18
	Semi-solid cable	mm ²	1 conductor: 0.2...2.5, cable: AWG 25... AWG14
	Solid cable	mm ²	1 conductor: 0.2...2.5, cable: AWG 25... AWG14 2 conductors: 0.2...1.5, cable: AWG 24... AWG16
	Tightening torque	N.m	0.5

--- 12 V supply characteristics

Smart relay type		SR2 B121JD	SR2 B201JD
Primary	Nominal voltage	V	12
Voltage limits	Including ripple	V	10.4...14.4
			10.4...14.4
Nominal input current		mA	120
Maximum nominal input current with extensions		mA	144
Power dissipated		VA	1.5
Micro-breaks	Permissible duration	ms	≤ 1 (repeated 20 times)
Protection			Against polarity inversion

--- 24 V supply characteristics

Smart relay type		SR2 e1e1BD	SR2 e1e2BD	SR2 e2e1BD	SR2 e2e2BD	SR3 B101BD	SR3 B102BD	SR3 B261BD	SR3 B262BD
Primary	Nominal voltage	V	24	24	24	24	24	24	24
Voltage limits	Including ripple	V	19.2...30	19.2...30	19.2...30	19.2...30	19.2...30	19.2...30	19.2...30
Nominal input current		mA	100	100	100	100	50	190	70
Maximum nominal input current with extensions		mA	-	-	-	100	160	300	180
Power dissipated		VA	3	3	6	3	4	6	5
Maximum power dissipated with extensions		W	-	-	-	8	8	10	10
Micro-breaks	Permissible duration	ms	≤ 1 (repeated 20 times)						
Protection			Against polarity inversion						

~ 24 V supply characteristics

Smart relay type		SR2e1e1B	SR2e2e1B	SR3 B101B	SR3 B261B
Primary	Nominal voltage	V	24	24	24
Voltage limits	Including ripple	V	20.4...28.8	20.4...28.8	20.4...28.8
Nominal frequency		Hz	50-60	50-60	50-60
Nominal input current		mA	145	233	140
Power dissipated		VA	4	6	4
Micro-breaks	Permissible duration	ms	≤ 10 (repeated 20 times)		
rms insulation voltage		V	1780 (50-60 Hz)		

~ 100...240 V supply characteristics

Smart relay type			SR2 ●101FU	SR2 ●121FU	SR2 ●201FU	SR3 B101FU	SR3 B261FU
Primary	Nominal voltage	V	100...240	100...240	100...240	100...240	100...240
Voltage limits	Including ripple	V	85...264	85...264	85...264	85...264	85...264
Nominal input current		mA	80/30	80/30	100/50	80/30	100/50
Maximum nominal input current with extensions		mA	—	—	—	80/40	80/60
Power dissipated		VA	7	7	11	7	12
Maximum power dissipated with extensions		VA	—	—	—	12	17
Micro-breaks	Permissible duration	ms	10	10	10	10	10
rms insulation voltage		V	1780	1780	1780	1780	1780

Processing characteristics

Smart relay type			SR2/SR3
Number of control scheme lines	With LADDER programming		120
Number of function blocks	With FBD programming		Up to 200
Cycle time		ms	10
Response time		ms	20
Back-up time (in the event of power failure)	Day/time		10 years (lithium battery) at 25 °C
	Program and settings		10 years (EEPROM memory)
Program memory checking			At each power-up
Clock drift			12 min/year (0 to 55 °C) 6 sec/month (at 25 °C and calibration)
Timer block accuracy			1 % ± 2 of the cycle time

Discrete ~ 24 V input characteristics

Smart relay type			SR2/SR3
Connection			Screw terminal block
Nominal value of inputs	Voltage	V	24
	Current	mA	4
Input switching limit values	At state 1	Voltage	V ≥ 15
		Current	mA ≥ 2.20
	At state 0	Voltage	V ≤ 5
		Current	mA < 0.75
Input impedance at state 1		KΩ	7.4
Configurable response time	State 0 to 1	ms	0.2
	State 1 to 0	ms	0.3
Conformity to IEC 61131-2			Type 1
Sensor compatibility	3-wire		Yes PNP
	2-wire		No
Input type			Resistive
Isolation	Between supply and inputs		None
	Between inputs		None
Maximum counting frequency		kHz	1
Protection	Against inversion of terminals		Control instructions not executed

Discrete ~ 100...240 V input characteristics

Smart relay type			SR2/SR3
Connection			Screw terminal block
Nominal value of inputs	Voltage	V	100... 240
	Current	mA	0.6
	Frequency	Hz	47... 63
Input switching limit values	At state 1	Voltage	V ≥ 79
		Current	mA > 0.1750
	At state 0	Voltage	V ≤ 40
		Current	mA < 0.05
Input impedance at state 1		KΩ	350
Configurable response time	State 0 to 1 (50/60 Hz)	ms	50
	State 1 to 0 (50/60 Hz)	ms	50
Isolation	Between supply and inputs		None
	Between inputs		None
Protection	Against inversion of terminals		Control instructions not executed

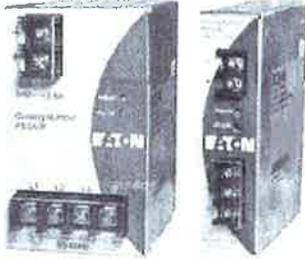
Integral analogue input characteristics				
Smart relay type		SR2/SR3		
Analogue inputs	Input range	V	0...10 or 0...24	
	Input impedance	K Ω	12	
	Maximum non destructive voltage	V	30	
	Value of LSB		39 mV, 4 mA	
	Input type		Common mode	
Conversion	Resolution		8 bit	
	Conversion time		Smart relay cycle time	
	Precision	at 25 °C		\pm 5 %
		at 55 °C		\pm 6.2 %
Repeat accuracy	at 55 °C		\pm 2 %	
Isolation	Between analogue channel and supply		None	
Cabling distance		m	10 maximum, with screened cable (sensor not isolated)	
Protection	Against inversion of terminals		Control instructions not executed	

Relay output characteristics						
Smart relay type		SR2 ^{eee} / SR3 B101 ^{ee}		SR3 B261 ^{ee} , SR3 XT141 ^{ee}		
Operating limit values		V	\approx 5...150. \sim 24...250	\approx 5...150. \sim 24...250		
Contact type			N/O	N/O		
Thermal current		A	8	8 outputs: 8 A 2 outputs: 5 A		
Electrical durability for 500 000 operating cycles	Utilisation category	DC-12	V	24	24	
			A	1.5	1.5	
	DC-13	V	24 (L/R = 10 ms)	24 (L/R = 10 ms)		
		A	0.6	0.6		
		V	230	230		
		A	1.5	1.5		
	AC-15	V	230	230		
		A	0.9	0.9		
	Minimum switching capacity		At minimum voltage of 12 V	mA	10	10
	Low power switching reliability of contact				12 V - 10 mA	12 V - 10 mA
Maximum operating rate	No-load	Hz	10	10		
	At I _e (operational current)	Hz	0.1	0.1		
Mechanical life		In millions of operating cycles		10	10	
Rated impulse withstand voltage		Conforming to IEC 60947-1 and 60664-1	kV	4	4	
Response time	Trip	ms	10	10		
	Reset	ms	5	5		
Built-in protection	Short-circuit		None			
	Against overvoltage and overload		None			

Transistor output characteristics			
Smart relay type		SR2/SR3	
Operating limit values		V	19.2...30
Load	Nominal voltage	V	\approx 24
	Nominal current	A	0.5
	Maximum current	A	0.625 at 30 V
Drop out voltage	At state 1	V	\leq 2 for I=0.5 A
Response time	Trip	ms	\leq 1
	Reset	ms	\leq 1
Built-in protection	Against overload and short-circuits		Yes
	Against overvoltage (1)		Yes
	Against inversions of power supply		Yes

(1) If there is no volt-free contact between the relay output and the load.

PSG Series



Product Description

Eaton's PSG Series of power supplies is designed to be a high-performance, high-quality line of products covering a majority of 24V DC control applications. With global certifications, compact size, and an impressive operating temperature range, the PSG series fits a wide variety of applications at a competitive price.

Eight models are offered, from 2.5A up to 20A with both single and 3-phase input voltage models available.

Application Description

The PSG series is a line of general-purpose power supplies for use in a wide variety of industrial control applications. Applications include communication networks, sensors, PLCs, and many other electrical systems.

Each model is equipped with a rugged metal housing, heavy-duty screw terminals, and a variety of protection features, making the PSG one of the most versatile industrial power supply lines on the market.

Features, Benefits and Functions

- Universal input voltages: 85 – 264V AC for single-phase units, 320 – 575V AC for 3-phase units.
- Rugged aluminum housing stands up to harsh environments.
- Current surge (power boost) of 1.5 times nominal current for 1 sec. allows branch protection and powering of high pick-up loads.
- Wide operating temperature range: -20°C to +75°C (derating above 50°C).

- Adjustable DC voltage output.
- LED indicating light for DC OK simplifies troubleshooting.
- Compact size, with common depth and height across all models allows for common panel depths and family consistency.
- MTBF up to 800,000 hours ensures uptime and reliability.
- Heavy duty screw terminals with finger-safe protective cover allow use of ring-lug terminals.
- All-metal DIN rail mounting hardware.
- Class 1, Division 2 hazardous location rated (February 2009).

Standards and Certifications

- UL/cUL Listed – UL 508.
- CSA Certified (contact Eaton for certification dates and status).
- CE Marked.
- RoHS Compliant.

Product Selection

Table 2. Product Selection

Description	Catalog Number	Price
Power Supply – Single-phase 85 – 264V AC input, 24V DC / 2.5A output	PSG60E	
Power Supply – 3-phase 320 – 575V AC input, 24V DC / 2.5A output	PSG60F	
Power Supply – Single-phase 85 – 264V AC input, 24V DC / 5A output	PSG120E	
Power Supply – 3-phase 320 – 575V AC input, 24V DC / 5A output	PSG120F	
Power Supply – Single-phase 85 – 264V AC input, 24V DC / 10A output	PSG240E	
Power Supply – 3-phase 320 – 575V AC input, 24V DC / 10A output	PSG240F	
Power Supply – Single-phase 85 – 264V AC input, 24V DC / 20A output	PSG480E	
Power Supply – 3-phase 320 – 575V AC input, 24V DC / 20A output	PSG480F	

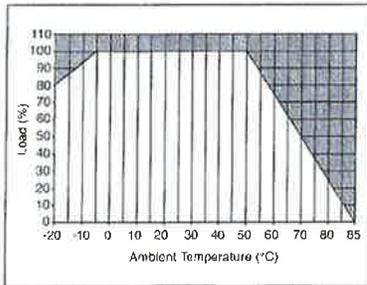


Figure 1. Power Derating Curve Vertical Mounting Position PSG60E

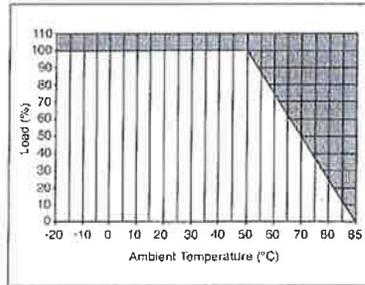


Figure 2. Power Derating Curve Vertical Mounting Position PSG60F, PSG120E, PSG120F, PSG480E, PSG480F

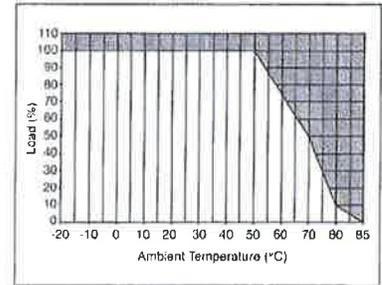


Figure 3. Power Derating Curve Vertical Mounting Position PSG240E, PSG240F

Discount Symbol MC7

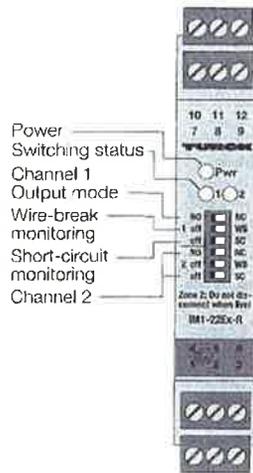
Technical Data and Specifications

Table 3. PSG Technical Specifications

Capacity	PSG60E	PSG120E	PSG240E	PSG480E	PSG60F	PSG120F	PSG240F	PSG480F
	60W	120W	240W	480W	60W	120W	240W	480W
Input								
Nominal Voltage	100 – 240V AC				3 x 400 – 500V AC			
Voltage Range	85 – 264V AC (DC input range 120 – 375V DC)				320 – 575V AC (DC input range 450 – 800V DC)			
Frequency	47-63 Hz (0 Hz at DC input)							
Nominal Current	1.1A	1.4A	2.9A	5.7A	0.3A	0.5A	0.8A	1.6A
Inrush Current Limitation	30A	<80A	N/A	N/A	<30A	<30A	<40A	<50A
Mains Buffering @ Nominal Load (Typ.)	>20 ms	>35 ms	>20 ms	>20 ms	>30 ms	>35 ms	>35 ms	>20 ms
Turn-on Time	<2.5 sec	<1 sec	<1 sec	<1 sec	<2 sec	<1 sec	<1 sec	<1 sec
Internal Fuse	T3.15 AH/250V		T6.3AH/250V		F 10H/250V		3.15AH/500V	
External Fusing	6A, 10A, or 16A		10A or 16A		3 x circuit breakers 6A, 10A or 16A			
Leakage Current	<1 mA	<1 mA	<3.5 mA	<1 mA	<3.5 mA			
Output								
Nominal Output Voltage	24V DC +/- 2%							
Adjustment Range	22 – 28V DC							
Nominal Current	2.5A	5A	10A	20A	2.5A	5A	10A	20A
Startup With Capacitive Loads	Max. 8,000 µF		Max. 10,000 µF					
Max. Power Dissipation Idling/ Nominal Load Approx.	10 W	22.5 W	42.5 W	72 W	9 W	18 W	36 W	72 W
Efficiency (@ 400V AC and Nominal Values)	>85% typ	>84% typ	>84% typ	>86% typ	>86% @ 2 x 400V AC >85% @ 3 x 500V AC		>87% @ 2 x 400V AC >86% @ 3 x 500V AC	
Current Surge (@ 24V DC)	3.75A	7.5A	15A	30A	3.75A	7.5A	15A	30A
Current Surge Time/Cycle	1 second (at 10-second intervals)							
Residual Ripple/Peak Switching (20 Mhz)	<50 mV/<240mVpp							
Parallel Operation	With Oring Diode							
Galvanic Isolation								
Input/Output	4 kVAC (type test)/3 kVAC (routine test)							
Input/Ground	1.5 kVAC (type test)/1.5 kVAC (routine test)							
Output/Ground	1.5 kVAC (type test)/500V AC (routine test)							
General/Physical Data								
Housing Material	Aluminum (Al5052)							
Signals	Green LED for DC OK							
MTBF	>800,000 hrs		>300,000 hrs		>500,000 hrs		>300,000 hrs	
Dimensions (L)	121 mm							
Dimensions (W)	32 mm	50 mm	85 mm	160 mm	70 mm	70 mm	85 mm	180 mm
Dimensions (H)	120 mm	115 mm	118.5 mm	115 mm	118.5 mm	118.5 mm	120.5 mm	115 mm
Weight (kg)	0.37	0.54	1.04	1.8	0.56	0.72	0.77	1.71
Operating Temperature	-20°C to +75°C (>50°C derating)							
Storage Temperature	-25°C to +85°C							
Operating Humidity	<95% RH, non-condensing							
Vibration (Operating)	10 to 150 Hz, 0.35 mm acc. 50 m/s/s, single amplitude (5 G max) for 90 min. in each X, Y, Z direction, in acc. with IEC 68-2-6							
Pollution Degree	2							
Climatic Class	3K3 according to EN 60721							
Approvals/Certifications								
	UL/cUL Listed-UL508 (Industrial Control Equipment), cURus-UL60950-1, CSA, CE, IEC, EN, German Safety, RoHS							
Safety & Protection								
Transient Surge Voltage	Varistor							
Surge Voltage Protection Against Internal Surge	Yes							
Safety Class	Class I with ground connection							
Shock	30 G (300 m/s/s) in all directions according to IEC 68-2-27							

① Ratings for single-phase models are at 115V AC; 3-phase models are at 400V AC.

Isolating Switching Amplifier IM1-22Ex-R 2-channel



- **2-channel isolating switching amplifier with removable terminal blocks**
- **Intrinsically safe input circuits EEx ia**
- **Area of application according to ATEX: II (1) GD, II 3 G**
- **Approved for installation in zone 2, however the device must be installed in a housing which complies with the requirements of EN 60079-15 with a minimum protection degree of IP54**
- **Functional safety up to SIL 2 (acc. to EN 61508)**
- **Galvanic isolation between input circuits, output circuits and supply voltage**
- **Input circuit monitoring for wire-break and short-circuit (can be disabled)**
- **2 relay outputs, each with one NO contact**
- **Selectable NO/NC output function**
- **Universal supply voltage (20...250 VAC/20...125 VDC)**

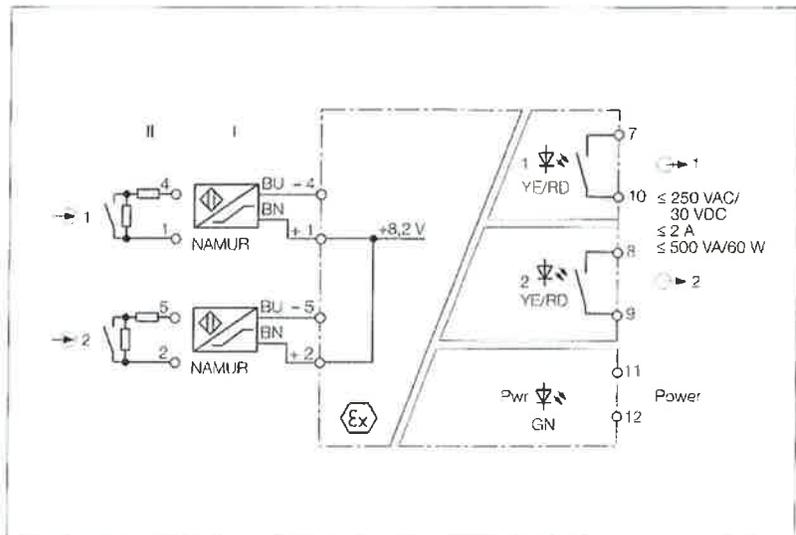
The isolating switching amplifier type IM1-22Ex-R is a dual channel device featuring intrinsically safe input circuits. It can be connected to sensors according to EN 60947-5-6 (NAMUR), variable resistors or potential-free contacts.

The output circuits feature one relay with one NO contact each.

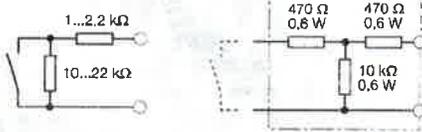
Six front panel programming switches select the output function of each channel (normally open mode = NO/or normally closed mode = NC) and enable separate activation and de-activation of wire-break (WB) and short-circuit (SC) monitoring of each channel.

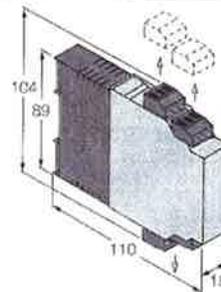
When using mechanical contacts as the input device, wire-break and short-circuit monitoring must be disabled or shunt resistors must be connected to the contacts (II). (See next page for contact configuration).

The green LED on the front cover indicates that the device is powered. The two dual colour LEDs indicate the switching status (yellow) as well as fault conditions (red). When the input circuit monitoring feature is activated, red illuminates to indicate a fault in the input circuit and the respective output relay is de-energised.



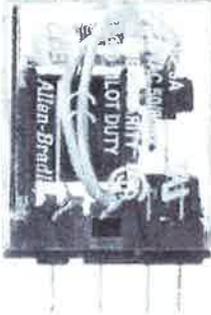
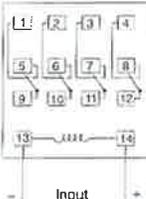
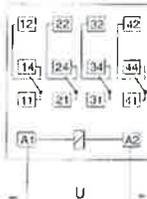
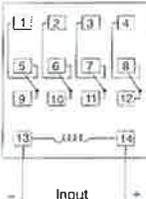
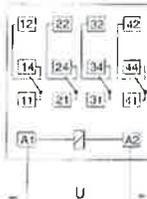
Isolating switching amplifier IM1-22Ex-R

Type	IM1 22Ex-R
Ident-no.	7541231
Supply voltage U_3	20...250 VAC/20...125 VDC
Line frequency (AC)	40...70 Hz
Power/current consumption	≤ 3 W
Galvanic isolation	between input circuit, output circuits and supply voltage for 250 V _{rms} test voltage 2.5 kV _{rms}
Input circuits	according to EN 60947-5-6 (NAMUR), intrinsically safe according to EN 50020
Operating characteristics	
- Voltage	8,2 V
- Current	8,2 mA
Switching threshold	1.55 mA
Hysteresis	typ. 0.2 mA
Wire-break threshold	≤ 0.1 mA
Short-circuit threshold	≥ 6 mA
Contact configuration	
Of mechanical switches with active input circuit monitoring function	 <p>resistor module WM1, ident-no. 0912101</p>
Output circuits	2 relay outputs with 1 NO contact each
Switching voltage	≤ 250 VAC/120 VDC
Switching current per output	≤ 2 A
Switching capacity per output	≤ 500 VA/60 W
Switching frequency	≤ 10 Hz
Contact material	silver-alloy + 3 μm Au
Ex-Approval acc. to certificate of conformity	TÜV 04 ATEX 2553 / TÜV 06 ATEX 552968 X
Maximum nominal values	
- No load voltage U_0	≤ 9.6 V
- Short-circuit current I_0	≤ 11 mA
- Power P_0	≤ 26 mW
Maximum external inductances/capacitances	
- [EEx ia] IIC	1 mH/1.1 μF / 5 mH/0.83 μF / 10 mH/0.74 μF
- [EEx ia] IIB	2 mH/5.2 μF / 10 mH/3.8 μF / 20 mH/3.4 μF
- Ex nL IIC	1 mH/1.9 μF / 5 mH/1.4 μF / 10 mH/1.2 μF
- Ex nL IIB	1 mH/11 μF / 5 mH/7.5 μF / 10 mH/6.6 μF
Marking of devices	Ⓔ II (1) GD [EEx ia] IIC II 3 G Ex nA nC [nL] IIC/IIB T4
LED indications	
- Power	green
- Switching status/Fault indication	2 x yellow/red (dual colour LED)
Terminal housing	12-pole, 18 mm wide, Polycarbonate/ABS, flammability class V-0 per UL 94
Mounting	snap-on clamps for top-hat rail (DIN 50022) or screw terminals for panel mounting
Connection	removeable terminal blocks, reverse-polarity protected, screw connection, self-lifting
Connection profile	≤ 1 x 2.5 mm ² , 2 x 1.5 mm ² or 2 x 1.0 mm ² with wire sleeves
Degree of protection (IEC 60529/EN 60529)	IP20
Operating temperature	-25...+70 °C



Bulletin 700-HC
Interposing/Isolation Relays
Product Selection

Bulletin 700-HC Miniature Square Base with Blade Terminals

	Description	Contact Rating	Wiring Diagrams		Coil Voltage	Cat. No. ① ②	Factory-stocked Item ③
			U.S./Canada	International			
	4PDT 4-Pole 4 Form C Contacts: 1 A = Au/Ag Bifurcated Gold Contacts Sockets	1 A	 Input	 U	12V DC	700-HC54Z12	
					24V DC	700-HC54Z24	✓
					24V AC	700-HC54A24	
					120V AC	700-HC54A1 ④	✓
	4PDT 4-Pole 4 Form C Contacts: 3 A = Au/Ag Gold Contacts Sockets	3 A (C300)	 Input 700-HN128	 U 700-HN103	6V AC	700-HC14A06	
					12V AC	700-HC14A12	
					24V AC	700-HC14A24	✓
					120V AC	700-HC14A1 ④	✓
					240V AC	700-HC14A2	✓
					6V DC	700-HC14Z06	
					12V DC	700-HC14Z12	✓
					24V DC	700-HC14Z24 ⑤	✓
4PDT 4-Pole 4 Form C Contacts: 5 A = AgCdO Silver Contacts Sockets	5 A (C300)			48V DC	700-HC14Z48		
				110V DC	700-HC14Z1		
				6V AC	700-HC24A06		
				12V AC	700-HC24A12		
				24V AC	700-HC24A24 ⑥	✓	
				120V AC	700-HC24A1 ⑥	✓	
				240V AC	700-HC24A2	✓	
				6V DC	700-HC24Z06		
				12V DC	700-HC24Z12	✓	
				24V DC	700-HC24Z24 ⑥	✓	
48V DC	700-HC24Z48	✓					
110V DC	700-HC24Z1						

- ① LED Option: Add suffix (-4) to the selected Bulletin 700-HC Relay Cat. No. except for the 240V AC units, add (-4L).
- ② Manual Operator and LED Option: Add suffix (-1-4) to the selected Bulletin 700-HC Relay Cat. No., except for the 240V AC units, add (-1-4L).
- ③ Bulk Package Option: Relay can be purchased at discounted prices in bulk quantities of 50. Add suffix (-99) to the selected relay Catalog Number.
- ④ Single Pack

**Bulletin 700-HC
Interposing/Isolation Relays
Accessories**

	Description	Pkg. Qty.	Cat. No.	Factory-stocked Item
 <p style="text-align: center;">Cat. No. 700-HN103</p>	<p>Screw Terminal Socket – Panel or DIN Rail Mounting, Guarded Terminal Construction 14-blade miniature socket for use with Bulletin 700-HC relays.</p>	1	700-HN103	✓
 <p style="text-align: center;">Cat. No. 700-HN128</p>	<p>Screw Terminal Base Sockets – Panel or DIN Rail Mounting, Open Style Construction 14-blade miniature socket for use with Bulletin 700-HC relays. Order must be for 10 sockets or multiples of 10.</p>	10	700-HN128	✓
 <p style="text-align: center;">Cat. No. 199-DR1</p>	<p>DIN Rail Mounting Pack Standard 35 x 7.5 mm DIN Rail, 1 meter long, 10 rails per package. Order must be for 10 rails or multiples of 10.</p>	10	199-DR1	✓
 <p style="text-align: center;">Sample Retainer Clips</p>	<p>Retainer Clip for Cat. Nos. 700-HN103, and -HN128 Sockets with 700-HC Relays and Cat. Nos. 700-HN116, Sockets with Bulletin 700-HF DPDT Relays  Secures relay in socket. Order must be for 10 clips or multiples of 10.</p>	10	700-HN114	✓
	<p>Pre-printed identification tags – contains 10 sheets of pre-printed and blank tags. Each sheet contains 13 sets of the markings CR...9CR, TR...9TR, M...9M, F, R, 1S, and 117 blank tags. Tags are peel-off with sticky backing for easy placement on relays.</p>	10	700-N40	
	<p>Blank identification tags – contains 10 sheets of blank identification tags for customer specialized printing. Each sheet contains 546 blank tags. Tags are peel-off with sticky backing for easy placement on relays.</p>	10	700-N41	

● Bulletin 700-HC Miniature Square Base Relay, Socket, and Retainer Clip Reference Chart

Relay Type	Socket Cat. No.	Retainer Clip Cat. No.
700-HC	700-HN103	700-HN114
	700-HN128	700-HN114

Relays, Timers, & Temperature Controllers

Product Overview

Bulletin No.	700-HT	700-HV	700-HX	700-HXM
Type	Tube Base Timing Relay	Repeat-Cycle Timing Relay	Digital Timer	Digital Counter/Timer
Features	<ul style="list-style-type: none"> Pin-style terminals Single range or fixed timers Available as ON- or OFF-Delays 	<ul style="list-style-type: none"> Pin-style terminals Single-range timer Repeat cycle 	<ul style="list-style-type: none"> Digital timer 5 A contact rating Negative transmissive LCD display 10 functions or modes Environmentally friendly—flash memory, no battery NEMA B300 rated NEMA 4/IP66 DIN Rail or panel mount capable 	<ul style="list-style-type: none"> World's smallest compact preset timer Built-in prescaling for counter operation Finger protection terminal block to meet VDE0106/P100 Panel surface compatible with NEMA 4/IP66 Six-language instruction manual provided Environmentally friendly—flash memory, no battery Negative transmissive LCD display
Control Outputs: Time Limit Instantaneous	DPDT	DPDT	SPDT	SPDT
Timing Operation Modes:	On-Delay Off-Delay	Repeat Cycle	Signal On-Delay 1 and 2 Signal Off-Delay One Shot Repeat Cycle Off Start Repeat Cycle On Start Signal On/Off-Delay Power On-Delay 1 and 2 Twin Timer Cumulative	On-Delay Repeat Cycle Signal Off-Delay One Shot Accumulative On/Off-duty Adjustable-Repeat Cycle Counter Multi Mode
Time Range	0.1 s...30 min.	0.1 s...30 min.	0.05 s...300 h	0...9999 h
Supply Voltage	12V DC 24V DC 24V AC 120V AC 240V AC	24V DC 24V AC 120V AC 240V AC	12...24V DC 24V AC 100...240V AC	24V DC
Contact Rating at 120V AC	10 A	10 A	5 A	5 A
Certifications	UR, UL, CSA, CE	UR, UL, CSA, CE	cURus, CE, C-Tick	cURus, CE, C-Tick
Socket Cat. No(s).	700-HN100 OR 700-HN101 700-HN125 OR 700-HN126	700-HN100 700-HN125	700-HN100 700-HN125	—
Page Number	Web‡	Web‡	page 9-96	page 9-106

‡ Information for this product line is available on the Industrial Controls Catalog website: www.ab.com/catalogs.



Heaters

Electric Heater



CAUTION

These electric heaters are not designed for use in dusty, dirty, corrosive, or hazardous locations. Portions of the heater can get hot. Adequate protection must be taken to protect people from potential burns, and to protect other components from this heat. Hoffman recommends this heater only be installed in a totally-enclosed metal enclosure.

DO NOT INSTALL HEATERS ON WOOD PANELS. Heat sensitive components should not be placed near the heater discharge area since this air can be quite warm. The clearance range defines the space that must be kept free of these components for proper and safe operation of the heater.

Industry Standards

UL 508A Component Recognized; File No. E61997

CSA Certified, CSA File No. LR42186
CE

Application

Protect mechanical, electrical and electronic equipment from low temperatures, condensation and corrosion with this thermostatically controlled, fan-driven heater that maintains a stable enclosure temperature.

Fan draws cool air from the bottom of the enclosure and passes this air across the thermostat and heating elements before being released into enclosure cavity. Heated air is discharged through the top of the heater unit.

Specifications

- Aluminum housing
- Thermostat range adjustable from 0 F to 100 F (-18 C to 38 C)
- Four 10-32 x self-tapping screws are included with each heater
- Ball bearing fan
- Terminal strip with clamp connector that accepts both solid and stranded wire

Finish

Brushed aluminum

Bulletin: D85

Standard Product

Catalog Number	Watts	Voltage	Hz	Amps	X in./mm	Weight (lbs.)	Weight (kg)
DAH1001A	100	115	50/60	0.98	4.00 102	4.00	1.81
DAH1002A	100	230	50/60	0.49	4.00 102	4.00	1.81
DAH2001A	200	115	50/60	1.89	6.00 152	4.00	1.81
DAH2002A	200	230	50/60	0.95	6.00 152	4.00	1.81
DAH4001B	400	115	50/60	3.72	6.00 152	6.00	2.72
DAH4002B	400	230	50/60	1.86	6.00 152	6.00	2.72
DAH8001B	800	115	50/60	7.37	8.00 203	6.00	2.72
DAH8002B	800	230	50/60	3.69	8.00 203	6.00	2.72

Simplify installation with a revolutionary mounting system

Magelis STU

Color touch screen graphic terminals, 5.7" or 3.5" screens, configured by Vijeo Designer

Schneider Electric has revolutionized the way industrial terminals are mounted. Thanks to its push-button style mounting system, Magelis STU, from the HMI range, fits anywhere on your machines or enclosures.



Vijeo Designer



5.7" or 3.5" screens



Mounting in enclosure

> Tool-free installation

After introducing the spring clip mounting mechanism, Schneider Electric™ delivers innovative technology once again with its 22 mm-diameter standard push-button style mounting system, which eliminates the need to make an enclosure cut-out.

> Optimum visibility

The 5.7" and 3.5" QVGA 65K color TFT screens are the latest addition to the Schneider Electric Small Panel HMI offer and provide crystal-clear readability.

> Innovative concept

The modular design of the HMISTU allows you to select between 3.5" and 5.7" screen sizes without having to change your panel cut out design.

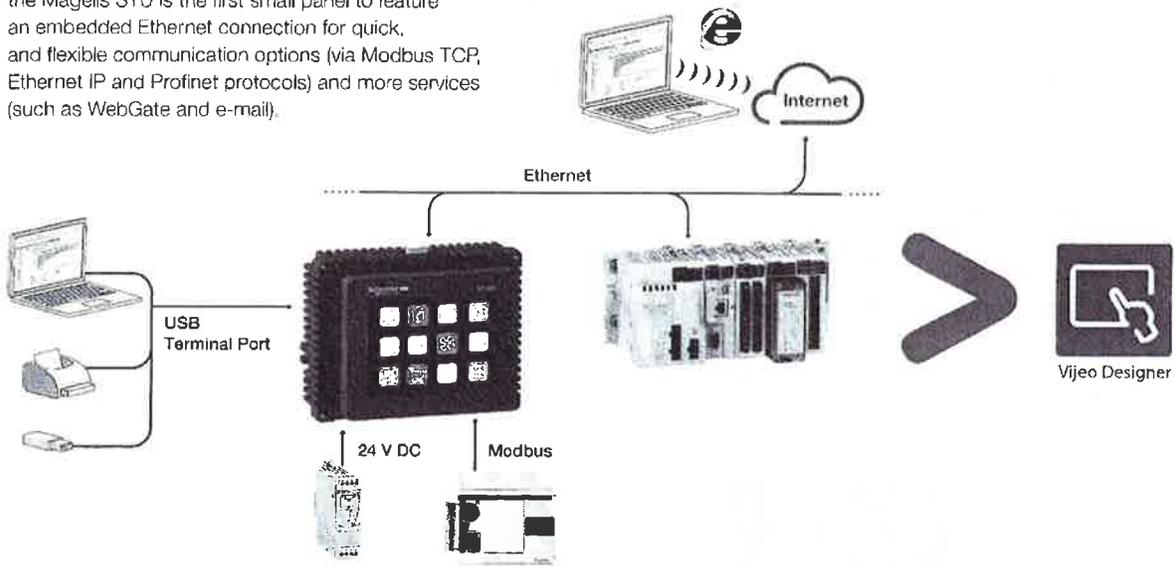
> Easy to program and maintain

- > Configured by the same Vijeo™ Designer HMI software as the rest of the Magelis™ HMI family giving you the full features of this high end software even on these smaller products.
- > No batteries required; backlit by an LED
- > Removable power connector
- > Use USB memory stick to load applications & manage runtime data
- > Remote view and control with the WebGate function by standard web browser on remote PC

Schneider
 **Electric**

> Enhanced communication

In addition to the standard RJ45 serial link, the Magelis STU is the first small panel to feature an embedded Ethernet connection for quick, and flexible communication options (via Modbus TCP, Ethernet IP and Profinet protocols) and more services (such as WebGate and e-mail).



> Selection guide

Designation	Magelis STU	
Size	3.5"	5.7"
Screen	QVGA resolution, 65K colors, analog touch panel	
Backlighting	LED, 50,000 hours	
Interfaces	Multiprotocol RS 485/232 RJ45 serial port, 10/100 BaseT RJ45 Ethernet port, 1 mini-USB Device + 1 USB Host V2.0	
Protocols	Modbus, Uni-Telway, Modbus TCP, Siemens® PPI-MPI/Profinet, Omron® Sysmacway/Sysmac Ethernet, Rockwell® DF1/DH485/Ethernet IP, Mitsubishi® Melsec FX/Q/A/TCP-A/TCP-Q	
Memory	Application: 16 MB FLASH/64 KB backup FRAM (USB may be used for additional storage)	
Power supply	24 VDC with removable connector	
Mounting	Diameter 22 mm	
External dimensions (mm)	Front module L98 x H81 x D16 Rear module L118 x H98 x D30	Front module L163 x H129.5 x D17.5 Rear module L118 x H98 x D30
Product reference	HMISTU655	HMISTU855

Accessories	
USB transfer cable	BMXXCAUSBH018
Screen protector (set of 5)	HMIZS61 (3.5"), HMIZS62 (5.7")
Mini-USB extension cable	HMIZSUSBB
Serial printer cable	HMIZURS
Maintenance kit (USB holders, anti-rotation Tee, panel spacer)	HMIZSUKIT

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Pilot Light Operators*



Plastic Pilot Light
 Cat. No. 800FP-P7



Metal Pilot Light
 Cat. No. 800FM-P4

Color	Pkg. Quantity	Plastic	Metal
		Cat. No.	Cat. No.
Green	1	800FP-P3	800FM-P3
Red		800FP-P4	800FM-P4
Yellow		800FP-P5	800FM-P5

800F **P** - **P** **3** -
 a b c d

a

Operator Construction	
Code	Description
P	Round plastic operator (IP66, Type 4/4X/13)
M	Round metal operator (IP66, Type 4/13)

c

Lens Cap*	
Code	Color
0	Amber*
3	Green
4	Red
5	Yellow*
6	Blue*
7	Clear
9	No lens

d

Packaging	
Code	Description
Blank	1 per package
BP	10 per package

b

Operator Type	
Code	Description
P	Diffuser

* For custom laser-engraved pilot light, order pilot light with applicable lens cap color plus custom laser-engraved diffuser on page 10-115.
 * When using LED for illumination, a white LED is recommended.

Momentary Push Button Operators, Non-Illuminated — Flush, Extended, Guarded



Flush Operator
 Cat. No. 800FP-F3



Extended Operator
 Cat. No. 800FM-E4



Guarded Operator
 Cat. No. 800FP-G6

Color	Pkg. Quantity	Flush		Extended	
		Plastic	Metal	Plastic	Metal
Black	1	800FP-F2	800FM-F2	800FP-E2	800FM-E2
Green		800FP-F3	800FM-F3	800FP-E3	800FM-E3
Red		800FP-F4	800FM-F4	800FP-E4	800FM-E4

800F P - F 3 -
 a b c d

a

Operator Construction	
Code	Description
P	Round plastic operator (IP66, Type 4/4X/13)
M	Round metal operator (IP66, Type 4/13)

b

Operator Type	
Code	Description
F	Flush
E	Extended
G	Guarded

c

Color Cap	
Code	Color
0	Orange
1	White
2	Black
3	Green
4	Red
5	Yellow
6	Blue
8	Grey*
9	No cap
X	Assortment pack‡

d

Packaging	
Code	Description
Blank	1 per package
BP	10 per package‡

* Available in flush only.
 † Assortment pack contains one cap of each color, not available in BP packaging.
 ‡ Only available with no color cap (9 from Table c).

GE Sensing

Features

- All-titanium construction, backed by a five-year corrosion warranty
- Accuracy: $\leq \pm 0.25\%$ full scale (FS) best standard line (BSL)
- Flush, polytetrafluoroethylene-coated elastomeric diaphragm
- Intrinsically safe approval (UL, FM, CSA)
- Outputs: 4 to 20 mA, 1 to 5 VDC
- Submersible with vented polyurethane cable

The PTX/PMP 1290 Series submersible/depth pressure transducers are specifically designed for the wastewater, pump/lift station application. The all-titanium construction assures excellent life in the most hostile environments, including corrosive and hazardous chemical applications. GE backs its titanium construction

with a five-year corrosion warranty. Standard vented cable is polyurethane.

The PTX/PMP 1290 Series pressure transmitter is similar to Druck's field proven 1830 Series submersible sensors with the exception of the pressure port. It is equipped with a flush polytetrafluoroethylene-coated elastomeric diaphragm that reduces the likelihood of grease or biosolids buildup. The pressure transfer medium is a silicone grease that maintains its elasticity between -40°F and 250°F (-40°C and 121°C).

An advanced micro-machined silicon piezoresistive pressure sensor provides excellent performance and resistance to shock and vibration. A tough, polyurethane cable is molded to the transducer body, providing a high integrity, waterproof assembly. The cable is strengthened with Kevlar[®] so that there is no measurable elongation when the cable is lowered into deep wells.

The fully isolated, all-titanium design ensures long term reliable measurements in water and wastewater management, industrial, process and marine applications.

PTX/PMP 1290 Series

Druck Wastewater Submersible Pressure Transmitters/Transducers

PTX/PMP 1290 Series is a Druck product. Druck has joined other GE high-technology sensing businesses under a new name—GE Industrial, Sensing.



PTX/PMP 1290 Specifications

General

Operating Ranges

Any range from 6 ftH₂O (1.75 mH₂O) and 46 ftH₂O (15 mH₂O) with elastomeric diaphragm. Higher ranges to 500 psig (35bar) available with plastic screen in place of elastomeric diaphragm.

Overpressure

4X minimum

Pressure Media

Fluids compatible with Titanium and polyurethane

Transduction Principle

Piezoresistive-micromachined silicon strain gauge

Combined Non-linearity, Hysteresis and Repeatability

<±0.25% FS BSL

Temperature Effects

±1.5% FS total error band (TEB) for ranges 10 psig (7 mH₂O) and up. Ranges 5 psig (3.5 mH₂O) and below prorated.

Resolution

Infinite

Insulation Resistance

100 MΩ @ 500 VDC

Relative Humidity

0 to 100%

Operating Temperature Range

-5°F to 140°F (-20°C to 60°C)

Compensated Temperature Range

30°F to 86°F (0°C to 30°C)

Electrical

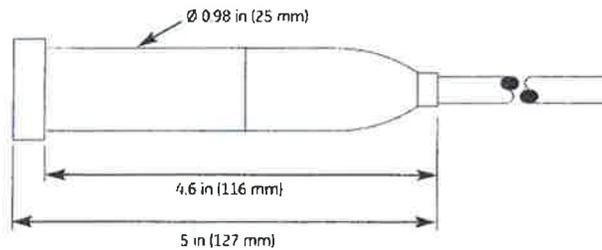
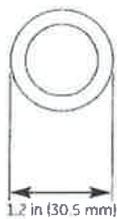
PTX 1290

- Two wire, 4 to 20 mA
- 9 to 32 VDC excitation

PMP 1290

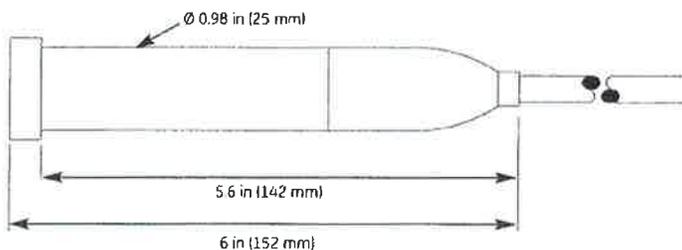
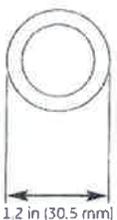
- Three-wire, 1 to 5 VDC
- 8 to 30 VDC excitation
- <2 mA current @ 80°F (25°C)

PMP 1290



Electrical Connection
 Red _ Positive supply
 White _ Negative supply
 Yellow _ Positive output
 Shield _ Connected to case

PTX 1290



Electrical Connection
 Red _ Positive supply
 Black _ Negative supply
 Shield _ Connected to case

Installation Drawings

Sensing

PTX/PMP 1290 Specifications

Mechanical

Sensor Body
Titanium

Measurement Diaphragm

- Internal: titanium
- External: polytetrafluoroethylene-coated nitrile rubber

Pressure Connection

Flush elastomeric diaphragm with titanium retaining ring

Electrical Connection

Vented polyurethane cable (specify length)

Diameter

1.20 in (30mm) maximum O.D.

Weight

5 oz (140 g) nominal (excluding cable)

Compatible Fluids

Any fluids compatible with titanium, polyurethane and polytetrafluoroethylene-coated nitrile rubber

Safety Classification

- UL, cUL, FM, CSA, intrinsically safe, Class I, Division 1, Groups A,B,C&D
- Class II, Groups E,F&G; Class III
- CE marked

Ingress Protection
Type 6/IP68

Caution

Do not remove the retaining ring that holds the elastomeric diaphragm in place. This will void the calibration and could result in the loss of the silicone pressure transfer compound.

Accessories

- STE 110 terminal enclosure with desiccant
- DPI 280 series digital indicator
- Anchor assembly (P/N: TAS-A157) consisting of marine anchor, 316 stainless steel cable and clamps for installation of PTX 1290
- Lightning arrestor (P/N: TAS 140-1)

Ordering Information

Please state the following:

- (1) Type number
- (2) Pressure range
- (3) Cable length

Please specify non-standard requirements in detail.

Shipping, Storage and Handling

Each transmitter is purged with clean dry nitrogen and shipped with desiccant to prevent moisture ingress during transit.



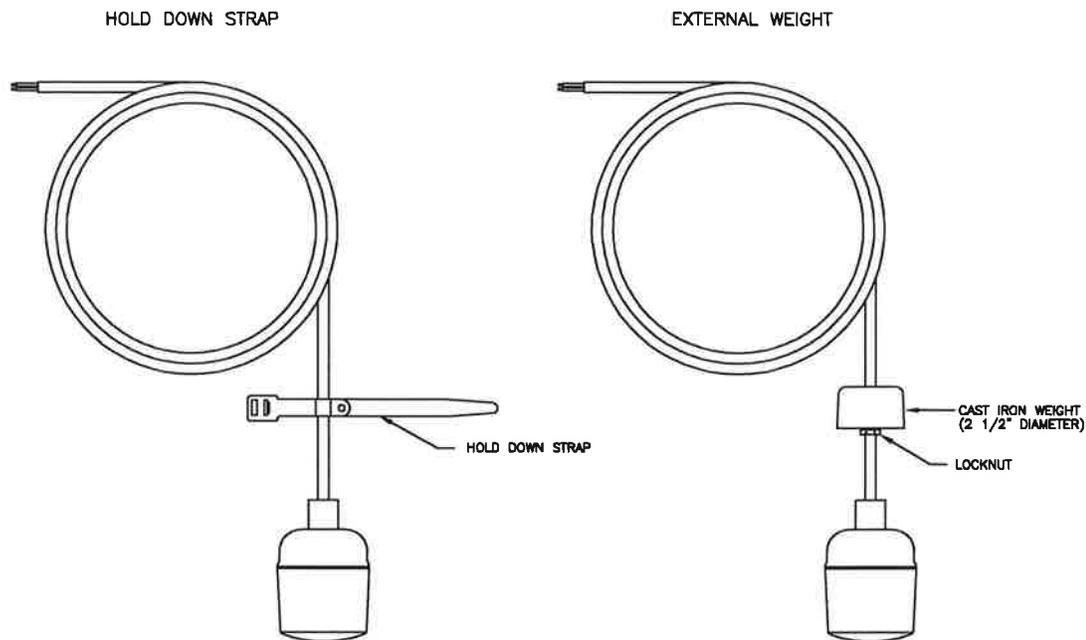
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CE

www.gesensing.com

SENSOR SWITCH NON MERCURY



ADVANTAGES

CSA certified and UL listed

The NON MERCURY design can be used in both potable and non-potable sewage applications

Compact design

Standard cord lengths from 10 to 35 ft. 65 ft length included
(Consult factory for special lengths.)

A two year limited warranty

Available with internal or external weights and/or hold down straps.

Available in 3 wire normally open and normally closed.

SPECIFICATIONS

ELECTRICAL RATINGS: 10A 120/240 AC 60HZ, 24VDC

CORD RATING: 16/2 SJOW or 16/3, 13 AMPS, water and oil resistant.

FLOAT: 2.68 Diameter x 2.44 High, corrosion resistant PVC for use in liquids up to 140°F.

NOTE

This switch requires a minimum tether length of 4 inches.



TULSAR CANADA LTD.

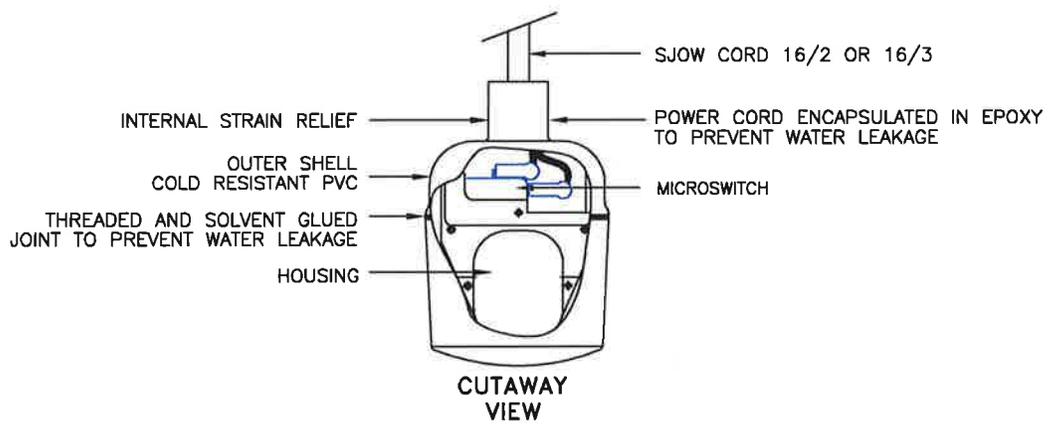
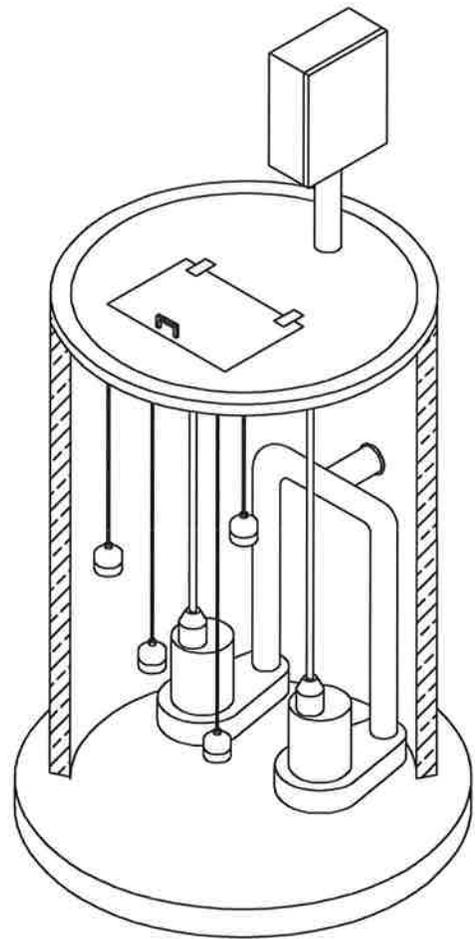
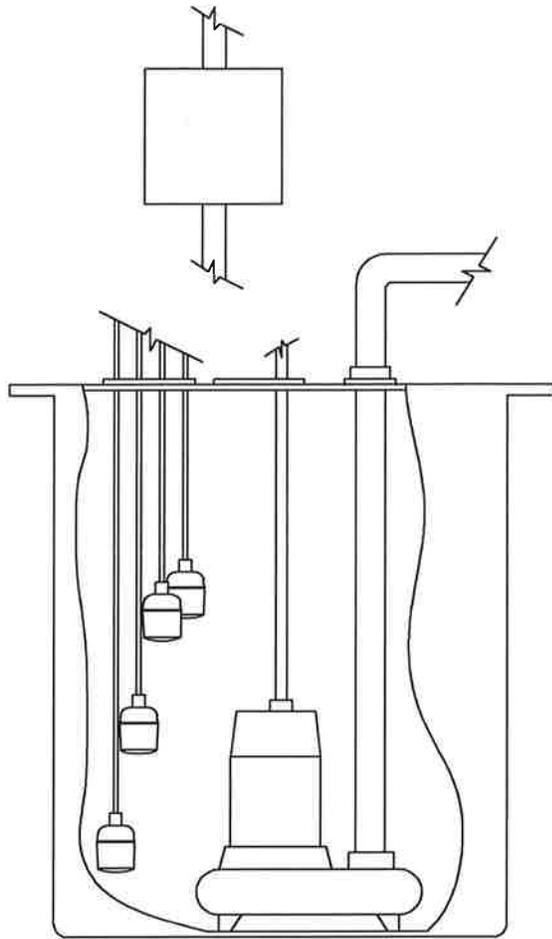
we're in control

975 BLEAMS ROAD, UNIT #5
KITCHENER, ONTARIO
N2E 3Z5

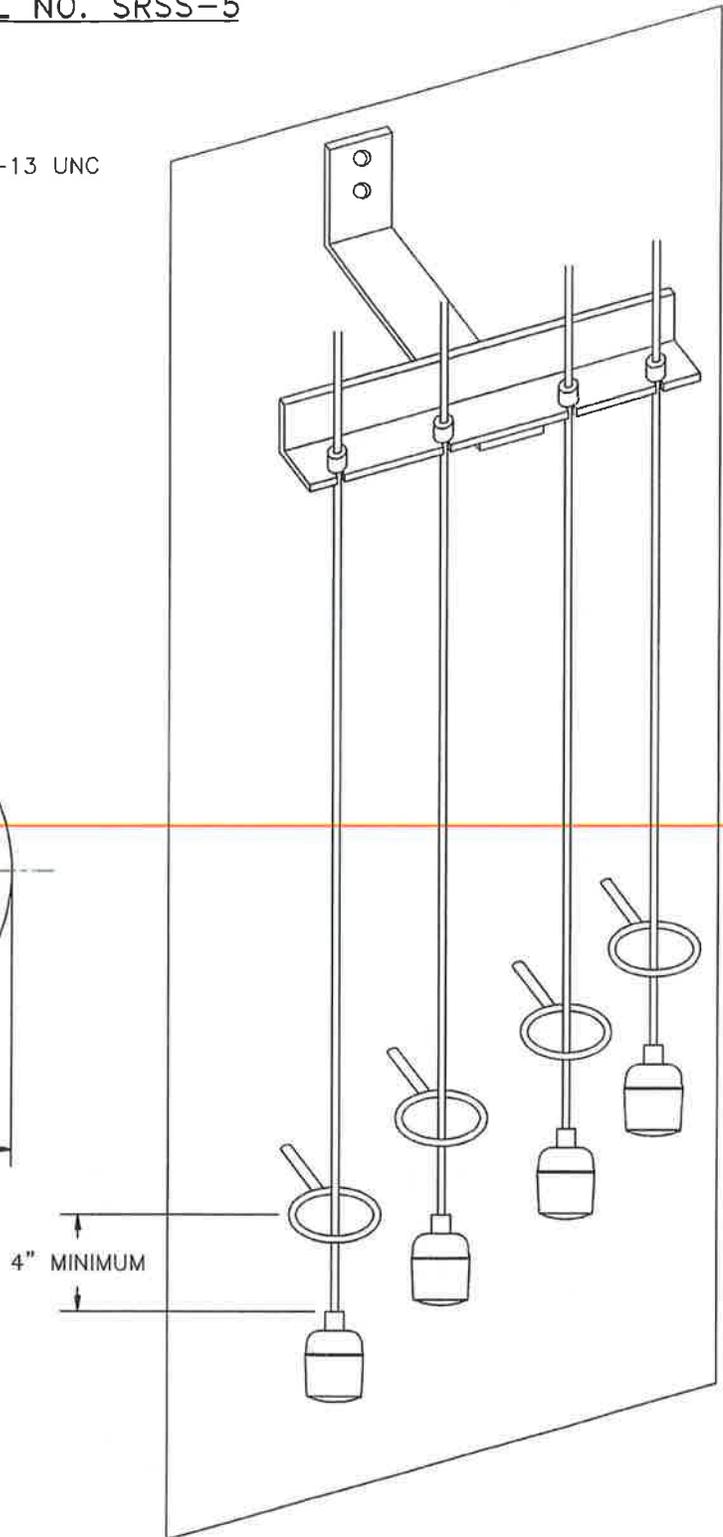
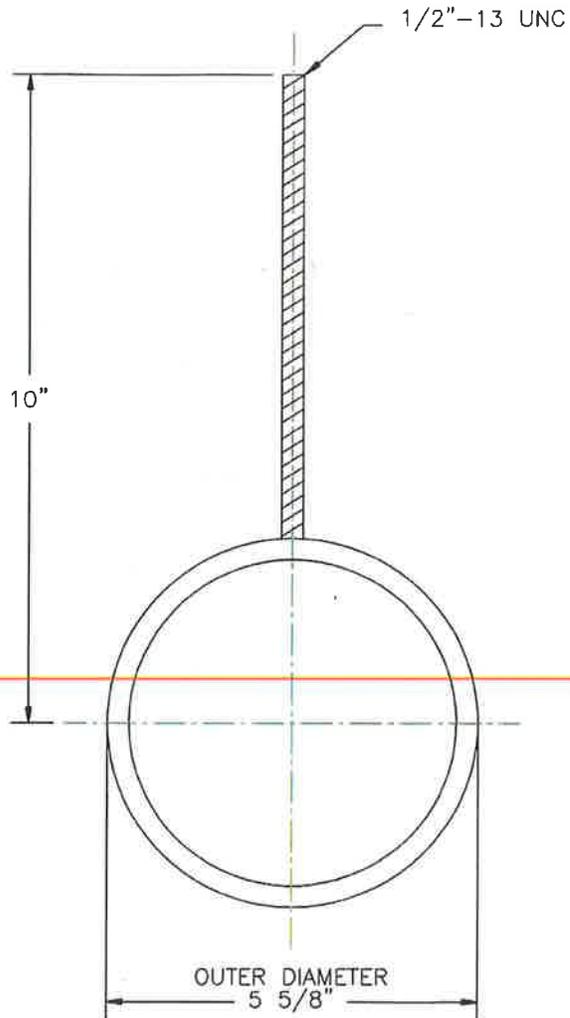
PH:(519)748-5055
FAX:(519)748-5077

CAD# SfloatPG1
67

TYPICAL APPLICATIONS



STAINLESS STEEL SWAY RING
MODEL NO. SRSS-5



45 BEASLEY DRIVE
KITCHENER, ONT.
N2E 1W7

TULSAR
TULSAR CANADA LTD.
we're in control

PH:(519)748-5055
FAX:(519)748-5077

CAD# SWAY RING

STORAGE INSTRUCTIONS

INSPECTION ON RECEIPT OF PUMP

The shipping container should be immediately inspected for damage that may have occurred in shipment. Exercise care in opening the shipping container to avoid damage to the pump. Remove any blocking and cushioning from within the container. Check all cushioning for spare parts before discarding. Visually check the pump and any spare parts for damage. Check for damaged inlet and outlet port threads, flanges, and electrical wires, especially where they exit the pump/mixer housing. Report any damage or shortage of parts directly to the carrier.

STORAGE BEFORE USE

ABS pumps/mixers are shipped from the factory ready for installation and use. They should be held in storage if the pump station is not complete. If storage is necessary, the pump/mixer should remain in its shipping container. It should be stored in a warehouse or storage shed that has a clean, dry, temperature-stable area. The pump/mixer and its container should be covered to protect it from water, dirt, dust, etc. The ends of the cables must be protected against moisture.

CAUTION!

**AT NO TIME SHOULD THE PUMP/MIXER BE STORED
WITHIN AN INCOMPLETE WET PIT.
THE PUMP/MIXER SHOULD NOT BE PLACED
INTO THE PIT UNTIL IT CAN BE FULLY INSTALLED
AND OPERATED.
THE PUMP/MIXER SHOULD ALWAYS BE
STORED VERTICALLY**

LONG TERM STORAGE

If it is necessary to store a pump/mixer for a long period of time, it should be stored in a clean, dry temperature-stable environment. The pump/mixer should be covered to protect it from dust, dirt and water. The ends of the cable must be protected against moisture.

Do not allow the pump/mixer to freeze. Any water trapped inside the pump/mixer during testing may expand and cause damage. If the pump/mixer must be stored in a sub-freezing environment, consult the factory for specific recommendations and precautions.

During storage, the motor should be rotated a few turns once a month. This can be accomplished by turning the impeller by hand. Spinning the motor will lubricate the mechanical seals and prevent their seizing.

Prior to installation, the pump/mixer motor should be rotated by hand to ensure the mechanical seals are free-spinning.

Installed pump/mixers which are idle for long periods of time should be jogged once a month to lubricate the mechanical seals.

Warranty

ONE YEAR PRODUCT WARRANTY

XFP, AFP, AFL, VUP, Piranha, AS, Scavenger, RCP, & Robusta Series Pumps; Mixers, Aerators, Control Panels, Installation Accessories*

Manufacturer warrants the above referenced ABS brand equipment ("Products") to be free from defects in workmanship and materials as follows:

The warranty period shall expire on the earliest of the below dates:

- i) one (1) year from date of installation of the Products; or
- ii) eighteen (18) months from date of shipment of the Products from Manufacturer.

Products or parts thereof that are replaced or repaired under warranty during the original warranty period, shall be covered under this warranty until the expiration of the original warranty period or ninety (90) days from the date of such replacement or repair, whichever is later. In any event, such extended warranty period shall not exceed ninety (90) days after the expiration of the original warranty period.

The warranties stated above are contingent upon start-up of the equipment on site by an authorized Manufacturer's representative, as verified by receipt of start-up reports completed and signed by an authorized Manufacturer's representative. Robusta Series pumps and Piranha 09 Series pumps are exempt from this requirement, though any supporting documentation is requested for all warranty claims.

If during the warranty period, any Products fail to meet the requirements set out in this warranty, the purchaser or end user shall give written notification to Manufacturer stating the reasons therefor. Upon receipt of prior written authorization from Manufacturer, Products shall be transported to Manufacturer's authorized service center, prepaid, at purchaser or end-user's cost. Manufacturer's sole obligation shall be to repair, modify or replace Products or parts thereof, at Manufacturer's sole option. Products repaired under this warranty will be returned with freight prepaid. Products must be repaired by an authorized Manufacturer repair center for warranty coverage to be considered. Explosion Proof or other Agency Approved pumps must be repaired at a Manufacturer's authorized service center in order to retain the agency's approval rating.

All protection features (such as moisture sensors, bearing monitors, and thermal overloads) incorporated in the Products must be connected and operable for warranty coverage. This warranty is valid only if Manufacturer supplied or authorized alarm monitoring components, cables and control components/panels are used.

This warranty shall not apply to any Products or parts thereof which have been (i) subjected to misuse, misapplication, accident, alteration, neglect, failure to act in a timely manner to address alarms/warnings, or physical damage; (ii) installed, operated, and/or maintained in a manner which is contrary to Manufacturer's written instructions as it pertains to installation, operation and maintenance of the Products, including but without limitation to being operated without being connected to monitoring devices supplied with specific products for protection; (iii) used in an application or for pumping liquids other than the use for which it is intended as specified in Manufacturer's product literature; (iv) damaged due to a defective power supply, improper electrical protection, faulty repair, ordinary wear and tear, corrosion, erosion or chemical attack, an act of God, an act of war or by an act of terrorism; (v) damaged resulting from the use of accessory equipment not sold by Manufacturer or not approved by Manufacturer for use in connection with Manufacturer's products; or (vi) repaired or altered without Manufacturer's written consent.

This warranty does not cover costs for standard and/or scheduled maintenance that is performed, nor does it cover Manufacturer's parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship is determined by Manufacturer. Wear Parts are defined as cutters, cutting plates, seals, bearings, impellers/propellers, diffusers, wear rings (stationary or rotating), volutes (when used in an abrasive environment), oil, grease, cooling fluids and/or any items deemed necessary to perform and meet the requirements of normal maintenance on all Manufacturer's equipment.

Manufacturer shall not be liable for any special, indirect, consequential, or punitive damages, or profit loss of any kind. Major components not manufactured by the Manufacturer are covered by the original manufacturer's warranty in lieu of this warranty. In addition to any other special, indirect or consequential damages referenced above, Manufacturer shall not be responsible for travel expenses, rented (replacement) equipment, pump removal fees, installation fees, outside contractors fees, or unauthorized repair shop expenses.

This warranty shall extend only to the initial end user.

ALL OTHER WARRANTIES, CONDITIONS AND REPRESENTATIONS, EXPRESSED OR IMPLIED BY STATUTE, COMMON LAW OR OTHERWISE, IN RELATION TO THE SUPPLY OF THE PRODUCTS INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED TO THE EXTENT PERMITTED BY LAW.

*This warranty is applicable to Products supplied by Sulzer Pump Solutions (US) Inc. or Sulzer Pumps Wastewater Canada, Inc. for installation in the U.S.A. or Canada, unless specifically indicated otherwise in writing by Manufacturer.

NK Sand Kit Installation



COMPONENTS

Parts that are necessary to install the sand kit into a NK Series



- Stainer (Left)

- Stirrer (Right)

STEP 1:

Remove the pump base by removing the four screws.



STEP 2:

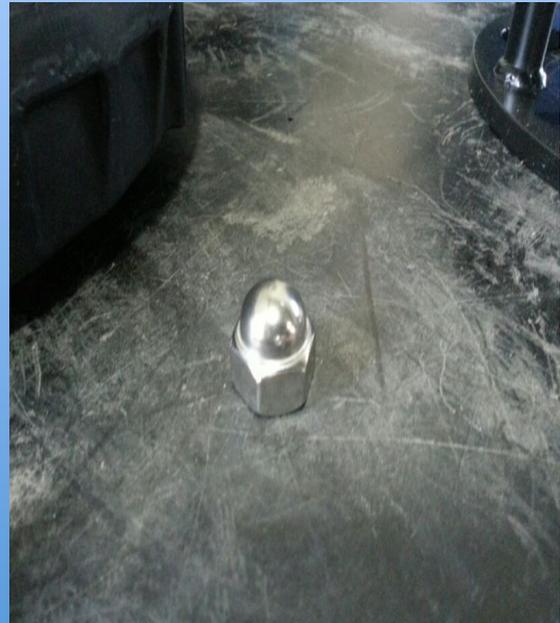
Once removed identify the rubber pump casing and the retainer. These will attach to the new strainer.

- Strainer, not used (left)
- Retainer (middle)
- Rubber pump casing (right)



STEP 3:

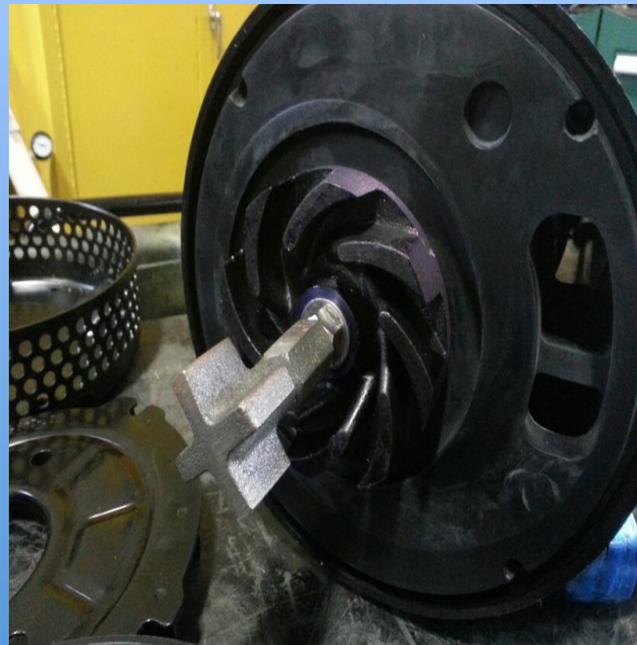
Remove **ONLY** the head bolt from the impeller.



STEP 4:

-Attach the stirrer where the head bolt was and turn until tight.

-Impeller rotation will further tighten stirrer.



STEP 5:

Place the retainer and the rubber pump casing into the sand strainer.



STEP 6:

Finally, attach the new sand strainer base to the pump with the existing hardware.

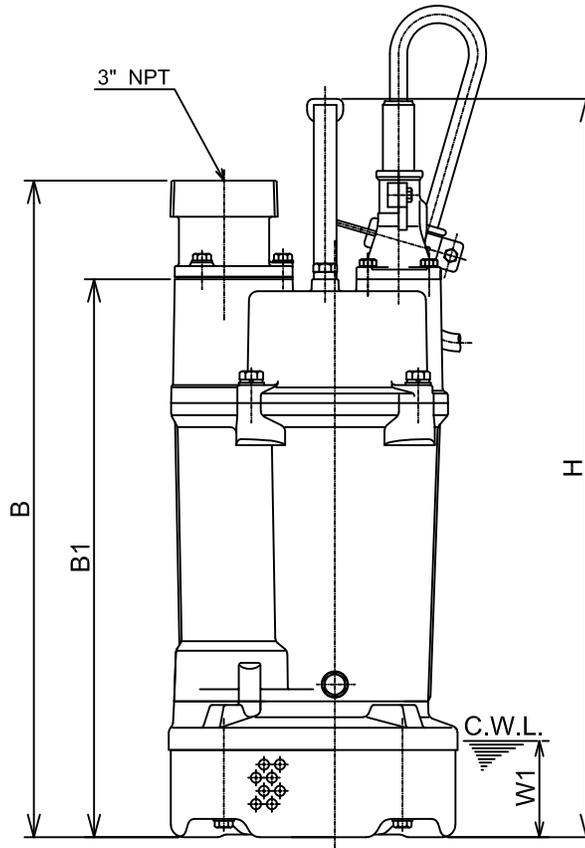
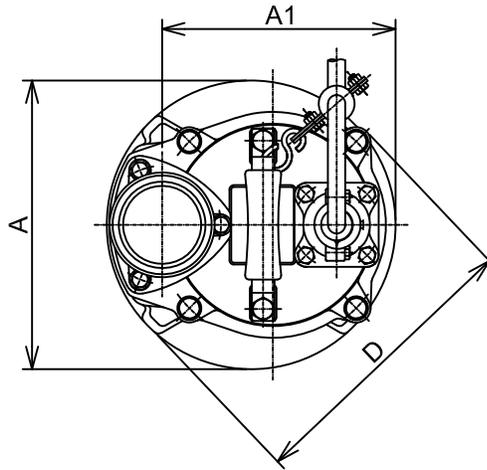




NK SERIES
SEMI-VORTEX - DEWATERING PUMPS

DIMENSIONS

NK4-22



DIMENSIONS:USCS (Inch)

Model	HP	NOM. SIZE	Pump & Motor						C.W.L.	Wt.*
			A	A1	B	B1	D	H	W1	(lbs.)
NK4-22	3	3"	9 7/16	7 5/8	21 1/2	18 1/4	9 9/16	24 3/16	3 1/4	64

DIMENSIONS:METRIC (mm)

Model	kW	NOM. SIZE	Pump & Motor						C.W.L.	Wt.*
			A	A1	B	B1	D	H	W1	(kg)
NK4-22	2.2	80	240	194	546	464	243	614	80	29

* Excluding Cable

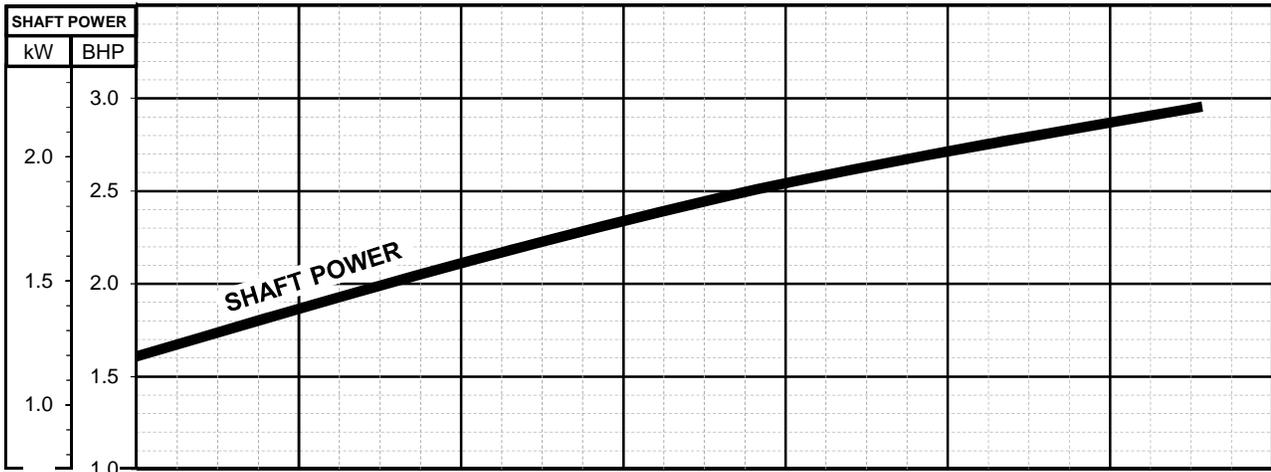
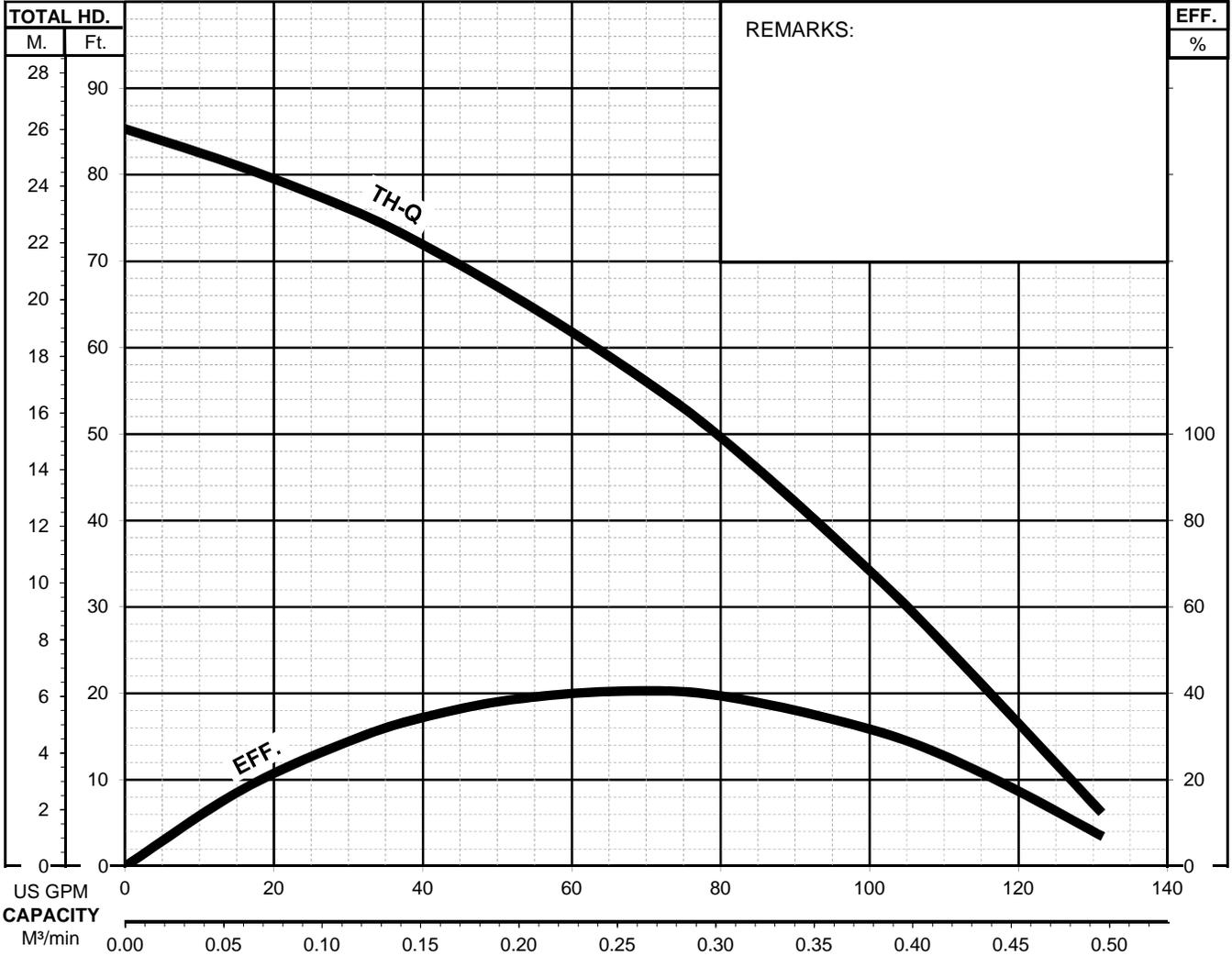


NK - SERIES

SEMI-VORTEX - DEWATERING PUMPS

PERFORMANCE
CURVE

MODEL	BORE	HP	KW	RPM	SOLIDS DIA.	LIQUID	SG.	VISCOSITY	TEMP.
NK4-22	3"/80mm	3	2.2	3470	0.334"/8.5mm	Water	1.0	1.123cSt.	60°F
PUMP TYPE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS			
Semi-Vortex Dewatering Pump	1	220 - 230	12.2 - 11.7	60	Capacitor Start	F			
CURVE No.	DATE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS		
-	-	-	-	-	-	-	-		

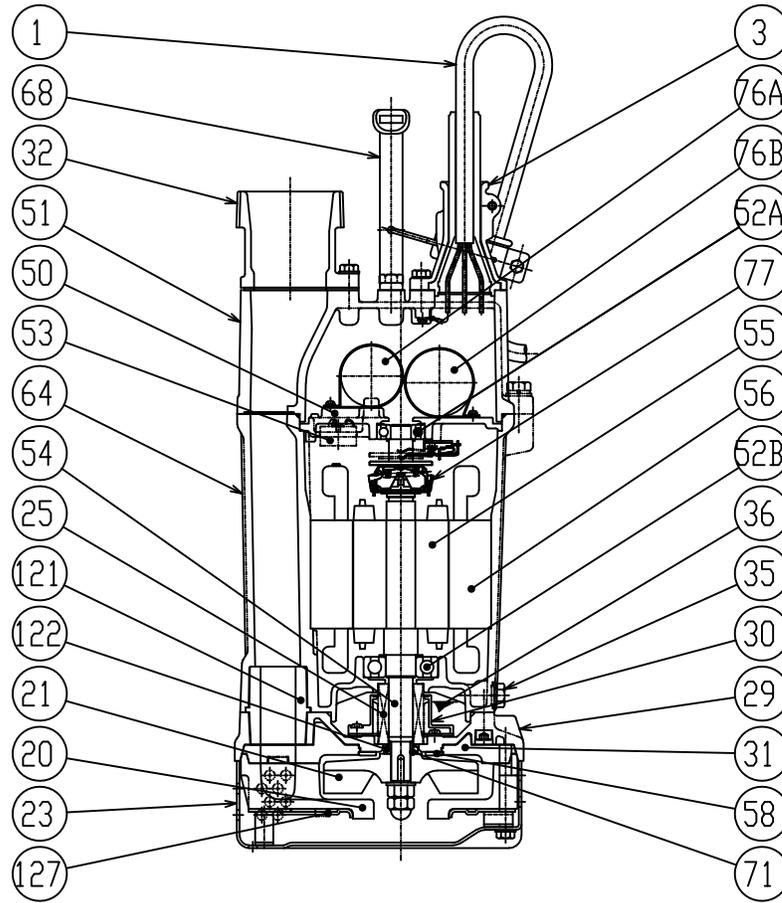




NK SERIES
SEMI-VORTEX - DEWATERING PUMPS

SECTIONAL VIEW

NK4-22



ITEM#	DESCRIPTION	MAIN MATERIAL / NOTE	RELATED ASTM, AISI CODE	RELATED EN CODE	Q'TY
1	Power Cable	Chloroprene Sheath AWG14/3-32ft			1
3	Stuffing Box	Aluminium Alloy Die Casting	B85 A360.0	EN 1706 AC-43400	1
20	Pump Casing	Butadiene Rubber + Natural Rubber			1
21	Impeller	Ductile Cast Iron	A536 100-70-03	EN 1563 GJS-700-2	1
23	Suction Strainer	Steel (Cold Rolled)	A109/A1008	EN 10130	1
25	Mechanical Seal	Silicon Carbide / H-20T			1
29	Oil Casing	Aluminium Alloy Die Casting	B85 383.0	EN 1706 AC-46100	1
30	Oil Lifter	PBT Plastic w/(GF+MD)40			1
31	Wear Ring	Butadiene Rubber			1
32	Discharge Connection	Cast Iron / NPT 3"	A48M Class30B	EN 1561 GJL-200	1
35	Oil Plug	Stainless Steel	S 30400	1.4301	1
36	Lubricant	Turbine Oil ISO VG32 or SAE 10W-20			
50	Motor Bracket	Cast Iron	A48M Class30B	EN 1561 GJL-200	1
51	Motor Head Cover	Aluminium Alloy Die Casting	B85 383.0	EN 1706 AC-46100	1
52A	Upper Bearing	#6203ZC3			1
52B	Lower Bearing	#6305ZC3			1
53	Motor Protector				1
54	Shaft	Stainless Steel	S 40300	1.4000	1
55	Rotor				1
56	Stator				1
58	Protection Plate	Stainless Steel	S 30400	1.4301	1
64	Motor Housing	Aluminium Alloy Die Casting	B85 383.0	EN 1706 AC-46100	1
68	Handle	Steel (Cold Rolled) + NBR Rubber	A109/A1008	EN 10130	1
71	Shaft Sleeve	Stainless Steel	S 30400	1.4301	1
76A	Capacitor				1
76B	Capacitor				1
77	Centrifugal Switch				1
121	Duct Sleeve	Styrene Butadiene Rubber			1
122	V-Ring	Nitrile Butadiene Rubber			1
127	Fixing Plate	Steel (Cold Rolled)	A109/A1008	EN 10130	1

PARTS LIST		SINGLE PHASE DEWATERING PUMP			5/16/2019	
ITEM	PART No.	DESCRIPTION	QTY	SIZE	MATERIAL	NOTES
1	001-499-16	Cabtyre Cable Set (32') 60Hz (USA)	1	2PNCTF3Cx2mm2	KTV	
2	010-124-15	Cable Clip Rubber	1	No.3	NBR	
3	010-135-19	Cable Clip	2	LP-3700A/S	SPC	
4	140-030-19	Hex.Bolt	2	M6x12	SUS304	
5	141-004-17	Hex.Nut	2	M6	SUS304	
6	140-033-12	Hex.Bolt	2	M6x16	SUS304	included in ITEM#1 Cable Ass'y
7	140-447-13	Hex.Bolt (w/Plain Washer)	4	M8x25(B=12)	SUS304	
8	003-122-24	Stuffing Box 230V-60Hz(USA)	1	No.1-1(w/Clamp)	ADC	included in ITEM#1 Cable Ass'y
9	008-133-10	Mould Cover 230V-60Hz(USA)	1	No.1-9	CR	included in ITEM#1 Cable Ass'y
10	009-274-17	Compression type Terminal	3	TMNB-2(Insulated)		
11	009-001-91	Intermediate Lead Wire	1	AWG14x140L (White)		
12	009-001-81	Intermediate Lead Wire	1	AWG14x190L (White)		
13	009-001-86	Intermediate Lead Wire	1	AWG14x95L (Earth)	H-VSF	
14	143-000-71	Tapping Pan Screw (w/Spring Washer)	1	M4x6	SWRM	
15	140-477-12	Hex.Bolt (w/Plain Washer)	3	M8x30	SUS304	
16	032-355-15	Hose Coupling	1	NPT-3(KTV2-15)	FC	
17	121-001-09	Packing	1	KTV2-15/22	NBR	*
18	068-000-34	Handle	1	KTZ21.5/32.2 (w/Shackle,H=150)	SPC+NBR	
19	140-074-15	Hex.Bolt	2	M10x20	SUS304	
20	140-433-16	Hex.Bolt (w/Spring Washer/Plain Washer)	4	M10x35	SUS304	
21	051-000-64	Head Cover	1		ADC	
22	122-000-63	O-Ring	1	GS-160 (159.3xd3.1)	NBR	*
23	143-000-73	Pan Screw (w/Spring Washer)	1	M4x8	SWRM	
24	127-000-99	Capacitor Fixing Plate	1	d51(1.0t)	SPC	
25	076-142-13	Capacitor 230V-60Hz(USA)	1	200MF-250VAC	(T)	
26	143-000-73	Pan Screw (w/Spring Washer)	1	M4x8	SWRM	
27	127-001-02	Capacitor Fixing Plate	1	d56 (t=1)	SPCC	
28	076-000-61	Capacitor 230V-60Hz(USA)	1	30MF-400VAC (d56x75L)		
29	009-001-84	Intermediate Lead Wire	1	AWG14x110L (Black)		
30	009-001-83	Intermediate Lead Wire	1	AWG14x160L (Black)		
31	009-001-92	Intermediate Lead Wire	1	AWG14x270L (Red)		
32	009-001-93	Intermediate Lead Wire	1	AWG14x270L (White)		
33	143-000-74	Pan Screw	2	M3x6	SWRM	
34	143-000-72	Truss Screw	2	M4x8	SWRM	
35	053-002-21	Motor Protector 230V-60Hz(USA)	1	KA143-CCTL402	(H.C)	
36	121-001-73	Packing	1	d157xd167X2t	NBR	
37	016-000-17	Lead Wire Protection Bush	1		NBR	
38	050-001-27	Motor Bracket	1		FC	
39	077-000-02	Centrifugal Switch	1	GS-119 (d20)		

PARTS LIST		SINGLE PHASE DEWATERING PUMP			5/16/2019	
ITEM	PART No.	DESCRIPTION	QTY	SIZE	MATERIAL	NOTES
40	143-015-17	Pan Screw	2	M4x10	SWRM	
41	056-009-30	Stator 230V-60Hz(USA)	1Set			
42	145-031-15	Spring Pin	1	#4x25l	SCM	
43	142-194-18	Wave Washer	2	6203	SK5	
44	052-102-17	Bearing	1	6203ZZC3		
45	061-152-10	Bearing Collar	1	d17.1xd23x1.6t	SPC	
	055-003-28	Rotor + Bearing + Centrifugal Switch Set	1Set	No.39,44,45,46,48,49		
46	055-003-29	Rotor	1Set			
47	147-128-16	Impeller Key	1	5x5x18.5L	SUS403	
48	061-161-12	Bearing Collar	1	d25.1xd36x1.6t	SPC	
49	052-108-13	Bearing	1	6305ZZC3		
50	064-001-46	Motor Frame	1		ADC	
51	121-445-12	Packing (Water Way, Upp.)	1	KTV2-15/22	NBR	*
52	121-246-11	Packing	1	d10.3xd16x2t	PE	*
53	035-125-13	Oil Plug	1	M10x20(B=13)	SUS304	
54	025-000-06	Mechanical Seal	1	H-20T(E)	SIC	
55	143-070-23	Pan Screw	2	M5x6	SWRM	
56	030-144-13	Oil Lifter	1	H-20(A)(T)	Resin	
57	143-070-10	Pan Screw	2	M5x6	SWRM	
58	030-155-17	Seal Stopper	1	H-20(KTV2)	SPCC	
59	122-134-18	O-Ring	1	G-115(114.4xd3.1)	NBR	*
60	029-000-77	Oil Casing	1	KTV2-15/22	ADC	
61	121-001-04	Packing (Water Way, Low.)	1	KTV2-15/22	SBR	*
62	140-270-13	Hex.Socket Cap Bolt	4	M8x30	SUS304	
63	031-000-08	Wear Ring	1	KTV2-15/22	BR+NR	
64	058-000-25	Protection Plate	1	d41xd70x3t	SUS304	
65	143-166-14	Flat Screw	2	M4x8	SUS304	
66	122-443-13	V-Ring	1	VR-20	NBR	
67	071-297-19	Shaft Sleeve	1	d16xd20x10l	SUS304	
68	021-F75-19	Impeller (60Hz)	1	NK4-22	FCD	
	021-F74-18	Impeller (50Hz) OPTION		NK4-22	FCD	50Hz OPTION
69	142-129-12	Plain Washer	1	M12	SUS304	
70	141-007-10	Hex.Nut	1	M12	SUS304	
71	141-032-14	Hex.Cap Nut	1	M12	SUS304	
72	020B1918	Pump Casing	1	KTV2-15/22	BR+NR	
73	127-249-12	Fixing Plate	1	KTV2-15/22	SPCC	
74	023-432-19	Strainer Stand	1	KTV2-15/22	SPCC	
75	140-479-14	Hex.Bolt (w/Plain Washer)	4	M8x85	SUS304	
	173-003-59	Packing O-Ring Set	1Set	(Marked by *)		

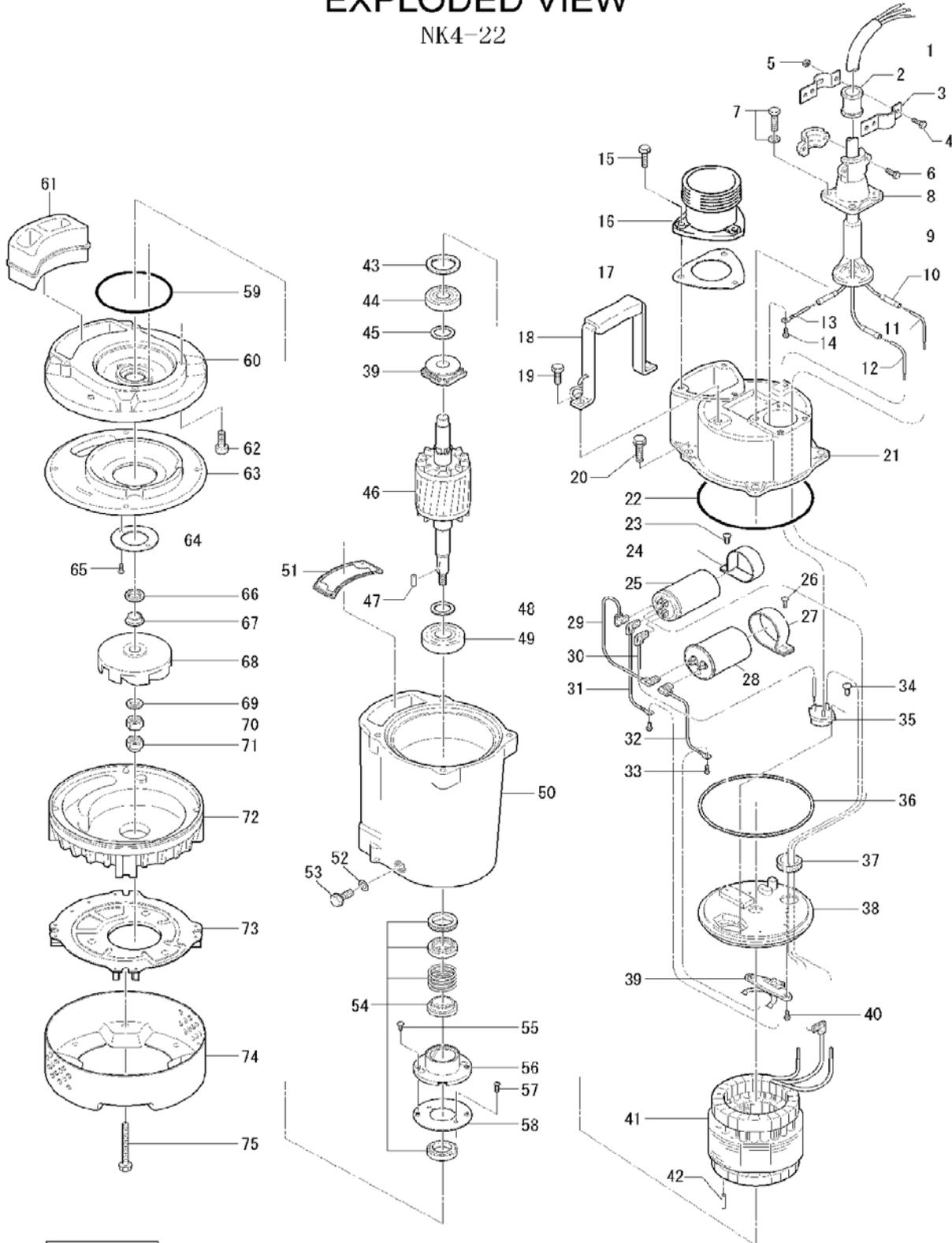


MODEL NK4-22

PARTS LIST		SINGLE PHASE DEWATERING PUMP				5/16/2019
ITEM	PART No.	DESCRIPTION	QTY	SIZE	MATERIAL	NOTES
17	121-001-09	Packing (Hose Coupling)	1	KTV2-15/22	NBR	*
22	122-000-63	O-Ring (M.Head cover/M.Frame)	1	GS-160(159.3xd3.1)	NBR	*
36	121-001-73	Packing (M.Head cover/M.Frame)	1	d157xd167X2t	NBR	*
51	121-445-12	Packing (Water Way, Upp.)	1	KTV2-15/22	NBR	*
52	121-246-11	Packing (Oil Plug)	1	d10.3xd16x2t	PE	*
59	122-134-18	O-Ring (M.Frame/O.Casing)	1	G-115(114.4xd3.1)	NBR	*
61	121-001-04	Packing (Water Way, Low.)	1	KTV2-15/22	SBR	*
		Lubricant		Turbine Oil VG32 270ml		

PARTS LIST		SINGLE PHASE DEWATERING PUMP			5/16/2019	
ITEM	PART No.	DESCRIPTION	QTY	SIZE	MATERIAL	NOTES

EXPLODED VIEW NK4-22



C-001602-2

SODERHOLM MARITIME SERVICES INC.

41 Fima Cres, Toronto, ON. M8W 3R1

PHONE 905. 529.1344 Toll Free: 800. 319.3556

E-mail: <admin@smsi-Canada.com>

www.Smsi-Canada.com

DATE: March 03, 2024

TO: WSP

ATTENTION: Luis Alvarez

FROM: Adrian Brown
Mobile Direct: 519.830.5400
E-mail: <abrown@smsi-Canada.com>

RE: Leachate Manhole Dive

Please note: Industry CSA Standards changed in the fall of 2018. The change includes the mandatory requirement of a 4-man dive crew. All CADC certified companies follow the requirements of the CSA Standards.

METHOD:

Use divers to complete the following:

- Install pipe plug.

A 4-person dive crew and dive plant will be provided by SMSI.

RATES:

4-Person Contaminated Dive Team	680.00/hr - 8 hour minimum
Premium Time	+ 315.00/hr additional (for work over 10 hours/day; between 18:00 and 6:00 daily; weekends; holidays)
Pressure washer	100.00/day
Rescue Tripod	200.00/day
Outside Rentals, Supplies, Fuel & Consumables	Cost + 15%

Budget Values: Install

Mob	2,040.00
Living Allowances X 4	1,040.00
4 person crew X 10 hours	6,800.00
Rescue tripod	200.00
Pressure washer	100.00
Demob	2,040.00
Total	<u>\$12,220.00 +HST</u>

Removal (If Required)

4 person crew X 10 hours	6,800.00
Rescue tripod	200.00
Total	<u>\$7,000.00 +HST</u>

These rates are valid until March 31, 2025.

SUPPORT REQUIREMENTS:

- Washroom facilities accessible for workers
- Contractor to provide pipe plug.

TERMS AND CONDITIONS:

Upon the acceptance of this budget value and prior to any materials being ordered, Soderholm Maritime requires all materials within the budget value to be paid 80% in advance.

The Team has a 2-hour minimum if no work available (weather or events beyond our control) plus board allowance if applicable.

Special training/orientation, if required, at cost plus expenses and wages.

Special/extra set-up charges for specific non-standard projects at labour rates, plus supplies and purchased equipment costs + 15%.

SMSI is not responsible for costs incurred by the client which arise from break-down or malfunction of SMSI-owned equipment. The client, however, will not be charged for down-time in these cases.

This standard rate sheet covers most operations. Special or unusual operations and functions will require extra or special charges.

Payment due within 30 days of invoice date. 2% Monthly Interest fee (24% per year) on all overdue accounts. Soderholm Maritime is not at all subjected to a hold back of any kind and/or amount.

Contractor is required to provide the following to accounting@smsi-canada.com, prior to commencement:

P.O. # (Purchase order)

Company Representative Contact information for billing

Acceptance signature portion signed and returned

SIGNATURE: ELLISDON

DATE

SIGNING AUTHORITY NAME (PRINTED)

POSITION

Kind regards,

Adrian Brown
Chief Operating Officer