

Bajwa, Mehak

From: Chris Visser <chris.visser@wasteconnections.com>
Sent: November 18, 2024 9:39 AM
To: Bajwa, Mehak
Cc: Laurel Hoffarth; Dey, Asit
Subject: RE: Waste Connections: Search Facility Final QA/QC Report for EAB Approval
Attachments: CA0039180.5749_CQA_Report_Letter_15Nov2024.pdf; RPT 13-11-2024 Prairie Green IWMF Search Facility Pad-Mob 2_1_Final_AFK 1000-043-27.pdf; CA0039180.5749_itr_EP340_Std_Equivalency_Review-11Nov2024.pdf

Follow Up Flag: Follow up
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ATTENTION: ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Good morning Mehak,

In follow-up to my e-mail below, please find attached the final geosynthetic installation report for the Search Facility liner system installation as required by Condition 5(g) of the Notice of Alteration under Environmental Act License Np. 2117 E R2. WSP, the Provinces appointed engineering consultant, has also provided the attached letter certifying the liner system was installed in compliance with the project specifications, including the granular materials that make up the search pad design. If you require any additional supporting information, please do not hesitate to contact us.

Regards,

Chris Visser, P.Eng.
Canadian Region Engineering Manager

C: 647-539-5923



Quality Engineering | Valued Relationships

WSP Canada Inc

Prairie Green IWMF Search Facility Pad – Mob 2

CQA Geosynthetics Monitoring Program

Prepared for:

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB
Attention: Derek Dreger

Distribution:

Fabiano Gondim

Project Number:

1000 043-27

Date:

November 15, 2024
Final Report



Quality Engineering | Valued Relationships

November 15, 2024

Our File No. 1000-043-27

Derek Dreger, P.Eng., PMP, FEC
WSP Canada Inc.
1600 Buffalo Place,
Winnipeg, MB
R3T 6B8

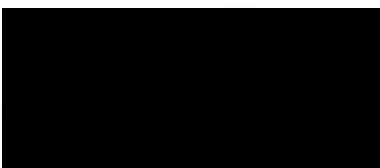
**RE: CQA Geosynthetics Monitoring Report for
Prairie Green IWMF Search Facility Pad- Mob 2**

TREK Geotechnical Inc. is pleased to submit our report for the Quality Assurance inspection services for the Prairie Green IWMF Search Facility Pad-Mob 2.

Please contact Angela Fidler-Kliewer if you have any questions. Thank you for the opportunity to serve you on this assignment.

Sincerely,

TREK Geotechnical Inc.
Per:



Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

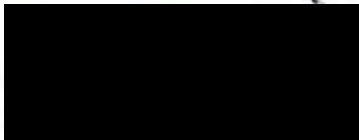
cc: Angela Fidler-Kliewer C. Tech. (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	AFK	November 13, 2024	Final Report
1	AFK	November 15, 2024	Final Report

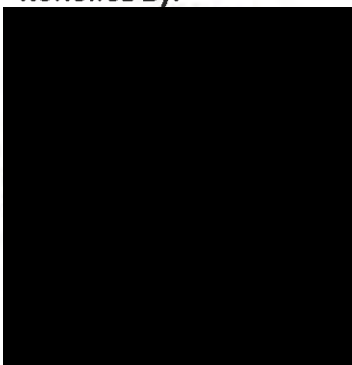
Authorization Signatures

Prepared By:



Angela Fidler-Kliewer C. Tech.
Manager of Laboratory and Field Services

Reviewed By:



Nelson Ferreira, Ph.D., P.Eng.
Geotechnical Engineer, Principal

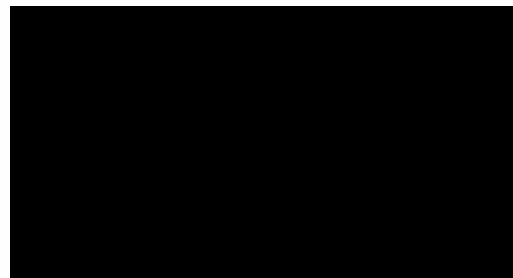


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Monitoring Program

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1.0 Introduction

1.1 Background

The Prairie Green Integrated Waste Management Facility is located in the Rural Municipality of Rosser, close to the City of Winnipeg (Township 12, Range 2 East of the Principal Meridian). Waste Connections of Canada Inc. (WCC) is the owner and operates the facility.

This report summarizes the Quality Assurance (QA) inspections and testing services associated with construction of the Search Facility Pad the work associated with installing a GCL and HDPE Geomembrane liner – Mob 2. The area constructed is about 1.5 Ha of a total of approximately 2.7 HA of pad and comprises the remainder of the South, West and East perimeter berms, the area of south of the work completed as part of Mob 1 and the South Pond. Work completed as part of Mob 1 was summarized in a report to WSP dated November 13, 2024 which is included in Appendix C.

The QA work was conducted in accordance with the Contract Documents and Project Specifications provided by WSP Canada Inc. The construction of geosynthetics for the Search Facility Pad - Mob 2 commenced on October 19, 2024 and was completed on October 31, 2024

1.2 Companies Involved in the Construction of the Search Facility Pad

The following sections summarize the roles and responsibilities of the companies involved in the design, construction, supervision, review, coordination and quality assurance services associated with the construction of Search Facility Pad – Mob 2.

WSP Canada Inc. (Designer):

- Search Facility Pad – Mob 2 design, excluding geotechnical design, and
- Preparation of construction documents, project specifications and tender
- Contract Administration during construction including QA testing of materials (excluding GCL and HDPE placement)

Earthmax Construction Inc (Prime Contractor) with Titan Environmental Containment Ltd. (Sub-Contractor):

- The prime contractor for the construction of Search Facility pad is Earth Max Construction Inc. (Earthmax) from Arborg, Manitoba. They performed the earthworks, including placement of the granular fill, and sand fill placement

- Titan Environmental Containment Ltd (Titan) was responsible for the installation of the GCL and the 1.5 mm (60 mil) thick High-Density Polyethylene (HDPE) membrane.

TREK Geotechnical Inc. (CQA Inspection):

- Overall review and inspection of the geosynthetics installation
- QA inspection, testing and approval of the GCL and 1.5 mm (60 mil) HDPE membrane liner materials including review of manufacturer’s factory quality control and materials testing, field liner sheet installation, non-destructive seam testing, destructive sampling and testing of field seams, repairs and vacuum box testing

1.3 GCL Liner Materials

The geosynthetic clay liner (GCL) used on this project consisted of Bentoliner provided by Solmax Geosynthetic LLC. A total of 242 rolls of GCL were delivered and inventoried on site, comprising of 4.27 m wide and 45.72 m long panels. The GCL was installed on the prepared subgrade and was covered by HDPE membrane TREK monitored the installation of the GCL including overlaps, tears, defects and subsequent repairs to the material. All materials utilized, as well as the installation process, met specifications and were inspected as per the Contract Documents and Project Specification. The manufacturer’s Quality Control (QC) documentation of the GCL material delivered to site is presented in Appendix C.

1.4 GCL Panel Deployment

Panel deployment for the liner was carried out between October 21, 2024 and October 30, 2024. Approximately 12,763 m² of GCL material was placed

Placement of the GCL was accomplished using an excavator and manual labour. A minimum overlap of 300 mm was maintained between adjoining panels. Powdered bentonite was placed and spread manually in the overlap.

During deployment of the GCL panels, TREK personnel carried out the following inspection and testing:

- measurements of the panel length;
- confirmation of panel overlap and bentonite placement in the seams;
- visual observations of overall material quality;

Upon completion of the GCL installation, the works were inspected by the Geosynthetics Installer (Titan) and the liner CQA Inspector (TREK), prior to HDPE geomembrane liner installation.

Two rolls of Bentomat GCL were utilized on site on a section of the East Perimeter Berm. Two layers of the material was placed due to the material not meeting the specifications of the project as a single layer but was accepted by WSP as a double layer. The manufacturer's Quality Control (QC) documentation of these rolls are included in Appendix A-1

2.0 HDPE Geomembrane Liner Installation

The following section summarizes the installation of the 1.5 mm thick (60 mil), smooth and textured HDPE membrane liner system. All materials utilized, as well as the installation process, met specifications and were inspected as per the Contract Documents and Project Specification.

2.1 Search Facility Pad Subgrade

Prior to the GCL and Geomembrane deployment, the sub-grade was inspected by the Titan Environmental, Earthmax and Trek Geotechnical and was formally accepted by Titan. Copies of the soil surface acceptance certificates are presented in Appendix A-2.

2.2 Membrane Liner Materials

The membrane (liner) material used on this contract consisted of 1.5 mm thick (60 mil), smooth and high-density polyethylene (HDPE) installed by Titan.

A total of 21 rolls of 7.5 m wide and 170 m long panels of smooth membrane and 10 rolls of textured membrane were delivered and inventoried onsite for this project. The HDPE liner materials were manufactured and supplied by Solmax. The manufacturer's Quality Control (QC) documentation for the membrane materials was provided by Solmax and indicates that all membrane used in the Search Facility Pad - Mob 2 is in compliance with the project specifications.

2.3 HDPE Liner Panel Deployment

Panel deployment for the HDPE liner was carried out between October 19, 2024 and October 30, 2024. Repair operations on the Search Facility Pad – Mob 2 took place until October 31, 2024. Approximately 14,347 m² of HDPE liner material was placed for Mob 2 out of approximately 26,702 m².

During deployment of the primary HDPE liner panels, TREK personnel carried out the following inspection and testing:

- measurements of the panel thickness
- confirmation of panel overlaps
- visual observations of overall sheet quality
- assignment of a unique identification number for each panel placed

Placement of the HDPE liner was accomplished using an excavator and manual labour. A minimum overlap of 150 mm was typically maintained between adjoining panels. The average panel thickness was determined by averaging the measurements made along each of the leading, two sides and trailing edges utilizing a Starret Micrometer.

Panel numbers were assigned a unique identification number according to the order in which they were installed. Deployment of the HDPE liner consisted of panels P24 to P100, respectively. The arrangement and designation of the various panels for the HDPE liner are presented on Drawing 1. The deployment Inspection Logs are provided in Appendix A-3.

Upon completion of the HDPE liner installation, the works were inspected by Titan and TREK personnel.

2.4 Trial Seams

The welding equipment used by Titan included double hot wedge fusion welders (production welding along panel seams and cap repairs) and hand-held extrusion fillet welders (for detailing, liner repairs, and reconstruction of failed fusion seam lengths).

TREK personnel monitored trial seams during daily start-up, and at approximately every five hours during continuous operation of each welding apparatus. Six sample coupons were cut from each test sample for tensile strength testing as follows:

- Four coupons were tested in the peel mode in accordance with ASTM D6392
- Two coupons were tested in the shear mode in accordance with ASTM D6392

A summary of the daily trial seaming for the equipment used during each workday is provided in Appendix A-4. All passing trial seams test results met the project specifications.

2.5 Production Seams

The HDPE liner seaming process proceeded in conjunction with the panel deployment. The majority of the seams were welded using a double hot wedge fusion welder. Some seams required repairs based on field test results and the reconstructed seams were made using a hand-held extrusion welding apparatus. Fusion and extrusion seams were subjected to non-destructive and destructive testing.

All seams (including repairs) welds were observed and documented by TREK personnel. A summary of the panel fusion and extrusion seaming are provided in Appendix A-5.

2.5.1 ***Non-Destructive Testing***

All non-destructive seam testing was performed by Titan personnel and observed by TREK personnel on a full-time basis. Two types of non-destructive testing were used on this project:

- Air pressure tests on fusion seams
- Vacuum box tests on extrusion seams, patches and beads

Air pressure testing comprised of the following procedure:

1. Sealing off the air channel between the inside and outside tracks of the double fusion weld
2. Inserting a pressure gauge into the air channel
3. Using a portable compressor or pump to pressurize the air channel to a minimum pressure of 210 kPa (30 psi)
4. Inspecting the seam along its entire length to confirm that entire seam was pressurized
5. Observing the pressure gauge over a five-minute period. The test is considered a pass (successful) if the pressure drop is less than 21 kPa (3 psi) over this period
6. Making an incision into the air channel, at the end of the test seam to release the pressurized air

Vacuum box testing comprised of the following procedure:

1. Applying a soapy water solution to the area to be tested
2. Placing a rigid-walled box over the area to be tested The box was constructed with a clear Plexi-glass top and/or sides with a neoprene gasket around the bottom of the box to facilitate a seal between the box and the HDPE liner
3. Applying a vacuum of 21 kPa to 35 kPa (3 psi to 5 psi) to the inside of the box for a minimum of ten seconds using a portable vacuum pump

4. Observing for air bubbles, which, if they occur, are indicative of defects or discontinuities of the welding procedure

Any leaks or discontinuities observed and detected during either testing method were considered a failure (non-conformance). The failed areas were marked and subsequently repaired in accordance with the project specifications and were retested using the procedures described above. All repaired areas were then re-tested and met the acceptance criteria.

Results of the non-destructive testing are provided in Appendix A-7 for the air pressure testing and in Appendix A-10 for the vacuum box testing. All non-destructive testing completed on both fusion and extrusion seaming comply with project specifications.

2.5.2 Destructive Testing

Destructive test samples of panel fusion welded seams were taken at an average of approximately one for every 188 m of fusion seam length. TREK personnel selected all test locations.

For each destructive sample, ten coupons were cut from the seam and tested in the field by TREK. TREK retained the remaining part of the samples for their archives. The destructive coupons that were tested in the field consisted of five coupons tested for peel adhesion strength (peel test mode ASTM D6392) and five tested for seam strength at yield (shear test mode ASTM D6392)

The specified acceptance criteria for destructive tests are as follows:

- Fusion and extrusion seam under peel mode:
 - Peel strength for the seam is not to be less than 340 N/25 mm for extrusion and 398 N/25 mm for fusion;
- Fusion and extrusion seam under shear mode:
 - Yield strength for the seam is not to be less than 525 N/25 mm.

Four out of five coupons were required to meet or exceed the acceptance criteria for peel and shear strength failure modes.

A total of sixteen fusion destructive tests (DSF designation) and one extrusion tests (DSX designation) were conducted of the HDPE liner. Three fusion destructive tests failed, and each failed test was traced

along the fusion seam activity log to obtain one passing destructive before and after the failed destructive. The failed sections of seams were subsequently extrusion welded and non-destructively tested with the vacuum box. All extrusion destructive tests completed comply with project specifications.

The destructive testing results are provided in Appendix A-6.

2.6 Repair of Installation Defects

All defects observed on the HDPE liner were assigned a unique identification number and marked by TREK personnel for repair. The defects were repaired by extrusion welding methods. The repairs were then tested (non-destructive) by Titan personnel by vacuum box test method. Once a noted defect was repaired and tested, it was documented as a “pass” and no other testing was required.

Defect repair locations are shown on Figure 1 for the HDPE liner. The documentation (repairs made and non-destructive testing) of defects and repairs to the seams and panels are included in Appendices A-8 and A-10 for the HDPE liner within the Search Facility Pad – Mob 2.

3.0 Summary

TREK personnel provided construction/quality assurance inspections, and supported WSP Canada Inc. with contract administration. The following activities and components were observed, monitored, inspected and/or reviewed for approval and conformance with specifications:

- Geosynthetic clay liner installation, placement and seaming procedures;
- 1.5 mm (60 mil) HDPE membrane installation, placement, seaming, non-destructive and destructive seam testing and repairs;

Based on the results of the field monitoring, observations, inspections and testing, the Search Facility Pad – Mob 2 was constructed in accordance with the project specifications and to current accepted industry standards.

4.0 Closure

The geotechnical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The information and findings of this report were based

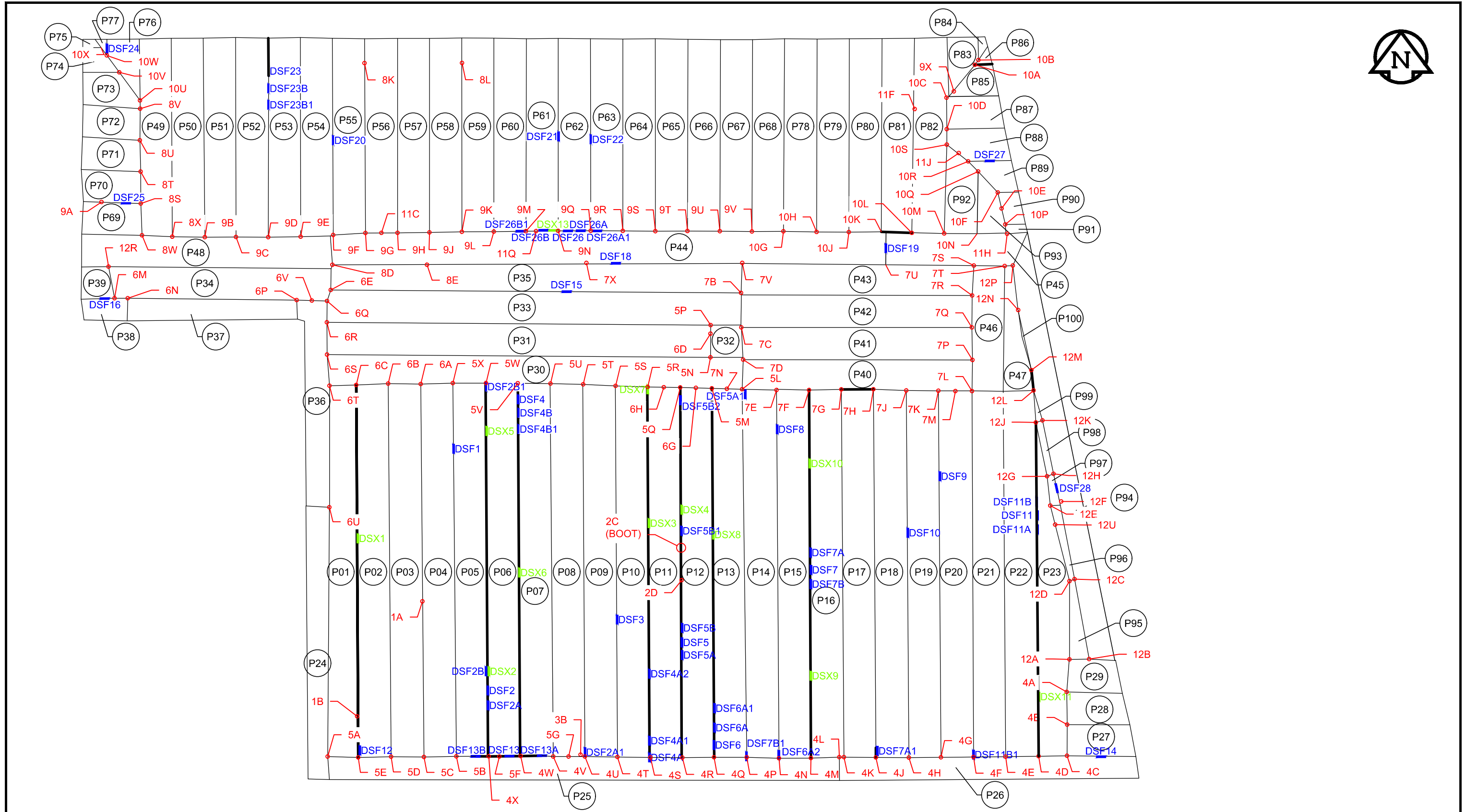
on the tests, measurements, and observations made by TREK during construction and are only applicable to those elements. TREK is not responsible for conformance of any elements that were not observed or tested.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of WSP Canada Inc. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be used or relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

Z:\Projects\1000 Soils Lab\1000 Lab Projects\1000-043 WSP\1000-043-27 Prairie Green Landfill Search Facility Pad Construction\CAD\Fig 01 2024-11-12 PGI Search Facility Pad Construction\CAD\Fig 01 2024-11-15 10:30:42 AM



0 10 20 30 m
SCALE = 1 : 750 (279 mm x 432 mm)

- 4C UNIQUE DEFECT IDENTIFICATION NUMBER
- DSF12 6U FUSION DESTRUCTIVE LOCATION AND DESIGNATION
- DSX1 EXTRUSION DESTRUCTIVE DESIGNATION
- FUSION SEAM
- EXTRUSION SEAM RECONSTRUCTION
- P01 PANEL DESIGNATION NUMBER

- NOTES:**
1. PANEL LOCATIONS ARE BASED ON SURVEY COMPLETED BY TREK GEOTECHNICAL.
 2. THE DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

Figure 01
Geomembrane Panel Layout
MOB 2 - Part B

Appendix A-I

GCL and Geomembrane Manufacturer's Quality Control Documents

Submittal #6.0 - Nonwoven Geotextile Cushion

Revision	0	Submittal Manager	Julian Kornelsen (Earth Max Construction Inc)
Status	Open	Date Created	Aug 14, 2024
		Spec Section	
Responsible Contractor	Earth Max Construction Inc	Received From	
Final Due Date		Lead Time	
		Cost Code	
Location		Type	Shop Drawing
Approvers			
Ball in Court	Julian Kornelsen (Earth Max Construction Inc)		
Distribution			
Description	Nonwoven Geotextile Cushion		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					TDS_S_E1600.pdf

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub- contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input checked="" type="checkbox"/> No Comment <input type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<table border="0" style="width: 100%;"> <tr> <td style="width: 15%;">Project No.</td> <td>CA0039180.5749</td> </tr> <tr> <td>Project Name</td> <td>Search Pad Construction</td> </tr> <tr> <td>Reviewed By</td> <td>F. Gondim</td> </tr> <tr> <td>Date:</td> <td>August 14, 2024</td> </tr> </table>	Project No.	CA0039180.5749	Project Name	Search Pad Construction	Reviewed By	F. Gondim	Date:	August 14, 2024
Project No.	CA0039180.5749								
Project Name	Search Pad Construction								
Reviewed By	F. Gondim								
Date:	August 14, 2024								

MIRAFI E1600



MIRAFI® E1600 is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. MIRAFI E1600 is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

TenCate Geosynthetics Americas (A Solmax Company) is accredited by Geosynthetic Accreditation Institute – Laboratory Accreditation Program ([GAI-LAP](http://GAI-LAP.com)).

MIRAFI E1600 meets Build America, Buy America Act, Pub. L. No. 117-58, div. G §§ 70901-52.

MECHANICAL PROPERTIES	TEST METHOD	UNIT	MINIMUM AVERAGE ROLL VALUE
Grab Tensile Strength	ASTM D4632	lbs (N)	425 (1891)
Grab Tensile Elongation	ASTM D4632	%	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	155 (690)
CBR Puncture Strength	ASTM D6241	lbs (N)	1200 (5340)
			MAXIMUM OPENING SIZE
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	100 (0.15)
			MINIMUM ROLL VALUE
Permittivity	ASTM D4491	sec ⁻¹	0.6
Permeability	ASTM D4491	cm/sec	0.15
Flow Rate	ASTM D4491	gal/min/ft ² (l/min/m ²)	40 (1630)
			MINIMUM TEST VALUE
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	80
PHYSICAL PROPERTIES	TEST METHOD	UNIT	TYPICAL ROLL VALUE
Weight	ASTM D5261	oz/yd ² (g/m ²)	16.0 (542)
			TYPICAL ROLL VALUE
Roll Dimensions (width x length)		ft (m)	15 x 300 (4.5 x 91)
Roll Area		yd ² (m ²)	500 (418)
Roll Weight		lb (kg)	516 (234)

365 South Holland Drive Pendergrass, GA 30567

Tel +1 706 693 2226 www.tencategeo.us



Solmax is not a design or engineering professional and has not performed any such design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation, or specification.
FGS000828 ETQR04



Submittal #7.0 - GCL

Revision	0	Submittal Manager	Julian Kornelsen (Earth Max Construction Inc)
Status	Open	Date Created	Aug 14, 2024
		Spec Section	
Responsible Contractor	Earth Max Construction Inc	Received From	
Final Due Date		Lead Time	
		Cost Code	
Location		Type	Shop Drawing
Approvers			
Ball in Court	Julian Kornelsen (Earth Max Construction Inc)		
Distribution			
Description	GCL		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					TR-401bmflw - 4.34 kg mpu.pdf

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input checked="" type="checkbox"/> No Comment <input type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<table border="0" style="width: 100%;"> <tr> <td style="width: 15%;">Project No.</td> <td>CA0039180.5749</td> </tr> <tr> <td>Project Name</td> <td>Search Pad Construction</td> </tr> <tr> <td>Reviewed By</td> <td>F. Gondim</td> </tr> <tr> <td>Date:</td> <td>August 14, 2024</td> </tr> </table>	Project No.	CA0039180.5749	Project Name	Search Pad Construction	Reviewed By	F. Gondim	Date:	August 14, 2024
Project No.	CA0039180.5749								
Project Name	Search Pad Construction								
Reviewed By	F. Gondim								
Date:	August 14, 2024								

BENTOMAT® FLW CERTIFIED PROPERTIES

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY	REQUIRED VALUES
Cap Nonwoven Geotextile Mass/Unit Area ¹	ASTM D 5261	1/20,000 m ²	200 g/m ² MARV
Carrier Scrim Nonwoven Geotextile Mass/Unit Area ¹	ASTM D 5261	1/20,000 m ²	200 g/m ² MARV
Bentonite Swell Index ²	ASTM D 5890	1/50,000 kg	24 mL/2g min
Bentonite Fluid Loss ²	ASTM D 5891	1/50,000 kg	18 mL max
Bentonite Moisture Content ²	ASTM D 2216	1/50,000 kg	12% max
Bentonite Mass/Unit Area ³	ASTM D 5993	1/4,000 m ²	4.34 kg/m ² MARV
GCL Tensile Strength ⁴	ASTM D 6768	1/4,000 m ²	8.8 kN/m MARV
GCL Peel Strength ⁴	ASTM D 6496	1/4,000 m ²	610 N/m MARV
GCL Index Flux ⁵	ASTM D 5887	1/25,000 m ²	1 x 10 ⁻⁸ m ³ /m ² /sec max.
GCL Hydraulic Conductivity ⁵	ASTM D 5887	1/25,000 m ²	5 x 10 ⁻⁹ cm/sec max.
GCL Hydrated Internal Shear Strength ⁶	ASTM D 6243	Periodically	24 kPa Typical

Bentomat FLW is a reinforced GCL consisting of a layer of granular sodium bentonite between a nonwoven geotextile and a scrim reinforced nonwoven geotextile, which are needlepunched together.

Notes

¹ Geotextile property tests performed on the geotextile components before they are incorporated into the finished GCL product.

² Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

³ Bentonite mass/area reported at 0 percent moisture content.

⁴ All tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496.

⁵ Index flux and permeability testing with deaired distilled/deionized water at 551kPa cell pressure, 531 kPa headwater pressure and 517 kPa tailwater pressure. This flux value is equivalent to a permeability of 5x10⁻⁹ cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

⁶ Peak values measured at 9.6 kPa normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

CETCO has developed an edge enhancement system that eliminates the need to use additional granular sodium bentonite within the overlap area of the seams. We call this edge enhancement, SuperGroove™, and it comes standard on both longitudinal edges of Bentomat® FLW. It should be noted that SuperGroove™ does not appear on the end-of-roll overlaps and recommend the continued use of supplemental bentonite for all end-of-roll seams.

TR 401-FLW-35
03/2014

800.527.9948 Fax 847.577.5566

For the most up-to-date product information, please visit our website, www.cetco.com.

A wholly owned subsidiary of AMCOL International Corporation. The information and data contained herein are believed to be accurate and reliable, CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.



Date: 24-Sep-2024 04:03
Purchase Order: PO8170
ORDER NUMBER: 55092449

TITAN ENVIRONMENTAL
777 QUEST BLVD

LLE DES CHENES,,R0A 0T1

To Whom It May Concern:

Please find the enclosed Manufacturing Quality Assurance/Manufacturing Quality Control (MQA/MQC) test data package for Geosynthetic Clay Liner (GCL) shipments to TITAN ENVIRONMENTAL .

Questions regarding this information should be directed to CETCO® Technical Services at eptechservices@cetco.com.

Sincerely,

NICHOLLS, RYAN J
Quality Assurance Coordinator
CETCO® Lovell Plant

**GEOSYNTHETIC CLAY LINER
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE**

PROJECT NAME:
CUSTOMER P.O.: PO8170
ORDER NUMBER: 55092449
PREPARED FOR: TITAN ENVIRONMENTAL

CONTENTS:

- Product Certifications
- GCL Order Packing List and MQA Tracking Form
- GCL Manufacturing Quality control test data
- Bentonite clay certification
- Raw Material Test results

PREPARED BY: NICHOLLS, RYAN J
Quality Assurance Coordinator
CETCO®
AMERICAN COLLOID COMPANY
92 HIGHWAY 37
LOVELL, 82431, WY
Telephone: 800-322-1159
Email: Ryan.Nicholls@mineralstech.com

PRODUCT CERTIFICATIONS

PROJECT NAME:
CUSTOMER P.O.: PO8170
ORDER NUMBER: 55092449
PREPARED FOR: TITAN ENVIRONMENTAL

The GCL Manufactured for the above-referenced order number is certified to meet the values listed in the tables below:

GCL PROPERTY SPECIFICATIONS FOR BENTOMAT® FLW

Test Method	Test Method Property	Test Frequency	Certified Value
ASTM D5887	GCL Hydraulic Conductivity	250,000 sq ft	5x10 ⁻⁹ - cm/s
ASTM D5890	Bentonite Free Swell	50 tons	24 - ml
ASTM D5891	Bentonite Fluid Loss	50 tons	18 - ml
ASTM D6768	GCL Grab Strength	40,000 sq ft (4,000 sq m)	50 - lbs/in
ASTM D6496	GCL Peel Strength	40,000 sq ft (4,000 sq m)	3.5 - lbs/in
ASTM D5887	GCL Index Flux	250,000 sq ft	1x10 ⁻⁸ - m ³ /m ² /s
ASTM D6243	GCL Hydrated Internal Shear Strength	1,000,000 sq ft	500 - psf
ASTM D5993	Bentonite Mass/Area	40,000 sq ft (4,000 sq m)	.90 - lbs/sq ft

All tensile testing is in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. An "*" indicates non-standard testing, frequency, or certified value .

NEEDLE DETECTION AND REMOVAL PROCEDURE

CETCO® hereby affirms that all Bentomat® geosynthetic clay liner material manufactured for this project is continually passed under a magnet for needle removal and then screened with a metal detection device. CETCO® certifies Bentomat® to be essentially free of broken needles and fragments of needles that would negatively affect the performance of the final product.

Sincerely,

NICHOLLS, RYAN J
Quality Assurance Coordinator
CETCO® Lovell Plant

GCL PACKING LIST AND MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 55092449

GCL								GEOTEXTILE			CLAY
BENTOMAT® FLW								01-9514	01-9518	01-9865	CG 50-BLK
Order	GCL Lot#	GCL Roll#	Length	Width	Weight	Sq. ft	Roll # Tested	Cap1 Roll #	Base1 Roll #	Base2 Roll #	Clay Lot #
55092449	LL-39-2024	89	150	15	2800	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	90	150	15	3080	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	91	150	15	3095	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	92	150	15	3045	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	93	150	15	3035	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	94	150	15	3050	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	95	150	15	3070	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	96	150	15	3165	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	97	150	15	3040	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	98	150	15	3025	2250	89	2027753837	2026973227	W2895089000	L-261-24-C
55092449	LL-39-2024	99	150	15	3055	2250	89	2027753827	2026973227	W2895397000	L-261-24-C
55092449	LL-39-2024	100	150	15	3035	2250	89	2027753827	2026973227	W2895397000	L-261-24-C
55092449	LL-39-2024	101	150	15	3070	2250	89	2027753827	2026973227	W2895397000	L-261-24-C
55092449	LL-39-2024	102	150	15	3010	2250	89	2027753827	2026973227	W2895397000	L-261-24-C
55092449	LL-39-2024	103	150	15	2990	2250	89	2027753827	700362828	W2895397000	L-261-24-C
Total Sq Ft:						33750		Total Number of Rolls Certified: 15			

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 55092449 have been tested in our production facility lab.

Product	Lot# Tested	Roll# Tested	Mass Area	Grab Strength	Peel Strength			
ASTM Test Method:			ASTM D5993	ASTM D6768	ASTM D6496			
Required Value:			.90 - lbs/sq ft	50 - lbs/in	3.5 - lbs/in			
BENTOMAT® FLW	LL-39-2024	89	1.03	70.1	4.5			

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 55092449 was tested in our production facility lab and yielded the following results.

Clay Lot #	Moist	Swell	Fluid Loss
ASTM Test Method:	ASTM D2216	ASTM D5890	ASTM D5891
Required Value:	12 - %	24 - ml	18 - ml
L-261-24-C	10.5	28	15

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 55092449 was manufactured with geotextiles which were tested and yielded the following results.

BASE GEOTEXTILE			
Material	Roll Number	Mass Area oz/yd ²	Grab Strength lbs
01-9518	700362828	7.63	105
01-9865	W2895089000		159.6
01-9518	2026973227	7.61	117.06
01-9865	W2895397000	6.29	168.41

COVER GEOTEXTILE			
Material	Roll Number	Mass Area oz/yd ²	Grab Strength lbs
01-9514	2027753837	6.81	193.42
01-9514	2027753827	6.89	198.24

Certifications from our suppliers are on file at our production facility.



PRODUCT CERTIFICATIONS

PROJECT NAME:
 CUSTOMER P.O.: PO8170
 ORDER NUMBER: 55092449
 PREPARED FOR: TITAN ENVIRONMENTAL

The GCL Manufactured for the above-referenced order number is certified to meet the values listed in the tables below:

GCL PROPERTY SPECIFICATIONS FOR BENTOMAT® FLW

Test Method	Test Method Property	Test Frequency	Certified Value
ASTM D5887	GCL-Hydraulic Conductivity	250,000 sq ft	5x10-9 - cm/s
ASTM D5887	GCL-Index Flux	250,000 sq ft	1x10-8 - m3/m2/s

Product	Lot# Tested	Roll# Tested	Index Flux	Hydraulic Conductivity				
ASTM Test Method:			ASTM D5887	ASTM D5887				
Required Value:			1x10-8 m3/m2/s	5x10-9 cm/s				
BENTOMAT® FLW	LL-39-2024	89	8.5x10-9	4.1x10-9				



Date: 24-Sep-2024 04:03
Purchase Order: PO8170
ORDER NUMBER: 55092449

TITAN ENVIRONMENTAL
777 QUEST BLVD

LLE DES CHENES,,R0A 0T1

WSP - Submittal Review	
WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub- contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.	
<input type="checkbox"/> No Comment	Project No. CA0039180.5749
<input checked="" type="checkbox"/> Reviewed as Noted	Project Name Search Pad Construction
<input type="checkbox"/> Amend and Resubmit	Reviewed By W. Francey
<input type="checkbox"/> Rejected	Date: October 18, 2024

WSP Comments:
Please provide hydraulic conductivity testing results when available.
All other properties meet specification.

To Whom It May Concern:

Please find the enclosed Manufacturing Quality Assurance/Manufacturing Quality Control (MQA/MQC) test data package for Geosynthetic Clay Liner (GCL) shipments to TITAN ENVIRONMENTAL .

The enclosed data package includes results for all MQC tests required by ASTM D5889, with the exception of index flux/hydraulic conductivity. This test, which is run according to ASTM D5887, is normally performed once every 250,000 sq./ft. of GCL produced, unless a higher frequency is required by the project specifications. Because of the GCL's low permeability, this test can take several weeks to complete. The index flux/hydraulic conductivity results associated with this lot of material will be provided under separate cover as soon as they are available.

Although the index flux/hydraulic conductivity test results are not yet available, CETCO® accepts responsibility for our GCL should the index flux/hydraulic conductivity test produce unacceptable results. If, upon delivery and prior to installation, individual rolls of GCL are found to be nonconforming to accepted project specifications, CETCO® will replace the nonconforming material at no charge.

Questions regarding this information should be directed to CETCO® Technical Services at eptechservices@cetco.com.

Sincerely,

NICHOLLS, RYAN J
Quality Assurance Coordinator
CETCO® Lovell Plant

**GEOSYNTHETIC CLAY LINER
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE**

PROJECT NAME:
CUSTOMER P.O.: PO8170
ORDER NUMBER: 55092449
PREPARED FOR: TITAN ENVIRONMENTAL

CONTENTS:

- Product Certifications
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PREPARED BY: NICHOLLS, RYAN J
Quality Assurance Coordinator
CETCO®
AMERICAN COLLOID COMPANY
92 HIGHWAY 37
LOVELL, 82431, WY
Telephone: 800-322-1159
Email: Ryan.Nicholls@mineralstech.com

PROPERTY ⁽¹⁾	TEST METHOD	FREQUENCY	UNIT Metric	1130008
SPECIFICATIONS				
GEOTEXTILE PROPERTY				
Cap Layer	-	-	-	Nonwoven
Cap Mass per Unit area	ASTM D5261	18,580 m ²	g/m ²	200
Carrier Layer	-	-	-	Woven
Carrier Mass per Unit Area	ASTM D5261	18,580 m ²	g/m ²	105
BENTONITE PROPERTY				
Swell Index (min.)	ASTM D5890	45,360 kg	ml/2 g	24
Moisture Content (max.)	ASTM D4643	45,360 kg	%	12
Fluid Loss (max.)	ASTM D5891	45,360 kg	ml	18
FINISHED GCL PROPERTY				
Bentonite Mass (0% moisture)	ASTM D5993	3,715 m ²	kg/m ²	3.66
Tensile Strength MD (min. avg.)	ASTM D6768	3,715 m ²	kN/m	5.3
Peel Strength (min.avg.)	ASTM D6496	3,715 m ²	N/m	928
Peel Strength (min. avg.)	ASTM D4632	3,715 m ²	N	156
Hydraulic Conductivity (max.)	ASTM D5887	One per week	cm/s	5x10 ⁻⁹
Index Flux	ASTM D5887	One per week	m ³ /m ² /sec	1x10 ⁻⁸
Effective Confining Stress (max.)	-	-	kPa	34.5
Internal Shear Strength	ASTM D6243	Periodically	kPa	24
Normal Stress	-	-	kPa	9.6

SUPPLY SPECIFICATIONS(Roll dimensions may vary ±1%)

Roll Dimension - Width	-	m	4.72
Roll Dimension - Length	-	m	61.0
Area (Surface/Roll)	-	m ²	287.92

NOTES

* The information contained herein is provided for reference purposes only and is not intended as a warranty or guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

WSP - Submittal Review	
WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.	
<input type="checkbox"/> No Comment <input checked="" type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	Project No. CA0039180.5749 Project Name Search Pad Construction Reviewed By W.Francey/F. Gondim Date: October 30, 2024

<p>WSP Comments:</p> <p>Proposed GCL (Bentoliner) is acceptable provided two layers are installed.</p>



LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: PO6811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

WSP - Submittal Review		WSP Comments:	
<p>WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.</p>			
<input type="checkbox"/> No Comment <input checked="" type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	Project No. CA0039180.5749 Project Name Search Pad Construction Reviewed By W. Francey Date: September 6, 2024	<p>Please provide conformance testing data for Oven Aging at 85C and UV Resistance.</p> <p>Other properties meet the Specification</p>	

ROLL NUMBER	RESIN LOT NUMBER	MANUFACT. DATE	RESIN MELT INDEX 190/2.16 g/10 min D1238	RESIN DENSITY g/cc D1505	OIT min D8117	HPOIT min D5885	ESCR SP-NCTL hours D5397
Product Code : 1101438							
HDPE 60 mils / 1.50 mm Black Smooth			1.0	> 0.932	100		500
1002-121848	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121849	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121850	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121856	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121858	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121860	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121861	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121863	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121865	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121866	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-122271	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122272	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122273	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122276	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

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LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: PO6811
SALES ORDER: SO-003722
PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

1002-122279	PRB821070	2024-04-08	0.09	0.938	120	>500 Certified 1002-122234
1002-122280	PRB821070	2024-04-08	0.09	0.938	120	>500 Certified 1002-122234
1002-122284	PRB821070	2024-04-09	0.09	0.938	120	>500 Certified 1002-122234
1002-122285	PRB821070	2024-04-09	0.09	0.938	120	>500 Certified 1002-122234
1002-122302	PRB820750	2024-04-10	0.08	0.938	120	>500 Certified 1002-122299
1002-122303	PRB820750	2024-04-10	0.08	0.938	120	>500 Certified 1002-122299

QUANTITY (ROLLS): 20

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Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



TEST RESULTS

PROJECT NUMBER: PO6811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

PRODUCT: 1101438

CE Certificate = HD-60-SS-BB

HDPE 60 mils / 1.50 mm Black Smooth

Properties	Thickness ave/min.	GeoM Density	Carbon Black Content	Carbon Black Dispersion	Tensile				Tear Resist.	Puncture Resist.	Dimension Stability	Asperity Height In/Out mm
					Yield Strength	Elong.	Break Strength	Elong.				
Unit	mm	g/cc	%	Cat 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5199	D792	D4218	D5596	D6693				D1004	D4833	D1204	
Frequency	Each roll	Every 10 rolls	Every 2 rolls	Every 10 rolls	Every 2 rolls				Every 5 rolls	Every 5 rolls		
Specification	1.50 / 1.35	≥ 0.940	2.0 - 3.0	Cat. 1 / Cat.	23	13	43	700	187	534		
1002-121848 MD XD	1.52 / 1.49	0.947	2.34	10/10 views	27.3 27.7	17.4 16.6	52.2 53.9	840 898	226 240	618		
1002-121849 MD XD	1.53 / 1.49	0.947	2.34	10/10 views	27.3 27.7	17.4 16.6	52.2 53.9	840 898	226 240	618		
1002-121850 MD XD	1.53 / 1.50	0.947	2.30	10/10 views	26.3 28.0	18.1 15.5	53.4 52.5	874 889	226 240	618		
1002-121856 MD XD	1.55 / 1.51	0.947	2.28	10/10 views	27.3 27.8	18.3 16.3	53.6 54.8	858 916	223 240	605		
1002-121858 MD XD	1.55 / 1.51	0.947	2.32	10/10 views	26.6 28.0	18.3 16.9	52.9 53.9	851 900	220 236	618		
1002-121860 MD XD	1.55 / 1.52	0.947	2.31	10/10 views	26.8 28.0	17.8 15.7	53.6 54.3	859 905	220 236	618		
1002-121861 MD XD	1.56 / 1.53	0.947	2.31	10/10 views	26.8 28.0	17.8 15.7	53.6 54.3	859 905	220 236	618		
1002-121863 MD XD	1.54 / 1.51	0.946	2.18	10/10 views	25.9 27.9	19.0 15.6	52.2 54.8	847 908	222 231	632		
1002-121865 MD XD	1.55 / 1.51	0.946	2.21	10/10 views	26.7 27.9	17.9 16.3	53.2 54.6	855 904	222 231	632		
1002-121866 MD XD	1.55 / 1.52	0.946	2.33	10/10 views	26.9 29.1	18.2 16.6	53.6 55.7	846 919	222 231	632		
1002-122271 MD XD	1.59 / 1.56	0.947	2.35	10/10 views	23.3 23.4	18.2 16.3	44.8 46.9	780 851	212 227	614		
1002-122272 MD XD	1.57 / 1.52	0.947	2.69	10/10 views	25.3 26.2	17.3 15.5	50.1 50.8	834 855	212 227	614		
1002-122273 MD XD	1.58 / 1.52	0.947	2.69	10/10 views	25.3 26.2	17.3 15.5	50.1 50.8	834 855	212 227	614		

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Solmax International Inc.

2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

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TEST RESULTS

PROJECT NUMBER: PO6811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

1002-122276	MD XD	1.57 / 1.51	0.948	2.66	10/10 views	24.1 25.5	17.6 15.6	47.8 48.7	807 845	219 236	632		
1002-122279	MD XD	1.56 / 1.51	0.948	2.67	10/10 views	24.7 26.1	17.8 16.3	50.8 50.6	825 870	219 236	632		
1002-122280	MD XD	1.56 / 1.54	0.947	2.60	10/10 views	24.4 23.8	17.9 18.0	49.2 49.4	810 840	222 236	641		
1002-122284	MD XD	1.55 / 1.47	0.947	2.54	10/10 views	23.2 24.5	19.2 16.6	48.5 50.3	820 880	222 236	641		
1002-122285	MD XD	1.55 / 1.52	0.947	2.54	10/10 views	23.2 24.5	19.2 16.6	48.5 50.3	820 880	211 231	618		
1002-122302	MD XD	1.53 / 1.50	0.947	2.65	10/10 views	23.5 23.8	18.6 17.5	48.9 49.7	825 890	222 231	614		
1002-122303	MD XD	1.56 / 1.52	0.947	2.65	10/10 views	23.5 23.8	18.6 17.5	48.9 49.7	825 890	222 231	614		

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Solmax International Inc.

2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM

Certificate of Analysis

Shipped To: SOLMAX : VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

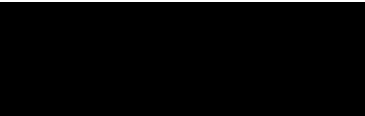
Delivery # 81084339
PO # 4158
Weight: 185200.000 LB
Ship Date: 02/13/2024
Package: BULK
Mode: Hopper Car
Car # AOKX602291
Seal No: 360701

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRA820560

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10min
HLMI Flow Rate	ASTM D1238	11.00	g/10min
Density	D1505 or D4883	0.9370	g/cm3
Production Date		01/10/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

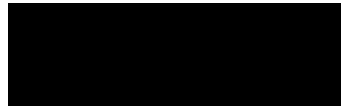
Delivery #: 81087531
PO #: 4158
Weight: 184800.000 LB
Ship Date: 02/17/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX817097
Seal No: 360702

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRA820550

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10min
HLMI Flow Rate	ASTM D1238	9.90	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		01/10/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

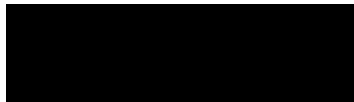
Delivery #: 81096119
PO #: 4244
Weight: 185000.000 LB
Ship Date: 03/01/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX815756
Seal No: 377727

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRB821070

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.090	g/10min
HLMI Flow Rate	ASTM D1238	13.10	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		02/15/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

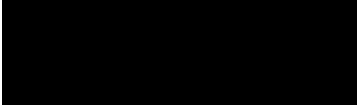
Delivery #: 81105699
PO #: 4244
Weight: 180900.000 LB
Ship Date: 03/16/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX816668
Seal No: 371583

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRB820750

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10min
HLMI Flow Rate	ASTM D1238	13.20	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		02/11/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

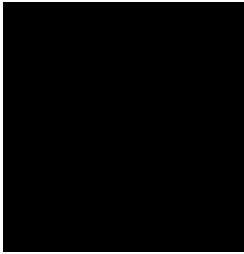


Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806



LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: P07947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

WSP - Submittal Review		WSP Comments:	
<p>WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.</p>			
<input type="checkbox"/> No Comment <input checked="" type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	Project No. CA0039180.5749 Project Name Search Pad Construction Reviewed By W. Francey Date: September 6, 2024	<p>Please provide conformance testing data for Oven Aging at 85C and UV Resistance.</p> <p>Other properties meet the Specification</p>	

ROLL NUMBER	RESIN LOT NUMBER	MANUFACT. DATE	RESIN MELT INDEX 190/2.16 g/10 min D1238	RESIN DENSITY g/cc D1505	OIT min D8117	HPOIT min D5885	ESCR SP-NCTL hours D5397
Product Code : 1101438							
HDPE 60 mils / 1.50 mm Black Smooth			1.0	> 0.932	100		500
1002-122819	PRF821720	2024-08-26	0.09	0.938	120		>500 Certified 1002-122821
1005-076005	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076006	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076007	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076008	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076009	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076010	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076011	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076012	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076013	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076014	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996
1005-076015	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996
1005-076016	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996

QUANTITY (ROLLS): 13

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



SOLMAX

MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER: PO7947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

PRODUCT: 1101438

CE Certificate = HD-60-SS-BB

HDPE 60 mils / 1.50 mm Black Smooth

Properties	Thickness ave/min.	GeoM Density	Carbon Black Content	Carbon Black Dispersion	Tensile				Tear Resist.	Puncture Resist.	Dimension Stability	Asperity Height In/Out mm
					Yield Strength	Elong.	Break Strength	Elong.				
Unit	mm	g/cc	%	Cat 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5199	D792	D4218	D5596	D6693				D1004	D4833	D1204	
Frequency	Each roll	Every 10 rolls	Every 2 rolls	Every 10 rolls	Every 2 rolls				Every 5 rolls	Every 5 rolls		
Specification	1.50 / 1.35	≥ 0.940	2.0 - 3.0	Cat. 1 / Cat.	23	13	43	700	187	534		
1002-122819 MD XD	1.55 / 1.51	0.944	2.08	10/10 views	23.1 23.8	18.1 16.9	46.8 51.0	784 897	214 222	592		
1005-076005 MD XD	1.54 / 1.50	0.944	2.55	10/10 views	23.8 25.1	17.5 16.1	49.0 50.1	799 856	205 222	609		
1005-076006 MD XD	1.52 / 1.49	0.944	2.70	10/10 views	24.5 23.4	19.5 16.0	46.6 51.7	753 894	205 222	609		
1005-076007 MD XD	1.56 / 1.50	0.946	2.70	10/10 views	24.5 23.4	19.5 16.0	46.6 51.7	753 894	212 231	609		
1005-076008 MD XD	1.56 / 1.48	0.946	2.67	10/10 views	24.4 24.6	18.8 15.4	51.3 53.1	815 928	212 231	609		
1005-076009 MD XD	1.55 / 1.48	0.946	2.67	10/10 views	24.4 24.6	18.8 15.4	51.3 53.1	815 928	212 231	609		
1005-076010 MD XD	1.55 / 1.47	0.946	2.79	10/10 views	23.7 25.1	18.4 16.6	50.1 53.6	806 907	212 231	609		
1005-076011 MD XD	1.56 / 1.51	0.946	2.79	10/10 views	23.7 25.1	18.4 16.6	50.1 53.6	806 907	212 231	609		
1005-076012 MD XD	1.55 / 1.50	0.944	2.75	10/10 views	23.6 23.9	18.2 16.7	49.0 52.2	802 910	211 236	614		
1005-076013 MD XD	1.55 / 1.52	0.944	2.75	10/10 views	23.6 23.9	18.2 16.7	49.0 52.2	802 910	211 236	614		
1005-076014 MD XD	1.55 / 1.51	0.944	2.61	10/10 views	23.8 23.8	18.6 16.7	49.7 52.4	800 900	211 236	614		
1005-076015 MD XD	1.54 / 1.51	0.944	2.61	10/10 views	23.8 23.8	18.6 16.7	49.7 52.4	800 900	211 236	614		
1005-076016 MD XD	1.57 / 1.51	0.944	2.45	10/10 views	23.7 23.9	18.0 16.2	48.0 50.6	800 900	211 236	614		

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.

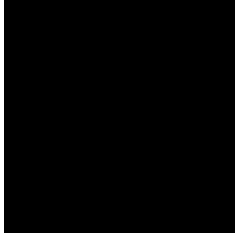
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

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SOLMAX

MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER:	PO7947
SALES ORDER:	SO-003996
PACKING SLIP NUMBER:	Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Giguere
Fax:


Delivery #: 81177768
PO #: 4563
Weight: 208400.000 LB
Ship Date: 07/04/2024
Package: BULK
Mode: Hopper Car
Car #: SHQX041855
Seal No: 394968

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRF821720

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.090	g/10min
HLMI Flow Rate	ASTM D1238	12.70	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		06/30/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806-4498



Bayport Polymers LLC
12212 Port Road
Pasadena, TX 77507

JAMI GRANGE
12212 PORT ROAD
PASADENA TX 77507

SHIPPED TO:
SOLMAX INTERNATIONAL INC
2801 MARIE VICTORIN
VARENNES-QUEBEC QC J3X 1P7
CANADA

Quality certificate

Date
06/04/2024
Purchase order item/date
PO-004493 / 05/16/2024
Delivery item/date
88111709 000001 / 06/03/2024
Order item
33470824 000001
Customer number
81137450

Material: Our / Your reference

MDPE 37120 (441840) /

Please find below test data and pertinent information on Bayport Polymers LLC.
Polyethylene material shipped to your plant.

Batch D240320543 **Quantity** 185,750 LB **Railcar** BPTX729101

Characteristic	Unit	Value
Density	g/cc	0.938
Melt Index 21.6/190	g/10 min	11.1
Railcar Prefix	-	BPTX
Railcar Number	-	729101
Railcar Seal Numbers	-	10904



JAMI GRANGE
12212 PORT ROAD
PASADENA TX 77507

Delivery item/date **Page**
88111709 000001 / 06/19/2024 2



Jeremy Gasper
Laboratory Superintendent
12212 Port Road, Pasadena, Texas 77507
P.O. Box 5010, LaPorte, Texas 77572-5010

TITAN ENVIR. CONTAINMENT LTD.
 777 QUEST BOULEVARD
 ILE DES CHENES, MB, R0A 0T1
 CANADA

Canada, September 10, 2024

Project Name: PRAIRIE GREEN LF
Purchase Order: PO7947
Sales Order: SO-003996
ATTN: Stephane Trudeau

WSP - Submittal Review	
WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.	
<input checked="" type="checkbox"/> No Comment	Project No. CA0039180.5749
<input type="checkbox"/> Reviewed as Noted	Project Name Search Pad Construction
<input type="checkbox"/> Amend and Resubmit	Reviewed By W. Francey
<input type="checkbox"/> Rejected	Date: September 11, 2024

To whom it may concern,

Solmax International hereby certifies that 1101547 (HDPE 60 mils / 1.50 mm Black Textured) and 1101438 (HDPE 60 mils / 1.50 mm Black Smooth) geomembrane supplied for the above-mentioned sales order meets or exceeds GM-13 requirements on Oven Aging, UV Resistance.

(1.50 mm Black Textured)

- Oven aging

(% retained after 90 days)	ASTM D5721	82%
HPOIT (min.avg)	ASTM D5885	1607 minutes
- UV resistance

(% retained after 1,600 hrs)	ASTM D7238	82%
HP OIT (min.avg)	ASTM D5885	1728 minutes

(1.50 mm Black Smooth)

- Oven aging

(% retained after 90 days)	ASTM D5721	81%
HPOIT (min.avg)	ASTM D5885	1387 minutes
- UV resistance

(% retained after 1,600 hrs)	ASTM D7238	85%
HP OIT (min.avg)	ASTM D5885	1442 minutes

Solmax International Inc

2801 Marie-Victorin Rte., Varennes, Quebec, Canada J3X 0J4
 (+1) 450 929-1234

You will find attached test report on roll produced using the same resin formulation that has been used to manufacture the above product.

Hoping the above information is satisfactory. Please, do not hesitate to contact us if you require any additional information.

Sincerely,



Claude Cormier

Coordonnateur qualité | Quality Control Manager/Chef de service qualité

|

Identification:

Type of Material :	<u>HDPE</u>	Formulation :	<u>HD53-45</u>
Roll Number:	<u>1002-118857</u>	Resin Type :	<u>Bavstar 37120</u>
Production Date :	<u>2023-05-30</u>	Lot Number :	<u>D220521102</u>

Oxidative Induction Time (ASTM D8117)

	Individual Data			Avg.	S.D.	% CV
OIT (minutes)	144	138		141	4	3.0

High Pressure Oxidative Induction Time (ASTM D5885)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes)	1802	1607		1705	138	8.1

UV Resistance (ASTM D7238)

- The resistance to degradation was determined in accordance with ASTM D7238 ;
- Apparatus used : Q-PANEL QUV/se - Lamp: UVA-340;
- Duration of the test: 1600 hours of UV exposure (total of 1920h);
- Cycle : 80 cycles of UVA (20h of light at 75°C followed by 4h of condensation at 60°C)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1802	1607		1705	138	8.1
HP OIT (minutes) : ASTM D5885 - After 1600h of UV	1492	1391		1442	72	5.0
PERCENTAGE RETAINED:	85 %			Note: No visual change after 1600 hrs		

Air-Oven Aging (ASTM D5721)

- The resistance to degradation was determined in accordance with ASTM D5721;
- Duration of the test: The geomembrane was exposed to 90 days in an air oven maintained at 85°C ± 0.5°C;
- Rotation of the exposed specimens : once per wee

	Individual Data			Avg.	S.D.	% CV
OIT (minutes) : ASTM D8117 - Initial	144	138		141	4	3.0
OIT (minutes) : ASTM D8117 - After 90 days of Oven Aging	21	23		22	1	6.2
PERCENTAGE RETAINED:	16 %					

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1802	1607		1705	138	8.1
HP OIT (minutes) : ASTM D5885 - After 90 days of Oven Aging	1317	1457		1387	99	7.1
PERCENTAGE RETAINED:	81 %			Note: No visual change after 90 days		

The tests were performed by Solmax. The laboratories of Solmax are accredited by the GRI.



Technical Services

Identification:

Type of Material :	HDPE	Formulation :	HD06-71
Roll Number:	1005-074521	Resin Type :	Chevron-USA K306
Production Date :	2024-05-13	Lot Number :	PRD610190

Oxidative Induction Time (ASTM D8117)

	Individual Data			Avg.	S.D.	% CV
OIT (minutes)	192	186		189	4	2.2

High Pressure Oxidative Induction Time (ASTM D5885)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes)	1686	1673		1680	9	0.5

UV Resistance (ASTM D7238)

- The resistance to degradation was determined in accordance with ASTM D7238 ;
- Apparatus used : Q-PANEL QUV/se - Lamp: UVA-340;
- Duration of the test: 1600 hours of UV exposure (total of 1920h);
- Cycle : 80 cycles of UVA (20h of light at 75°C followed by 4h of condensation at 60°C)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1686	1673		1680	9	0.5
HP OIT (minutes) : ASTM D5885 - After 1600h of UV	1378	1364		1371	10	0.7

PERCENTAGE RETAINED: 82 %

Note: No visual change after 1600 hrs

Air-Oven Aging (ASTM D5721)

- The resistance to degradation was determined in accordance with ASTM D5721;
- Duration of the test: The geomembrane was exposed to 90 days in an air oven maintained at 85°C ± 0.5°C;
- Rotation of the exposed specimens : once per wee

	Individual Data			Avg.	S.D.	% CV
OIT (minutes) : ASTM D8117 - Initial	192	186		189	4	2.2
OIT (minutes) : ASTM D8117 - After 90 days of Oven Aging	66	82		74	11	15.3

PERCENTAGE RETAINED: 39 %

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1686	1673		1680	9	0.5
HP OIT (minutes) : ASTM D5885 - After 90 days of Oven Aging	1351	1395		1373	31	2.3

PERCENTAGE RETAINED: 82 %

Note: No visual change after 90 days

The tests were performed by Solmax. The laboratories of Solmax are accredited by the GRI.



Simon Gilbert St-Pierre, P.Eng.
 Technical Services

PROPERTY ⁽¹⁾	TEST METHOD	FREQUENCY	UNIT Metric	1130008
SPECIFICATIONS				
GEOTEXTILE PROPERTY				
Cap Layer	-	-	-	Nonwoven
Cap Mass per Unit area	ASTM D5261	18,580 m ²	g/m ²	200
Carrier Layer	-	-	-	Woven
Carrier Mass per Unit Area	ASTM D5261	18,580 m ²	g/m ²	105
BENTONITE PROPERTY				
Swell Index (min.)	ASTM D5890	45,360 kg	ml/2 g	24
Moisture Content (max.)	ASTM D4643	45,360 kg	%	12
Fluid Loss (max.)	ASTM D5891	45,360 kg	ml	18
FINISHED GCL PROPERTY				
Bentonite Mass (0% moisture)	ASTM D5993	3,715 m ²	kg/m ²	3.66
Tensile Strength MD (min. avg.)	ASTM D6768	3,715 m ²	kN/m	5.3
Peel Strength (min.avg.)	ASTM D6496	3,715 m ²	N/m	928
Peel Strength (min. avg.)	ASTM D4632	3,715 m ²	N	156
Hydraulic Conductivity (max.)	ASTM D5887	One per week	cm/s	5x10 ⁻⁹
Index Flux	ASTM D5887	One per week	m ³ /m ² /sec	1x10 ⁻⁸
Effective Confining Stress (max.)	-	-	kPa	34.5
Internal Shear Strength	ASTM D6243	Periodically	kPa	24
Normal Stress	-	-	kPa	9.6

SUPPLY SPECIFICATIONS(Roll dimensions may vary ±1%)

Roll Dimension - Width	-	m	4.72
Roll Dimension - Length	-	m	61.0
Area (Surface/Roll)	-	m ²	287.92

NOTES

* The information contained herein is provided for reference purposes only and is not intended as a warranty or guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input type="checkbox"/> No Comment	Project No. CA0039180.5749
<input checked="" type="checkbox"/> Reviewed as Noted	Project Name Search Pad Construction
<input type="checkbox"/> Amend and Resubmit	Reviewed By W.Francey/F. Gondim
<input type="checkbox"/> Rejected	Date: October 30, 2024

WSP Comments:

Proposed GCL (Bentoliner) is acceptable provided two layers are installed.

Submittal #4.0 - Textured HDPE Geomembrane

Revision	0	Submittal Manager	Julian Kornelsen (Earth Max Construction Inc)
Status	Open	Date Created	Aug 14, 2024
		Spec Section	
Responsible Contractor	Earth Max Construction Inc	Received From	
Final Due Date		Lead Time	
		Cost Code	
Location		Type	Shop Drawing
Approvers			
Ball in Court	Julian Kornelsen (Earth Max Construction Inc)		
Distribution			
Description	Textured HDPE Geomembrane		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					HDPE 60 mils _1.50 mm Black Textured -TDS (2).pdf

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub- contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input type="checkbox"/> No Comment	Project No. <u>CA0039180.5749</u>
<input checked="" type="checkbox"/> Reviewed as Noted	Project Name <u>Search Pad Construction</u>
<input type="checkbox"/> Amend and Resubmit	Reviewed By <u>F. Gondim</u>
<input type="checkbox"/> Rejected	Date: <u>August 14, 2024</u>

WSP Comments:
 The material meets the specifications. Please provide certificate for the rolls to be used for the project for final review.

PROPERTY ⁽¹⁾	TEST METHOD	FREQUENCY	UNIT Metric	1101547
SPECIFICATIONS				
Nominal Thickness			mm	1.50
Thickness (min. avg.)	ASTM D5994	Every roll	mm	1.43
Lowest individual (8 values/10)			mm	1.35
Lowest individual (10 values/10)			mm	1.28
Asperity Height (min. avg.)	ASTM D7466	Every roll	mm	0.40
Resin Density	ASTM D1505	One per batch	g/cc	> 0.932
Melt Index - 190°C/2.16 kg (max.)	ASTM D1238	One per batch	g/10 min	1.0
Density	ASTM D792	Every 10 rolls	g/cm ³	≥ 0.940
Carbon Black Content	ASTM D4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - Standard (min. avg.)	ASTM D8117	One per batch	min	100
Tensile Properties (min. avg.) (2)	ASTM D6693	Every 2 rolls		
Strength at Yield			kN/m	23
Elongation at Yield			%	13
Strength at Break			kN/m	23
Elongation at Break			%	150
Tear Resistance (min. avg.)	ASTM D1004	Every 5 rolls	N	200
Puncture Resistance (min. avg.)	ASTM D4833	Every 5 rolls	N	534
Dimensional Stability	ASTM D1204	Certified	%	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D5397	One per batch	hr	500
Oven Aging - % retained after 90 days	ASTM D5721	Per formulation		
HP-OIT (min. avg.)	ASTM D5885		%	80
UV Resistance - % retained after 1,600 hr	ASTM D7238	Per formulation		
HP-OIT (min. avg.)	ASTM D5885		%	50
Low Temperature Brittleness	ASTM D746	Per formulation	°C	- 77
SUPPLY SPECIFICATIONS(Roll dimensions may vary ±1%)				
Roll Dimension - Width	-		m	6.86
Roll Dimension - Length	-		m	158.5
Area (Surface/Roll)	-		m ²	1087.31

NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.

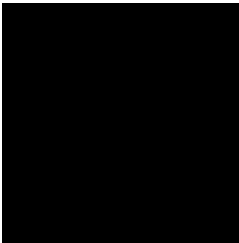
* All values are nominal test results, except when specified as minimum or maximum.

* The information contained herein is provided for reference purposes only and is not intended as a warranty or guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.



LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: P07947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-2

PROJECT NAME : PRAIRIE GREEN LF

WSP - Submittal Review		WSP Comments:
<p>WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.</p>		<p>Please provide conformance testing data for Oven Aging at 85C and UV Resistance.</p> <p>Other properties meet the Specification</p>
<input type="checkbox"/> No Comment	Project No. CA0039180.5749	
<input checked="" type="checkbox"/> Reviewed as Noted	Project Name Search Pad Construction	
<input type="checkbox"/> Amend and Resubmit	Reviewed By W. Francey	
<input type="checkbox"/> Rejected	Date: September 6, 2024	

ROLL NUMBER	RESIN LOT NUMBER	MANUFACT. DATE	RESIN MELT INDEX 190/2.16 g/10 min D1238	RESIN DENSITY g/cc D1505	OIT min D8117	HPOIT min D5885	ESCR SP-NCTL hours D5397
Product Code : 1101547							
HDPE 60 mils / 1.50 mm Black Textured			1.0	> 0.932	100		500
1001-168553	PRG820110	2024-08-17	0.11	0.936	120		>500 Certified 1001-168489
1001-168554	PRG820110	2024-08-17	0.11	0.936	120		>500 Certified 1001-168489
1001-168555	PRG820110	2024-08-17	0.11	0.936	120		>500 Certified 1001-168489
1001-168556	PRG820110	2024-08-17	0.11	0.936	120		>500 Certified 1001-168489
1001-168557	PRG820110	2024-08-17	0.11	0.936	120		>500 Certified 1001-168489
1001-168558	PRG820110	2024-08-17	0.11	0.936	120		>500 Certified 1001-168489
1001-168559	PRG820110	2024-08-17	0.11	0.936	120		>500 Certified 1001-168489
1001-168560	PRG820110	2024-08-18	0.11	0.936	120		>500 Certified 1001-168489
1001-168648	PRG820090	2024-08-22	0.07	0.937	120		>500 Certified 1005-075978
1001-168652	PRG820090	2024-08-22	0.07	0.937	120		>500 Certified 1005-075978

QUANTITY (ROLLS): 10

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



SOLMAX

MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER: PO7947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-2

PROJECT NAME : PRAIRIE GREEN LF

PRODUCT: 1101547

CE Certificate = HD-60-TT-BB

HDPE 60 mils / 1.50 mm Black Textured

Properties	Thickness ave/min.	GeoM Density	Carbon Black Content	Carbon Black Dispersion	Tensile				Tear Resist.	Puncture Resist.	Dimension Stability	Asperity Height In/Out
					Yield Strength	Elong.	Break Strength	Elong.				
Unit	mm	g/cc	%	Cat 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5994	D792	D4218	D5596	D6693				D1004	D4833	D1204	D7466
Frequency	Each roll	Every 10 rolls	Every 2 rolls	Every 10 rolls	Every 2 rolls				Every 5 rolls	Every 5 rolls		Every roll
Specification	1.43 / 1.28	≥ 0.940	2.0 - 3.0	Cat. 1 & Cat. 2	23	13	23	150	200	534		0.40 / 0.40
1001-168553 MD XD	1.53 / 1.44	0.947	2.41	10/10 views	27.2 27.0	15.1 15.2	36.8 35.6	577 580	264 276	689		0.47 / 0.51
1001-168554 MD XD	1.45 / 1.35	0.947	2.41	10/10 views	27.2 27.0	15.1 15.2	36.8 35.6	577 580	264 276	689		0.48 / 0.46
1001-168555 MD XD	1.53 / 1.48	0.947	2.50	10/10 views	24.8 25.1	15.9 14.5	36.6 30.6	598 532	264 276	689		0.44 / 0.48
1001-168556 MD XD	1.51 / 1.46	0.947	2.50	10/10 views	24.8 25.1	15.9 14.5	36.6 30.6	598 532	240 254	614		0.50 / 0.48
1001-168557 MD XD	1.49 / 1.41	0.947	2.42	10/10 views	25.0 23.6	16.6 18.0	35.7 32.9	583 574	240 254	614		0.50 / 0.47
1001-168558 MD XD	1.46 / 1.39	0.947	2.42	10/10 views	25.0 23.6	16.6 18.0	35.7 32.9	583 574	240 254	614		0.54 / 0.50
1001-168559 MD XD	1.48 / 1.38	0.947	2.41	10/10 views	25.0 24.0	15.2 18.5	30.5 34.0	534 553	240 254	614		0.51 / 0.53
1001-168560 MD XD	1.50 / 1.44	0.947	2.41	10/10 views	25.0 24.0	15.2 18.5	30.5 34.0	534 553	240 254	614		0.44 / 0.54
1001-168648 MD XD	1.50 / 1.42	0.948	2.84	10/10 views	25.4 26.0	16.7 15.3	33.3 31.7	538 537	239 262	641		0.54 / 0.65
1001-168652 MD XD	1.70 / 1.61	0.951	2.38	10/10 views	27.4 28.1	17.4 16.6	35.6 33.6	539 526	270 280	672		0.55 / 0.51

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.

2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:


Delivery #: 81191921
PO #: 4563
Weight: 205700.000 LB
Ship Date: 07/27/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX816565
Seal No: 395028

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRG820110

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.110	g/10min
HLMI Flow Rate	ASTM D1238	14.00	g/10min
Density	D1505 or D4883	0.9360	g/cm3
Production Date		07/02/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806-4498

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

Delivery #: 81188226
PO #: 4563
Weight: 205200.000 LB
Ship Date: 07/22/2024
Package: BULK
Mode: Hopper Car
Car #: IARX625566
Seal No: 395022

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRG820090

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10min
HLMI Flow Rate	ASTM D1238	11.20	g/10min
Density	D1505 or D4883	0.9370	g/cm3
Production Date		07/02/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

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Appendix A-2

Certificate of Acceptance – Subgrade



SUB-GRADE ACCEPTANCE

PROJECT: _____ LOCATION: _____
PROJECT #: _____ CONTRACTOR: _____
OWNER: _____ QA/QC: _____
ENGINEER: _____ DATE: _____

This document certifies that on _____, the project superintendant, _____, for TITAN ENVIRONMENTAL CONTAINMENT has inspected the surface of the sub-grade and has found that it meets the installation of the geomembrane and geosynthetics as per engineer specifications.

TITAN ENVIRONMENTAL CONTAINMENT accepts only the surface of the sub-grade and holds no responsibility of the structural strength of the containment system used on this project. Any and all failure causing damage to the geomembranes and geosynthetics being installed on this project will be repaired or replaced at the General contractors or Owners expense.

TITAN ENVIRONMENTAL CONTAINMENT will only accept Sub-grade on a daily installation and will not be held accountable for any damages to Sub-grade out side our control.

Area Being Accepted: _____

TITAN REPRESENTATIVE

GENERAL CONTRACTOR, OWNER REPRESENTATIVE

DATE

DATE

Appendix A-3

Geomembrane Deployment Inspection Summary

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 10/19/2024
 SHEET NUMBER: 1

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P24				PANEL P25				PANEL P26						
	NUMBER	LEAD	L SIDE	R SIDE	TRAIL	NUMBER	LEAD	L SIDE	R SIDE	TRAIL	NUMBER	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76012					76012					76013				
DEPLOYED LENGTH	57.6					106.6					54.4				
AMBIENT AIR TEMP.	2					2					5				
OBSERVED OVERLAP	150 mm					150 mm					150 mm				
REMARKS															
MONITOR															
SHEET THICKNESS															
	60	59	60	60	60	60	58	59	60	60	60	59	59	60	60
	60	57	61	60	60	61	58	61	59	59	62	58	60	60	60
	59	58	60	60	60	60	58	60	60	60	59	59	60	60	60
AVERAGE	60	58	60	60	60	60	58	60	60	60	60	59	60	60	60

DESCRIPTION	PANEL P27				PANEL P28				PANEL P29						
	NUMBER	LEAD	L SIDE	R SIDE	TRAIL	NUMBER	LEAD	L SIDE	R SIDE	TRAIL	NUMBER	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76013					76013					76013				
DEPLOYED LENGTH	16.2					17					17.8				
AMBIENT AIR TEMP.	5					5					5				
OBSERVED OVERLAP	150 mm					150 mm					150 mm				
REMARKS															
MONITOR															
SHEET THICKNESS															
	60	58	60	60	60	60	58	61	59	59	60	59	62	59	59
	62	58	60	59	60	61	59	62	59	60	59	61	61	60	60
	59	58	60	60	60	59	58	61	59	60	59	59	61	60	60
AVERAGE	60	58	60	60	60	60	58	61	59	60	59	61	61	60	60

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 10/21/2024
 SHEET NUMBER: 2

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P30				PANEL P31				PANEL P32			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76007				76007				121863			
DEPLOYED LENGTH	91.3				81.9				8.3			
AMBIENT AIR TEMP.	17				17				17			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	57	61	60	62	58	61	61	60	62	60	61	62
	60	61	61	60	58	60	61	61	60	61	61	57
	58	61	60	60	59	62	61	60	61	60	61	62
AVERAGE	58	61	60	61	58	61	61	60	61	60	61	60

DESCRIPTION	PANEL P33				PANEL P34				PANEL P35			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	121863				121863				76008			
DEPLOYED LENGTH	90.9				49.2				89.1			
AMBIENT AIR TEMP.	18				18				18			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	62	61	62	62	61	61	60	62	60	61	61	61
	61	62	61	58	61	61	60	60	62	60	60	61
	60	60	61	61	61	60	60	60	62	60	60	61
AVERAGE	61	61	61	60	61	61	60	61	61	60	60	61

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 10/23/2024
 SHEET NUMBER: 3

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER P36				PANEL NUMBER P37				PANEL NUMBER P38			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76008				76008				121863			
DEPLOYED LENGTH	44.5				35.7				10.6			
AMBIENT AIR TEMP.	5				5				5			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
<hr/>												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	59	61	61	62	60	61	60	60	61	60	61	61
	60	60	60	61	61	60	60	61	60	61	62	61
	59	60	61	61	60	60	60	60	60	61	60	61
AVERAGE	59	60	61	61	60	60	60	60	60	61	61	61

DESCRIPTION	PANEL NUMBER P39				PANEL NUMBER				PANEL NUMBER			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	121863											
DEPLOYED LENGTH	8											
AMBIENT AIR TEMP.	5											
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
<hr/>												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	61	60	61	60								
	60	60	61	60								
	61	60	61	60								
AVERAGE	61	60	61	60								

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 10/24/2024
 SHEET NUMBER: 4

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P40				PANEL P41				PANEL P42			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76015				76015				76015			
DEPLOYED LENGTH	51.4				50.8				50.9			
AMBIENT AIR TEMP.	11				11				11			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	60	61	60	60	62	61	62	60	57	61	61	60
	60	60	60	61	61	60	60	60	60	61	60	58
	61	60	60	60	62	62	61	60	60	60	60	60
AVERAGE	60	60	60	60	62	61	61	60	59	61	60	59

DESCRIPTION	PANEL P43				PANEL P44				PANEL P45			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122280				122280							
DEPLOYED LENGTH	50.5				120.9							
AMBIENT AIR TEMP.	11				11							
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	60	61	60	61	61	61	60	59				
	59	60	61	57	61	60	60	59				
	59	61	60	60	61	60	60	59				
AVERAGE	59	61	60	59	61	60	60	59				

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 10/25/2024
 SHEET NUMBER: 5

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P45				PANEL P46				PANEL P47			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122272				122272				122272			
DEPLOYED LENGTH	22.1				26.9				28.1			
AMBIENT AIR TEMP.	5				6				6			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	61	60	60	61	60	59	58	61	61	61	60	61
	61	61	60	61	58	61	59	59	61	61	59	58
	60	61	60	61	60	60	61	61	61	61	61	59
AVERAGE	61	61	60	61	59	60	59	60	61	61	60	59

DESCRIPTION	PANEL P48				PANEL				PANEL			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76011											
DEPLOYED LENGTH	53.6											
AMBIENT AIR TEMP.	8											
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	60	59	61	59								
	61	60	62	59								
	61	62	60	60								
AVERAGE	61	60	61	59								

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 27-Oct-24
 SHEET NUMBER: 6

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P49				PANEL P50				PANEL P51			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	168556				1685586				168556			
DEPLOYED LENGTH	44.3				44.7				44.4			
AMBIENT AIR TEMP.	8				8				8			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	62	62	62	63	63	62	63	62	63	64	63	63
	62	62	63	62	62	63	64	62	62	64	64	63
		62	63			63	63			64	63	
AVERAGE	62	62	63	63	63	63	63	62	63	64	63	63

DESCRIPTION	PANEL P52				PANEL P53				PANEL P54			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	168553				168553				168553			
DEPLOYED LENGTH	46				44.7				44.9			
AMBIENT AIR TEMP.	8				8				8			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	63	63	62	63	63	63	62	62	62	63	63	61
	62	63	62	62	63	64	62	62	63	63	64	62
		64	62			64	63			62	63	
AVERAGE	63	63	62	63	63	64	62	62	63	63	63	62

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 27-Oct-24
 SHEET NUMBER: 7

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P55				PANEL P56				PANEL P57			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	168558				168558				168558			
DEPLOYED LENGTH	43.7				43.3				43.8			
AMBIENT AIR TEMP.	11				11				11			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	62	63	64	62	63	62	63	62	62	63	64	63
	62	63	64	63	63	63	63	62	62	62	64	62
		63	63			62	63			63	64	
AVERAGE	62	63	64	63	63	62	63	62	62	63	64	63

DESCRIPTION	PANEL P58				PANEL P59				PANEL P60			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	168557				168557				168557			
DEPLOYED LENGTH	43.7				43.5				43.8			
AMBIENT AIR TEMP.	11				11				11			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	62	61	63	63	61	63	61	62	63	64	62	61
	62	61	62	61	62	62	62	62	62	64	62	62
		62	62			63	61			63	62	
AVERAGE	62	61	62	62	62	63	61	62	63	64	62	62

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 27-Oct-24
 SHEET NUMBER: 8

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P61				PANEL P62				PANEL P63			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	168554				168554				168554			
DEPLOYED LENGTH	43.4				43.1				43.5			
AMBIENT AIR TEMP.	12				12				12			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	62	62	62	62	62	63	62	61	62	63	62	60
	61	63	62	62	62	64	62	62	61	62	62	61
		62	61			93	62			62	63	
AVERAGE	62	62	62	62	62	73	62	62	62	62	62	61

DESCRIPTION	PANEL P64				PANEL P65				PANEL P66			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	168648				168648				168648			
DEPLOYED LENGTH	43.5				43.1				43.2			
AMBIENT AIR TEMP.	13				13				13			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	61	63	63	62	62	63	62	62	62	62	62	60
	62	63	64	62	60	62	62	61	60	63	64	61
		62	62			63	62			62	62	
AVERAGE	62	63	63	62	61	63	62	62	61	62	63	61

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 27-Oct-24
 SHEET NUMBER: 9

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER P67				PANEL NUMBER P68				PANEL NUMBER P69			
	ROLL NUMBER	168559				168559				168556		
DEPLOYED LENGTH	43.6				43.5				13.7			
AMBIENT AIR TEMP.	13				13				13			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	62	62	62	61	61	62	63	62	62	63	60	62
	63	62	63	62	62	62	62	62	62	62	61	61
		63	62			63	64			61	63	
AVERAGE	63	62	62	62	62	62	63	62	62	62	61	62

DESCRIPTION	PANEL NUMBER P70				PANEL NUMBER P71				PANEL NUMBER P72			
	ROLL NUMBER	168553				168557				168558		
DEPLOYED LENGTH	13.3				14.2				13.7			
AMBIENT AIR TEMP.	13				13				13			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	61	62	63		61	62	63	61	62	61	63	63
	61	62	63		61	62	62	62	62	62	63	62
		63	62			62	63			63	62	62
AVERAGE	61	62	63		61	62	63	62	62	62	63	62

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 27-Oct-24
 SHEET NUMBER: 10

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER P73				PANEL NUMBER P74				PANEL NUMBER P75			
	ROLL NUMBER	168648				168648				168648		
DEPLOYED LENGTH	13.4				9				2			
AMBIENT AIR TEMP.	12				12				12			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS					Triangle				Triangle			
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	62	61	63	62	61	62	62	62	63	62	61	61
	62	62	62	62	62	63	63	63	62	63	62	62
		63	62		62	63			63	62		
	AVERAGE	62	62	62	62	62	63	63	63	63	62	62

DESCRIPTION	PANEL NUMBER P76				PANEL NUMBER P77				PANEL NUMBER			
	ROLL NUMBER	168557				168558						
DEPLOYED LENGTH	13.4				7.1							
AMBIENT AIR TEMP.	12				12							
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS					Triangle							
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	62	62	63	62	63	63	62	62				
	63	62	61	62	63	63	62	62				
		63	62		62	62						
	AVERAGE	63	62	62	62	63	63	62	62			

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 28-Oct-24
 SHEET NUMBER: 11

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER P78				PANEL NUMBER P79				PANEL NUMBER P80			
	ROLL NUMBER	168559				168555				168555		
DEPLOYED LENGTH	41.9				42.2				42.1			
AMBIENT AIR TEMP.	15				15				15			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	62	62	62		62	62	63	63	61	61	64	63
	63	63	61		63	62	63	62	63	62	64	63
		62	62			62	62			63	62	
AVERAGE	63	62	62		63	62	63	63	62	62	63	63

DESCRIPTION	PANEL NUMBER P81				PANEL NUMBER P82				PANEL NUMBER P83			
	ROLL NUMBER	168555				168652				168652		
DEPLOYED LENGTH	41.9				42.3				14.2			
AMBIENT AIR TEMP.	15				15				15			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	63	61	62	62	62	62	63	61	61	61	62	62
	62	61	62	62	62	62	63	62	62	62	62	61
		62	62			62	62			62	62	
AVERAGE	63	61	62	62	62	62	63	62	62	62	62	62

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 28-Oct-24
 SHEET NUMBER: 12

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER P84				PANEL NUMBER P85				PANEL NUMBER P86				
	ROLL NUMBER	168652				168652				168652			
DEPLOYED LENGTH	6.5				12.6				6.4				
AMBIENT AIR TEMP.	15				15				15				
OBSERVED OVERLAP	150 mm				150 mm				150 mm				
REMARKS	Triangle								Triangle				
MONITOR													
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	
		63	61	62	62	61	62	62	62	62	62	62	
		62	61	61	61	62	62	62	63	62	62	62	
		62	62		62	62			62				
	AVERAGE	62	61	62	62	62	62	62	62	62	62	62	62

DESCRIPTION	PANEL NUMBER P87				PANEL NUMBER P88				PANEL NUMBER P89			
	ROLL NUMBER	168652				168652				168652		
DEPLOYED LENGTH	14.1				14.3				11			
AMBIENT AIR TEMP.	15				15				15			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
		62	62	61	62	61	62	62	62	61	61	61
		62	63	61	62	62	61	61	61	61	62	62
		63	62		62	62			63	62		
	AVERAGE	62	63	61	62	62	62	62	62	62	62	62

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 28-Oct-24
 SHEET NUMBER: 13

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER P90				PANEL NUMBER P91				PANEL NUMBER P92			
	ROLL NUMBER	168652				168652				168560		
DEPLOYED LENGTH	6				5.5				18			
AMBIENT AIR TEMP.	15				15				15			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	62	62	62	62	62	62	62	62				
	61	63	62	62	62	63	62	62				
AVERAGE	62	63	62	62	62	63	62	62				

DESCRIPTION	PANEL NUMBER P93				PANEL NUMBER				PANEL NUMBER			
	ROLL NUMBER	168560										
DEPLOYED LENGTH	13											
AMBIENT AIR TEMP.	15											
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS	Triangle											
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
		62	62	62								
		62	63	63								
AVERAGE		62	63	63								

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 30-Oct-24
 SHEET NUMBER: 14

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER P94				PANEL NUMBER P95				PANEL NUMBER P96			
	ROLL NUMBER	76011				76011				76011		
DEPLOYED LENGTH	90				17.3				16.5			
AMBIENT AIR TEMP.	4				5				5			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	60	63	61	62	61	62	60	61	60	61	62	60
	61	62	61	62	62	62	61	61	61	61	62	60
		61	61			60	60			61	60	
AVERAGE	61	62	61	62	62	61	60	61	61	61	61	60

DESCRIPTION	PANEL NUMBER P97				PANEL NUMBER P98				PANEL NUMBER P99			
	ROLL NUMBER	76011				76015				76015		
DEPLOYED LENGTH	6.5				11.6				8.5			
AMBIENT AIR TEMP.	5				6				6			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	61	62	61	62	60	62	63	60	61	62	62	61
	60	62	61	62	61	61	62	60	60	62	63	60
		61	60			61	61			61	61	
AVERAGE	61	62	61	62	61	61	62	60	61	62	62	61

REVIEWED BY: AFK
 DATE: November 5, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 30-Oct-24
 SHEET NUMBER: 15

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER	P100	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER		76015		
DEPLOYED LENGTH		14		
AMBIENT AIR TEMP.		6		
OBSERVED OVERLAP		150 mm	150 mm	150 mm
REMARKS				
MONITOR				
<hr/>				
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL
	60	62	61	62
	61	62	61	62
		61	61	
AVERAGE	61	62	61	62

DESCRIPTION	PANEL NUMBER	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER			
DEPLOYED LENGTH			
AMBIENT AIR TEMP.			
OBSERVED OVERLAP		150 mm	150 mm
REMARKS			
MONITOR			
<hr/>			
SHEET THICKNESS	LEAD	L SIDE	R SIDE
AVERAGE			

REVIEWED BY: AFK
 DATE: November 5, 2024

Appendix A-4

Geomembrane Trial Seam Summary



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/19/2024
 SHEET NUMBER: 1

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF14	10:18	WW39	CN	6	550		458	FTB 142,146,151,147	FTB 145,143,148,151	FTB 174,177	PASS	AFK	

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/21/2024
 SHEET NUMBER: 2

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF15	2:25	WW27	CN	20	550		860	F			FAIL	AFK	100% peel
								138,129,60	136,135				
TF16	2:37	WW39	DG	20	570		458	FTB	FTB	FTB	PASS	AFK	
								121,118,126,127	137,139,130,133	160,158			
TF15A	3:01	WW27	CN	20	520		860	FTB	FTB	FTB	PASS	AFK	
								109,123,125,130	127,126,133,140	148,148			

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/23/2024
 SHEET NUMBER: 3

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF17	12:05	WW39	DG	6	570		458	FTB	FTB	FTB	PASS	AFK	
								150,136,140,150	145,136,136,145	173,183			
TF18	12:15	WW15	CN	6	530		860	FTB	FTB	FTB	PASS	AFK	
								141,135,143,134	140,139,119,133	199,197			

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/24/2024
 SHEET NUMBER: 4

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF19	4:55	WW15	CN	11	530		860	FTB	FTB	FTB	PASS	AFK	
								123,124,124,133	154,146,136,139	175,171			
TF20	5:00	WW39	DG	11	550		460	FTB	FTB	FTB	PASS	AFK	
								150,153,143,152	141,133,149,149	175,171			

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/25/2024
 SHEET NUMBER: 5

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF21	10:30	WW15	CN	5	500		860	FTB	FTB	FTB	PASS	AFK	
								134,126,132,129	149,140,128,128	184,193			
TF22	10:32	WW27	BB	5	500		860	F			FAIL	AFK	100%peel
								141					
TF23	11:06	WW39	BB	6	500		460	FTB	FTB	FTB	PASS	AFK	
								129,118,131,130	119,133,120,120	188,189			
TF24	2:14	WW15	CN	10	500		860	FTB	FTB	FTB	PASS	AFK	
								98,141,129,131	151,132,149,93	178,184			

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

X	TF - # = FUSION
	TX - # = EXTRUSION

DATE: 2024-10-27
 SHEET NUMBER: 6

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF25	10:57	WW44	BB	6	500		460	FTB	FTB	FTB	PASS	AFK	
								147,167,141,147	137,149,141,151	201,200			
TF26	10:57	WW15	CN	6	500		860	FTB	FTB	FTB	PASS	AFK	
								152,145,160,158	136,132,136,137	218,219			
TF27	12:12	WW39	DG	7	550		460	FTB	FTB	FTB	PASS	AFK	
								130,123,147,153	134,130,142,132	183,180			
TF28	2:12	WW43	BB	10	500		860	F			FAIL	AFK	100% peel TX/SM
								126					
TF28A	2:19	WW43	BB	10	450		860	FTB	FTB	FTB	PASS	AFK	TX/SM
								131,131,127,132	122,146,144,137	180,182			
TF29	3:10	WW15	CN	10	500		860	FTB	FTB	FTB	PASS	AFK	
								140,134,144,145	130,133,139,135	182,180			
TF30	4:26	WW39	DG	10	500		460	F			FAIL	AFK	100% peel
								158,137					
TF30A	4:39	WW39	DG	10	450		460	FTB	FTB	FTB	PASS	AFK	
								140,153,122,151	136,134,149,133	178,179			

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-10-28
 SHEET NUMBER: 7

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF31	3:32	WW15	CN	15	500		860	FTB	FTB	FTB	PASS	AFK	
								130,133,134,134	123,120,122,123	176,175			
TF32	3:55	WW39	DG	15	550		460	FTB	FTB	FTB	PASS	AFK	
								123,129,121,126	126,125,129,133	171,173			
TF33	5:00	WW39	DG	15	450		460	FTB	FTB	FTB	PASS	AFK	TX/SM
								143,137,135,120	138,141,140,136	173,171			
TF34	5:05	WW39	DG	15	450		460	FT3	FTB	FTB	PASS	AFK	TX/SM
								129,155,141,172	144,164,160,165	195,182			

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 03-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-10-29
 SHEET NUMBER: 8

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF35	9:11	WW15	CN	2	450		860	FTB 143,150,163,124	FTB 148,154,141,155	FTB 213,218	PASS	AFK	

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-10-30
 SHEET NUMBER: 9

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF36	11:11	WW15	CN	4	480		860		F		FAIL	AFK	50%peel
								166	152				
TF36A	12:02	WW15	CN	4	450		860	FTB	FTB	FTB	PASS	AFK	
								126,133,147,122	117,133,134,136	193,190			

Note: FTB (film tear bond)

**Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/19/2024
 SHEET NUMBER: 1

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX9	2:49	EXT40	RN	11	250	255		FTB 99,104,115,129		FTB 161,156	PASS	AFK	

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/20/2024

SHEET NUMBER: 2

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX10	9:42	EXT40	RN	10	250	255		FTB 116,109,112,119		FTB 175,180	PASS	AFK	

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/21/2024

SHEET NUMBER: 3

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX11	4:45	EXT40	RN	20	250	255		FTB 80,99,123,111		FTB 154,153	PASS	AFK	

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/23/2024

SHEET NUMBER: 4

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX12	3:32	EXT40	RN	11	250	255		FTB 100,125,135,131		FTB 175,123	PASS	AFK	

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 10/25/2024

SHEET NUMBER: 5

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX13	2:30	EXT40	JR	10	250	255		FTB 138,139,121,140		FTB 177,182	PASS	AFK	

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 29-Oct-24
 SHEET NUMBER: 6

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX14	9:05	EXT40	RN	2	250	255		FTB		FTB	PASS	AFK	
								138,122,138,132		177,196			
TX15	3:32	EXT40	RN	9	250	255		FTB		FTB	PASS	AFK	
								101,122,135,114		201,175			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 30-Oct-24
 SHEET NUMBER: 7

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX16	2:50	EXT40	RN	7	250	255		FTB 121,130,120,123		FTB 211,264	PASS	AFK	

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 31-Oct-24
 SHEET NUMBER: 8

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX17	9:13	EXT40	RN	2	250	255		FTB 94,100,110,118		FTB 185,190	PASS	AFK	

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 05-Nov-24

Appendix A-5

Geomembrane Seam Welding Inspection



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/23/2024

SHEET NUMBER 1

X FUSION

EXTRUSION

MACHINE # WW15

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF18	12:15	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P24/36	WEOS SEOS	12:48	6	CN	530	860		8	8		AFK		10-23-24	AFK	
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/24/2024

SHEET NUMBER 2

X FUSION

EXTRUSION

MACHINE # WW15

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF19	4:55	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P41/42	WEOS EEOS	5:09	11	CN	550	460		51	59		KC		10-25-24	KC	
2	P42/43	WEOS EEOS	5:31	11	CN	550	460		51	110		KC		10-25-24	KC	
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/25/2024

SHEET NUMBER 3

FUSION

EXTRUSION

MACHINE # WW15

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF21	10:30	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P40/46	SEOS	NEOS	11:12	5	CN	500	860	7	117		AFK		10-25-24	KC		
2	P41/46	SEOS	NEOS	11:15	5	CN	500	860	7	124		AFK		10-25-24	KC		
3	P42/46	SEOS	NEOS	11:17	5	CN	500	860	7	131		AFK		10-25-24	KC		
4	P43/46	SEOS	NEOS	11:20	5	CN	500	860	7	138		AFK		10-25-24	KC		
5	P44/45	NEOS	SEOS	11:32	5	CN	500	860	7	140/5	DSF19	AFK		10-25-24	KC		
6	P22/47	EEOS	WEOS	2:26	10	CN	500	860	7	12		AFK		10-25-24	KC		
7	P21/46	EEOS	WEOS	2:29	10	CN	500	860	7	19		AFK		10-25-24	KC		
8	P44/48	SEOS	NEOS	3:14	10	CN	500	860	7	26		AFK		10-25-24	KC		
9	P39/48	WEOS	EEOS	3:23	10	CN	500	860	8	34		AFK		10-26-24	KC		
10	P34/48	WEOS	EEOS	3:26	10	CN	500	860	46	80		AFK		10-26-24	KC		
11																	
12																	
13																	
14																	
15																	
16																	
17																	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/27/2024

SHEET NUMBER 4

X FUSION

EXTRUSION

MACHINE # WW15

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF26	10:57	CN
TF29	3:10	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P49/50	SEOS NEOS	12:12	6	CN	500	860		43	123		AFK		10-29-24	KC
2	P51/52	SEOS NEOS	12:35	8	CN	500	860		43	166		AFK		10-29-24	KC
3	P54/55	SEOS NEOS	1:53	10	CN	500	860		43	186/23	DSF20	AFK		10-29-24	KC
4	P56/57	SEOS NEOS	2:16	10	CN	500	860		43	6		AFK		10-29-24	KC
5	P57/58	SEOS NEOS	2:39	10	CN	500	860		43	109		AFK		10-30-24	DS
6	P59/60	SEOS NEOS	3:13	10	CN	500	860		43	152		AFK		10-29-24	KC
7	P61/62	SEOS NEOS	3:38	10	CN	500	860		43	172/23	DSF21	AFK		10-29-24	KC
8	P63/64	SEOS NEOS	4:01	10	CN	500	860		43	66		AFK		10-29-24	KC
9	P65/66	SEOS NEOS	4:29	10	CN	500	860		43	109		AFK		10-29-24	KC
10	P67/68	SEOS NEOS	4:55	10	CN	500	860		43	152		AFK		10-29-24	KC
11	P72/73	EEOS WEOS	5:24	10	CN	500	860		13	165		AFK		10-29-24	KC
12	P73/74	EEOS WEOS	5:36	10	CN	500	860		8	173		AFK		10-29-24	KC
13	P74/75	EEOS WEOS	5:42	10	CN	500	860		2	175		AFK		10-29-24	KC
14	P76/77	SEOS NEOS	5:47	10	CN	500	860		7	180/2	DSF24	AFK		10-29-24	KC
15	P49/76	NEOS SEOS	5:53	10	CN	500	860		12	14		AFK		10-29-24	KC
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/28/2024

FUSION

PASSING TRIAL SEAMS

SHEET NUMBER 5

EXTRUSION

NO.	TIME	TECH ID
TF27	3:32	CN

MACHINE # WW15

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						WEDGE OR BARREL	WEDGE OR NOZZLE	TEST DATE	MON.
1	P68/78	SEOS NEOS	4:00	15	CN	500	860		42	56		AFK		29/10	KC		
2	P78/79	SEOS NEOS	4:22	15	CN	500	860		43	99		AFK		29/10	KC		
3	P79/80	SEOS NEOS	4:46	15	CN	500	860		43	142		AFK		29/10	KC		
4	P80/81	SEOS NEOS	5:08	15	CN	500	860		43	185		AFK		29/10	KC		
5	P88/89	WEOS EEOS	5:32	15	CN	500	860		10	187/8	DSF27	AFK		29/10	KC		
6	P89/90	WEOS EEOS	5:41	15	CN	500	860		5	13		AFK		29/10	KC		
7	P87/88	WEOS EEOS	5:45	15	CN	500	860		13	26		AFK		29/10	KC		
8	P82/83	SEOS NEOS	5:56	12	CN	500	860		14	40		KC		29/10	KC		
9	P92/93	SEOS NEOS	6:09	12	CN	500	860		13	53		KC		29/10	KC		
10	P82/92	SEOS NEOS	6:20	12	CN	500	860		18	71		KC		29/10	KC		
11	P82/88	SEOS NEOS	6:29	11	CN	500	860		4	75		KC		29/10	KC		
12	P82/87	SEOS NEOS	6:31	11	CN	500	860		7	82		KC		29/10	KC		
13	P90/91	WEOS EEOS	6:38	10	CN	500	860		5	87		KC	ext 11k to weos	29/10	KC		
14																	
15																	
16																	
17																	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/29/2024

SHEET NUMBER 6

X FUSION

EXTRUSION

MACHINE # WW15

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF35	9:11	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P73/76	SEOS	NEOS	9:26	2	CN	450	860	6	93		KC		10-29-24	KC		
2	P74/76	SEOS	NEOS	9:29	2	CN	450	860	3	96		KC		10-29-24	KC		
3	P74/77	SEOS	NEOS	9:30	2	CN	450	860	7	103		KC		10-29-24	KC		
4	P75/77	SEOS	NEOS	9:34	2	CN	450	860	2	105		KC		10-29-24	KC		
5	P44/78	WEOS	EEOS	10:08	5	CN	450	860	7	112		KC		10-29-24	KC		
6	P44/79	WEOS	EEOS	10:15	5	CN	450	860	7	119		KC		10-29-24	KC		
7	P44/80	WEOS	EEOS	10:19	5	CN	450	860	7	126		KC		10-29-24	KC		
8	P44/81	WEOS	EEOS	10:23	5	CN	450	860	7	133		KC	EXTRUDED				
9	P45/82	WEOS	EEOS	10:27	5	CN	450	860	7	140		KC		10-29-24	KC		
10	P45/92	WEOS	EEOS	10:31	5	CN	450	860	7	147		KC		10-29-24	KC		
11	P45/93	WEOS	EEOS	10:35	5	CN	450	860	7	154		KC		10-29-24	KC		
12																	
13																	
14																	
15																	
16																	
17																	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/30/2024

SHEET NUMBER 7

X FUSION

EXTRUSION

MACHINE # WW15

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF36A	12:02	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P98/99	WEOS	EEOS	12:32	6	CN	450	860	2	158		KC		10-31-24	KC
2	P97/98	WEOS	EEOS	12:35	6	CN	450	860	3	161		KC		10-31-24	KC
3	P96/97	WEOS	EEOS	12:40	6	CN	450	860	3	164		KC		10-31-24	KC
4	P95/96	WEOS	EEOS	12:45	6	CN	450	860	3	167		KC		10-31-24	KC
5	P94/95	SEOS	NEOS	2:18	8	CN	450	860	17	180/4	DSF28	KC	11L	10-31-24	KC
6	P94/96	SEOS	NEOS	2:26	8	CN	450	860	17	21		KC	ext 12T to 11M	10-31-24	DS
7	P94/97	SEOS	NEOS	2:36	8	CN	450	860	7	28		KC		10-31-24	KC
8	P94/98	SEOS	NEOS	2:40	8	CN	450	860	11	39		KC		10-31-24	KC
9	P94/99	SEOS	NEOS	2:45	8	CN	450	860	9	48		KC		10-31-24	KC
10	P94/100	SEOS	NEOS	2:50	8	CN	450	860	14	62		KC		10-31-24	KC
11	P29/94	EEOS	WEOS	3:06	8	CN	450	860	7	69		KC		10-31-24	KC
12	P29/95	EEOS	WEOS	3:09	8	CN	450	860	7	76		KC		10-31-24	KC
13	P23/95	SEOS	NEOS	3:14	8	CN	450	860	16	92		KC		10-31-24	KC
14	P23/96	SEOS	NEOS	3:22	8	CN	450	860	16	108		KC	ext neos to 12U	10-31-24	DS
15	P23/97	SEOS	NEOS	3:31	8	CN	450	860	6	114		KC		10-31-24	KC
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/30/2024

SHEET NUMBER 8

X FUSION

EXTRUSION

MACHINE # WW15

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF36A	12:02	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE								
1	P23/98	SEOS	NEOS	3:35	8	CN	450	860	12	26		KC		31/10	KC	
2	P22/99	SEOS	NEOS	3:39	8	CN	450	860	6	132		KC		31/10	KC	
3	P47/99	SEOS	NEOS	3:43	8	CN	450	860	3	135		KC		31/10	KC	
4	P47/94	SEOS	2m N	3:44	8	CN	450	860	2	137		KC		EXTRUDED		
5	P47/100	SEOS	NEOS	3:45	8	CN	450	860	12	149		KC		31/10	KC	
6	P47/94	9ms of neos	NEOS	3:51	8	CN	450	860	9	158		KC		31/10	KC	
7	P45/94	SEOS	NEOS	3:56	8	CN	450	860	7	165		KC		31/10	KC	
8	P91/94	WEOS	EEOS	4:02	8	CN	450	860	7	172		KC		31/10	KC	
9																
10																
11																
12																
13																
14																
15																
16																
17																

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/19/2024

SHEET NUMBER 9

FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF14	10:18	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P28/29	WEOS	EEOS	10:29	7	CN	550	458		12	12		KC	10-19-24	KC		
2	P27/28	WEOS	EEOS	10:37	7	CN	550	458		14	26		KC	10-19-24	KC		
3	P23/27	SEOS	NEOS	10:47	7	CN	550	458		7	35		KC	10-19-24	KC		
4	P23/28	SEOS	NEOS	10:51	7	CN	550	458		7	42		KC	10-19-24	KC		
5	P23/29	SEOS	NEOS	10:53	7	CN	550	458		7	49		KC	10-19-24	KC		
6	P24/25	NEOS	SEOS	11:10	8	CN	550	458		7	56		KC	10-19-24	KC		
7	P25/26	NEOS	SEOS	11:33	8	CN	550	458		7	63		KC	10-19-24	KC		
8	P1/24	NEOS	SEOS	11:46	9	CN	550	458		55	115		KC	10-19-24	KC		
9	P1/25	NEOS	SEOS	12:06	10	CN	550	458		7	112		KC	10-19-24	KC		
10	P2/25	NEOS	SEOS	12:09	10	CN	550	458		7	129		KC	10-19-24	KC		
11	P3/25	WEOS	EEOS	12:12	10	CN	550	458		7	136		KC	10-19-24	KC		
12	P4/25	WEOS	EEOS	12:15	10	CN	550	458		7	143		KC	10-19-24	KC		
13	P5/25	WEOS	EEOS	12:18	10	CN	550	458		7	147/3	DSF13	KC	10-19-24	KC		
14	P6/25	WEOS	EEOS	12:21	10	CN	550	458		7	10		KC	10-19-24	KC		
15	P7/25	WEOS	EEOS	12:24	10	CN	550	458		7	17		KC	10-19-24	KC		
16	P8/25	WEOS	EEOS	12:27	10	CN	550	458		7	24		KC	10-19-24	KC		
17	P9/25	WEOS	EEOS	12:30	10	CN	550	458		7	31			10-19-24	KC		

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/19/2024

SHEET NUMBER 10

FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF14	10:18	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P10/25	WEOS	EEOS	12:33	12	CN	550	458	7	38		KC		10-19-24	KC
2	P11/25	WEOS	EEOS	12:36	12	CN	550	458	7	45		KC		10-19-24	KC
3	P12/25	WEOS	EEOS	12:39	12	CN	550	458	7	52		KC		10-19-24	KC
4	P13/25	WEOS	EEOS	12:42	12	CN	550	458	7	59		KC		10-19-24	KC
5	P14/25	WEOS	EEOS	12:45	12	CN	550	458	7	66		KC		10-19-24	KC
6	P15/25	WEOS	EEOS	12:48	12	CN	550	458	7	73		KC		10-19-24	KC
7	P16/25	WEOS	EEOS	12:51	12	CN	550	458	6	79		KC		10-19-24	KC
8	P16/26	WEOS	EEOS	12:54	12	CN	550	458	1	80		KC		EXTRUDED	
9	P17/26	WEOS	EEOS	12:57	12	CN	550	458	7	87		KC		10-19-24	KC
10	P18/26	WEOS	EEOS	1:00	12	CN	550	458	7	94		KC		10-19-24	KC
11	P19/26	WEOS	EEOS	1:03	12	CN	550	458	7	101		KC		10-19-24	KC
12	P20/26	WEOS	EEOS	1:06	12	CN	550	458	7	108		KC		10-19-24	KC
13	P21/26	WEOS	EEOS	1:09	12	CN	550	458	7	115		KC		10-19-24	KC
14	P22/26	WEOS	EEOS	1:12	12	CN	550	458	7	122		KC		10-19-24	KC
15	P23/26	WEOS	EEOS	1:15	12	CN	550	458	7	129		KC		10-19-24	KC
16	P26/27	WEOS	EEOS	1:18	12	CN	550	458	15	136/8	DSF14	KC		10-19-24	KC
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/21/2024

SHEET NUMBER 11

FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF16	2:37	DG

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P30/31	WEOS EEOS	2:47	19	SG	570	458		80	88		KC		10-21-24	KC
2	P30/32	WEOS EEOS	3:20	20	SG	570	458		8	96		KC		10-21-24	KC
3	P33/35	WEOS EEOS	3:25	20	SG	570	458		85	150/36	DSF15	KC		10-21-24	KC
4	P14/30	EEOS WEOS	4:02	20	SG	570	458		1	37		KC		Covered by 5L	
5	P13/30	EEOS WEOS	4:03	20	SG	570	458		7	44		KC		10-21-24	KC
6	P12/30	EEOS WEOS	4:07	20	SG	570	458		7	51		KC		10-23-24	KC
7	P11/30	EEOS WEOS	4:11	20	SG	570	458		7	58		KC		10-23-24	KC
8	P10/30	EEOS WEOS	4:14	20	SG	570	458		7	65		KC		10-23-24	KC
9	P9/30	EEOS WEOS	4:17	20	SG	570	458		7	72		KC		10-23-24	KC
10	P8/30	EEOS WEOS	4:20	20	SG	570	458		7	79		KC		10-23-24	KC
11	P7/30	EEOS WEOS	4:23	20	SG	570	458		7	86		KC		10-23-24	KC
12	P6/30	EEOS WEOS	4:26	20	SG	570	458		7	93		KC		10-23-24	KC
13	P5/30	EEOS WEOS	4:29	20	SG	570	458		7	100		KC		10-23-24	KC
14	P4/30	EEOS WEOS	4:32	20	SG	570	458		7	107		KC		10-23-24	KC
15	P3/30	EEOS WEOS	4:35	20	SG	570	458		7	114		KC		10-23-24	KC
16	P2/30	EEOS WEOS	4:38	20	SG	570	458		7	121		KC		10-23-24	KC
17	P1/30	EEOS WEOS	4:41	20	SG	570	458		7	128		KC		10-23-24	KC

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/23/2024

SHEET NUMBER 12

X FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF17	12:05	DG

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P36/37	NEOS SEOS	12:20	7	PG	570	450		8	136		KC		10-23-24	KC		
2	P37/38	NEOS SEOS	12:25	7	PG	570	450		8	144		KC		10-23-24	KC		
3	P38/39	WEOS EEOS	12:32	7	PG	570	450		8	150/2	DSF-16	KC		10-23-24	KC		
4	P34/39	WEOS SEOS	12:39	7	PG	570	450		9	11		KC		10-23-24	KC		
5	P34/38	WEOS EEOS	12:42	7	PG	570	450		1	12		KC		10-23-24	KC		
6	P34/37	WEOS EEOS	12:43	7	PG	570	450		36	48		KC		10-23-24	KC		
7	P34/36	WEOS SEOS	12:54	7	PG	570	450		4	52		KC		10-23-24	KC		
8	P33/36	NEOS SEOS	12:56	7	PG	570	450		6	58		KC		10-23-24	KC		
9	P31/36	NEOS SEOS	12:57	7	PG	570	450		7	65		KC		10-23-24	KC		
10	P30/36	NEOS SEOS	1:00	7	PG	570	450		7	72		KC		10-23-24	KC		
11	P1/36	NEOS SEOS	1:10	7	PG	570	450		24	96		KC		10-23-24	KC		
12																	
13																	
14																	
15																	
16																	
17																	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/24/2024

X FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF20	5:00	DG

SHEET NUMBER 13

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
							WEDGE OR BARREL NOZZLE	WEDGE OR BARREL NOZZLE							
1	P40/41	WEOS EEOS	5:13	11	DG	550	460		48	142/2	DSF17	AFK		10-25-24	KC
2	P21/40	EEOS WEOS	5:36	11	DG	550	460		2	4		AFK	COVERED BY 7L		
3	P20/40	EEOS WEOS	5:37	11	DG	550	460		7	11		AFK		10-25-24	KC
4	P19/40	EEOS WEOS	5:40	11	DG	550	460		7	18		AFK		10-25-24	KC
5	P18/40	EEOS WEOS	5:43	11	DG	550	460		7	25		AFK		10-25-24	KC
6	P17/40	EEOS WEOS	5:46	11	DG	550	460		7	32		AFK		EXTRUDED	
7	P16/40	EEOS WEOS	5:48	11	DG	550	460		7	39		AFK		10-25-24	KC
8	P15/40	EEOS WEOS	5:51	11	DG	550	460		7	46		AFK		10-25-24	KC
9	P14/40	EEOS WEOS	5:53	11	DG	550	460		7	53		AFK		10-25-24	KC
10	P30/40	SEOS NEOS	5:56	11	DG	550	460		7	60		AFK		10-25-24	KC
11	P32/41	SEOS NEOS	5:59	11	DG	550	460		7	67		AFK		10-25-24	KC
12	P33/42	SEOS NEOS	6:03	11	DG	550	460		7	74		AFK		10-25-24	KC
13	P35/43	SEOS NEOS	6:06	11	DG	550	460		7	81		AFK		10-25-24	KC
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/25/2024

SHEET NUMBER 14

X FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF23	11:00	BB

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P46/47	NEOS SEOS	11:48	5	BB	500	860		27	108		AFK		10-25-24	KC
2	P43/45	WEOS EEOS	11:33	5	BB	500	860		13	121		AFK		10-25-24	KC
3	P45/46	WEOS EEOS	11:38	5	BB	500	860		7	128		AFK		10-25-24	KC
4	P45/47	WEOS EEOS	11:41	5	BB	500	860		2	130		AFK		cut out	
5	P35/44	WEOS EEOS	11:58	7	BB	500	860		86	180/26	DSF18	AFK		10-26-24	KC
6	P43/44	WEOS EEOS	12:40	7	BB	500	860		35	61		AFK		10-25-24	KC
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/27/2024

SHEET NUMBER 15

FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF27	12:26	DG
TF30A	4:39	DG

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P53/54	SEOS NEOS	12:42	7	CN	550	460		43	104		KC		10-30-24	KC		
2	P48/49	WEOS EEOS	5:37	7	CN	450	460		7	111		KC		10-29-24	KC		
3	P48/50	WEOS EEOS	5:41	7	CN	450	460		7	118		KC		10-29-24	KC		
4	P48/51	WEOS EEOS	5:45	7	CN	450	460		7	125		KC		10-29-24	KC		
5	P48/52	WEOS EEOS	5:49	7	CN	450	460		7	132		KC		10-29-24	KC		
6	P48/53	WEOS EEOS	5:53	8	CN	450	460		7	139		KC		10-29-24	KC		
7	P48/54	WEOS EEOS	5:57	8	CN	450	460		7	146		KC		10-29-24	KC		
8	P44/55	WEOS EEOS	6:01	9	CN	450	460		7	153		KC		10-29-24	KC		
9	P44/56	WEOS EEOS	6:05	10	CN	450	460		7	160		KC		10-29-24	KC		
10	P44/57	WEOS EEOS	6:09	10	CN	450	460		7	167		KC		10-29-24	KC		
11	P44/58	WEOS EEOS	6:13	10	CN	450	460		7	174		KC		10-29-24	KC		
12	P44/59	WEOS EEOS	6:17	10	CN	450	460		7	181		KC		10-29-24	KC		
13	P44/60	WEOS EEOS	6:21	10	CN	450	460		7	188	DSF-13	KC		10-29-24	KC		
14	P44/61	WEOS EEOS	6:25	10	CN	450	460		7	195		KC		10-29-24	KC		
15	P44/62	WEOS EEOS	6:29	10	CN	450	460		7	197/5		KC		10-29-24	KC		
16	P44/63	WEOS EEOS	6:33	10	CN	450	460		7	12		KC		10-29-24	KC		
17	P44/64	WEOS EEOS	6:37	10	CN	450	460		7	19		KC		10-29-24	KC		

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/27/2024

SHEET NUMBER 16

X FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF27	12:26	DG
TF30A	4:39	DG

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE								
1	P44/65	WEOS	EEOS	6:37	10	CN	450	460		7	26		KC		10-30-24	KC
2	P44/66	WEOS	EEOS	6:41	10	CN	450	460		7	33		KC		10-29-24	KC
3	P44/67	WEOS	EEOS	6:45	10	CN	450	460		7	40		KC		10-29-24	KC
4	P44/68	WEOS	EEOS	6:49	10	CN	450	460		7	47		KC		10-29-24	KC
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17																

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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/28/2024

SHEET NUMBER 17

X FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF32	3:55	DG
TF33	5:00	DG
TF34	5:05	DG

TX/SM
TX/TX

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
							WEDGE OR BARREL NOZZLE	WEDGE OR BARREL NOZZLE							
1	P81/82	SEOS NEOS	5:18	15	DG	550	460		43	90		AFK		10-30-24	DS
2	P83/84	SEOS NEOS	5:55	15	DG	550	460		4	94		AFK		10-29-24	KC
3	P85/86	WEOS EEOS	6:02	14	DG	550	460		4	98		AFK		extruded	KC
4	P85/87	WEOS EEOS	6:06	14	DG	550	460		13	111		AFK		10-29-24	KC
5	P83/85	WEOS EEOS	6:15	14	DG	550	460		9	120		AFK		10-29-24	KC
6	P83/86	WEOS EEOS	6:20	14	DG	450	460		1	121		AFK		extruded	
7	P84/86	WEOS EEOS	6:21	14	DG	450	460		4	125		AFK		10-29-24	KC
8	P88/92	WEOS EEOS	6:27	14	DG	450	460		6	131		AFK		10-29-24	KC
9	P89/92	WEOS EEOS	6:31	13	DG	450	460		3	134		AFK		10-29-24	KC
10	P89/93	WEOS EEOS	6:33	13	DG	450	460		7	141		AFK		10-29-24	KC
11	P90/93	NEOS SEOS	6:40	13	DG	450	460		6	147		AFK		10-29-24	KC
12	P91/93	NEOS SEOS	6:42	13	DG	450	460		4	151		AFK		10-29-24	KC
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/21/2024

SHEET NUMBER 18

X FUSION

EXTRUSION

MACHINE # WW27

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF15A	3:01	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P31/32	NEOS SEOS	3:07	20	CN	520	860		7	7		AFK		10-21-24	KC	
2	P31/33	WEOS EESO	3:16	20	CN	520	860		81	88		AFK		10-21-24	KC	
3	P32/33	WEOS EEOS	3:50	20	CN	520	860		8	96		AFK		10-21-24	KC	
4	P33/34	SEOS NEOS	3:55	20	CN	520	860		3	99		AFK		10-23-24	KC	
5	P34/35	SEOS NEOS	3:57	20	CN	520	860		5	104		AFK		10-23-24	KC	
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

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REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/27/2024

SHEET NUMBER 19

X FUSION

EXTRUSION

MACHINE # WW44

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF25	10:57	BB

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P50/51	SEOS WEOS	12:12	7	BB	500	460		43	43		AFK		10-30-24	DS	
2	P52/53	SEOS WEOS	12:36	8	BB	500	460		43	78/8	DSF23	AFK		10-30-24	DS	
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE 10/27/2024

X FUSION

PASSING TRIAL SEAMS

EXTRUSION

NO.	TIME	TECH ID
TF28A	14:19	BB

SHEET NUMBER 20

MACHINE # WW43

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P55/56	SEOS	NEOS	2:30	10	BB	450	860	43	43		AFK		10-29-24	KC		
2	P58/59	SEOS	NEOS	3:08	10	BB	450	860	43	86		AFK		10-29-24	KC		
3	P60/61	SEOS	NEOS	3:39	10	BB	450	860	43	129		AFK		10-29-24	KC		
4	P62/63	SEOS	NEOS	4:00	10	BB	450	860	43	149/23	DSF22	AFK		10-29-24	KC		
5	P64/65	SEOS	NEOS	4:35	10	BB	450	860	43	66		AFK		10-29-24	KC		
6	P66/67	SEOS	NEOS	5:00	10	BB	450	860	43	109		AFK		10-29-24	KC		
7	P71/72	EEOS	WEOS	5:24	10	BB	450	860	13	122		AFK		10-29-24	KC		
8	P70/71	WEOS	EEOS	5:40	10	BB	450	860	13	135		AFK		10-29-24	KC		
9	P69/70	WEOS	EEOS	5:55	10	BB	450	860	13	145/3	DSF25	AFK		10-29-24	KC		
10	P49/73	NEOS	SEOS	6:03	10	BB	450	860	2	5		AFK		10-29-24	KC		
11	P49/72	NEOS	SEOS	6:05	10	BB	450	860	7	12		AFK		10-29-24	KC		
12	P49/71	NEOS	SEOS	6:08	8	BB	450	860	7	19		AFK		10-29-24	KC		
13	P49/70	NEOS	SEOS	6:11	8	BB	450	860	7	26		AFK		10-29-24	KC		
14	P49/69	NEOS	SEOS	6:14	7	BB	450	860	7	33		AFK		10-29-24	KC		
15	P48/69	EEOS	WEOS	6:19	7	BB	450	860	13	46		AFK		10-29-24	KC		
16																	
17																	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 10/20/2024

SHEET NUMBER 1

FUSION

EXTRUSION

MACHINE # EXT 40

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TX10	9:42	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P7/25	5J WEOS	10:32	10	RN	250	255		4	4		KC		10-20-24	KC		
2	P6/25	EEOS 5F	10:36	10	RN	250	255		2	6		KC		10-20-24	KC		
3	P6/25	5F WEOS	10:38	10	RN	250	255		4	10		KC		10-20-24	KC		
4	P5/25	EEOS 5K	10:42	10	RN	250	255		2	12		KC		10-20-24	KC		
5	P16/26	EEOS WEOS	12:00	10	RN	250	255		7	19		KC		10-20-24	KC		
6																	
7																	
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16																	
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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 10/23/2024

SHEET NUMBER 2

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 40

NO.	TIME	TECH ID
TX12	3:32	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P34/36	WEOS	6V	5:31	10	RN	250	255		3	22		AFK		10-25-24	KC	
2																	
3																	
4																	
5																	
6																	
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* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 10/25/2024

SHEET NUMBER 3

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 40

NO.	TIME	TECH ID
TX13	2:30	JR

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P17/40	WEOS	EEOS	4:30	10	JR	250	255		7	29		AFK		10-25-24	KC	
2																	
3																	
4																	
5																	
6																	
7																	
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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 10/29/2024

SHEET NUMBER 4

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 40

NO.	TIME	TECH ID
TX14	9:05	RN
TX15	3:32	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P69/70	8R 9L	1:15	8	RN	250	255		3	31				10-31-24	DS		
2	P45/81	EEOS WEOS	4:03	8	RN	250	255		1	32			by 10L	10-31-24	DS		
3	P83/86	SEOS NEOS	5:00	8	RN	250	255		2	34				10-31-24	DS		
4	P44/81	WEOS EEOS	5:45	9	RN	250	255		7	41				10-31-24	DS		
5																	
6																	
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* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 10/30/2024

SHEET NUMBER 5

FUSION

EXTRUSION

MACHINE # EXT 40

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TX16	2:50	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P85/86	EEOS WEOS	5:12	5	RN	250	255		4	45		AFK		10-31-24	DS
2	P90/91	11K WEOS	5:20	5	RN	250	255		2	47		AFK		10-31-24	DS
3	P44/63	11T WEOS	6:00	4	RN	250	255		1	48		AFK		10-31-24	DS
4	P44/62	EEOS 11R	6:12	4	RN	250	255		2	50		AFK		10-31-24	DS
5	P44/62	11R 9P	6:17	4	RN	250	255		2	52		AFK		10-31-24	DS
6	P44/62	9P WEOS	6:22	4	RN	250	255		1	53		AFK		10-31-24	DS
7	P44/61	EEOS 11Q	6:25	4	RN	250	255		2	54/1	DSX13	AFK		10-31-24	DS
8	P44/61	11Q WEOS	6:32	4	RN	250	255		4	5		AFK		10-31-24	DS
9	P52/53	8P 11N	6:40	4	RN	250	255		3	8		AFK		10-31-24	DS
10	P52/53	11N 11P	6:50	4	RN	250	255		3	11		AFK		10-31-24	DS
11															
12															
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* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 10/31/2024

SHEET NUMBER 6

PASSING TRIAL SEAMS

FUSION

EXTRUSION

MACHINE # EXT 40

NO.	TIME	TECH ID
TX17	9:13	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P52/53	NEOS 8P	9:45	4	RN	250	255		6	17		AFK		10-31-24	DS		
2	P47/P94	NEOS SEOS	9:55	4	RN	250	255		3	20		AFK		10-31-24	DS		
3	P94/96	12T 11M	10:30	4	RN	250	252		4	24		AFK		10-31-24	DS		
4	P22/96	NEOS 12U	11:24	5	RN	250	252		2	26		AFK		10-31-24	DS		
5																	
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* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 05-Nov-24

Appendix A-6

Geomembrane Seam Destructive Test Summary

- **Tensiometer Certificate of Calibration**
 - **Seam Destructive Test Summary**
-

#10



CALIBRATION CERTIFICATE

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell
 Range: 0 - 750 lbs. Tension
 Model No: M2405-750W
 Serial No: 029951

Calibration Apparatus: Pro-Cal unit, model TC-0100/A

A/D Module Model No: T-029
 A/D Module Serial No: 1415029951
 Channel No: N/A

Dead Weight: W1: 2, W2: 152, W3: 302
 Reference Cell: R1: 2, R2: 152, R3: 302

Indicator reading with no load: 0

Offset: -3.158184 Scale: 3.328007

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F
 Excitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards
 Manufacture recommendation to Calibrate load cells annually. Valid for one year of date shown.

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

Date: 1/22/2024

[Redacted Signature]



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: October 20, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF13	2024-10-19	P6/25 4m E of WEOS	5F	F F 126,108,84	144,143,157		FAIL	AFK	100% PEEL
DSF14	2024-10-19	P26/27 7m E of Weos	5H	FTB 153,146,160,156,144	FTB 120,121,134,123,130	FTB 190,196,193,193,194	PASS	AFK	
DSF13A	2024-10-19	P7/25 3m W of EEOS	5J	FTB 150,141,156,140,152	FTB 120,117,113,118,116	FTB 184,187,186,187,186	PASS	AFK	
DSF13B	2024-10-20	P5/25 3m W of EEOS	5K	FTB 156,154,151,158,153	FTB 169,121,122,125,150	FTB 192,189,190,189	PASS	AFK	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: November 6, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: October 22, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF15	2024-10-21	P33/35 49m E of WEOS	6F	FTB 128,124,131,125,122	FTB 161,158,163,157,161	FTB 192,190,191,193,193	PASS	AFK	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: November 6, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: October 23, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF16	2024-10-23	P38/39 2m W of EEOS	6L	FTB	FTB	FTB	PASS	AFK	
				123,127,120,140,113	143,153,151,148,141	190,188,187,187,186			
DSF17	2024-10-23	P40-41 2m W of EEOS	7A	FTB	FTB	FTB	PASS	AFK	
				128,132,166,128,127	149,150,128,145,138	185,184,184,182,186			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: November 6, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: October 26, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF18	2024-10-25	P35/44 26m W of EEOS	7W	FTB	FTB	FTB	PASS	AFK	
				131,130,128,132,144	147,131,141,139,151	190,188,187,187,186			
DSF19	2024-10-25	P44/45 2m S of NEOS	8B	FTB	FTB	FTB	PASS	AFK	
				172,153,156,169,164	140,140,143,135,142	200,198,202,198,200			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: November 6, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: October 30, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF20	2024-10-27	P54/55 20m N of SEOS	8J	FTB	F	FTB	PASS	DS	
				125,134,127,122,154	146,149,141,133,149	202,203,202,201,201			
DSF21	2024-10-27	P61/62 20m N of SEOS	8M	FTB	FTB	FTB	PASS	DS	
				148,151,126,154,154	140,119,158,123,125	190,197,196,197,199			
DSF22	2024-10-27	P62/63 20m N of SEOS	8N	FTB	FTB	FTB	PASS	DS	
				125,126,129,132,125	147,148,154,145,147	196,198,198,196,196			
DSF23	2024-10-27	P52/53 35m N of SEOS	8P		F F		FAIL	DS	100% peel ext to neos
				135,135	134,110				
DSF24	2024-10-27	P76/77 2m S of NEOS	8Q	FTB	FTB	FTB	PASS	DS	
				147,147,150,147,142	148,139,143,102,140	193,203,200,198,202			
DSF25	2024-10-27	P69/70 10m E of WEOS	8R	FTB	FTB	FTB	PASS	DS	
				140,149,148,148,147	176,171,172,175,174	198,202,200,205,204			
DSF26	2024-10-27	P44/62 2m E of WEOS	9P	F	F		FAIL	DS	50% peel
				154,120,155,162,103	103,146,129				
DSF27	2024-10-28	P88/89 2m E of WEOS	9W	FTB	FTB	FTB	PASS	DS	
				163,147,146,144,163	146,139	219,217,217,218,219			
DSF28	2024-10-30	P94/97 2m S of NEOS	11L	FTB	FTB	FTB	PASS	DS	
				171,151,157,162,118	135,140,130,119,137	188,189,185,189,187			
DSF23B	2024-10-27	P52/53 3m S of DSF23	11N	FTB	F F		FAIL	DS	50% peel
				163,165,164,163,167	147,117,137,93,136				

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: November 6, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: October 30, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF23B1	2024-10-27	P52/53 3m S of 11N	11P	FTB 164,165,163,166,175	FTB 153,160,155,151,158	FTB 204,209,206,206,210	PASS	DS	
DSF26B	2024-10-27	P44/61 3m W of EEOS	11Q	F 150,160	F F 142,140		FAIL	DS	100% peel
DSF26A	2024-10-27	P44/62 3m E of WEOS	11R	F 102,161,164,165,169	F F 95,145,121,143		FAIL	DS	50% peel
DSF26A1	2024-10-27	P44/60 2m W of EEOS	11S	FTB 121,123,123,156,128	FTB 167,162,166,135,171	FTB 204,203,204,204	PASS	DS	
DSF26B1	2024-10-27	P44/63 2m E of WEOS	11T	FTB 150,158,140,177,161	FTB 128,129,172,126,129	FTB 200,200,201,202,202	PASS	DS	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: November 6, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: October 31, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSX12	2024-10-30	P41/44 2m W of EEOS	12Q	FTB 132,126,130,132,86		FTB 204,209,206,206,210	PASS	KC	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: November 6, 2024

Appendix A-7

Geomembrane Seam Pressure Test Summary



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 19/10/2024

Sheet Number 1

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P1/24	SEOS	NEOS	1	JP	3:17	3:22	38	38	Y	P		X	KC	
2	P24/25	NEOS	SEOS	2	JP	3:22	3:27	51	50	Y	P		X	KC	
3	P1/25	EEOS	WEOS	1	JP	3:30	3:35	36	36	Y	P		X	KC	
4	P2/25	WEOS	EEOS	2	JP	3:33	3:38	39	36	Y	P		X	KC	
5	P3/25	EEOS	WEOS	1	JP	3:40	3:45	38	38	Y	P		X	KC	
6	P4/25	WEOS	EEOS	1	JP	3:46	3:51	38	38	Y	P		X	KC	
7	P5/25	EEOS	WEOS	1	JP	3:54	3:59	54	51	Y	P		X	KC	
8	P6/25	WEOS	5F	3	JP	3:55	4:00	48	45	Y	P	X		KC	
9	P6/25	EEOS	5F	1	JP	4:04	4:09	55	52	Y	P		X	KC	
10	P7/25	WEOS	EEOS	1	JP	4:10	4:15	39	38	Y	P		X	KC	
11	P8/25	5G	EEOS	1	JP	4:20	4:25	50	48	Y	P	X		KC	
12	P8/25	5G	WEOS	3	JP	4:20	4:25	40	39	Y	P		X	KC	
13	P9/25	EEOS	WEOS	1	JP	4:27	4:32	38	36	Y	P		X	KC	
14	P10/25	WEOS	WEOS	3	JP	4:27	4:32	45	43	Y	P		X	KC	
15	P11/25	EEOS	EEOS	1	JP	4:33	4:38	38	38	Y	P		X	KC	
16	P12/25	WEOS	EEOS	3	JP	4:33	4:38	41	40	Y	P		X	KC	
17	P13/25	EEOS	WEOS	1	JP	4:38	4:43	40	39	Y	P		X	KC	
18	P14/25	WEOS	EEOS	3	JP	4:38	4:43	38	38	Y	P		X	KC	
19	P15/25	EEOS	WEOS	1	JP	4:45	4:50	39	39	Y	P		X	KC	
20	P16/25	WEOS	4L	3	JP	4:45	4:50	40	39	Y	P		X	KC	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 19/10/2024

Sheet Number 2

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P25/26	NEOS	SEOS	1	JP	4:53	4:58	39	39	Y	P		X	KC	
2	P17/26	WEOS	EEOS	3	JP	4:54	4:59	39	38	Y	P		X	KC	
3	P18/26	EEOS	WEOS	1	JP	5:02	5:07	39	38	Y	P		X	KC	
4	P19/26	WEOS	EEOS	3	JP	5:02	5:07	38	38	Y	P		X	KC	
5	P20/26	EEOS	WEOS	1	JP	5:08	5:13	38	38	Y	P		X	KC	
6	P21/26	WEOS	EEOS	3	JP	5:08	5:13	38	37	Y	P		X	KC	
7	P22/26	EEOS	WEOS	1	JP	5:14	5:19	39	39	Y	P		X	KC	
8	P23/26	WEOS	EEOS	3	JP	5:14	5:19	41	39	Y	P		X	KC	
9	P26/27	WEOS	5H	1	JP	5:20	5:25	39	38	Y	P	X		KC	
10	P23/27	SEOS	NEOS	3	JP	5:20	5:25	38	37	Y	P		X	KC	
11	P27/28	WEOS	EEOS	1	JP	5:25	5:30	38	38	Y	P		X	KC	
12	P28/29	WEOS	EEOS	3	JP	5:26	5:31	50	48	Y	P		X	KC	
13	P23/28	NEOS	SEOS	1	JP	5:32	5:37	39	39	Y	P		X	KC	
14	P23/29	SEOS	NEOS	3	JP	5:41	5:46	55	54	Y	P		X	KC	
15	P26/27	5H	EEOS	1	JP	5:44	5:49	40	37	Y	P		X	KC	
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 21/10/2024
 Sheet Number

3

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P30/32	EEOS	WEOS	1	JP	5:21	5:26	55	54	Y	P		X	KC	
2	P30/31	WEOS	EEOS	2	JP	5:21	5:26	38	38	Y	P		X	KC	
3	P31/32	SEOS	NEOS	3	JP	5:21	5:26	51	48	Y	P		X	KC	
4	P32/33	WEOS	EEOS	1	JP	5:29	5:34	40	39	Y	P		X	KC	
5	P31/33	EEOS	WEOS	2	JP	5:29	5:34	56	54	Y	P		X	KC	
6	P13/30	WEOS	EEOS	1	JP	5:38	5:43	51	50	Y	P		X	KC	
7	P12/30	EEOS	WEOS	2	JP	5:40	5:45	47	45	Y	P		X	KC	
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* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 23/10/2024

Sheet Number 4

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P11/30	WEOS	EEOS	1	JP	8:50	8:55	49	48	Y	P		X	KC	
2	P10/30	EEOS	WEOS	2	JP	8:50	8:55	38	37	Y	P		X	KC	
3	P9/30	WEOS	EEOS	1	JP	8:56	9:01	51	50	Y	P		X	KC	
4	P8/30	EEOS	WEOS	2	JP	8:56	9:01	53	53	Y	P		X	KC	
5	P7/30	WEOS	EEOS	1	JP	9:03	9:08	45	45	Y	P		X	KC	
6	P6/30	EEOS	6J	2	JP	9:03	9:08	52	51	Y	P	X		KC	
7	P6/30	WEOS	6J	1	JP	9:10	9:15	38	38	Y	P		X	KC	
8	P5/30	EEOS	WEOS	2	JP	9:10	9:15	53	52	Y	P		X	KC	
9	P4/30	WEOS	EEOS	1	JP	9:18	9:23	52	51	Y	P		X	KC	
10	P3/30	EEOS	WEOS	2	JP	9:18	9:23	47	47	Y	P		X	KC	
11	P2/30	WEOS	EEOS	1	JP	9:26	9:31	48	47	Y	P		X	KC	
12	P1/30	EEOS	WEOS	2	JP	9:26	9:31	49	48	Y	P		X	KC	
13	P33/35	6F	EEOS	1	JP	9:35	9:40	51	51	Y	P		X	KC	
14	P33/35	WEOS	6F	2	JP	4:04	4:09	52	51	Y	P	X		KC	
15	P34/35	SEOS	NEOS	1	JP	4:04	4:09	49	48	Y	P		X	KC	
16	P33/34	NEOS	SEOS	2	JP	4:10	4:15	48	47	Y	P		X	KC	
17	P24/36	EEOS	WEOS	1	JP	4:18	4:23	50	49	Y	P		X	KC	
18	P1/36	SEOS	NEOS	2	JP	4:20	4:25	56	53	Y	P		X	KC	
19	P30/36	NEOS	SEOS	1	JP	4:30	4:35	55	53	Y	P		X	KC	
20	P31/36	SEOS	NEOS	2	JP	4:30	4:35	46	44	Y	P		X	KC	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-25



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 23/10/2024

Sheet Number 5

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P33/36	NEOS	SEOS	1	JP	4:38	4:43	54	52	Y	P		X	KC	
2	P38/39	EEOS	WEOS	1	JP	4:44	4:49	56	55	Y	P		X	KC	
3	P34/39	SEOS	NEOS	2	JP	4:44	4:49	47	44	Y	P		X	KC	
4	P34/38	EEOS	WEOS	1	JP	4:51	4:56	52	50	Y	P		X	KC	
5	P34/37	WEOS	EEOS	2	JP	4:51	4:56	50	47	Y	P		X	KC	
6	P37/38	NEOS	SEOS	1	JP	4:58	5:03	53	50	Y	P		X	KC	
7	P36/37	NEOS	SEOS	2	JP	5:41	5:46	62	62	Y	P		X	KC	
8	P34/36	6V	EEOS	1	JP	5:33	5:38	53	53	Y	P		X	KC	6V to weos ext
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 25/10/2024

Sheet Number

6

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P22/47	WEOS	EEOS	1	JP	3:21	3:26	44	43	Y	P		X	AFK	
2	P21/46	WEOS	EEOS	2	JP	3:21	3:26	55	54	Y	P		X	AFK	
3	P40/46	NEOS	SEOS	1	JP	3:31	3:36	53	51	Y	P		X	AFK	
4	P40/41	EEOS	7A	1	JP	3:38	3:43	53	52	Y	P	X		KC	
5	P41/46	SEOS	NEOS	2	JP	3:36	3:41	57	56	Y	P		X	KC	
6	P42/46	NEOS	SEOS	1	JP	3:45	3:50	57	57	Y	P		X	KC	
7	P43/46	SEOS	NEOS	2	JP	3:45	3:50	52	52	Y	P		X	KC	
8	P45/46	EEOS	8A	1	JP	3:55	4:00	59	57	Y	P	X		KC	
9	P46/47	NEOS	SEOS	2		3:55	4:00	60	59	Y	P		X	KC	
10	P45/46	WEOS	8A	1		4:02	4:07	57	56	Y	P		X	KC	
11	P43/45	EEOS	NEOS	2		4:02	4:07	58	55	Y	P		X	KC	
12	P44/45	EEOS	NEOS	1		4:08	4:13	57	54	Y	P		X	KC	
13	P20/40	EEOS	WEOS	1		4:32	4:37	52	51	Y	P		X	KC	
14	P19/40	WEOS	EEOS	2		4:32	4:37	48	46	Y	P		X	KC	
15	P14/40	WEOS	EEOS	1		4:44	4:49	56	53	Y	P		X	KC	
16	P15/40	EEOS	WEOS	2		4:38	4:43	53	50	Y	P		X	KC	
17	P30/40	SEOS	NEOS	1		4:45	4:50	48	46	Y	P		X	KC	
18	P43/44	WEOS	EEOS	1		4:46	4:51	60	58	Y	P		X	KC	
19	P32/41	NEOS	SEOS	1		5:15	5:20	50	48	Y	P		X	KC	
20	P33/42	SEOS	NEOS	2		5:15	5:20	58	57	Y	P		X	KC	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 05-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 25/10/2024
 Sheet Number

7

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P35/43	NEOS	SEOS	1	JP	5:21	5:26	49	46	Y	P		X	KC	
2	P16/40	WEOS	EEOS	1	JP	5:27	5:32	51	48	Y	P		X	KC	
3	P40/41	WEOS	7A	2	JP	5:29	5:34	59	59	Y	P		X	KC	
4	P41/42	WEOS	EEOS	1	JP	5:38	5:43	52	49	Y	P		X	KC	
5	P42/43	WEOS	EEOS	2	JP	5:35	5:40	61	61	Y	P		X	KC	
6	P35/44	7W	EEOS	1	JP	5:45	5:50	51	48	Y	P	X		KC	
7	P35/44	7X	7W	1	JP	5:51	5:56	50	48	Y	P	X		KC	
8	P44/48	SEOS	NEOS	1	JP	6:14	6:19	55	54	Y	P		X	KC	
9	P35/44	WEOS	8E	1	JP	6:30	6:35	49	46	Y	P	X		KC	
10	P18/40	WEOS	EEOS	1	JP	4:24	4:29	60	57	Y	P		X	KC	
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 26/10/2024

Sheet Number 8

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P34/48	EEOS	WEOS	7	JP	12:27	12:32	43	42	Y	P		X	KC	
2	P39/48	EEOS	WEOS	1	JP	12:33	12:38	50	48	Y	P		X	KC	
3	P35/44	8F	WEOS	1	JP	12:44	12:49	41	38	Y	P	X		KC	
4	P35/44	8F	7X	1	JP	1:53	1:58	48	46	Y	P		X	KC	
5															
6															
7															
8															
9															
10															
11															
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20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 29/10/2024
 Sheet Number

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P48/53	EEOS	WEOS	1	JP	11:05	11:10	58	58	Y	P		X	KC	
2	P48/52	EEOS	WEOS	2	JP	11:05	11:10	56	55	Y	P		X	KC	
3	P51/52	SEOS	NEOS	3	JP	11:08	11:13	62	61	Y	P		X	KC	
4	P48/51	EEOS	WEOS	4	JP	11:10	11:15	36	35	Y	P		X	KC	
5	P48/50	EEOS	WEOS	2	JP	11:15	11:20	57	54	Y	P		X	KC	
6	P49/50	SEOS	NEOS	3	JP	11:21	11:26	34	33	Y	P		X	KC	
7	P48/49	EEOS	WEOS	4	JP	11:21	11:26	56	54	Y	P		X	KC	
8	P49/69	11B	SEOS	2	JP	11:37	11:42	48	48	Y	P	X		KC	
9	P49/69	11B	NEOS	3	JP	11:37	11:42	58	58	Y	P		X	KC	
10	P48/69	EEOS	WEOS	4	JP	11:38	11:43	58	58	Y	P		X	KC	
11	P69/70	8R	EEOS	3	JP	11:46	11:51	52	52	Y	P	X		KC	
12	P69/70	9A	WEOS	2	JP	11:46	11:51	56	50	Y	P		X	KC	ext 8R to 9A
13	P49/70	NEOS	SEOS	2	JP	11:57	12:02	48	48	Y	P		X	KC	
14	P49/71	SEOS	NEOS	3	JP	11:59	12:04	36	36	Y	P		X	KC	
15	P70/71	EEOS	WEOS	4	JP	11:57	12:02	55	53	Y	P		X	KC	
16	P71/72	EEOS	WEOS	2	JP	12:04	12:09	55	54	Y	P		X	KC	
17	P49/72	NEOS	SEOS	3	JP	12:11	12:16	49	49	Y	P		X	KC	
18	P49/73	SEOS	NEOS	4	JP	12:11	12:16	42	42	Y	P		X	KC	
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 29/10/2024

Sheet Number 10

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P72/73	EEOS	WEOS	2	JP	12:11	12:16	56	55	Y	P		X	KC	
2	P73/74	EEOS	WEOS	2	JP	12:18	12:23	51	50	Y	P		X	KC	
3	P74/76	SEOS	NEOS	3	JP	12:18	12:23	37	36	Y	P		X	KC	
4	P73/76	NEOS	SEOS	4	JP	12:18	12:23	55	54	Y	P		X	KC	
5	P49/76	SEOS	NEOS	5	JP	12:18	12:23	51	50	Y	P		X	KC	
6	P74/75	EEOS	WEOS	3	JP	12:27	12:32	32	32	Y	P		X	KC	
7	P74/77	NEOS	SEOS	5	JP	12:27	12:32	50	49	Y	P		X	KC	
8	P75/77	SEOS	NEOS	2	JP	12:27	12:32	54	53	Y	P		X	KC	
9	P76/77	SEOS	8Q	4	JP	12:27	12:32	52	52	Y	P	X		KC	
10	P50/51	11A	NEOS	3	JP	12:38	12:43	58	56	Y	P		X	KC	
11	P76/77	8Q	NEOS	5	JP	12:47	12:52	50	49	Y	P		X	KC	
12	P52/53	8P	NEOS	2	JP	12:59	13:04	52	50	Y	P	X		KC	
13	P52/53	8P	11E	3	JP	3:10	3:15	55	54	Y	P	X		KC	see Oct 30
14	P54/55	SEOS	8J	4	JP	3:46	3:51	32	31	Y	P	X		KC	see Oct 30
15	P54/55	8J	NEOS	3	JP	3:19	3:24	52	52	Y	P		X	KC	
16	P55/56	8K	NEOS	2	JP	3:22	3:27	62	62	Y	P	X		KC	
17	P55/56	8K	SEOS	4	JP	3:22	3:27	59	58	Y	P		X	KC	
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 29/10/2024

Sheet Number

11

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P58/59	8L	NEOS	3	JP	3:56	4:01	53	53	Y	P	X		KC	
2	P58/59	8L	SEOS	2	JP	3:56	4:01	54	52	Y	P		X	KC	
3	P48/54	EEOS	WEOS	2	JP	4:04	4:09	57	57	Y	P		X	KC	
4	P44/55	WEOS	EEOS	3	JP	4:07	4:12	42	42	Y	P		X	KC	
5	P4456	WEOS	11C	4	JP	4:07	4:12	42	42	Y	P	X		KC	
6	P44/56	EEOS	11C	2	JP	4:15	4:20	59	59	Y	P		X	KC	
7	P44/57	WEOS	EEOS	3	JP	4:15	4:20	52	52	Y	P		X	KC	
8	P56/57	SEOS	NEOS	4	JP	4:15	4:20	57	56	Y	P		X	KC	
9	P44/58	EEOS	WEOS	3	JP	4:22	4:27	59	59	Y	P		X	KC	
10	P44/59	WEOS	EEOS	2	JP	4:22	4:27	53	53	Y	P		X	KC	
11	P59/60	SEOS	NEOS	4	JP	4:24	4:29	58	58	Y	P		X	KC	
12	P44/60	EEOS	WEOS	3	JP	4:32	4:37	59	59	Y	P		X	KC	
13	P44/61	WEOS	EEOS	4	JP	4:32	4:37	32	32	Y	P		X	KC	
14	P60/61	SEOS	NEOS	2	JP	4:32	4:37	57	56	Y	P		X	KC	
15	P61/62	SEOS	8M	5	JP	4:33	4:38	55	54	Y	P	X		KC	
16	P44/62	9P	NEOS	5	JP	4:41	4:46	56	55	Y	P	X		KC	
17	P44/62	9P	EEOS	4	JP	4:41	4:46	42	41	Y	P		X	KC	
18	P62/63	SEOS	8N	3	JP	4:41	4:46	55	54	Y	P	X		KC	
19	P44/63	WEOS	EEOS	2	JP	4:42	4:47	60	58	Y	P		X	KC	
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 29/10/2024

Sheet Number 12

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P63/64	SEOS	NEOS	3	JP	4:49	4:54	58	58	Y	P		X	KC	
2	P61/62	8M	NEOS	5	JP	4:49	4:54	58	57	Y	P		X	KC	
3	P62/63	8N	NEOS	2	JP	4:50	4:55	58	57	Y	P		X	KC	
4	P44/64	EEOS	WEOS	3	JP	4:57	5:02	34	34	Y	P		X	KC	
5	P44/65	WEOS	EEOS	4	JP	4:57	5:02	58	58	Y	P		X	KC	
6	P64/65	SEOS	NEOS	5	JP	4:57	5:02	61	61	Y	P		X	KC	
7	P65/66	SEOS	NEOS	2	JP	4:58	5:03	58	57	Y	P		X	KC	
8	P44/66	EEOS	WEOS	3	JP	5:05	5:10	32	30	Y	P		X	KC	
9	P44/67	WEOS	EEOS	4	JP	5:05	5:10	53	53	Y	P		X	KC	
10	P66/67	SEOS	NEOS	5	JP	5:05	5:10	59	59	Y	P		X	KC	
11	P67/68	SEOS	NEOS	2	JP	5:07	5:12	58	57	Y	P		X	KC	
12	P44/68	EEOS	WEOS	3	JP	5:16	5:21	40	40	Y	P		X	KC	
13	P44/78	WEOS	EEOS	4	JP	5:16	5:21	54	53	Y	P		X	KC	
14	P68/78	SEOS	NEOS	5	JP	5:16	5:21	58	57	Y	P		X	KC	
15	P78/79	SEOS	NEOS	2	JP	5:22	5:27	45	45	Y	P		X	KC	
16	P44/79	EEOS	WEOS	3	JP	5:26	5:31	52	51	Y	P		X	KC	
17	P44/80	WEOS	EEOS	4	JP	5:26	5:31	30	30	Y	P		X	KC	
18	P79/80	SEOS	NEOS	5	JP	5:26	5:31	59	58	Y	P		X	KC	
19	P80/81	SEOS	WEOS	2	JP	5:28	5:33	60	60	Y	P		X	KC	
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 29/10/2024

Sheet Number 13

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P45/82	WEOS	EEOS	3	JP	5:34	5:39	36	36	Y	P		X	KC	
2	P81/82	SEOS	11F	4	JP	5:34	5:39	56	54	Y	P	X		KC	see Oct 30
3	P82/92	SEOS	NEOS	5	JP	5:45	5:50	59	58	Y	P		X	KC	
4	P45/92	EEOS	WEOS	3	JP	5:45	5:50	34	32	Y	P		X	KC	
5	P45/93	WEOS	EEOS	2	JP	5:45	5:50	54	54	Y	P		X	KC	
6	P92/93	SEOS	WEOS	4	JP	5:45	5:50	54	51	Y	P		X	KC	
7	P91/93	NEOS	SEOS	4	JP	5:53	5:58	40	40	Y	P		X	KC	
8	P90/93	WEOS	EEOS	4	JP	5:53	5:58	58	58	Y	P	X		KC	
9	P88/92	WEOS	EEOS	2	JP	6:11	6:16	60	60	Y	P		X	KC	
10	P89/93	WEOS	EEOS	3	JP	6:02	6:07	61	61	Y	P		X	KC	
11	P89/90	WEOS	EEOS	4	JP	6:00	6:05	58	58	Y	P		X	KC	
12	P89/92	SEOS	NEOS	2	JP	6:04	6:09	50	49	Y	P		X	KC	
13	P88/89	WEOS	9W	5	JP	6:07	6:12	61	61	Y	P	X		KC	
14	P88/89	9W	EEOS	4	JP	6:07	6:12	61	60	Y	P		X	KC	
15	P82/88	SEOS	NEOS	3	JP	6:11	6:16	58	57	Y	P		X	KC	
16	P87/88	NEOS	EEOS	5	JP	6:13	6:18	59	58	Y	P		X	KC	
17	P82/87	SEOS	NEOS	4	JP	6:13	6:18	58	57	Y	P		X	KC	
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 29/10/2024

Sheet Number 14

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P82/83	SEOS	NEOS	3	JP	6:19	6:24	36	35	Y	P		X	KC	
2	P85/87	WEOS	EEOS	2	JP	6:19	6:24	61	59	Y	P		X	KC	
3	P83/85	NEOS	SEOS	5	JP	6:21	6:26	59	59	Y	P		X	KC	
4	P84/86	WEOS	EEOS	5	JP	6:27	6:32	55	54	Y	P		X	KC	
5	P83/84	SEOS	NEOS	2	JP	6:27	6:32	60	59	Y	P		X	KC	
6	P90/91	11K	EEOS	5	JP	6:36	6:41	60	60	Y	P		X	KC	11k to weos ext
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 30/10/2024

Sheet Number 15

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P50/51	SEOS	11A	1	JP	11:13	11:18	59	58	Y	P		X	KC	
2	P52/53	SEOS	11E	1	JP	11:22	11:27	62	61	Y	P		X	KC	
3	P53/54	SEOS	NEOS	1	JP	17:36	17:41	61	61	Y	P		X	KC	
4	P57/58	SEOS	NEOS	1	JP	17:43	17:48	62	61	Y	P		X	KC	
5	P81/82	11F	NEOS	1	JP	10:30	10:35	60	60	Y	P		X	KC	
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 31/10/2024

Sheet Number 16

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P91/94	WEOS	EEOS	2	JP	10:20	10:25	58	57	Y	P		X	KC	
2	P47/94	NEOS	9m S OF NEOS	1	JP	10:27	10:32	49	46	Y	P		X	KC	
3	P94/100	NEOS	SEOS	2	JP	10:30	10:35	60	59	Y	P		X	KC	
4	P47/100	NEOS	SEOS	1	JP	10:30	10:35	46	44	Y	P		X	KC	
5	P47/99	NEOS	SEOS	2	JP	10:38	10:43	60	60	Y	P		X	KC	
6	P94/99	NEOS	SEOS	3	JP	10:38	10:43	36	35	Y	P		X	KC	
7	P22/99	NEOS	SEOS	2	JP	10:45	10:50	53	50	Y	P		X	KC	
8	P98/99	EEOS	WEOS	1	JP	10:57	11:02	55	53	Y	P		X	KC	
9	P94/98	NEOS	SEOS	3	JP	10:47	10:52	60	60	Y	P		X	KC	
10	P23/98	SEOS	NEOS	3	JP	10:59	11:04	59	56	Y	P		X	KC	
11	P23/97	NEOS	SEOS	4	JP	10:59	11:04	60	58	Y	P		X	KC	
12	P97/98	WEOS	EEOS	2	JP	11:07	11:12	56	53	Y	P		X	KC	
13	P94/97	NEOS	SEOS	3	JP	11:08	11:13	63	62	Y	P	X		KC	
14	P94/96	SEOS	12T	4	JP	11:08	11:13	56	56	Y	P		X	KC	
15	P96/97	EEOS	WEOS	5	JP	11:08	11:13	59	58	Y	P	X		KC	
16	P23/96	SEOS	12U	3	JP	11:16	11:21	59	56	Y	P		X	KC	
17	P23/95	NEOS	SEOS	4	JP	11:16	11:21	51	48	Y	P		X	KC	
18	P95/96	WEOS	EEOS	5	JP	11:16	11:21	58	56	Y	P		X	KC	
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 31/10/2024

Sheet Number 17

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P94/96	SEOS	11M	4	JP	11:27	11:32	74	76	Y	P		X	KC	12T to 11M extruded
2	P94/95	11L	SEOS	3	JP	11:29	11:34	59	58	Y	P	X		KC	
3	P94/95	11L	NEOS	2	JP	11:29	11:34	59	59	Y	P		X	KC	
4	P23/95	SEOS	NEOS	3	JP	11:42	11:47	50	48	Y	P		X	KC	
5	P29/95	WEOS	EEOS	4	JP	11:36	11:41	60	59	Y	P		X	KC	
6	P29/94	WEOS	EEOS	2	JP	11:53	11:58	51	50	Y	P		X	KC	
7	P45/94	NEOS	SEOS	3	JP	12:00	12:05	61	61	Y	P		X	KC	
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 06-Nov-24

Appendix A-8

Geomembrane Defect Summary



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 4

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM,PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P23/28/29	INT	T	AFK		10-19-24	10-20-24
B	P23/27/28	INT	T	AFK		10-19-24	10-20-24
C	P23/26/27	INT	T	AFK		10-19-24	10-20-24
D	P22/23/26	INT	T	AFK		10-19-24	10-20-24
E	P21/22/26	INT	T	AFK		10-19-24	10-20-24
F	P20/21/26	INT	T	AFK		10-19-24	10-20-24
G	P19/20/26	INT	T	AFK		10-19-24	10-20-24
H	P18/19/26	INT	T	AFK		10-19-24	10-20-24
J	P17/18/26	INT	T	AFK		10-19-24	10-20-24
K	P16/17/26	INT	T	AFK		10-19-24	10-20-24
L	P16/25/26	INT	T	AFK		10-19-24	10-20-24
M	P15/16/25	INT	T	AFK		10-19-24	10-20-24
N	P14/15/25	INT	T	AFK		10-19-24	10-20-24
P	P13/14/25	INT	T	AFK		10-19-24	10-20-24
Q	P12/13/25	INT	T	AFK		10-19-24	10-20-24
R	P11/12/25	INT	T	AFK		10-19-24	10-20-24
S	P10/11/25	INT	T	AFK		10-19-24	10-20-24
T	P9/10/25	INT	T	AFK		10-19-24	10-20-24
U	P8/9/25	INT	T	AFK		10-19-24	10-20-24
V	P7/8/25	INT	T	AFK		10-19-24	10-20-24
W	P6/7/25	INT	T	AFK		10-19-24	10-20-24
X	P5/6/25	INT	T	AFK		10-19-24	10-20-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 5

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P1/24/25	INT	T	AFK		10-19-24	10-20-24
B	P4/5/25	INT	T	AFK		10-19-24	10-20-24
C	P3/4/25	INT	T	AFK		10-19-24	10-20-24
D	P2/3/25	INT	T	AFK		10-19-24	10-20-24
E	P1/2/25	INT	T	AFK		10-19-24	10-20-24
F	P6/25	4m E OF WEOS	DSF13	AFK		10-19-24	10-20-24
G	P8/25	3m E OF WEOS	BO	AFK		10-19-24	10-20-24
H	P26/27	7m E OF WEOS	DSF14	AFK		10-19-24	10-20-24
J	P7/25	3m W OF EEOS	DSF13A	AFK		10-20-24	10-20-24
K	P5/25	3m W OF EEOS	DSF13B	AFK		10-20-24	10-20-24
L	P13/14/30	INT	T	AFK		10-21-24	covered by 7N
M	P12/14/30	INT	T	AFK		10-23-24	10-25-24
N	P30/31/32	INT	T	AFK		10-25-24	10-25-24
P	P31/32/33	INT	T	AFK		10-25-24	10-25-24
Q	P11/12/30	INT	T	AFK		10-21-24	10-25-24
R	P10/11/30	INT	T	AFK		10-23-24	10-25-24
S	P9/10/30	INT	T	AFK		10-21-24	10-25-24
T	P8/9/30	INT	T	AFK		10-23-24	10-25-24
U	P7/8/30	INT	T	AFK		10-21-24	10-25-24
V	P6/7/30	INT	T	AFK		10-23-24	10-25-24
W	P5/6P30	INT	T	AFK		10-23-24	10-25-24
X	P4/5/30	INT	T	AFK		10-21-24	10-25-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMP	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 6

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P3/4/30	INT	T	AFK		10-23-24	10-25-24
B	P2/3/30	INT	T	AFK		10-21-24	10-25-24
C	P1/2/30	INT	T	AFK		10-23-24	10-25-24
D	P32	3m S and 2m E OF WEOP	D	AFK		10-21-24	10-25-24
E	P33/34/35	INT	T	AFK		10-23-24	10-25-24
F	P33/35	49m E OF WEOS	DSF15	AFK		10-21-24	10-25-24
G	P12/30	2m W OF EEOS	BO	AFK		10-21-24	10-25-24
H	P10/30	3m W OF EEOS	BO	AFK		10-21-24	10-25-24
J	P6/30	2m W OF EEOS	WR	AFK		10-21-24	10-25-24
K	P3/30	1m E OF WEOS	IO	AFK		10-23-24	10-25-24
L	P38/39	2m W OF EEOS	DSF16	AFK		10-23-24	10-25-24
M	P34/38/39	INT	T	AFK		10-23-24	10-25-24
N	P34/37/38	INT	T	AFK		10-23-24	10-25-24
P	P34/36/37	INT	T	AFK		10-23-24	10-25-24
Q	P33/34/36	INT	T	AFK		10-23-24	10-25-24
R	P31/33/36	INT	T	AFK		10-23-24	10-25-24
S	P30/31/36	INT	T	AFK		10-23-24	10-25-24
T	P1/30/36	INT	T	AFK		10-23-24	10-25-24
U	P1/24/36	INT	T	AFK		10-23-24	10-25-24
V	P34/36	4m W OF EEOS	PT	AFK		10-23-24	10-25-24
W							
X							

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 7

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P40/41	2M W OF EEOS	DSF17	AFK		10-25-24	10-25-24
B	P33/35/43	INT	T	AFK		10-25-24	10-25-24
C	P32/33/42	INT	T	AFK		10-25-24	10-25-24
D	P30/32/41	INT	T	AFK		10-25-24	10-25-24
E	P14/15/40	INT	T	AFK		10-25-24	10-25-24
F	P15/16/40	INT	T	AFK		10-25-24	10-25-24
G	P16/17/40	INT	T	AFK		10-25-24	10-25-24
H	P17/18/40	INT	T	AFK		10-25-24	10-25-24
J	P18/19/40	INT	T	AFK		10-25-24	10-25-24
K	P19/20/40	INT	T	AFK		10-25-24	10-25-24
L	P20/21/40	INT	T	AFK		10-25-24	10-25-24
M	P20/40	2m W OF EEOS	BO	AFK		10-25-24	10-25-24
N	P13/30/40	INT	T	AFK	Covers 5L	10-25-24	10-25-24
P	P40/41/46	INT	T	AFK		10-25-24	10-25-24
Q	P41/42/46	INT	T	AFK		10-25-24	10-25-24
R	P42/43/46	INT	T	AFK		10-25-24	10-25-24
S	P43/45/46	INT	T	AFK		10-25-24	10-25-24
T	P45/46/47	INT	T	AFK		10-25-24	10-25-24
U	P43/44/45	INT	T	AFK		10-25-24	10-25-24
V	P35/43/44	INT	T	AFK		10-25-24	10-25-24
W	P35/44	26m W OF EEOS	DSF18	AFK		10-25-24	10-25-24
X	P35/44	33m W OF EEOS	BO	AFK		10-25-24	10-25-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 8

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM,PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P45/46	2m W OF EEOS	D	AFK		10-25-24	10-31-24
B	P44/45	2M S OF NEOS	DSF19	AFK		10-25-24	10-25-24
C	P22/46/47	INT	T	AFK		10-25-24	10-25-24
D	P35/44/48	INT	T	AFK		10-29-24	10-31-24
E	P35/44	21m E of WEOS	PT	AFK		10-29-24	10-31-24
F	P35/44	9m W of 8E	PT	AFK		10-29-24	10-31-24
G	P48	27m E and 4m N of WEOP	D	AFK		10-29-24	10-31-24
H	P48	25m E and 4m N of WEOP	D	AFK		10-29-24	10-31-24
J	P54/55	20m N of SEOS	DSF20	AFK		10-29-24	10-31-24
K	P55/56	6m S of NEOS	BO	AFK		10-29-24	10-31-24
L	P58/59	6m S of NEOS	BO	AFK		10-29-24	10-31-24
M	P61/62	20m N of SEOS	DSF21	AFK		10-29-24	10-31-24
N	P62/63	20m N of SEOS	DSF22	AFK		10-29-24	10-31-24
P	P52/53	35m N of SEOS	DSF23	AFK		10-29-24	10-31-24
Q	P76/77	2m S of SEOS	DSF24	AFK		10-29-24	10-31-24
R	P69/70	10m E of WEOS	DSF25	AFK		10-29-24	10-31-24
S	P49/69/70	INT	T	AFK		10-30-24	10-31-24
T	P49/70/71	INT	T	AFK		10-30-24	10-31-24
U	P49/71/72	INT	T	AFK		10-30-24	10-31-24
V	P49/72/73	INT	T	AFK		10-30-24	10-31-24
W	P48/49/69	INT	T	AFK		10-30-24	10-31-24
X	P48/49/50	INT	T	AFK		10-30-24	10-31-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 9

DEFECT CODE	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
		DEFECT LOCATION DESCRIPTION					REPAIR DATE	TEST DATE
A	P69/70	7m W of EEOS		BO	AFK		10-29-24	10-31-24
B	P48/50/51	INT		T			10-30-24	10-31-24
C	P48/51/52	INT		T			10-29-24	10-31-24
D	P48/52/53	INT		T			10-30-24	10-31-24
E	P48/53/54	INT		T			10-30-24	10-31-24
F	P44/48/54	INT		T			10-29-24	10-31-24
G	P44/55/56	INT		T			10-30-24	10-31-24
H	P44/56/57	INT		T			10-30-24	10-31-24
J	P44/57/58	INT		T			10-30-24	10-31-24
K	P44/58/59	INT		T			10-30-24	10-31-24
L	P44/59/60	INT		T			10-30-24	10-31-24
M	P44/60/61	INT		T			10-30-24	10-31-24
N	P44/61/62	INT		T			10-30-24	10-31-24
P	P44/62	2m E of WEOS		DSF26			10-29-24	10-31-24
Q	P44/62/63	INT		T			10-30-24	10-31-24
R	P44/63/64	INT		T			10-30-24	10-31-24
S	P44/64/65	INT		T			10-30-24	10-31-24
T	P44/65/66	INT		T			10-30-24	10-31-24
U	P44/66/67	INT		T			10-30-24	10-31-24
V	P44/67/68	INT		T			10-30-24	10-31-24
W	P88/89	2m E of WEOS		DSF27			10-29-24	10-31-24
X	P83/85	2m E of WEOS		BO			10-29-24	10-31-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 10

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P83/85/86	INT	T	AFK		10-30-24	10-31-24
B	P83/84/86	INT	T			10-30-24	10-31-24
C	P82/83/85/87	INT	PT			10-29-24	10-31-24
D	P82/87/88	INT	T			10-30-24	10-31-24
E	P90/93	1m S of NEOS	BO			10-29-24	10-31-24
F	P89/90/93	INT	T			10-30-24	10-31-24
G	P44/68/78	INT	T			10-30-24	10-31-24
H	P44/78/79	INT	T			10-30-24	10-31-24
J	P44/79/80	INT	T			10-30-24	10-31-24
K	P44/80/81	INT	T			10-30-24	10-31-24
L	P44/81/82	INT	T			10-30-24	10-31-24
M	P45/82/92	INT	T			10-30-24	10-31-24
N	P45/92/93	INT	T			10-30-24	10-31-24
P	P90/91/92	INT	T			10-29-24	10-31-24
Q	P89/92/93	INT	T			10-30-24	10-31-24
R	P88/89/92	INT	T			10-30-24	10-31-24
S	P82/88/92	INT	T			10-30-24	10-31-24
T	P48	17m W + 2m S of EEOP	D			10-29-24	10-31-24
U	P49/73/76	INT	T			10-30-24	10-31-24
V	P73/74/76	INT	T			10-30-24	10-31-24
W	P74/76/77	INT	T			10-30-24	10-31-24
X	P74/75/77	INT	T			10-30-24	10-31-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 11

DEFECT CODE	SEAM,PANEL OR REPAIR NO.	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
		DEFECT LOCATION DESCRIPTION					REPAIR DATE	TEST DATE
A	P50/51	5m S of NEOS		PT	AFK		10-30-24	10-31-24
B	P49/69	2m N of SEOS		PT	AFK		10-30-24	10-31-24
C	P44/56	2m E of WEOS		BO	AFK		10-29-24	10-31-24
D	P44/54/55	INT		T	AFK		10-29-24	10-31-24
E	P52/53	12m N of SEOS		PT	AFK		10-29-24	10-31-24
F	P81/82	15m S of NEOS		IO	AFK		10-30-24	10-31-24
G	P81/82	1m S of NEOS		BO	AFK		10-30-24	10-31-24
H	P45/91/93	INT		T	AFK		10-31-24	10-31-24
J	P88/92	3m S of NEOS		BO	AFK		10-29-24	10-31-24
K	P90/91	1.2 m E of WEOS		IO	DS		10-29-24	10-31-24
L	P94/97	4m S of NEOS		DSF28	AFK		10-31-24	10-31-24
M	P96/98	8m N of SEOS		BO	AFK		10-31-24	10-31-24
N	P52/53	3m S of 8P		DSF23B	DS		10-30-24	10-31-24
P	P52/53	3m S of 11n		DSF23B1	DS		10-29-24	10-31-24
Q	P44/61	3m W of EEOS		DSF26B	DS		10-30-24	10-31-24
R	P44/62	3m W of EEOS		DSF26A	DS		10-30-24	10-31-24
S	P44/60	2m W of EEOS		DSF26A1	DS		10-30-24	10-31-24
T	P44/63	2m E of WEOS		DSF26B1	DS		10-30-24	10-31-24
U								
V								
W								
X								

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>AD- ANIMAL RELATED DAMAGE
 B - UNDISPERSED RESIN BEAD
 BO - FUSION WELDER BURN
 CO - CHANGE OF OVERLAP
 CR - CREASE
 D - INSTALLATION DAMAGE
 DS - # - DESTRUCTIVE TEST NUMBER
 PT - PRESSURE TEST CUT
 SI - SOIL SURFACE IRRECLARITY
 WS - WELDER RESTART
 INT - Intersection
 WEOS - west end of seam
 NEOS - north end of seam
 EEOS - east end of seam
 SEOS - south end of seam</p> | <p>EE - EARTHWORK EQUIPMENT DAMAGE
 EXT - EXTENSION
 FM - FISHMOUTH
 FS - FAILED SEAM LENGTH
 FTS - FIELD TEST STRIP
 HT - HEAT TACK BURN
 IO - INSUFFICIENT OVERLAP (UNDER SPEC)
 MD - MAUFACTURER/DELIVERY DAMAGE
 T - THREE PANEL INTERSECTION
 WR - WRINKLE</p> <p style="text-align: right;">REVIEWED BY: AFK
 DATE: 06-Nov-24</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 12

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM,PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P23/29/95	INT	T	AFK		10-31-24	10-31-24
B	P29/94/95	INT	T	AFK		10-31-24	10-31-24
C	P94/95/96	INT	T	AFK		10-31-24	10-31-24
D	P23/95/96	INT	T	AFK		10-31-24	10-31-24
E	P23/96/97	INT	T	AFK		10-31-24	10-31-24
F	P94/96/97	INT	T	AFK		10-31-24	10-31-24
G	P23/97/98	INT	T	AFK		10-31-24	10-31-24
H	P94/97/98	INT	T	AFK		10-31-24	10-31-24
J	P22/23/98	INT	T	AFK		10-31-24	10-31-24
K	P94/98/99	INT	T	AFK		10-31-24	10-31-24
L	P22/47/99	INT	T	AFK		10-31-24	10-31-24
M	P47/94/99	INT	T	AFK		10-31-24	10-31-24
N	P47/94/100	NEOS	T	AFK		10-31-24	10-31-24
P	P45/47/94	INT	T	AFK		10-31-24	10-31-24
Q	P44/61	1m W of EEOS	DSX12	AFK		10-31-24	10-31-24
R	P34/39/48	INT	T	AFK		10-31-24	10-31-24
S	P47/94/100	SEOS	T	AFK		10-31-24	10-31-24
T	P94/96	6m S of NEOS	PT	AFK		10-31-24	10-31-24
U	P23/96	2m S OF NEOS	PT	AFK		10-31-24	10-31-24
V							
W							
X							

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 06-Nov-24

Appendix A-9

Geomembrane Repair Summary



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX9	2:49	RN

DATE October 19, 2024

SHEET NUMBER 1

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	5F	2024-10-19	3:18	P	1.0 x 2.0	RN	AFK	
2	5G	2024-10-19	3:26	P	0.4 x 0.4	RN	AFK	
3	5D	2024-10-19	3:10	G+W	0.2	RN	AFK	
4	5B	2024-10-19	3:15	G+W	0.2	RN	AFK	
5	4L	2024-10-19	3:40	P	1.0 x 2.0	RN	AFK	
6	5H	2024-10-19	4:08	P	1.0 x 2.0	RN	AFK	
7	4B	2024-10-19	4:10	G+W	0.2	RN	AFK	
8	4V	2024-10-19	3:12	G+W	0.2	RN	AFK	
9	4U	2024-10-19	3:18	G+W	0.2	RN	AFK	
10	4S	2024-10-19	3:20	G+W	0.5	RN	AFK	
11	4Q	2024-10-19	3:22	G+W	0.3	RN	AFK	
12	4N	2024-10-19	3:25	G+W	0.2	RN	AFK	
13	4K	2024-10-19	3:42	G+W	0.3	RN	AFK	
14	4H	2024-10-19	3:43	G+W	0.2	RN	AFK	
15	4F	2024-10-19	3:50	G+W	1.0	RN	AFK	
16	4D	2024-10-19	3:54	G+W	0.2	RN	AFK	
17	5A	2024-10-19	5:00	G+W	2.0	RN	AFK	
18	5E	2024-10-19	5:03	G+W	0.3	RN	AFK	
19	5C	2024-10-19	5:04	G+W	0.3	RN	AFK	
20	4X	2024-10-19	5:06	G+W	0.3	RN	AFK	
21	4W	2024-10-19	5:08	G+W	0.3	RN	AFK	
22	4T	2024-10-19	5:10	G+W	0.3	RN	AFK	
23	4R	2024-10-19	5:12	G+W	0.3	RN	AFK	
24	4P	2024-10-19	5:14	G+W	0.3	RN	AFK	
25	4M	2024-10-19	5:16	G+W	0.3	RN	AFK	

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
 P - PATCH

G & W - GRIND WELD
 C - CAP

REVIEWED BY: AFK

DATE: 06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
EXT40

NO.	TIME	TECH. ID
TX11	4:45	RN

DATE October 21, 2024

SHEET NUMBER 4

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	6G	2024-10-21	5:05	p	0.5 x 2.0	RN	AFK	
2	6D	2024-10-21	5:11	G+W	0.3	RN	AFK	
3	6H	2024-10-21	5:15	G+W	0.3	RN	AFK	
4	6J	2024-10-21	5:24	P	1.0 x 2.0	RN	AFK	
5	6F	2024-10-21	5:37	P	0.5 x 2.0	RN	AFK	
6	5L	2024-10-21	4:50	G+W	0.3	RN	AFK	
7	5Q	2024-10-21	4:53	G+W	0.3	RN	AFK	
8	5S	2024-10-21	4:55	G+W	0.3	RN	AFK	
9	5U	2024-10-21	4:57	G+W	0.3	RN	AFK	
10	5X	2024-10-21	5:00	G+W	0.3	RN	AFK	
11	6B	2024-10-21	5:03	G+W	0.3	RN	AFK	
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

REPAIR TYPE : RS - RECONSTRUCTED SEAM G & W - GRIND WELD
 P - PATCH C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
EXT40

NO.	TIME	TECH. ID
TX12	3:32	RN

DATE October 23, 2024

SHEET NUMBER 5

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	5M	2024-10-23	3:45	G+W	0.3	RN	AFK	
2	5R	2024-10-23	3:48	G+W	0.3	RN	AFK	
3	5T	2024-10-23	3:50	G+W	0.3	RN	AFK	
4	5V	2024-10-23	3:53	G+W	0.3	RN	AFK	
5	5W	2024-10-23	3:55	G+W	0.3	RN	AFK	
6	6A	2024-10-23	3:58	G+W	0.3	RN	AFK	
7	6K	2024-10-23	4:00	G+W	1.5	RN	AFK	
8	6C	2024-10-23	4:05	G+W	0.2	RN	AFK	
9	6U	2024-10-23	4:10	P	1.5 x 2.0	RN	AFK	
10	6T	2024-10-23	4:14	P	1.5 x 2.5	RN	AFK	
11	6E	2024-10-23	4:20	G+W	0.2	RN	AFK	
12	6Q	2024-10-23	4:16	P	1.0 x 2.0	RN	AFK	
13	6R	2024-10-23	4:22	G+W	0.2	RN	AFK	
14	6P	2024-10-23	4:28	G+W	0.2	RN	AFK	
15	6L	2024-10-23	5:00	P	1.5 x 2.0	RN	AFK	
16	6M	2024-10-23	4:35	G+W	0.2	RN	AFK	
17	6N	2024-10-23	5:10	G+W	0.2	RN	AFK	
18	6V	2024-10-23	5:39	G+W	0.4	RN	AFK	
19	6S	2024-10-23	5:42	G+W	0.3	RN	AFK	
20								
21								
22								
23								
24								
25								

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
P - PATCH

G & W - GRIND WELD
C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX13	2:30	JR

DATE October 25, 2024

SHEET NUMBER 6

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	7A	2024-10-25	3:20	P	1.0 x 1.5	JR	AFK	
2	7L	2024-10-25	3:10	P	1.0 x 2.0	JR	AFK	
3	7M	2024-10-25	3:02	P	1.0 x 2.0	JR	AFK	
4	7J	2024-10-25	3:12	G+W	0.3	JR	AFK	
5	8A	2024-10-25	3:05	G+W	0.3	JR	AFK	
6	7H	2024-10-25	3:50	P	0.4 x 0.4	JR	AFK	
7	7G	2024-10-25	4:05	P	0.5 x 2.0	JR	AFK	
8	7E	2024-10-25	4:07	G+W	0.3	JR	AFK	
9	5N	2024-10-25	4:09	G+W	0.3	JR	AFK	
10	5P	2024-10-25	4:12	G+W	0.3	JR	AFK	
11	7N	2024-10-25	4:15	P	2.0 x 2.0	JR	AFK	
12	7D	2024-10-25	4:17	G+W	0.3	JR	AFK	
13	8B	2024-10-25	3:03	P	1.0 x 2.0	JR	AFK	
14	7U	2024-10-25	3:38	P	1.0 x 1.0	JR	AFK	
15	7S	2024-10-25	5:05	G+W	0.3	JR	AFK	
16	7T	2024-10-25	5:07	G+W	0.3	JR	AFK	
17	8C	2024-10-25	5:15	G+W	0.4	JR	AFK	
18	7P	2024-10-25	5:16	G+W	0.3	JR	AFK	
19	7Q	2024-10-25	5:18	G+W	0.3	JR	AFK	
20	7R	2024-10-25	5:20	G+W	0.3	JR	AFK	
21	7K	2024-10-25	5:22	G+W	0.3	JR	AFK	
22	7B	2024-10-25	5:23	G+W	0.5	JR	AFK	
23	7V	2024-10-25	5:30	G+W	0.3	JR	AFK	
24	7F	2024-10-25	5:33	G+W	0.5	JR	AFK	
25	7C	2024-10-25	5:45	G+W	0.5	JR	AFK	

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
 P - PATCH

G & W - GRIND WELD
 C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
EXT4

NO.	TIME	TECH. ID
TX13	2:30	JR

DATE October 25, 2024

SHEET NUMBER 7

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	7W	2024-10-25	5:40	P	1.0 X 2.0	JR	AFK	
2	7X	2024-10-25	5:55	P	1.0 X 1.0	JR	AFK	
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

REPAIR TYPE : RS - RECONSTRUCTED SEAM G & W - GRIND WELD
 P - PATCH C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX14	9:05	RN
TX15	3:32	RN

DATE October 29, 2024

SHEET NUMBER 8

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	8F	2024-10-29	9:41	P	0.4 x 0.5	RN	AFK	
2	8E	2024-10-29	9:54	G+W	0.3	RN	AFK	
3	8D	2024-10-29	9:48	G+W	1	RN	AFK	
4	10T	2024-10-29	9:53	P	0.5 x 1.5	RN	AFK	
5	9C	2024-10-29	9:59	P	0.4 x 0.4	RN	AFK	
6	8G	2024-10-29	10:12	P	0.4 x 0.4	RN	AFK	
7	8H	2024-10-29	10:15	P	0.4 x 0.4	RN	AFK	
8	8R	2024-10-29	10:30	P	1.0 x 2.0	RN	AFK	
9	9X	2024-10-29	10:45	P	1.0 x 2.0	RN	AFK	
10	8Q	2024-10-29	11:20	P	0.8 x 1.5	RN	AFK	
11	8P	2024-10-29	11:44	P	1.0 x 2.0	RN	AFK	
12	8J	2024-10-29	11:49	P	1.0 x 2.0	RN	AFK	
13	8K	2024-10-29	11:53	P	0.4 x 0.4	RN	AFK	
14	8L	2024-10-29	12:00	P	0.5 x 0.5	RN	AFK	
15	8N	2024-10-29	12:26	P	1.0 x 2.0	RN	AFK	
16	8M	2024-10-29	12:30	P	1.0 x 2.0	RN	AFK	
17	9P	2024-10-29	12:44	P	1.0 x 2.0	RN	AFK	
18	11C	2024-10-29	12:55	G+W	0.4	RN	AFK	
19	9F	2024-10-29	1:01	P	0.8 x 0.8	RN	AFK	
20	11D	2024-10-29	1:05	G+W	1.5	RN	AFK	
21	11E	2024-10-29	1:06	G+W	0.4	RN	AFK	
22	10G	2024-10-29	4:00	P	0.5 x 1.0	RN	AFK	
23	10E	2024-10-29	4:33	G+W	0.4	RN	AFK	
24	11J	2024-10-29	4:40	G+W	0.4	RN	AFK	
25	9W	2024-10-29	4:42	P	1.0 x 2.0	RN	AFK	

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
 P - PATCH

G & W - GRIND WELD
 C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX15	3:32	RN

DATE October 29, 2024

SHEET NUMBER 9

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	11G	2024-10-29	5:06	P	0.8 x 0.8	RN	DS	
2	11K	2024-10-29	6:00	G+W	1.0	RN	DS	
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

REPAIR TYPE : RS - RECONSTRUCTED SEAM G & W - GRIND WELD
 P - PATCH C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX16	2:50	RN

DATE October 30, 2024

SHEET NUMBER 10

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	10P	2024-10-30	3:30	G+W	0.3	RN	AFK	
2	10N	2024-10-30	3:32	G+W	0.3	RN	AFK	
3	10M	2024-10-30	3:33	G+W	0.3	RN	AFK	
4	10L	2024-10-30	3:35	G+W	0.3	RN	AFK	
5	10K	2024-10-30	3:36	G+W	0.3	RN	AFK	
6	10J	2024-10-30	3:37	G+W	0.3	RN	AFK	
7	10H	2024-10-30	3:39	G+W	0.3	RN	AFK	
8	9V	2024-10-30	3:43	G+W	0.3	RN	AFK	
9	9U	2024-10-30	3:44	G+W	0.3	RN	AFK	
10	9T	2024-10-30	3:45	G+W	0.3	RN	AFK	
11	9S	2024-10-30	3:46	G+W	0.3	RN	AFK	
12	9R	2024-10-30	3:47	G+W	0.3	RN	AFK	
13	9Q	2024-10-30	3:48	G+W	0.3	RN	AFK	
14	9N	2024-10-30	3:49	G+W	0.3	RN	AFK	
15	9M	2024-10-30	3:50	G+W	0.3	RN	AFK	
16	9L	2024-10-30	3:51	G+W	0.3	RN	AFK	
17	9K	2024-10-30	3:52	G+W	0.3	RN	AFK	
18	9J	2024-10-30	3:54	G+W	0.3	RN	AFK	
19	9H	2024-10-30	3:56	G+W	0.3	RN	AFK	
20	9G	2024-10-30	3:58	G+W	0.3	RN	AFK	
21	9E	2024-10-30	3:59	G+W	0.3	RN	AFK	
22	9D	2024-10-30	4:00	G+W	0.3	RN	AFK	
23	9B	2024-10-30	4:03	G+W	0.3	RN	AFK	
24	8X	2024-10-30	4:05	G+W	0.3	RN	AFK	
25								

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
 P - PATCH

G & W - GRIND WELD
 C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX16	2:50	RN

DATE October 30, 2024

SHEET NUMBER 11

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	8W	2024-10-30	4:08	G+W	0.3	RN	AFK	
2	11B	2024-10-30	4:10	G+W	0.3	RN	AFK	
3	8S	2024-10-30	4:12	G+W	0.3	RN	AFK	
4	8T	2024-10-30	4:13	G+W	0.3	RN	AFK	
5	8U	2024-10-30	4:14	G+W	0.3	RN	AFK	
6	8V	2024-10-30	4:16	G+W	0.3	RN	AFK	
7	10U	2024-10-30	4:17	G+W	0.3	RN	AFK	
8	10V	2024-10-30	4:19	G+W	0.3	RN	AFK	
9	10W	2024-10-30	4:20	G+W	0.3	RN	AFK	
10	10X	2024-10-30	4:22	G+W	0.3	RN	AFK	
11	11A	2024-10-30	4:25	G+W	0.5	RN	AFK	
12	11F	2024-10-30	4:58	G+W	1.0	RN	AFK	
13	10C	2024-10-30	5:01	G+W	0.3	RN	AFK	
14	10D	2024-10-30	5:05	G+W	0.3	RN	AFK	
15	10S	2024-10-30	5:06	G+W	0.3	RN	AFK	
16	10R	2024-10-30	5:08	G+W	0.3	RN	AFK	
17	10A	2024-10-30	5:10	G+W	0.3	RN	AFK	
18	10B	2024-10-30	5:11	G+W	0.3	RN	AFK	
19	10Q	2024-10-30	5:12	G+W	0.3	RN	AFK	
20	10F	2024-10-30	5:14	G+W	0.3	RN	AFK	
21	11T	2024-10-30	6:08	P	1.0 x 2.0	RN	AFK	
22	11R	2024-10-30	6:16	P	0.4 x 0.5	RN	AFK	
23	11Q	2024-10-30	6:30	P	0.4 x 0.5	RN	AFK	
24	11S	2024-10-30	6:45	P	1.0 x 2.0	RN	AFK	
25								

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
 P - PATCH

G & W - GRIND WELD
 C - CAP

REVIEWED BY: AFK

06-Nov-24



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
OWNER: Waste Connections
LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
CONTRACTOR: Titan
CLIENT: WSP Canada

MACHINE NUMBER
EXT40

NO.	TIME	TECH. ID
TX17	9:13	RN

DATE October 31, 2024

SHEET NUMBER 13

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. SIZE (m)	WELD TECH.	MON.	REMARKS
1	12Q	31-Oct	9:30	P	1.0 x 2.0	RN	AFK	
2	12R	31-Oct	9:39	G+W	0.4	RN	AFK	
3	11H	31-Oct	9:50	P	0.5 x 1.5	RN	AFK	
4	12J	31-Oct	10:15	P	0.5 x 2.0	RN	AFK	
5	12U	31-Oct	10:20	P	0.5 x 0.8	RN	AFK	
6	11M	31-Oct	10:33	P	0.4 x 0.4	RN	AFK	
7	11L	31-Oct	10:44	P	1.0 x 2.0	RN	AFK	
8	10P	31-Oct	11:05	G+W	0.3	RN	AFK	
9	12P	31-Oct	11:08	G+W	0.3	RN	AFK	
10	12N	31-Oct	11:10	G+W	1.0	RN	AFK	
11	12S	31-Oct	11:12	G+W	0.3	RN	AFK	
12	12M	31-Oct	11:14	G+W	0.3	RN	AFK	
13	12L	31-Oct	11:15	G+W	0.3	RN	AFK	
14	12K	31-Oct	11:17	G+W	0.3	RN	AFK	
15	12H	31-Oct	11:19	G+W	0.3	RN	AFK	
16	12G	31-Oct	11:20	G+W	0.3	RN	AFK	
17	12F	31-Oct	11:22	G+W	0.3	RN	AFK	
18	12E	31-Oct	11:23	G+W	0.3	RN	AFK	
19	12T	31-Oct	11:25	G+W	0.3	RN	AFK	
20	12D	31-Oct	11:27	G+W	0.3	RN	AFK	
21	12C	31-Oct	11:34	G+W	0.3	RN	AFK	
22	12A	31-Oct	11:36	G+W	0.3	RN	AFK	
23	12B	31-Oct	11:38	G+W	0.3	RN	AFK	
24								
25								

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
P - PATCH

G & W - GRIND WELD
C - CAP

REVIEWED BY: AFK

06-Nov-24

Appendix A-10

Geomembrane Seam and Repair Vacuum Test Summary



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 1

SEAMS											
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES			
1	P5/25	5K	EEOS	2024-10-24	DP	N		X	Y	KC	
2	P6/25	WEOS	5F	2024-10-24	DP	N	X		Y	KC	
3	P6/25	5F	EEOS	2024-10-24	DP	N		X	Y	KC	
4	P7/25	WEOS	5J	2024-10-24	DP	N		X	Y	KC	
5	P16/26	EEOS	WEOS	2024-10-24	DP	N		X	Y	KC	
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS							
	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	5A	2024--10-24	DP	N	Y	KC	
22	5E	2024--10-24	DP	N	Y	KC	
23	5D	2024--10-24	DP	N	Y	KC	
24	5C	2024--10-24	DP	N	Y	KC	
25	5B	2024--10-24	DP	N	Y	KC	
26	5K	2024--10-24	DP	N	Y	KC	
27	5F	2024--10-24	DP	N	Y	KC	
28	5J	2024--10-24	DP	N	Y	KC	
29	4V	2024--10-24	DP	N	Y	KC	
30	5G	2024--10-24	DP	N	Y	KC	
31	4U	2024--10-24	DP	N	Y	KC	
32	4T	2024--10-24	DP	N	Y	KC	
33	4S	2024--10-24	DP	N	Y	KC	
34	4R	2024--10-24	DP	N	Y	KC	
35	4Q	2024--10-24	DP	N	Y	KC	
36	4P	2024--10-24	DP	N	Y	KC	
37	4N	2024--10-24	DP	N	Y	KC	
38	4M	2024--10-24	DP	N	Y	KC	
39	4L	2024--10-24	DP	N	Y	KC	
40	4K	2024--10-24	DP	N	Y	KC	
41							

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)

** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 2

SEAMS											
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES			
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS							
	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	4J	2024--10-24	DP	N	Y	KC	
22	4H	2024--10-24	DP	N	Y	KC	
23	4G	2024--10-24	DP	N	Y	KC	
24	4F	2024--10-24	DP	N	Y	KC	
25	4E	2024--10-24	DP	N	Y	KC	
26	4D	2024--10-24	DP	N	Y	KC	
27	4C	2024--10-24	DP	N	Y	KC	
28	5H	2024--10-24	DP	N	Y	KC	
29	4B	2024--10-24	DP	N	Y	KC	
30	4A	2024--10-24	DP	N	Y	KC	
31	4W	2024--10-24	DP	N	Y	KC	
32	4X	2024--10-24	DP	N	Y	KC	
33							
34							
35							
36							
37							
38							
39							
40							
41							

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 3

SEAMS											
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES			
1	P34/36	WEOS	6V	2024-10-25	JC	N		X	Y	KC	
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS							
	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	5M	2024-10-25	JC	N	Y	KC	
22	6G	2024-10-25	JC	N	Y	KC	
23	5Q	2024-10-25	JC	N	Y	KC	
24	5R	2024-10-25	JC	N	Y	KC	
25	6H	2024-10-25	JC	N	Y	KC	
26	5S	2024-10-25	JC	N	Y	KC	
27	5U	2024-10-25	JC	N	Y	KC	
28	6J	2024-10-25	JC	N	Y	KC	
29	5X	2024-10-25	JC	N	Y	KC	
30	5W	2024-10-25	JC	N	Y	KC	
31	6A	2024-10-25	JC	N	Y	KC	
32	6K	2024-10-25	JC	N	Y	KC	
33	6B	2024-10-25	JC	N	Y	KC	
34	6C	2024-10-25	JC	N	Y	KC	
35	6T	2024-10-25	JC	N	Y	KC	
36	6U	2024-10-25	JC	N	Y	KC	
37	6S	2024-10-25	JC	N	Y	KC	
38	6R	2024-10-25	JC	N	Y	KC	
39	6Q	2024-10-25	JC	N	Y	KC	
40	6E	2024-10-25	JC	N	Y	KC	
41	6P	2024-10-25	JC	N	Y	KC	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 4

SEAMS											
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES			
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS							
	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	6N	2024-10-25	JC	N	Y	KC	
22	6M	2024-10-25	JC	N	Y	KC	
23	6L	2024-10-25	JC	N	Y	KC	
24	6V	2024-10-25	JC	N	Y	KC	
25	6F	2024-10-25	JC	N	Y	KC	
26	5P	2024-10-25	JC	N	Y	KC	
27	5N	2024-10-25	JC	N	Y	KC	
28	6D	2024-10-25	JC	N	Y	KC	
29	5T	2024-10-25	JC	N	Y	KC	
30	5V	2024-10-25	JC	N	Y	KC	
31	8C	2024-10-25	JC	N	Y	KC	
32	7L	2024-10-25	JC	N	Y	KC	
33	7M	2024-10-25	JC	N	Y	KC	
34	7T	2024-10-25	JC	N	Y	KC	
35	8A	2024-10-25	JC	N	Y	KC	
36	7S	2024-10-25	JC	N	Y	KC	
37	7R	2024-10-25	JC	N	Y	KC	
38	7Q	2024-10-25	JC	N	Y	KC	
39	7P	2024-10-25	JC	N	Y	KC	
40	7A	2024-10-25	JC	N	Y	KC	
41	7U	2024-10-25	JC	N	Y	KC	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)

** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 5

SEAMS											REPAIRS								
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS		DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES											
1	P17/P40	EEOS	NEOS	2024-10-25	JC	NO		X	Y	KC	7A	21	8B	2024-10-25	JC	N	Y	KC	
2												22	7K	2024-10-25	JC	N	Y	KC	
3												23	7J	2024-10-25	JC	N	Y	KC	
4												24	7H	2024-10-25	JC	N	Y	KC	
5												25	7G	2024-10-25	JC	N	Y	KC	
6												26	7F	2024-10-25	JC	N	Y	KC	
7												27	7E	2024-10-25	JC	N	Y	KC	
8												28	7N	2024-10-25	JC	N	Y	KC	
9												29	7D	2024-10-25	JC	N	Y	KC	
10												30	7C	2024-10-25	JC	N	Y	KC	
11												31	7B	2024-10-25	JC	N	Y	KC	
12												32	7V	2024-10-25	JC	N	Y	KC	
13												33	7W	2024-10-25	JC	N	Y	KC	
14												34	7X	2024-10-25	JC	N	Y	KC	
15												35	6F	2024-10-25	JC	N	Y	KC	
16												36							
17												37							
18												38							
19												39							
20												40							
												41							

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)

** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 6

SEAMS											
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES			
1	P69/70	DSF25	9A	Y	CN	N		X	Y	DS	
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS							
	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	8D	31/10/2024	CN	N	Y	DS	
22	10T	31/10/2024	CN	N	Y	DS	
23	8G	31/10/2024	CN	N	Y	DS	
24	8H	31/10/2024	CN	N	Y	DS	
25	12R	31/10/2024	CN	N	Y	DS	
26	8W	31/10/2024	CN	N	Y	DS	
27	8X	31/10/2024	CN	N	Y	DS	
28	11B	31/10/2024	CN	N	Y	DS	
29	8S	31/10/2024	CN	N	Y	DS	
30	8R	31/10/2024	CN	N	Y	DS	
31	9A	31/10/2024	CN	N	Y	DS	
32	8T	31/10/2024	CN	N	Y	DS	
33	8U	31/10/2024	CN	N	Y	DS	
34	8V	31/10/2024	CN	N	Y	DS	
35	10U	31/10/2024	CN	N	Y	DS	
36	10V	31/10/2024	CN	N	Y	DS	
37	10W	31/10/2024	CN	N	Y	DS	
38	8Q	31/10/2024	CN	N	Y	DS	
39	10X	31/10/2024	CN	N	Y	DS	
40	11A	31/10/2024	CN	N	Y	DS	
41	9B	31/10/2024	CN	N	Y	DS	

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 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 7

SEAMS										
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
	FROM	TO				NO	YES			
1	P52/53	DSF23B1 DSF23B	31/10/2024	CN	N	X		Y	DS	
2	P52/53	DSF23B DSF23	31/10/2024	CN	N	X		Y	DS	
3	P52/53	DSF23 NEOS	31/10/2024	CN	N		X	Y	DS	
4	P44/61	WEOS DSF26B	31/10/2024	CN	N	X		Y	DS	
5	P44/61	DSF26B EEOS	31/10/2024	CN	N	X		Y	DS	
6	P44/62	WEOS DSF26	31/10/2024	CN	N	X		Y	DS	
7	P44/62	DSF26 DSF26A	31/10/2024	CN	N	X		Y	DS	
8	P44/62	DSF26A EEOS	31/10/2024	CN	N		X	Y	DS	
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	9C	31/10/2024	CN	N	Y	DS
22	9D	31/10/2024	CN	N	Y	DS
23	11E	31/10/2024	CN	N	Y	DS
24	11R	31/10/2024	CN	N	Y	DS
25	11J	31/10/2024	CN	N	Y	DS
26	9E	31/10/2024	CN	N	Y	DS
27	9F	31/10/2024	CN	N	Y	DS
28	11D	31/10/2024	CN	N	Y	DS
29	9G	31/10/2024	CN	N	Y	DS
30	9H	31/10/2024	CN	N	Y	DS
31	11C	31/10/2024	CN	N	Y	DS
32	8K	31/10/2024	CN	N	Y	DS
33	8E	31/10/2024	CN	N	Y	DS
34	9J	31/10/2024	CN	N	Y	DS
35	9K	31/10/2024	CN	N	Y	DS
36	9L	31/10/2024	CN	N	Y	DS
37	8L	31/10/2024	CN	N	Y	DS
38	8F	31/10/2024	CN	N	Y	DS
39	11S	31/10/2024	CN	N	Y	DS
40	9M	31/10/2024	CN	N	Y	DS
41	9N	31/10/2024	CN	N	Y	DS

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 8

SEAMS											
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES			
1	P80/81	10K	EEOS	31/10/2024	CN	N		X	Y	DS	
2	P85/86	WEOS	EEOS	31/10/2024	CN	N		X	Y	DS	
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS							
	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	9Q	31/10/2024	CN	N	Y	DS	
22	11T	31/10/2024	CN	N	Y	DS	
23	8M	31/10/2024	CN	N	Y	DS	
24	8N	31/10/2024	CN	N	Y	DS	
25	9R	31/10/2024	CN	N	Y	DS	
26	9S	31/10/2024	CN	N	Y	DS	
27	9T	31/10/2024	CN	N	Y	DS	
28	9U	31/10/2024	CN	N	Y	DS	
29	9V	31/10/2024	CN	N	Y	DS	
30	10S	31/10/2024	CN	N	Y	DS	
31	10H	31/10/2024	CN	N	Y	DS	
32	10J	31/10/2024	CN	N	Y	DS	
33	10L	31/10/2024	CN	N	Y	DS	
34	10M	31/10/2024	CN	N	Y	DS	
35	10S	31/10/2024	CN	N	Y	DS	
36	10D	31/10/2024	CN	N	Y	DS	
37	10C	31/10/2024	CN	N	Y	DS	
38	9X	31/10/2024	CN	N	Y	DS	
39	10A	31/10/2024	CN	N	Y	DS	
40	10B	31/10/2024	CN	N	Y	DS	
41	11G	31/10/2024	CN	N	Y	DS	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)

** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 9

SEAMS									
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	SEAM NUMBER	SEAM SECTION * FROM TO	TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE NO YES	OBS. TEST	MON.	REMARKS

REPAIRS							
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
	11J	31/10/2024	CN	N	Y	DS	
	10R	31/10/2024	CN	N	Y	DS	
	9W	31/10/2024	CN	N	Y	DS	
	10Q	31/10/2024	CN	N	Y	DS	
	10F	31/10/2024	CN	N	Y	DS	
	10E	31/10/2024	CN	N	Y	DS	
	10P	31/10/2024	CN	N	Y	DS	
	11K	31/10/2024	CN	N	Y	DS	
	11H	31/10/2024	CN	N	Y	DS	
	12P	31/10/2024	CN	N	Y	DS	
	12N	31/10/2024	CN	N	Y	DS	
	8A	31/10/2024	CN	N	Y	DS	
	12S	31/10/2024	CN	N	Y	DS	
	12L	31/10/2024	CN	N	Y	DS	
	12J	31/10/2024	CN	N	Y	DS	
	12K	31/10/2024	CN	N	Y	DS	
	12G	31/10/2024	CN	N	Y	DS	
	12H	31/10/2024	CN	N	Y	DS	
	8P	31/10/2024	CN	N	Y	DS	
	8J	31/10/2024	CN	N	Y	DS	
	10G	31/10/2024	CN	N	Y	DS	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMP
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 10

SEAMS											
	SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
		FROM	TO				NO	YES			
1	P23/96	WEOS	12U	31/10/2024	CN	N		X	Y	DS	
2	P94/96	12T	11M	31/10/2024	CN	N		X	Y	DS	
3	P47/94	NEOS	SEOS	31/10/2024	CN	N		X	Y	DS	
4	P22/96	NEOS	12U	31/10/2024	CN	N		X	Y	DS	
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS							
	DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	12F	31/10/2024	CN	N	Y	DS	
22	12E	31/10/2024	CN	N	Y	DS	
23	12T	31/10/2024	CN	N	Y	DS	
24	12U	31/10/2024	CN	N	Y	DS	
25	11M	31/10/2024	CN	N	Y	DS	
26	12D	31/10/2024	CN	N	Y	DS	
27	12C	31/10/2024	CN	N	Y	DS	
28	11L	31/10/2024	CN	N	Y	DS	
29	12A	31/10/2024	CN	N	Y	DS	
30	12B	31/10/2024	CN	N	Y	DS	
31	10N	31/10/2024	CN	N	Y	DS	
32	11F	31/10/2024	CN	N	Y	DS	
33	10K	31/10/2024	CN	N	Y	DS	
34	11N	31/10/2024	CN	N	Y	DS	
35	11P	31/10/2024	CN	N	Y	DS	
36	11Q	31/10/2024	CN	N	Y	DS	
37	11J	31/10/2024	CN	N	Y	DS	
38	12Q	31/10/2024	CN	N	Y	DS	
39	12M	31/10/2025	CN	N	Y	DS	
40							
41							

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 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 06-Nov-24

Appendix B

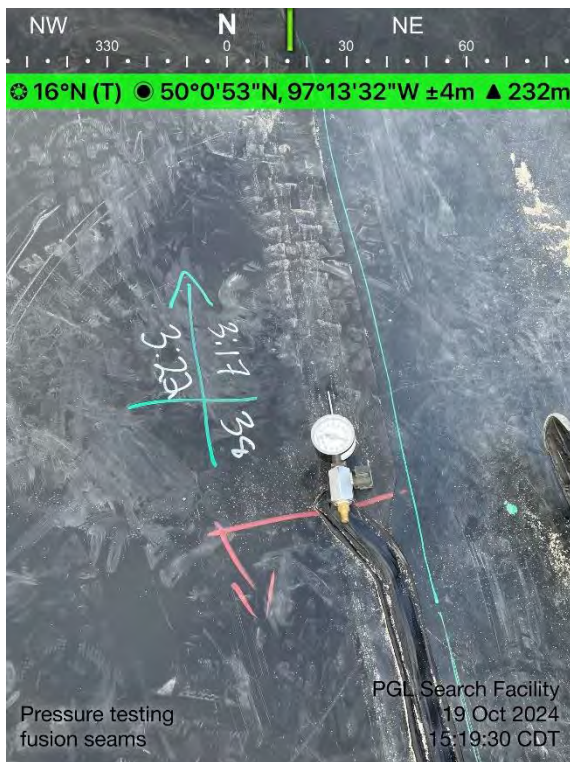
Construction Photo Summary



Smooth Liner deployment on South Berm



Fusion Seaming Toe of Berm



Air Testing Fusion Seam



Vacuum Box testing Repairs



GCL placement North side of Search Pad



Bentonite placement in seam of GCL



South Containment Berm Complete



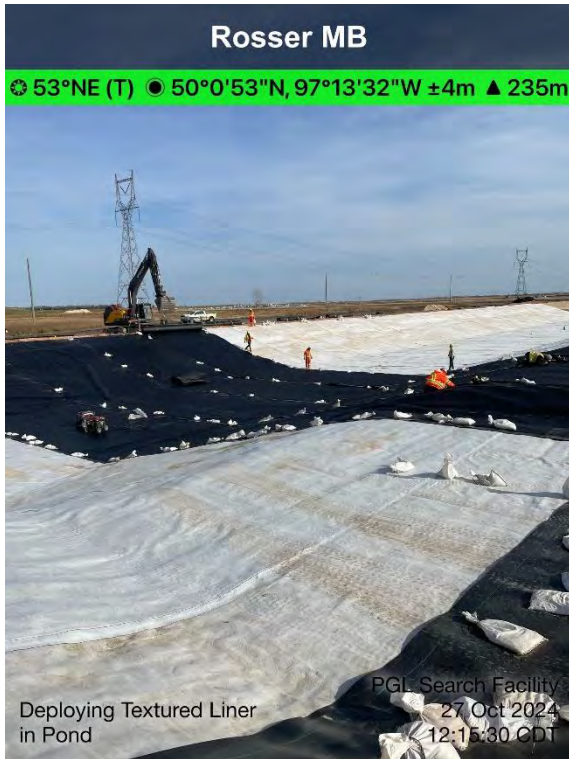
West Containment Berm looking North



GCL placement in Pond



Testing Destructs



Deploying Textured Liner in Pond



Extruding T's for air testing



Mob 2 Completed

Appendix C

Prairie Green IWMF Search Facility Pad- Mob I

CQA Geosynthetics Monitoring Program



Quality Engineering | Valued Relationships

WSP Canada Inc

Prairie Green IWMF Search Facility Pad – Mob I

CQA Geosynthetics Monitoring Program

Prepared for:

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB
Attention: Derek Dreger

Distribution:

Fabiano Gondim

Project Number:

1000 043-27

Date:

October 3, 2024
Final Report



Quality Engineering | Valued Relationships

October 3, 2024

Our File No. 1000-043-27

Derek Dreger, P.Eng., PMP, FEC
WSP Canada Inc.
1600 Buffalo Place,
Winnipeg, MB
R3T 6B8


**RE: CQA Geosynthetics Monitoring Report for
Prairie Green IWMF Search Facility Pad- Mob 1**

TREK Geotechnical Inc. is pleased to submit our report for the Quality Assurance inspection services for the Prairie Green IWMF Search Facility Pad-Mob 1.

Please contact Angela Fidler-Kliewer if you have any questions. Thank you for the opportunity to serve you on this assignment.

Sincerely,

TREK Geotechnical Inc.
Per:


Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

cc: Angela Fidler-Kliewer C. Tech. (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	AFK	October 3, 2024	Final Report

Authorization Signatures

Prepared By:



Angela Fidler-Kliewer C. Tech.
Manager of Laboratory and Field Services

Reviewed By:



Nelson Ferreira, Ph.D., P.Eng.
Geotechnical Engineer, Principal

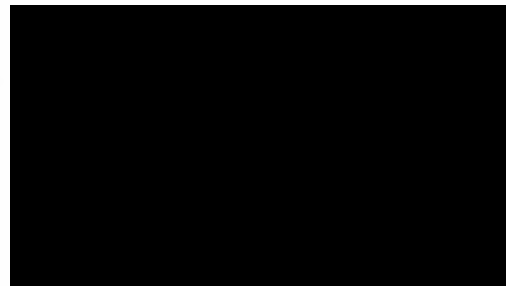


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Drawing 1 As-built Primary 60-mil HDPE Geosynthetic Liner

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Appendix A Geosynthetic Liner Documentation

A-1 - Geosynthetic and GCL Manufacturer's Quality Control Documentation

A-2 - Certificate of Acceptance- Subgrade

A-3 - Geomembrane Deployment Inspection Summary

A-4 - Geomembrane Trial Seam Summary

A-5 - Geomembrane Weld Inspection

A-6 - Geomembrane Seam Destructive Test Summary

- Fusion and Extrusion Seam Destructive Test Record

A-7 - Geomembrane Seam Pressure Test Log

A-8 - Geomembrane Defect Repair Summary

A-9 - Geomembrane Repair Log

A-10 - Geomembrane Seam Vacuum Test Log

Appendix B Photos

1.0 Introduction

1.1 Background

The Prairie Green Integrated Waste Management Facility is located in the Rural Municipality of Rosser, close to the City of Winnipeg (Township 12, Range 2 East of the Principal Meridian). Waste Connections of Canada Inc. (WCC) is the owner and operates the facility.

This report summarizes the Quality Assurance (QA) inspections and testing services associated with construction of the Search Facility Pad the work associated with installing a GCL and HDPE Geomembrane liner – Mob 1. The area constructed is about 1.2 Ha of a total of approximately 2.7 HA of pad to be constructed and comprises the building area in the South section of the pad.

The QA work was conducted in accordance with the Contract Documents and Project Specifications provided by WSP Canada Inc. The construction of geosynthetics for the Search Facility Pad - Mob 1 commenced on September 14, 2024, and was completed on September 24, 2024.

1.2 Companies Involved in the Construction of the Search Facility Pad

The following sections summarize the roles and responsibilities of the companies involved in the design, construction, supervision, review, coordination and quality assurance services associated with the construction of Search Facility Pad – Mob 1.

WSP Canada Inc. (Designer):

- Search Facility Pad – Mob 1 design, excluding geotechnical design, and
- Preparation of construction documents, project specifications and tender
- Contract Administration during construction including QA testing of materials (excluding GCL and HDPE placement)

Earthmax Construction Inc (Prime Contractor) with Titan Environmental Containment Ltd. (Sub-Contractor):

- The prime contractor for the construction of Search Facility pad is Earth Max Construction Inc. (Earthmax) from Arborg, Manitoba. They performed the earthworks, including placement of the granular fill, and sand fill placement
- Titan Environmental Containment Ltd (Titan) was responsible for the installation of the GCL and the 1.5 mm (60 mil) thick High-Density Polyethylene (HDPE) membrane.

TREK Geotechnical Inc. (CQA Inspection):

- Overall review and inspection of the geosynthetics installation
- QA inspection, testing and approval of the GCL and 1.5 mm (60 mil) HDPE membrane liner materials including review of manufacturer's factory quality control and materials testing, field liner sheet installation, non-destructive seam testing, destructive sampling and testing of field seams, repairs and vacuum box testing

1.3 GCL Liner Materials

The geosynthetic clay liner (GCL) used on this project consisted of Bentoliner provided by Solmax Geosynthetic LLC. A total of 27 rolls of GCL were delivered and inventoried on site, comprising of 4.27 m wide and 45.72 m long panels. The GCL was installed on the prepared subgrade by HDPE membrane. TREK monitored the installation of the liners including overlaps, tears, defects and subsequent repairs to the material. The manufacturer's Quality Control (QC) documentation of the GCL material delivered to site is presented in Appendix A-1.

1.4 GCL Panel Deployment

Panel deployment for the liner was carried out between September 18, 2024 and September 20, 2024. Approximately 4,965 m² of GCL material was placed out of 17,888 m².

Placement of the GCL was accomplished using an excavator and manual labour. A minimum overlap of 300 mm was maintained between adjoining panels. Powdered bentonite was placed and spread manually in the overlap.

During deployment of the GCL panels, TREK personnel carried out the following inspection and testing:

- measurements of the panel length;
- confirmation of panel overlap and bentonite placement in the seams;
- visual observations of overall material quality;

Upon completion of the GCL installation, the works were inspected by the Geosynthetics Installer (Titan) and the liner CQA Inspector (TREK), prior to HDPE geomembrane liner installation.

2.0 HDPE Geomembrane Liner Installation

The following section summarizes the installation of the 1.5 mm thick (60 mil), smooth HDPE membrane liner system. All materials utilized, as well as the installation process, met specifications and were inspected as per the Contract Documents and Project Specification.

2.1 Search Facility Pad Subgrade

Prior to the GCL and Geomembrane deployment, the sub-grade was inspected by the Titan Environmental, Earthmax and Trek Geotechnical and was formally accepted by Titan. Copies of the soil surface acceptance certificates are presented in Appendix A-2.

2.2 Membrane Liner Materials

The membrane (liner) material used on this contract consisted of 1.5 mm thick (60 mil), smooth and high-density polyethylene (HDPE) installed by Titan.

A total of 21 rolls of 7.5 m wide and 170 m long panels of smooth membrane were delivered and inventoried onsite for this project. The HDPE liner materials were manufactured and supplied by Solmax. The manufacturer's Quality Control (QC) documentation for the membrane materials was provided by Solmax and indicates that all membrane used in the Search Facility Pad - Mob 1 is in compliance with the project specifications.

2.3 HDPE Liner Panel Deployment

Panel deployment for the HDPE liner was carried out between September 18, 2024 and September 20, 2024. Repair operations on the Search Facility Pad – Mob 1 took place until September 24, 2024. Approximately 12,355 m² of HDPE liner material was placed out of 28,076 m².

During deployment of the primary HDPE liner panels, TREK personnel carried out the following inspection and testing:

- measurements of the panel thickness
- confirmation of panel overlaps
- visual observations of overall sheet quality
- assignment of a unique identification number for each panel placed

Placement of the HDPE liner was accomplished using an excavator and manual labour. A minimum

overlap of 150 mm was typically maintained between adjoining panels. The average panel thickness was determined by averaging the measurements made along each of the leading, two sides and trailing edges utilizing a Starret Micrometer.

Panel numbers were assigned a unique identification number according to the order in which they were installed. Deployment of the HDPE liner consisted of panels P1 to P23, respectively. The arrangement and designation of the various panels for the HDPE liner are presented on Drawing 1. The deployment Inspection Logs are provided in Appendix A-3.

Upon completion of the HDPE liner installation, the works were inspected by Titan and TREK personnel.

2.4 Trial Seams

The welding equipment used by Titan included double hot wedge fusion welders (production welding along panel seams and cap repairs) and hand-held extrusion fillet welders (for detailing, liner repairs, and reconstruction of failed fusion seam lengths).

TREK personnel monitored trial seams during daily start-up, and at approximately every five hours during continuous operation of each welding apparatus. Six sample coupons were cut from each test sample for tensile strength testing as follows:

- Four coupons were tested in the peel mode in accordance with ASTM D6392
- Two coupons were tested in the shear mode in accordance with ASTM D6392

A summary of the daily trial seaming for the equipment used during each workday is provided in Appendix A-4. All passing trial seams test results met the project specifications.

2.5 Production Seams

The HDPE liner seaming process proceeded in conjunction with the panel deployment. The majority of the seams were welded using a double hot wedge fusion welder. Some seams required repairs based on field test results and the reconstructed seams were made using a hand-held extrusion welding apparatus. Fusion and extrusion seams were subjected to non-destructive and destructive testing.

All seams (including repairs) welds were observed and documented by TREK personnel. A summary of the panel fusion and extrusion seaming are provided in Appendix A-5.

2.5.1 Non-Destructive Testing

All non-destructive seam testing was performed by Titan personnel and observed by TREK personnel on a full-time basis. Two types of non-destructive testing were used on this project:

- Air pressure tests on fusion seams
- Vacuum box tests on extrusion seams, patches and beads

Air pressure testing comprised of the following procedure:

1. Sealing off the air channel between the inside and outside tracks of the double fusion weld
2. Inserting a pressure gauge into the air channel
3. Using a portable compressor or pump to pressurize the air channel to a minimum pressure of 210 kPa (30 psi)
4. Inspecting the seam along its entire length to confirm that entire seam was pressurized
5. Observing the pressure gauge over a five-minute period. The test is considered a pass (successful) if the pressure drop is less than 21 kPa (3 psi) over this period
6. Making an incision into the air channel, at the end of the test seam to release the pressurized air

Vacuum box testing comprised of the following procedure:

1. Applying a soapy water solution to the area to be tested
2. Placing a rigid-walled box over the area to be tested The box was constructed with a clear Plexi-glass top and/or sides with a neoprene gasket around the bottom of the box to facilitate a seal between the box and the HDPE liner
3. Applying a vacuum of 21 kPa to 35 kPa (3 psi to 5 psi) to the inside of the box for a minimum of ten seconds using a portable vacuum pump
4. Observing for air bubbles, which, if they occur, are indicative of defects or discontinuities of the welding procedure

Any leaks or discontinuities observed and detected during either testing method were considered a failure (non-conformance). The failed areas were marked and subsequently repaired in accordance with the project specifications and were retested using the procedures described above. All repaired areas were then re-tested and met the acceptance criteria.

Results of the non-destructive testing are provided in Appendix A-7 for the air pressure testing and in Appendix A-10 for the vacuum box testing. All non-destructive testing completed on both fusion and extrusion seaming comply with project specifications.

2.5.2 Destructive Testing

Destructive test samples of panel fusion welded seams were taken at an average of approximately one for every 144 m of fusion seam length. TREK personnel selected all test locations.

For each destructive sample, ten coupons were cut from the seam and tested in the field by TREK. TREK retained the remaining part of the samples for their archives. The destructive coupons that were tested in the field consisted of five coupons tested for peel adhesion strength (peel test mode ASTM D6392) and five tested for seam strength at yield (shear test mode ASTM D6392)

The specified acceptance criteria for destructive tests are as follows:

- Fusion and extrusion seam under peel mode:
 - Peel strength for the seam is not to be less than 340 N/25 mm for extrusion and 398 N/25 mm for fusion;

- Fusion and extrusion seam under shear mode:
 - Yield strength for the seam is not to be less than 525 N/25 mm.

Four out of five coupons were required to meet or exceed the acceptance criteria for peel and shear strength failure modes.

A total of twelve fusion destructive tests (DSF designation) and eleven extrusion tests (DSX designation) were conducted of the HDPE liner. Seven fusion destructive tests failed, and each failed test was traced along the fusion seam activity log to obtain one passing destructive before and after the failed destructive. The failed sections of seams were subsequently extrusion welded and non-destructively tested with the vacuum box. All extrusion destructive tests completed comply with project specifications.

The destructive testing results are provided in Appendix A-6.

2.6 Repair of Installation Defects

All defects observed on the HDPE liner were assigned a unique identification number and marked by TREK personnel for repair. The defects were repaired by extrusion welding methods. The repairs were then tested (non-destructive) by Titan personnel by vacuum box test method. Once a noted defect was repaired and tested, it was documented as a “pass” and no other testing was required.

Defect repair locations are shown on Figure 1 for the HDPE liner. The documentation (repairs made and non-destructive testing) of defects and repairs to the seams and panels are included in Appendices A-8 and A-10 for the HDPE liner within the Search Facility Pad – Mob 1.

3.0 Summary

TREK personnel provided construction/quality assurance inspections, and supported WSP Canada Inc. with contract administration. The following activities and components were observed, monitored, inspected and/or reviewed for approval and conformance with specifications:

- Geosynthetic clay liner installation, placement and seaming procedures;
- 1.5 mm (60 mil) HDPE membrane installation, placement, seaming, non-destructive and destructive seam testing and repairs;

Based on the results of the field monitoring, observations, inspections and testing, the Search Facility Pad – Mob 1 was constructed in accordance with the project specifications and to current accepted industry standards.

4.0 Closure

The geotechnical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The information and findings of this report were based on the tests, measurements, and observations made by TREK during construction and are only applicable to those elements. TREK is not responsible for conformance of any elements that were not observed or tested.

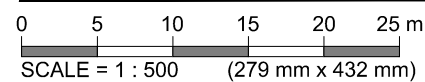
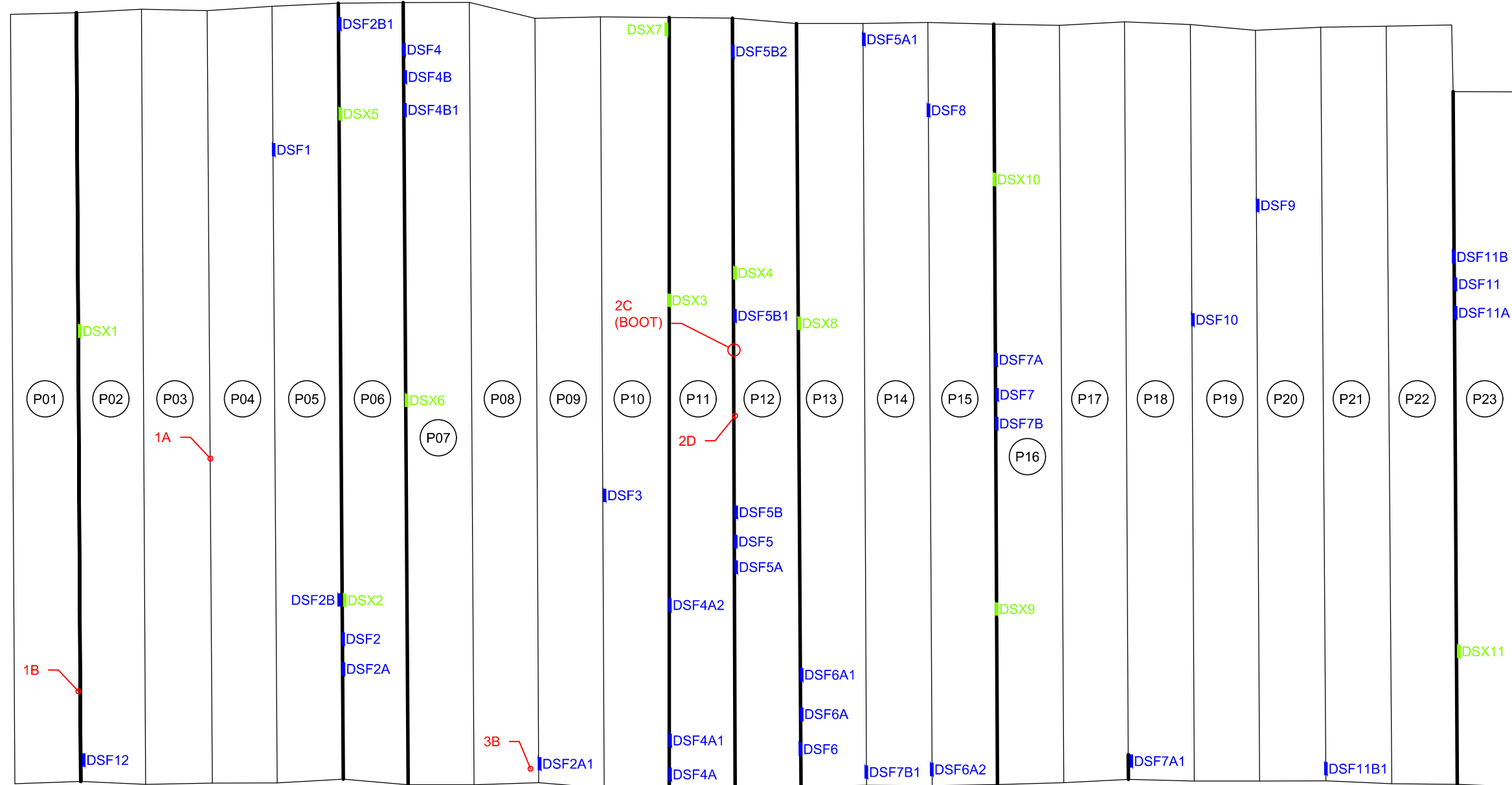
All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not

already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of WSP Canada Inc. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be used or relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

Z:\Projects\1000 Soils Lab\1000 Lab Projects\1000-043 WSP\1000-043 WSP\1000-043-27 Prairie Green Landfill Search Facility Pad Construction\CAD\Fig 01 2024-09-25 PGI Search Facility Pad 0_A 1000-043-27.dwg, 2024-09-25 9:18:09 AM



- 4C UNIQUE DEFECT IDENTIFICATION NUMBER
- DSF12 6U FUSION DESTRUCTIVE LOCATION AND DESIGNATION
- DSX1 EXTRUSION DESTRUCTIVE DESIGNATION

- FUSION SEAM
- EXTRUSION SEAM RECONSTRUCTION
- P01 PANEL DESIGNATION NUMBER

- NOTES:**
- PANEL LOCATIONS ARE BASED ON SURVEY COMPLETED BY TREK GEOTECHNICAL.
 - THE DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING LETTER.

Figure 01
Geomembrane Panel Layout
MOB 1

Appendix A-I

**GCL and Geomembrane
Manufacturer's Quality Control
Documents**

Submittal #6.0 - Nonwoven Geotextile Cushion

Revision	0	Submittal Manager	Julian Kornelsen (Earth Max Construction Inc)
Status	Open	Date Created	Aug 14, 2024
		Spec Section	
Responsible Contractor	Earth Max Construction Inc	Received From	
Final Due Date		Lead Time	
		Cost Code	
Location		Type	Shop Drawing
Approvers			
Ball in Court	Julian Kornelsen (Earth Max Construction Inc)		
Distribution			
Description	Nonwoven Geotextile Cushion		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					TDS_S_E1600.pdf

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub- contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input checked="" type="checkbox"/> No Comment <input type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<table border="0" style="width: 100%;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Project No.</td> <td>CA0039180.5749</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Project Name</td> <td>Search Pad Construction</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Reviewed By</td> <td>F. Gondim</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Date:</td> <td>August 14, 2024</td> </tr> </table>	Project No.	CA0039180.5749	Project Name	Search Pad Construction	Reviewed By	F. Gondim	Date:	August 14, 2024
Project No.	CA0039180.5749								
Project Name	Search Pad Construction								
Reviewed By	F. Gondim								
Date:	August 14, 2024								

MIRAFI E1600



MIRAFI® E1600 is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. MIRAFI E1600 is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

TenCate Geosynthetics Americas (A Solmax Company) is accredited by Geosynthetic Accreditation Institute – Laboratory Accreditation Program ([GAI-LAP](http://GAI-LAP.com)).

MIRAFI E1600 meets Build America, Buy America Act, Pub. L. No. 117-58, div. G §§ 70901-52.

MECHANICAL PROPERTIES	TEST METHOD	UNIT	MINIMUM AVERAGE ROLL VALUE
Grab Tensile Strength	ASTM D4632	lbs (N)	425 (1891)
Grab Tensile Elongation	ASTM D4632	%	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	155 (690)
CBR Puncture Strength	ASTM D6241	lbs (N)	1200 (5340)
			MAXIMUM OPENING SIZE
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	100 (0.15)
			MINIMUM ROLL VALUE
Permittivity	ASTM D4491	sec ⁻¹	0.6
Permeability	ASTM D4491	cm/sec	0.15
Flow Rate	ASTM D4491	gal/min/ft ² (l/min/m ²)	40 (1630)
			MINIMUM TEST VALUE
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	80
PHYSICAL PROPERTIES	TEST METHOD	UNIT	TYPICAL ROLL VALUE
Weight	ASTM D5261	oz/yd ² (g/m ²)	16.0 (542)
			TYPICAL ROLL VALUE
Roll Dimensions (width x length)		ft (m)	15 x 300 (4.5 x 91)
Roll Area		yd ² (m ²)	500 (418)
Roll Weight		lb (kg)	516 (234)

365 South Holland Drive Pendergrass, GA 30567

Tel +1 706 693 2226 www.tencategeo.us



Solmax is not a design or engineering professional and has not performed any such design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation, or specification.
FGS000828 ETQR04



Submittal #7.0 - GCL

Revision	0	Submittal Manager	Julian Kornelsen (Earth Max Construction Inc)
Status	Open	Date Created	Aug 14, 2024
		Spec Section	
Responsible Contractor	Earth Max Construction Inc	Received From	
Final Due Date		Lead Time	
		Cost Code	
Location		Type	Shop Drawing
Approvers			
Ball in Court	Julian Kornelsen (Earth Max Construction Inc)		
Distribution			
Description	GCL		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					TR-401bmflw - 4.34 kg mpu.pdf

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub- contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input checked="" type="checkbox"/> No Comment <input type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<table border="0" style="width: 100%;"> <tr> <td style="width: 15%;">Project No.</td> <td>CA0039180.5749</td> </tr> <tr> <td>Project Name</td> <td>Search Pad Construction</td> </tr> <tr> <td>Reviewed By</td> <td>F. Gondim</td> </tr> <tr> <td>Date:</td> <td>August 14, 2024</td> </tr> </table>	Project No.	CA0039180.5749	Project Name	Search Pad Construction	Reviewed By	F. Gondim	Date:	August 14, 2024
Project No.	CA0039180.5749								
Project Name	Search Pad Construction								
Reviewed By	F. Gondim								
Date:	August 14, 2024								

BENTOMAT® FLW CERTIFIED PROPERTIES

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY	REQUIRED VALUES
Cap Nonwoven Geotextile Mass/Unit Area ¹	ASTM D 5261	1/20,000 m ²	200 g/m ² MARV
Carrier Scrim Nonwoven Geotextile Mass/Unit Area ¹	ASTM D 5261	1/20,000 m ²	200 g/m ² MARV
Bentonite Swell Index ²	ASTM D 5890	1/50,000 kg	24 mL/2g min
Bentonite Fluid Loss ²	ASTM D 5891	1/50,000 kg	18 mL max
Bentonite Moisture Content ²	ASTM D 2216	1/50,000 kg	12% max
Bentonite Mass/Unit Area ³	ASTM D 5993	1/4,000 m ²	4.34 kg/m ² MARV
GCL Tensile Strength ⁴	ASTM D 6768	1/4,000 m ²	8.8 kN/m MARV
GCL Peel Strength ⁴	ASTM D 6496	1/4,000 m ²	610 N/m MARV
GCL Index Flux ⁵	ASTM D 5887	1/25,000 m ²	1 x 10 ⁻⁸ m ³ /m ² /sec max.
GCL Hydraulic Conductivity ⁵	ASTM D 5887	1/25,000 m ²	5 x 10 ⁻⁹ cm/sec max.
GCL Hydrated Internal Shear Strength ⁶	ASTM D 6243	Periodically	24 kPa Typical

Bentomat FLW is a reinforced GCL consisting of a layer of granular sodium bentonite between a nonwoven geotextile and a scrim reinforced nonwoven geotextile, which are needlepunched together.

Notes

¹ Geotextile property tests performed on the geotextile components before they are incorporated into the finished GCL product.

² Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

³ Bentonite mass/area reported at 0 percent moisture content.

⁴ All tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496.

⁵ Index flux and permeability testing with deaired distilled/deionized water at 551kPa cell pressure, 531 kPa headwater pressure and 517 kPa tailwater pressure. This flux value is equivalent to a permeability of 5x10⁻⁹ cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

⁶ Peak values measured at 9.6 kPa normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

CETCO has developed an edge enhancement system that eliminates the need to use additional granular sodium bentonite within the overlap area of the seams. We call this edge enhancement, SuperGroove™, and it comes standard on both longitudinal edges of Bentomat® FLW. It should be noted that SuperGroove™ does not appear on the end-of-roll overlaps and recommend the continued use of supplemental bentonite for all end-of-roll seams.

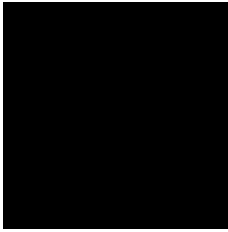
TR 401-FLW-35
03/2014

800.527.9948 Fax 847.577.5566

For the most up-to-date product information, please visit our website, www.cetco.com.

A wholly owned subsidiary of AMCOL International Corporation. The information and data contained herein are believed to be accurate and reliable, CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: P06811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

WSP - Submittal Review		WSP Comments:
<p>WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.</p>		<p>Please provide conformance testing data for Oven Aging at 85C and UV Resistance.</p> <p>Other properties meet the Specification</p>
<input type="checkbox"/> No Comment <input checked="" type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<p>Project No. CA0039180.5749</p> <p>Project Name Search Pad Construction</p> <p>Reviewed By W. Francey</p> <p>Date: September 6, 2024</p>	

ROLL NUMBER	RESIN LOT NUMBER	MANUFACT. DATE	RESIN MELT INDEX 190/2.16 g/10 min D1238	RESIN DENSITY g/cc D1505	OIT min D8117	HPOIT min D5885	ESCR SP-NCTL hours D5397
Product Code : 1101438							
HDPE 60 mils / 1.50 mm Black Smooth			1.0	> 0.932	100		500
1002-121848	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121849	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121850	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121856	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121858	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121860	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121861	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121863	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121865	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121866	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-122271	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122272	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122273	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122276	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234

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Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: PO6811
SALES ORDER: SO-003722
PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

1002-122279	PRB821070	2024-04-08	0.09	0.938	120	>500 Certified 1002-122234
1002-122280	PRB821070	2024-04-08	0.09	0.938	120	>500 Certified 1002-122234
1002-122284	PRB821070	2024-04-09	0.09	0.938	120	>500 Certified 1002-122234
1002-122285	PRB821070	2024-04-09	0.09	0.938	120	>500 Certified 1002-122234
1002-122302	PRB820750	2024-04-10	0.08	0.938	120	>500 Certified 1002-122299
1002-122303	PRB820750	2024-04-10	0.08	0.938	120	>500 Certified 1002-122299

QUANTITY (ROLLS): 20

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Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



SOLMAX

MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER: PO6811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

PRODUCT: 1101438

CE Certificate = HD-60-SS-BB

HDPE 60 mils / 1.50 mm Black Smooth

Properties	Thickness ave/min.	GeoM Density	Carbon Black Content	Carbon Black Dispersion	Tensile				Tear Resist.	Puncture Resist.	Dimension Stability	Asperity Height In/Out mm
					Yield Strength	Elong.	Break Strength	Elong.				
Unit	mm	g/cc	%	Cat 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5199	D792	D4218	D5596	D6693				D1004	D4833	D1204	
Frequency	Each roll	Every 10 rolls	Every 2 rolls	Every 10 rolls	Every 2 rolls				Every 5 rolls	Every 5 rolls		
Specification	1.50 / 1.35	≥ 0.940	2.0 - 3.0	Cat. 1 / Cat.	23	13	43	700	187	534		
1002-121848 MD XD	1.52 / 1.49	0.947	2.34	10/10 views	27.3 27.7	17.4 16.6	52.2 53.9	840 898	226 240	618		
1002-121849 MD XD	1.53 / 1.49	0.947	2.34	10/10 views	27.3 27.7	17.4 16.6	52.2 53.9	840 898	226 240	618		
1002-121850 MD XD	1.53 / 1.50	0.947	2.30	10/10 views	26.3 28.0	18.1 15.5	53.4 52.5	874 889	226 240	618		
1002-121856 MD XD	1.55 / 1.51	0.947	2.28	10/10 views	27.3 27.8	18.3 16.3	53.6 54.8	858 916	223 240	605		
1002-121858 MD XD	1.55 / 1.51	0.947	2.32	10/10 views	26.6 28.0	18.3 16.9	52.9 53.9	851 900	220 236	618		
1002-121860 MD XD	1.55 / 1.52	0.947	2.31	10/10 views	26.8 28.0	17.8 15.7	53.6 54.3	859 905	220 236	618		
1002-121861 MD XD	1.56 / 1.53	0.947	2.31	10/10 views	26.8 28.0	17.8 15.7	53.6 54.3	859 905	220 236	618		
1002-121863 MD XD	1.54 / 1.51	0.946	2.18	10/10 views	25.9 27.9	19.0 15.6	52.2 54.8	847 908	222 231	632		
1002-121865 MD XD	1.55 / 1.51	0.946	2.21	10/10 views	26.7 27.9	17.9 16.3	53.2 54.6	855 904	222 231	632		
1002-121866 MD XD	1.55 / 1.52	0.946	2.33	10/10 views	26.9 29.1	18.2 16.6	53.6 55.7	846 919	222 231	632		
1002-122271 MD XD	1.59 / 1.56	0.947	2.35	10/10 views	23.3 23.4	18.2 16.3	44.8 46.9	780 851	212 227	614		
1002-122272 MD XD	1.57 / 1.52	0.947	2.69	10/10 views	25.3 26.2	17.3 15.5	50.1 50.8	834 855	212 227	614		
1002-122273 MD XD	1.58 / 1.52	0.947	2.69	10/10 views	25.3 26.2	17.3 15.5	50.1 50.8	834 855	212 227	614		

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.

2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



TEST RESULTS

PROJECT NUMBER: PO6811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

1002-122276	MD XD	1.57 / 1.51	0.948	2.66	10/10 views	24.1 25.5	17.6 15.6	47.8 48.7	807 845	219 236	632		
1002-122279	MD XD	1.56 / 1.51	0.948	2.67	10/10 views	24.7 26.1	17.8 16.3	50.8 50.6	825 870	219 236	632		
1002-122280	MD XD	1.56 / 1.54	0.947	2.60	10/10 views	24.4 23.8	17.9 18.0	49.2 49.4	810 840	222 236	641		
1002-122284	MD XD	1.55 / 1.47	0.947	2.54	10/10 views	23.2 24.5	19.2 16.6	48.5 50.3	820 880	222 236	641		
1002-122285	MD XD	1.55 / 1.52	0.947	2.54	10/10 views	23.2 24.5	19.2 16.6	48.5 50.3	820 880	211 231	618		
1002-122302	MD XD	1.53 / 1.50	0.947	2.65	10/10 views	23.5 23.8	18.6 17.5	48.9 49.7	825 890	222 231	614		
1002-122303	MD XD	1.56 / 1.52	0.947	2.65	10/10 views	23.5 23.8	18.6 17.5	48.9 49.7	825 890	222 231	614		

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.

2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

Delivery #: 81084339
PO #: 4158
Weight: 185200.000 LB
Ship Date: 02/13/2024
Package: BULK
Mode: Hopper Car
Car #: AOKX602291
Seal No: 360701

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRA820560

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10min
HLMI Flow Rate	ASTM D1238	11.00	g/10min
Density	D1505 or D4883	0.9370	g/cm3
Production Date		01/10/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

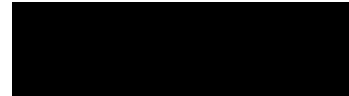
<p>Shipped To: SOLMAX : VARENNES 2801 BOUL MARIE-VICTORIN VARENNES QC J3X 1P7 CANADA</p> <p>Recipient: Desbiens Fax:</p>	<p>Delivery # 81087531 PO # 4158 Weight: 184800.000 LB Ship Date: 02/17/2024 Package: BULK Mode: Hopper Car Car # CPCX817097 Seal No: 360702</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Product:
 MARLEX K306 POLYETHYLENE in Bulk
 Additive levels have been tested and meet minimum the specification for this lot.
 As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
 As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRA820550

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10min
HLMI Flow Rate	ASTM D1238	9.90	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		01/10/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
 Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

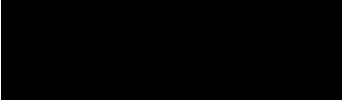
Delivery #: 81096119
PO #: 4244
Weight: 185000.000 LB
Ship Date: 03/01/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX815756
Seal No: 377727

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRB821070

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.090	g/10min
HLMI Flow Rate	ASTM D1238	13.10	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		02/15/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

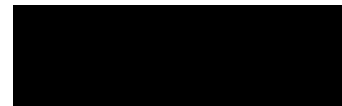
Delivery #: 81105699
PO #: 4244
Weight: 180900.000 LB
Ship Date: 03/16/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX816668
Seal No: 371583

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRB820750

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10min
HLMI Flow Rate	ASTM D1238	13.20	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		02/11/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

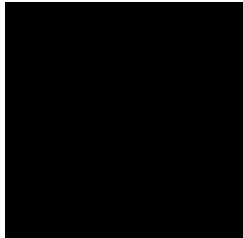


Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806



LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: P07947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

WSP - Submittal Review		WSP Comments:
<p>WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.</p>		<p>Please provide conformance testing data for Oven Aging at 85C and UV Resistance.</p> <p>Other properties meet the Specification</p>
<input type="checkbox"/> No Comment <input checked="" type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<p>Project No. CA0039180.5749</p> <p>Project Name Search Pad Construction</p> <p>Reviewed By W. Francey</p> <p>Date: September 6, 2024</p>	

ROLL NUMBER	RESIN LOT NUMBER	MANUFACT. DATE	RESIN MELT INDEX 190/2.16 g/10 min D1238	RESIN DENSITY g/cc D1505	OIT min D8117	HPOIT min D5885	ESCR SP-NCTL hours D5397
Product Code : 1101438							
HDPE 60 mils / 1.50 mm Black Smooth			1.0	> 0.932	100		500
1002-122819	PRF821720	2024-08-26	0.09	0.938	120		>500 Certified 1002-122821
1005-076005	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076006	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076007	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076008	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076009	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076010	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076011	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076012	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076013	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076014	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996
1005-076015	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996
1005-076016	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996

QUANTITY (ROLLS): 13

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



SOLMAX

MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER: PO7947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

PRODUCT: 1101438

CE Certificate = HD-60-SS-BB

HDPE 60 mils / 1.50 mm Black Smooth

Properties	Thickness ave/min.	GeoM Density	Carbon Black Content	Carbon Black Dispersion	Tensile				Tear Resist.	Puncture Resist.	Dimension Stability	Asperity Height In/Out mm
					Yield Strength	Elong.	Break Strength	Elong.				
Unit	mm	g/cc	%	Cat 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5199	D792	D4218	D5596	D6693				D1004	D4833	D1204	
Frequency	Each roll	Every 10 rolls	Every 2 rolls	Every 10 rolls	Every 2 rolls				Every 5 rolls	Every 5 rolls		
Specification	1.50 / 1.35	≥ 0.940	2.0 - 3.0	Cat. 1 / Cat.	23	13	43	700	187	534		
1002-122819 MD XD	1.55 / 1.51	0.944	2.08	10/10 views	23.1 23.8	18.1 16.9	46.8 51.0	784 897	214 222	592		
1005-076005 MD XD	1.54 / 1.50	0.944	2.55	10/10 views	23.8 25.1	17.5 16.1	49.0 50.1	799 856	205 222	609		
1005-076006 MD XD	1.52 / 1.49	0.944	2.70	10/10 views	24.5 23.4	19.5 16.0	46.6 51.7	753 894	205 222	609		
1005-076007 MD XD	1.56 / 1.50	0.946	2.70	10/10 views	24.5 23.4	19.5 16.0	46.6 51.7	753 894	212 231	609		
1005-076008 MD XD	1.56 / 1.48	0.946	2.67	10/10 views	24.4 24.6	18.8 15.4	51.3 53.1	815 928	212 231	609		
1005-076009 MD XD	1.55 / 1.48	0.946	2.67	10/10 views	24.4 24.6	18.8 15.4	51.3 53.1	815 928	212 231	609		
1005-076010 MD XD	1.55 / 1.47	0.946	2.79	10/10 views	23.7 25.1	18.4 16.6	50.1 53.6	806 907	212 231	609		
1005-076011 MD XD	1.56 / 1.51	0.946	2.79	10/10 views	23.7 25.1	18.4 16.6	50.1 53.6	806 907	212 231	609		
1005-076012 MD XD	1.55 / 1.50	0.944	2.75	10/10 views	23.6 23.9	18.2 16.7	49.0 52.2	802 910	211 236	614		
1005-076013 MD XD	1.55 / 1.52	0.944	2.75	10/10 views	23.6 23.9	18.2 16.7	49.0 52.2	802 910	211 236	614		
1005-076014 MD XD	1.55 / 1.51	0.944	2.61	10/10 views	23.8 23.8	18.6 16.7	49.7 52.4	800 900	211 236	614		
1005-076015 MD XD	1.54 / 1.51	0.944	2.61	10/10 views	23.8 23.8	18.6 16.7	49.7 52.4	800 900	211 236	614		
1005-076016 MD XD	1.57 / 1.51	0.944	2.45	10/10 views	23.7 23.9	18.0 16.2	48.0 50.6	800 900	211 236	614		

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Solmax International Inc.

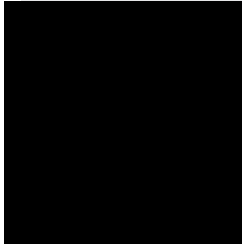
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



SOLMAX

MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER: PO7947
SALES ORDER: SO-003996
PACKING SLIP NUMBER: Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Giguere
Fax:

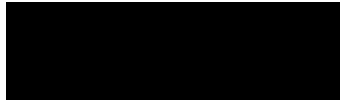
Delivery #: 81177768
PO #: 4563
Weight: 208400.000 LB
Ship Date: 07/04/2024
Package: BULK
Mode: Hopper Car
Car #: SHQX041855
Seal No: 394968

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRF821720

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.090	g/10min
HLMI Flow Rate	ASTM D1238	12.70	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		06/30/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806-4498



Bayport Polymers LLC
12212 Port Road
Pasadena, TX 77507

JAMI GRANGE
12212 PORT ROAD
PASADENA TX 77507

SHIPPED TO:
SOLMAX INTERNATIONAL INC
2801 MARIE VICTORIN
VARENNES-QUEBEC QC J3X 1P7
CANADA

Material: Our / Your reference

MDPE 37120 (441840) /

Please find below test data and pertinent information on Bayport Polymers LLC.
Polyethylene material shipped to your plant.

Batch D240320543 **Quantity** 185,750 LB **Railcar** BPTX729101

Quality certificate

Date

06/04/2024

Purchase order item/date

PO-004493 / 05/16/2024

Delivery item/date

88111709 000001 / 06/03/2024

Order item

33470824 000001

Customer number

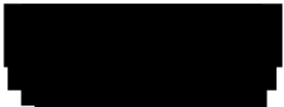
81137450

Characteristic	Unit	Value
Density	g/cc	0.938
Melt Index 21.6/190	g/10 min	11.1
Railcar Prefix	-	BPTX
Railcar Number	-	729101
Railcar Seal Numbers	-	10904



JAMI GRANGE
12212 PORT ROAD
PASADENA TX 77507

Delivery item/date **Page**
88111709 000001 / 06/19/2024 2



Jeremy Gasper
Laboratory Superintendent
12212 Port Road, Pasadena, Texas 77507
P.O. Box 5010, LaPorte, Texas 77572-5010

TITAN ENVIR. CONTAINMENT LTD.
 777 QUEST BOULEVARD
 ILE DES CHENES, MB, R0A 0T1
 CANADA

Canada, September 10, 2024

Project Name: PRAIRIE GREEN LF
Purchase Order: PO7947
Sales Order: SO-003996
ATTN: Stephane Trudeau

WSP - Submittal Review	
WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.	
<input checked="" type="checkbox"/> No Comment	Project No. CA0039180.5749
<input type="checkbox"/> Reviewed as Noted	Project Name Search Pad Construction
<input type="checkbox"/> Amend and Resubmit	Reviewed By W. Francey
<input type="checkbox"/> Rejected	Date: September 11, 2024

To whom it may concern,

Solmax International hereby certifies that 1101547 (HDPE 60 mils / 1.50 mm Black Textured) and 1101438 (HDPE 60 mils / 1.50 mm Black Smooth) geomembrane supplied for the above-mentioned sales order meets or exceeds GM-13 requirements on Oven Aging, UV Resistance.

(1.50 mm Black Textured)

- Oven aging

(% retained after 90 days)	ASTM D5721	82%
HPOIT (min.avg)	ASTM D5885	1607 minutes
- UV resistance

(% retained after 1,600 hrs)	ASTM D7238	82%
HP OIT (min.avg)	ASTM D5885	1728 minutes

(1.50 mm Black Smooth)

- Oven aging

(% retained after 90 days)	ASTM D5721	81%
HPOIT (min.avg)	ASTM D5885	1387 minutes
- UV resistance

(% retained after 1,600 hrs)	ASTM D7238	85%
HP OIT (min.avg)	ASTM D5885	1442 minutes

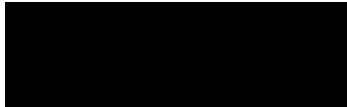
Solmax International Inc

2801 Marie-Victorin Rte., Varennes, Quebec, Canada J3X 0J4
 (+1) 450 929-1234

You will find attached test report on roll produced using the same resin formulation that has been used to manufacture the above product.

Hoping the above information is satisfactory. Please, do not hesitate to contact us if you require any additional information.

Sincerely,



Claude Cormier

Coordonnateur qualité | Quality Control Manager/Chef de service qualité

|

Identification:

Type of Material :	<u>HDPE</u>	Formulation :	<u>HD53-45</u>
Roll Number:	<u>1002-118857</u>	Resin Type :	<u>Bavstar 37120</u>
Production Date :	<u>2023-05-30</u>	Lot Number :	<u>D220521102</u>

Oxidative Induction Time (ASTM D8117)

	Individual Data			Avg.	S.D.	% CV
OIT (minutes)	144	138		141	4	3.0

High Pressure Oxidative Induction Time (ASTM D5885)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes)	1802	1607		1705	138	8.1

UV Resistance (ASTM D7238)

- The resistance to degradation was determined in accordance with ASTM D7238 ;
- Apparatus used : Q-PANEL QUV/se - Lamp: UVA-340;
- Duration of the test: 1600 hours of UV exposure (total of 1920h);
- Cycle : 80 cycles of UVA (20h of light at 75°C followed by 4h of condensation at 60°C)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1802	1607		1705	138	8.1
HP OIT (minutes) : ASTM D5885 - After 1600h of UV	1492	1391		1442	72	5.0
PERCENTAGE RETAINED:	85 %			Note: No visual change after 1600 hrs		

Air-Oven Aging (ASTM D5721)

- The resistance to degradation was determined in accordance with ASTM D5721;
- Duration of the test: The geomembrane was exposed to 90 days in an air oven maintained at 85°C ± 0.5°C;
- Rotation of the exposed specimens : once per wee

	Individual Data			Avg.	S.D.	% CV
OIT (minutes) : ASTM D8117 - Initial	144	138		141	4	3.0
OIT (minutes) : ASTM D8117 - After 90 days of Oven Aging	21	23		22	1	6.2
PERCENTAGE RETAINED:	16 %					

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1802	1607		1705	138	8.1
HP OIT (minutes) : ASTM D5885 - After 90 days of Oven Aging	1317	1457		1387	99	7.1
PERCENTAGE RETAINED:	81 %			Note: No visual change after 90 days		

The tests were performed by Solmax. The laboratories of Solmax are accredited by the GRI.



Technical Services

Identification:

Type of Material :	HDPE	Formulation :	HD06-71
Roll Number:	1005-074521	Resin Type :	Chevron-USA K306
Production Date :	2024-05-13	Lot Number :	PRD610190

Oxidative Induction Time (ASTM D8117)

OIT (minutes)	Individual Data		Avg.	S.D.	% CV
	192	186			
			189	4	2.2

High Pressure Oxidative Induction Time (ASTM D5885)

HP OIT (minutes)	Individual Data		Avg.	S.D.	% CV
	1686	1673			
			1680	9	0.5

UV Resistance (ASTM D7238)

- The resistance to degradation was determined in accordance with ASTM D7238 ;
- Apparatus used : Q-PANEL QUV/se - Lamp: UVA-340;
- Duration of the test: 1600 hours of UV exposure (total of 1920h);
- Cycle : 80 cycles of UVA (20h of light at 75°C followed by 4h of condensation at 60°C)

HP OIT (minutes) : ASTM D5885 - Initial	Individual Data		Avg.	S.D.	% CV
	1686	1673			
			1680	9	0.5
HP OIT (minutes) : ASTM D5885 - After 1600h of UV	Individual Data		Avg.	S.D.	% CV
	1378	1364			
			1371	10	0.7

PERCENTAGE RETAINED: 82 %

Note: No visual change after 1600 hrs

Air-Oven Aging (ASTM D5721)

- The resistance to degradation was determined in accordance with ASTM D5721;
- Duration of the test: The geomembrane was exposed to 90 days in an air oven maintained at 85°C ± 0.5°C;
- Rotation of the exposed specimens : once per wee

OIT (minutes) : ASTM D8117 - Initial	Individual Data		Avg.	S.D.	% CV
	192	186			
			189	4	2.2
OIT (minutes) : ASTM D8117 - After 90 days of Oven Aging	Individual Data		Avg.	S.D.	% CV
	66	82			
			74	11	15.3

PERCENTAGE RETAINED: 39 %

HP OIT (minutes) : ASTM D5885 - Initial	Individual Data		Avg.	S.D.	% CV
	1686	1673			
			1680	9	0.5
HP OIT (minutes) : ASTM D5885 - After 90 days of Oven Aging	Individual Data		Avg.	S.D.	% CV
	1351	1395			
			1373	31	2.3

PERCENTAGE RETAINED: 82 %

Note: No visual change after 90 days

The tests were performed by Solmax. The laboratories of Solmax are accredited by the GRI.



Technical Services

Appendix A-2

Certificate of Acceptance – Subgrade



SUB-GRADE ACCEPTANCE

PROJECT: _____ LOCATION: _____
PROJECT #: _____ CONTRACTOR: _____
OWNER: _____ QA/QC: _____
ENGINEER: _____ DATE: _____

This document certifies that on _____, the project superintendant, _____, for TITAN ENVIRONMENTAL CONTAINMENT has inspected the surface of the sub-grade and has found that it meets the installation of the geomembrane and geosynthetics as per engineer specifications.

TITAN ENVIRONMENTAL CONTAINMENT accepts only the surface of the sub-grade and holds no responsibility of the structural strength of the containment system used on this project. Any and all failure causing damage to the geomembranes and geosynthetics being installed on this project will be repaired or replaced at the General contractors or Owners expense.

TITAN ENVIRONMENTAL CONTAINMENT will only accept Sub-grade on a daily installation and will not be held accountable for any damages to Sub-grade out side our control.

Area Being Accepted: _____

TITAN REPRESENTATIVE

GENERAL CONTRACTOR, OWNER REPRESENTATIVE

DATE

DATE

Appendix A-3

Geomembrane Deployment Inspection Summary

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 18-Sep-24
 SHEET NUMBER: 1

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P01				PANEL P02				PANEL P03			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76009				76009				122819			
DEPLOYED LENGTH	79.4				79.5				79.9			
AMBIENT AIR TEMP.	19				19				21			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	60	60	58	61	60	58	60	62	60	62	62	61
	60	60	58	60	60	58	60	60	58	62	61	62
	60	60	60	60	60	60	60	60	60	62	61	61
	60	60	60	61	60	58	60	61	60	61	61	61
AVERAGE	60	60	59	61	60	59	60	61	60	62	61	61

DESCRIPTION	PANEL P04				PANEL				PANEL			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122819											
DEPLOYED LENGTH	79.9											
AMBIENT AIR TEMP.	21											
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	61	61	62	61								
	61	59	60	60								
	60	59										
	60	58										
AVERAGE	61	60	60	61								

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 19-Sep-24
 SHEET NUMBER: 2

TRANSPORT EQUIPMENT: Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P05				PANEL P06				PANEL P07			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76076				76076				76010			
DEPLOYED LENGTH	80.4				80.9				80.6			
AMBIENT AIR TEMP.	19				20				20			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS												
	60	59	60	60	60	60	60	60	61	60	60	60
	60	59	60	60	59	60	59	60	60	60	60	59
		60	60			60	60			60	59	
		60	60			60	60			60	59	
AVERAGE	60	60	60	60	60	60	60	60	61	60	60	60

DESCRIPTION	PANEL P08				PANEL P09				PANEL P10			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76070				76006				76006			
DEPLOYED LENGTH	81.8				79.8				80			
AMBIENT AIR TEMP.	20				20				20			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS												
	61	60	60	60	60	58	59	59	60	60	59	60
	59	61	59	60	60	60	59	60	59	59	58	60
		60	59			59	58			60	61	
		60	60			60	60			61	61	
AVERAGE	60	60	60	60	60	59	59	60	60	60	60	60

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 20-Sep-24
 SHEET NUMBER: 3

TRANSPORT EQUIPMENT: Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P11				PANEL P12				PANEL P13			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76014				76014				122273			
DEPLOYED LENGTH	79.5				79.4				78.3			
AMBIENT AIR TEMP.	16				16				17			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS												
	57	58	59	61	61	60	58	61	61	61	61	60
	60	59	59	61	61	60	58	61	61	60	61	60
		60	60			60	57			60	61	
		59	60			60	58			61	61	
AVERAGE	59	59	60	61	61	60	58	61	61	61	61	60

DESCRIPTION	PANEL P14				PANEL P15				PANEL P16			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122273				76005				76005			
DEPLOYED LENGTH	80				78.7				78.7			
AMBIENT AIR TEMP.	17				20				20			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS												
	60	60	61	60	60	60	60	61	60	60	60	61
	60	61	60	60	60	61	59	60	61	60	60	61
		61	60			60	59			59	60	
		60	60			60	60			59	60	
AVERAGE	60	61	60	60	60	60	60	61	61	60	60	61

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 20-Sep-24
 SHEET NUMBER: 4

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P17				PANEL P18				PANEL P19			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	121861				121861				122284			
DEPLOYED LENGTH	78.6				78.8				78.1			
AMBIENT AIR TEMP.	20				20				23			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	60	61	60	60	61	60	60	59	58	60	60	60
	60	61	61	60	60	61	60	60	59	59	60	61
		60	60			60	60			60	60	
		60	60			60	59			60	60	
AVERAGE	60	61	60	60	61	60	60	60	59	60	60	61

DESCRIPTION	PANEL P20				PANEL P21				PANEL P22			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122284				122279				122279			
DEPLOYED LENGTH	77.7				78.2				78.1			
AMBIENT AIR TEMP.	23				23				22			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	60	60	60	60	60	60	60	60	60	60	60	61
	60	60	60	60	60	60	60	61	60	59	60	61
		60	60			60	59			59	60	
		59	61			60	60			59	60	
AVERAGE	60	60	60	60	60	60	60	61	60	59	60	61

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 20-Sep-24
 SHEET NUMBER: 5

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER	P23	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER		122272		
DEPLOYED LENGTH		72.1		
AMBIENT AIR TEMP.		22		
OBSERVED OVERLAP		150 mm	150 mm	150 mm
REMARKS				
MONITOR				
<hr/>				
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL
	62	62	61	62
	60	63	61	61
		62	61	
		61	61	
AVERAGE	61	62	61	62

DESCRIPTION	PANEL NUMBER	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER			
DEPLOYED LENGTH			
AMBIENT AIR TEMP.			
OBSERVED OVERLAP	150 mm	150 mm	150 mm
REMARKS			
MONITOR			
<hr/>			
SHEET THICKNESS	LEAD	L SIDE	R SIDE
AVERAGE			

REVIEWED BY: AFK
 DATE: October 1, 2024

Appendix A-4

Geomembrane Trial Seam Summary



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-09-18
 SHEET NUMBER: 1

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF1	9:52	WW46	BB	19	560		860	F			FAIL	AFK	50% PEEL not used
								125/136	150				
TF2	10:13	WW49	JH	19	560		460	F			FAIL	AFK	50% PEEL not used
								139					
TF3	10:35	WW43	BB	19	520		460	FTB	FTB	FTB	PASS	AFK	
								132/138/147/142	128/142/129/149	158/166			
TF4	10:51	WW7	TC	19	550		860	FTB	FTB	FTB	PASS	AFK	
								129/133/131/138	126/135/139/139	150/153			
TF5	10:59	WW44	JH	19	500		460	F			FAIL	AFK	50% PEEL not used
								146/138/134	141/138				

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE: 2024-09-19
 SHEET NUMBER: 2

TF - # = FUSION
 TX - # = EXTRUSION

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF6	9:10	WW43	BB	19	520		460	F			FAIL	AFK	70% PEEL not used
								132/132/99	143/141				
TF7	9:31	WW39	CN	19	520		460	FTB	FTB	FTB	PASS	AFK	
								133/132/136/132	139/132	141/143			
TF8	9:50	WW7	TC	19	550		860	FTB	FTB	FTB	PASS	AFK	
								126/138/128/128	130/132/139/143	146/150			
TF9	9:58	WW29	BB	19	540		860	FTB	FTB	FTB	PASS	AFK	
								144/141/135/139	147/143/144/135	157/156			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-09-20
 SHEET NUMBER: 3

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF10	10:43	WW29	DP	15	520		860	FTB	FTB	FTB	PASS	AFK	
								130/135/139/141	138/142/140/148	158/160			
TF11	10:44	WW39	CN	15	520		460	FTB	FTB	FTB	PASS	AFK	
								144/138/139/148	138/144/141/136	14/154			
TF12	14:50	WW29	DP	21	560		860	FTB	FTB	FTB	PASS	AFK	
								124/130/124/129	123/130/127/125	138/140			
TF13	15:12	WW39	CN	21	520		460	FTB	FTB	FTB	PASS	AFK	
								119/131/127/136	124/127/124/130	141/136			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 22-Sep-24
 SHEET NUMBER: 1

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX-1	8:00	EXT 40	RN	6	245	242		F			FAIL	AFK	60% PEEL
								99,110,105,110					
TX-1A	8:23	EXT 40	RN	8	250	250		FTB		FTB	PASS	AFK	
								132,106,114,131		161,159			
TX-2	13:55	EXT 40	RN	17	250	250		FTB		FTB	PASS	DS	
								114,117,110,134		134,132			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 23-Sep-24
 SHEET NUMBER: 2

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX-3	7:55	EXT 41	DP	12	250	250		FTB		FTB	Pass	DS	
								96,88,105,97		162,158			
TX-4	7:55	EXT 40	RN	12	250	250		F			FAIL	DS	50% peel
								75,138					
TX-4A	8:29	EXT 40	RN	12	250	250		FTB		FTB	PASS	DS	
								112,101,110,154		160,153			
TX-5	13:24	EXT 40	RN	19	250	250		FTB		FTB	PASS	DS	
								137,143,141,141		149,152			
TX-6	15:00	EXT 41	DP	19	250	250		FTB		FTB	PASS	DS	
								141,131,115,146		150,151			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 24-Sep-24
 SHEET NUMBER: 3

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX-7	7:55	EXT 41	DP	10	250	250		FTB		FTB	PASS	DS	
								86,82,84,83		168,166			
TX-8	8:07	EXT 40	RN	10	250	250		FTB		FTB	PASS	DS	
								145,129,104,131		147,148			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24

Appendix A-5

Geomembrane Seam Welding Inspection



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 18, 2024

SHEET NUMBER 1

X FUSION

EXTRUSION

MACHINE # WW43

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF3	10:35	BB

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
	BARREL	NOZZLE					BARREL	NOZZLE						DATE	MON.
1	P1/P2	NEOS SEOS	10:47	22	BB	520	460		79	77/2	DSF12	AF	capped	09-20-24	DS
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 18, 2024

SHEET NUMBER 2

X FUSION

EXTRUSION

MACHINE # WW7

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF4	10:51	TC

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE								
1	P3/P4	NEOS SEOS	10:59	22	TC	860	550		80	80		AF		09-20-24	DS	
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 19, 2024

SHEET NUMBER 3

X FUSION

EXTRUSION

MACHINE # WW7

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF8	9:50	TC

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P4/P5	SEOS	NEOS	10:10	20	TC	550	860	80	145/15	DSF1	DS		09-20-24	DS	
2	P7/P8	NEOS	SEOS	11:21	20	TC	550	860	82	97		DS		09-20-24	DS	
3	P9/P10	SEOS	SEOS	14:18	20	TC	550	860	80	146/31	DSF3	DS		09-21-24	AFK	
4																
5																
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13																
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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 19, 2024

SHEET NUMBER 4

X FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF7	9:31	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P2/P3	SEOS NEOS	9:36	20	CN	520	460		80	80		DS	DSF2B1	09-02-24	DS
2	P5/P6	NEOS SEOS	10:31	20	CN	520	460		80	145/15	DSF2	DS	capped	09-20-24	DS
3	P8/P9	SEOS NEOS	14:06	20	CN	520	460		80	95		DS	DSF2A1	09-21-24	DS
4															
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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 20, 2024

SHEET NUMBER 5

FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF11	10:44	CN
TF13	15:12	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P11/P12	NEOS 2C	11:34	17	CN	520	460		33	128		AFK	capped	09-22-24	DS
2	P11/P12	2C SEOS	11:52	17	CN	520	460		45	145/25	DSF5	AFK	capped	09-22-24	DS
3	P13/P14	NEOS SEOS	13:48	20	CN	520	460		78	103		AFK	DSF7B1	09-22-24	DS
4	P15/P16	SEOS NEOS	19:30	20	CN	520	460		79	143/39	DSF7	AFK	capped	09-22-24	DS
5	P17/P18	SEOS NEOS	15:39	20	CN	520	460		79	118		AFK	DSF7A1	09-22-24	DS
6	P18/P19	NEOS SEOS	17:36	20	CN	520	460		78	148/58	DSF10	AFK		09-22-24	DS
7	P20/P21	NEOS SEOS	18:16	20	CN	520	460		78	126		AFK		09-22-24	DS
8	P22/P23	NEOS SEOS	18:58	18	CN	520	460		72	146/52	DSF11	AFK		09-22-24	DS
9															
10															
11															
12															
13															
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15															
16															
17															

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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 19, 2024

SHEET NUMBER 6

X FUSION

EXTRUSION

MACHINE # WW29

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF9	9:58	BB

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
							WEDGE OR BARREL NOZZLE	WEDGE OR BARREL NOZZLE							
1	P6/P7	SEOS NEOS	10:50	20	BB	540	860		81	86/76	DSF4	AFK	capped	09-21-24	AFK
2															
3															
4															
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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 20, 2024

SHEET NUMBER 7

X FUSION

EXTRUSION

MACHINE # WW29

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF10	10:43	DP
TF12	14:50	DP

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P10/P11	SEOS NEOS	11:16	15	DP	550	860		80	156		AFK	capped	09-22-24	DS
2	P12/P13	SEOS NEOS	11:54	16	DP	550	860		78	161/73	DSF6	AFK	capped	09-22-24	DS
3	P14/P15	SEOS NEOS	14:11	20	DP	550	860		79	143/9	DSF8	AFK		09-22-24	DS
4	P16/P17	NEOS SEOS	15:05	20	DP	560	860		79	88		AFK		09-22-24	DS
5	P19/P20	SEOS NEOS	17:52	20	DP	560	860		78	148/18	DSF9	AFK		09-22-24	DS
6	P21/P22	SEOS NEOS	18:31	20	DP	560	860		78	96		AFK		09-22-24	DS
7															
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REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-22

SHEET NUMBER 1

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 40

NO.	TIME	TECH ID
TX-1A	8:23	RN
TX-2	13:55	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P6/P7	2B NEOS	9:31	9	RN	250	250		4	4				09-23-24	KC		
2	P1/P2	SEOS NEOS	14:17	17	RN	250	250		75	50/29	DSX1	KC		09-23-24	DS		
3	P5/P6	SEOS 39.0MS	16:45	17	RN	250	250		49	28	DSX2	KC		09-23-24	KC		
4																	
5																	
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 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

PASSING TRIAL SEAMS

DATE 2024-09-23

SHEET NUMBER 2

FUSION

EXTRUSION

MACHINE # EXT 41

NO.	TIME	TECH ID
TX-3	7:55	DP
TX-6	15:00	DP

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P10/P11	SEOS 53M SEOS	8:31	12	DP	250	250		53	50/3.0	DSX3	KC		09-23-24	KC		
2	P11/P12	SEOS 2C	10:05	14	DP	250	250		44	47		KC		09-23-24	DS		
3	P11/P12	2C NEOS	11:20	16	DP	250	250		32	50/28	DSX4	KC		09-23-24	KC		
4	P10/P11	53m N of SEOS NEOS	12:10	17	DP	250	250		25	50/3	DSX7	AFK		09-23-24	KC		
5	P12/P13	SEOS NEOS	15:22	17	DP	250	250		75	50/28	DSX8	AFK		09-24-24	KC		
6	P15/P16	SEOS 50m N	17:46	17	DP	250	250		50	49/29	DSX9	AFK		09-24-24	DS		
7																	
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REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-23

SHEET NUMBER 3

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 41

NO.	TIME	TECH ID
TX-4A	8:29	RN
TX-5	13:24	RN

28

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	49m N of SEOS	NEOS	8:57	12	RN	250	250		30	50/8	DSX5	KC		09-23-24	KC
2	SEOS	2B	11:07	15	RN	250	250		74	50/32	DSX6	AFK		09-23-24	KC
3	NEOS	26m N	17:55	17	RN	250	250		26	50/8	DSX10	AFK		09-24-24	DS
4															
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14															
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16															
17															

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REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-24

SHEET NUMBER 4

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 40

NO.	TIME	TECH ID
TX-8	8:07	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P22/P23	NEOS 25m S	8:50	16	RN	250	250		25	33		AFK		09-24-24	DS		
2																	
3																	
4																	
5																	
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16																	
17																	

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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-24

SHEET NUMBER 5

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 41

NO.	TIME	TECH ID
TX-7	7:55	DP

29

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P22/P23	SEOS 45m N	8:45	16	DP	250	250		45	48/33	DSX11	AFK		09-24-24	DS		
2																	
3																	
4																	
5																	
6																	
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15																	
16																	
17																	

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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24

Appendix A-6

Geomembrane Seam Destructive Test Summary

- **Tensiometer Certificate of Calibration**
 - **Seam Destructive Test Summary**
-

#10



CALIBRATION CERTIFICATE

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell
 Range: 0 - 750 lbs. Tension
 Model No: M2405-750W
 Serial No: 029951

Calibration Apparatus: Pro-Cal unit, model TC-0100/A

A/D Module Model No: T-029
 A/D Module Serial No: 1415029951
 Channel No: N/A

Dead Weight: W1: 2, W2: 152, W3: 302
 Reference Cell: R1: 2, R2: 152, R3: 302

Indicator reading with no load: 0

Offset: -3.158184 Scale: 3.328007

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F
 Excitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards
 Manufacture recommendation to Calibrate load cells annually. Valid for one year of date shown.

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

IM [Redacted] Date: 1/22/2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 21, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF-1	2024-09-19	P4/P5 65m N OF SEOS	1C	FTB 131,141,138,140,139	FTB 130,139,140,127,136	FTB 177,181,181,180,180	PASS	DS	
DSF-2	2024-09-19	P5/P6 65m S OF NEOS	1D	F F F 46/105/44	F 131		FAIL	DS	100% peel
DSF-3	2024-09-19	P9/P10 49m S OF NEOS	2A	FTB 108,114,117,117,115	FTB 131,130,137,144,137	FTB 169,170,166,169,169	PASS	DS	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 21, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF4	2024-09-18	5m S OF NEOS	2B	P6/P7			FAIL	AFK	50% Peel
				F F					
DSF5	2024-09-20	25m N OF SEOS	2E	P11/P12			FAIL	AFK	100% Peel
				F F	124,126				
DSF6	2024-09-20	5m N OF SEOS	2F	P12/P13			FAIL	AFK	50% Peel
				F F					
DSF7	2024-09-20	40m N OF SEOS	2C	P15/P16			FAIL	AFK	100% Peel
				F F					
DSF2B	2024-09-19	3m N OF DSF22	2J	P5/P6			FAIL	AFK	100% Peel
				F F					
DSF2A	2024-09-19	3m S POF DSF2	2H	P5/P6			FAIL	AFK	100% Peel
				F F					
DSF4B	2024-09-19	3m S OF DSF4	2K	P6/P7			FAIL	AFK	100% Peel
				F F					
DSF4A	2024-09-20	2m N OF SEOS	2G	P10/P11			FAIL	AFK	100% Peel
				F F					
DSF8	2024-09-20	70m N OF SEOS	2L	P14/P15	FTB	FTB	PASS	AFK	
				F F	116,118,113,118,120	143,144,147,144,149			
DSF9	2024-09-20	40m N OF SEOS	2C	P19/P20	FTB	FTB	PASS	AFK	
				F F	120,162,110,117,104	142,138,149,139,144			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 22, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF10	2024-09-20	P18/P19 30m S OF NEOS	2N	FTB	FTB	FTB	PASS	AFK	
				110,114,110,109,118	109,111,113,109,110	140,140,150,143,143			
DSF11	2024-09-20	P22/P23 20m SO OF NEOS	2P	F	F		FAIL	AFK	100% Peel
				123,86	115				
DSF12	2024-09-18	P1/P2 2m N OF SEOS	2Q	F F			FAIL	DS	100% Peel
				105,41,106,63	122,120				
DSF4B1	2024-09-18	P6/P7 3m S OF DSF4B	2S	F F			FAIL	DS	100% Peel
				111,54					
DSF4A1	2024-09-18	P10/P11 3m N OF DSF4A	2R	F F			FAIL	DS	100% Peel
				74,79					
DSF2A1	2024-09-19	P8/P9 2m N OF SEOS	2U	FTB	FTB	FTB	PASS	DS	
				113,120,105,114,108	116,111,111,104,107	144,142,145,139,139			
DSF2B1	2024-09-19	P5/P6 3m N OF SEOS	2T	FTB	FTB	FTB	PASS	DS	
				111,111,105,108,108	118,116,124,107,119	148,147,149,150,149			
DSF4A2	2024-09-18	P10/P11 15m N OF DSF4A1	2U	F F			FAIL	DS	100% Peel
				78, 100					
DSF6A	2024-09-20	P12/P13 3m N OF DSF6	2V	F F			FAIL	DS	75% Peel
				93,118					
DSF5B	2024-09-20	P11/P12 3m N OF DSF5	2W	F F			FAIL	DS	100% Peel
				95,91					

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 22, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF5A	2024-09-20	P11/P12 3m S OF DSF5	2X	F F			FAIL	DS	100% Peel
				110,67,83	126				
DSF5B1	2024-09-20	P11/P12 2m N OF 2C	1G	F F			FAIL	DS	100% Peel
				116,110,28,32	128,128				
DSF5A1	2024-09-20	P13/P14 2m S OF NEOS	1F	FTB	FTB	FTB	PASS	DS	
				116,111,117,114,114	129,125,117,122,125	158,162,160,163,162			
DSF5B2	2024-09-20	P11/P12 4m S OF NEOS	1H	FTB	FTB	FTB	PASS	DS	
				112,115,113,114,116	131,133,130,131,129	151,150,151,153,148			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 22, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF 6A1	2024-09-20	P122/P13 3m N OF DSF6A	1J	F F			FAIL	DS	100% Peel
				111,128,132,95	132,134				
DSF6A2	2024-09-20	P14/P15 2m N OF SEOS	1K	FTB	FTB	FTB	PASS	DS	
				131,123,142,128,131	148,153,123,148,144	174,174,174,176,176			
DSF7B	2024-09-02	P15/P16 3m S OF DSF7	1L	F F			FAIL	DS	100% Peel
				118,49,119,106	132,134				
DSF 7A	2024-09-20	P15/P16 3m N OF DSF7	1M	F F			FAIL	DS	25% Peel
				111,116					
DSF 7A1	2024-09-20	P17/P18 2m N OF SEOS	1N	FTB	FTB	FTB	PASS	DS	
				121,119,117,120,115	131,131,131,134,150	185,184,181,82,184			
DSF 7B1	2024-09-20	P13/P14 2m N OF SEOS	1P	FTB	FTB	FTB	PASS	DS	
				124,123,68,127,126	150,135,130,140,135	180,178,176,181,180			
DSF11B	2024-09-20	P22/P23 3m NOF DSF 11	1Q	F	F		FAIL	DS	100% Peel
				124,128,128,64	130,124,126				
DSF11A	2024-09-20	P22/P23 3m S OF DSF 11	1P	F F			FAIL	DS	100% Peel
				69,81					
DSF 11B1	2024-09-20	P20/P21 2m N OF SEOS	1R	FTB	FTB	FTB	PASS	DS	
				136,134,116,137,132	143,134,134,139,130	167,168,167,170,167			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 23, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSX1	2024-09-22	P1/P2 46 m N OF SEOS	1S	FTB		FTB	PASS	DS	
				108,113,109,115,100		172,167,165,158,163			
DSX2	2024-09-22	P5/P6 18m N of SEOS	1T	FTB		FTB	PASS	DS	
				98,98,100,114,104		154,153,153,153,152			
DSX3	2024-09-23	P10/P11 50 m N OF SOES	1U	FTB		FTB	PASS	DS	
				80,95,111,94,93		155,160,158,157,156			
DSX4	2024-09-24	P11/P12 7m N OF 2C	1V	FTB		FTB	PASS	DS	
				102,115,96,103,78		157,152,157,153,153			
DSX5	2024-09-24	P5/P6 11m S OF NEOS	1W	FTB		FTB	PASS	DS	
				102,131,87,92,86		156,153,158,156,158			
DSX6	2024-02-23	P6/P7 39m N OF SEOS	1X	FTB		FTB	PASS	DS	
				100,100,134,92,100		155.155.158.156.157			
DSX7	2024-09-23	P10/P11 2m S OFF NEOS	3A	FTB		FTB	PASS	DS	
				109,110,92,115,108		156,152,143,156,154			
DSX8	2024-09-23	P12/P13 47m N OF SEOS	3C	FTB		FTB	PASS	DS	
				98,86,86,100,93		163,163,160,159,155			

**Pass: Peel: 78 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 24, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSX9	2024-09-23	P15/P16 18m N OF SEOS	3D	FTB 111,96,104,93,87		FTB 169,162,160,155,176	PASS	DS	
DSX10	2024-09-23	P15/P16 15m S OF NEOS	3E	FTB 109,119,119,113,127		FTB 165,166,162,161,160	PASS	DS	
DSX11	2024-09-24	P22/P23 15m N OF SEOS	3F	FTB 106,95,95,99,103		FTB 180,178,174,170,172	PASS	DS	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024

Appendix A-7

Geomembrane Seam Pressure Test Summary



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 20-Sep-24
 Sheet Number 1

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P2/P3	SEOS	NEOS	1	JP	11:51	11:56	49	48	YES	PASS		X	DS	
2	P1/P2	SEOS	1B	1	JP	13:52	13:57	56	53	YES	PASS	X		DS	
3	P1/P2	1B	NEOS	2	JP	13:58	14:03	56	53	YES	PASS		X	DS	
4	P3/P4	SEOS	1A	1	JP	14:14	14:19	56	54	YES	PASS	X		DS	
5	P3/P4	1A	NEOS	2	JP	14:20	14:25	53	52	YES	PASS		X	DS	
6	P4/P5	SEOS	NEOS	1	JP	14:36	14:41	53	51	YES	PASS		X	DS	
7	P5/P6	SEOS	NEOS	2	JP	14:50	14:55	54	53	YES	PASS		X	DS	
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 21-Sep-24
 Sheet Number 2

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P6/P7	SEOS	NEOS	1	JP	9:15	9:20	59	58	YES	PASS		X	AFK	
2	P7/P8	SEOS	NEOS	2	JP	9:18	9:23	60	59	YES	PASS		X	AFK	
3	P8/P9	SEOS	NEOS	1	JP	9:27	9:32	60	60	YES	PASS		X	AFK	
4	P9/P10	SEOS	NEOS	2	JP	9:28	9:33	59	59	YES	PASS		X	AFK	
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 22-Sep-24

Sheet Number 3

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P10/P11	SEOS	NEOS	1	JP	9:05	9:10	54	52	YES	PASS		X	DS	
2	P11/P12	2E	SEOS	1	JP	9:15	9:20	59	58	YES	PASS	X		DS	
3	P11/P12	2E	2D	2	JP	9:15	9:20	58	57	YES	PASS	X		DS	
4	P11/P12	2D	2C	1	JP	9:22	9:27	59	58	YES	PASS	X		DS	
5	P11/P12	2C	NEOS	2	JP	9:23	9:28	59	58	YES	PASS		X	DS	
6	P12/P13	SEOS	NEOS	1	JP	9:32	9:37	59	58	YES	PASS		X	DS	
7	P13/P14	SEOS	NEOS	2	JP	9:32	9:37	60	59	YES	PASS		X	DS	
8	P14/P15	SEOS	NEOS	1	JP	9:43	9:48	61	60	YES	PASS		X	DS	
9	P15/P16	SEOS	NEOS	2	JP	9:43	9:48	58	58	YES	PASS		X	DS	
10	P16/P17	SEOS	NEOS	1	JP	9:53	9:58	61	60	YES	PASS		X	DS	
11	P17/P18	SEOS	NEOS	2	JP	9:53	9:58	59	58	YES	PASS		X	DS	
12	P18/P19	SEOS	NEOS	1	JP	10:06	10:11	59	57	YES	PASS		X	DS	
13	P19/P20	SEOS	NEOS	2	JP	10:06	10:11	59	59	YES	PASS		X	DS	
14	P20/P21	SEOS	NEOS	1	JP	10:21	10:26	58	56	YES	PASS		X	DS	
15	P21/P22	SEOS	NEOS	1	JP	10:31	10:36	58	56	YES	PASS		X	DS	
16	P22/P23	SEOS	NEOS	1	JP	11:14	11:19	57	55	YES	PASS		X	DS	
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 01-Oct-24

Appendix A-8

Geomembrane Defect Summary



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 1

DEFECT CODE	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION			REMARKS	**	**
		DEFECT LOCATION DESCRIPTION	DEFECT TYPE	MON.		REPAIR DATE	TEST DATE
A	P3/P4	33.6m N OF SEOS	BO	DS		09-22-24	09-23-24
B	P1/P2	8.8m N OF SEOS	BO	DS		09-22-24	09-23-24
C	P4/P5	65m N OF SEOS	DSF1	DS		09-22-24	09-23-24
D	P5/P6	65m S OF NEOS	DSF2	DS		09-22-24	09-23-24
E	P22/P23	2m N OF SEOS	EXT	DS		09-22-24	09-24-24
F	P13/P14	2m S OF NEOS	DSF5A1	DS		09-23-24	09-23-24
G	P11/P12	2m N OF 22C	DSF5B1	AFK		09-23-24	09-23-24
H	P11/P12	4m W OF SEOS	DSF5B2	DS		09-23-24	09-23-24
J	P12/P13	3m N OF DSF6A	DSF6A1	DS		09-23-24	09-24-24
K	P14/P15	2m N OF SEOS	DSF6A2	DS		09-23-24	09-24-24
L	P15/P16	3m S OF DSF7	DSF7B	DS		09-23-24	09-24-24
M	P15/P16	3m N OF DSF7	DSF7A	DS		09-23-24	09-24-24
N	P17/P18	2m N OF SEOS	DSF7A1	DS		09-24-24	09-24-24
P	P22/P23	3m S OF DSF11	DSF11A	DS		09-23-24	09-24-24
Q	P22/P23	3m N OF DSF11	DSF11B	DS		09-24-24	09-24-24
R	P20/P21	2m N OF SEOS	DSF11B1	DS		09-24-24	09-24-24
S	P1/P2	46m N OF SEOS	DSX1	DS		09-23-24	09-23-24
T	P5/P6	18m N OF SEOS	DSX2	DS		09-23-24	09-23-24
U	P10/P11	50m N OF SOES	DSX3	DS		09-23-24	09-23-24
V	P11/P12	7m N OF 2C	DSX4	DS		09-23-24	09-23-24
W	P5/P6	11m S OF NEOS	DSX5	DS		09-23-24	09-23-24
X	P6/P7	39m N OF SEOS	DSX6	DS		09-23-24	09-23-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 02-Oct-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 2

DEFECT CODE	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION			REMARKS	**	**
		DEFECT LOCATION DESCRIPTION	DEFECT TYPE	MON.		REPAIR DATE	TEST DATE
A	P9/P10	49m S OF NEOS	DSF3	AFK		09-22-24	09-23-24
B	P6/P7	5m S OF NEOS	DSF4	AFK		09-22-24	09-23-24
C	P11/P12	33m S OF NEOS	BOOT	AFK		09-22-24	09-23-24
D	P11/P12	44m S OF NEOS	BO	AFK		09-22-24	09-23-24
E	P11/P12	25m N OF SEOS	DSF5	AFK		09-22-24	09-23-24
F	P12/P13	5m N OF SEOS	DSF6	AFK		09-22-24	09-24-24
G	P10/P11	2m N OF SEOS	DSF4A	AFK		09-23-24	09-23-24
H	P5/P6	3m S OF DSF2	DSF2A	AFK		09-22-24	09-23-24
J	P5/P6	3m N OF DSF2	DSF2B	AFK		09-22-24	09-23-24
K	P6/P7	3m S OF DSF4	DSF4B	AFK		09-23-24	09-23-24
L	P14/P15	70m N OF SEOS	DSF8	AFK		09-22-24	09-24-24
M	P19/P20	18m S OF NEOS	DSF9	AFK		09-24-24	09-24-24
N	P18/P19	30m S OF NEOS	DSF10	AFK		09-24-24	09-24-24
P	P22/P23	20m S OF NEOS	DSF11	AFK		09-23-24	09-23-24
Q	P1/P2	2m N OF SEOS	DSF12	AFK		09-24-24	09-24-24
R	P10/P11	3m N OF DSF4A	DSF4A1	AFK		09-23-24	09-23-24
S	P6/P7	3m S OF DSF4B	DSF4B1	AFK		09-23-24	09-23-24
T	P5/P6	2m S OF NEOS	DSF2B1	AFK		09-23-24	09-23-24
U	P10/P11	15m N OF DSF4A1	DSF4A2	AFK		09-23-24	09-23-24
V	P12/P13	3m N OF DSF6	DSF6A	AFK		09-23-24	09-24-24
W	P11/P12	3m N OF DSF5	DSF5B	AFK		09-23-24	09-23-24
X	P11/P12	3m S OF DSF5	DSF5A	AFK		09-23-24	09-23-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 02-Oct-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 3

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION DESCRIPTION				REPAIR DATE	TEST DATE
A	P10/P11	2m S OF NEOS	DSX7	AFK		09-23-24	09-23-24
B	P8	2m N + 1m W OF SEOP	D	AFK		09-23-24	09-23-24
C	P12/P13	47m N OF SEOS	DSX8	AFK		09-23-24	09-24-24
D	P15/P16	18m N OF SEOS	DSX9	AFK		09-24-24	09-24-24
E	P15/P16	15m S OF NEOS	DSX10	AFK		09-24-24	09-24-24
F	P22/P23	15m N OF SEOS	DSX11	AFK		09-24-24	09-24-24
G							
H							
J							
K							
L							
M							
N							
P							
Q							
R							
S							
T							
U							
V							
W							
X							

<p>AD- ANIMAL RELATED DAMAGE B - UNDISPERSED RESIN BEAD BO - FUSION WELDER BURN CO - CHANGE OF OVERLAP CR - CREASE D - INSTALLATION DAMAGE DS - # - DESTRUCTIVE TEST NUMBER PT - PRESSURE TEST CUT SI - SOIL SURFACE IRRECLARITY WS - WELDER RESTART INT - Intersection WEOS - west end of seam NEOS - north end of seam EEOS - east end of seam SEOS - south end of seam</p>	<p>EE - EARTHWORK EQUIPMENT DAMAGE EXT - EXTENSION FM - FISHMOUTH FS - FAILED SEAM LENGTH FTS - FIELD TEST STRIP HT - HEAT TACK BURN IO - INSUFFICIENT OVERLAP (UNDER SPEC) MD - MAUFACTURER/DELIVERY DAMAGE T - THREE PANEL INTERSECTION WR - WRINKLE</p> <p style="text-align: right;">REVIEWED BY: AFK DATE: 02-Oct-24</p>
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SEOP - south end of panel
 NEOP - north end of panel
 WEOP - west end of panel
 SEOP - east end of panel

Appendix A-9

Geomembrane Repair Summary



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX-1A	8:23	RN
TX-2	13:55	RN

DATE September 22, 2024

SHEET NUMBER 1

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. DIMENSION	WELD TECH.	MON.	REMARKS
1	1B	2024-09-22	8:50	P	1 X 2.8	RN	KC	
2	1A	2024-09-22	9:00	P	0.6 X 0.6	RN	KC	
3	1D	2024-09-22	9:02	P	0.7 X 1.8	RN	KC	
4	1C	2024-09-22	9:16	P	0.6 X 1.4	RN	KC	
5	2A	2024-09-22	9:25	P	1.2 X 0.5	RN	KC	
6	2B	2024-09-22	9:31	P	1.5 X 0.8	RN	KC	
7	2D	2024-09-22	9:54	P	0.6 X 0.6	RN	KC	
8	2E	2024-09-22	9:57	P	1.5 X 0.7	RN	KC	
9	2C	2024-09-22	10:13	BOOT	2.5 X 2.5	RN	KC	
10	2F	2024-09-22	10:31	P	1.3 X 0.9	RN	KC	
11	2L	2024-09-22	10:40	P	1.5 X 0.7	RN	KC	
12	1E	2024-09-22	10:46	RS	1.7	RN	KC	
13	2H	2024-09-22	16:50	P	1.5 X 1.0	RN	KC	
14	2J	2024-09-22	17:00	P	2.0 X 1.0	RN	KC	
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
 P - PATCH

G & W - GRIND WELD
 C - CAP

REVIEWED BY: AFK

DATE: 02-Oct-24

Appendix A-10

Geomembrane Seam and Repair Vacuum Test Summary



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 1

SEAMS											
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS	
	FROM	TO				NO	YES				
1	P1/P2	SEOS	NEOS	2024-09-23	BT	0		X	Y	DS	
2	P11/P12	SEOS	2C	2024-09-23	BT	0		X	Y	DS	
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	2P	2024-09-23	BT	0	Y	DS
22	1B	2024-09-23	BT	0	Y	DS
23	1S	2024-09-23	BT	0	Y	DS
24	1A	2024-09-23	BT	0	Y	DS
25	3B	2024-09-23	BT	0	Y	DS
26	2U	2024-09-23	BT	0	Y	DS
27	2X	2024-09-23	BT	0	Y	DS
28	2E	2024-09-23	BT	0	Y	DS
29	2W	2024-09-23	BT	0	Y	DS
30	2D	2024-09-23	BT	0	Y	DS
31	2C	2024-09-23	BT	0	Y	DS
32	1G	2024-09-23	BT	0	Y	DS
33						
34						
35						
36						
37						
38						
39						
40						
41						

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER

SEAMS										
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
	FROM	TO				NO	YES			
1	P5/P6	SEOS NEOS	2024-09-23	CN	0		X	Y	KC	
2	P6/P7	SEOS NEOS	2024-09-23	CN	0		X	Y	KC	
3	P10/P11	SEOS NEOS	2024-09-23	CN	0		X	Y	KC	
4	P11/P12	NEOS 2C	2024-09-23	CN	0		X	Y	KC	
5										
6										
7										
8										
9										
10										
11										
12										
13										
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15										
16										
17										
18										
19										
20										

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	2H	2024-09-23	CN	0	Y	KC
22	1D	2024-09-23	CN	0	Y	KC
23	1T	2024-09-23	CN	0	Y	KC
24	2J	2024-09-23	CN	0	Y	KC
25	2T	2024-09-23	CN	0	Y	KC
26	1W	2024-09-23	CN	0	Y	KC
27	1C	2024-09-23	CN	0	Y	KC
28	2B	2024-09-23	CN	0	Y	KC
29	2K	2024-09-23	CN	0	Y	KC
30	2S	2024-09-23	CN	0	Y	KC
31	1X	2024-09-23	CN	0	Y	KC
32	2A	2024-09-23	CN	0	Y	KC
33	2G	2024-09-23	CN	0	Y	KC
34	2U	2024-09-23	CN	0	Y	KC
35	1U	2024-09-23	CN	0	Y	KC
36	3A	2024-09-23	CN	0	Y	KC
37	1H	2024-09-23	CN	0	Y	KC
38	1V	2024-09-23	CN	0	Y	KC
39	2R	2024-09-23	CN	0	Y	KC
40						
41						

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Faciltiy Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 3

SEAMS										
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
	FROM	TO				NO	YES			
1	P15/P16	SEOS NEOS	2024-09-24	BT	0		X	Y	DS	
2	P22/P23	NEOS 1P	2024-09-24	BT	0		X	Y	DS	
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	1P	2024-09-24	BT	0	Y	DS
22	1K	2024-09-24	BT	0	Y	DS
23	1L	2024-09-24	BT	0	Y	DS
24	2L	2024-09-24	BT	0	Y	DS
25	1M	2024-09-24	BT	0	Y	DS
26	3E	2024-09-24	BT	0	Y	DS
27	3D	2024-09-24	BT	0	Y	DS
28	1Q	2024-09-24	BT	0	Y	DS
29	1N	2024-09-24	BT	0	Y	DS
30	2Q	2024-09-24	BT	1	Y	DS
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 4

SEAMS											
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS	
	FROM	TO				NO	YES				
1	P12/P13	SEOS	NEOS	2024-09-24	CN	0		X	Y	KC	
2	P22/P23	SEOS	1P	2024-09-24	CN	0		X	Y	KC	
3											
4											
5											
6											
7											
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10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	2F	2024-09-24	CN	0	Y	KC
22	2V	2024-09-24	CN	0	Y	KC
23	1J	2024-09-24	CN	0	Y	KC
24	3C	2024-09-24	CN	0	Y	KC
25	1F	2024-09-24	CN	0	Y	KC
26	2N	2024-09-24	CN	0	Y	KC
27	2M	2024-09-24	CN	0	Y	KC
28	3F	2024-09-24	CN	0	Y	KC
29	1R	2024-09-24	CN	0	Y	KC
30	1E	2024-09-24	CN	0	Y	KC
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35						
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* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24

Appendix B

Construction Photo Summary



GCL Deployment



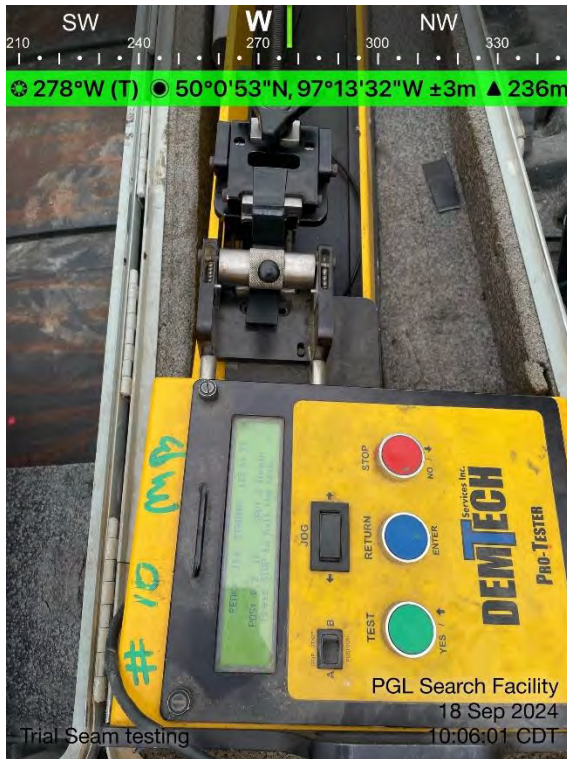
Bentonite in Seams



Smooth Geomembrane Deployment



Thickness verification of Smooth Geomembrane



Trial Seams testing of Fusion Welder



Fusion Welding Smooth Geomembrane



Pressure testing Fusion Seams



Extrusion Welding of Boot



Vacuum Box Testing of Extrusion Welds

Appendix C

Prairie Green IWMF Search Facility Pad- Mob I

CQA Geosynthetics Monitoring Program



Quality Engineering | Valued Relationships

WSP Canada Inc

Prairie Green IWMF Search Facility Pad – Mob I

CQA Geosynthetics Monitoring Program

Prepared for:

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB
Attention: Derek Dreger

Distribution:

Fabiano Gondim

Project Number:

1000 043-27

Date:

November 13, 2024
Final Report



Quality Engineering | Valued Relationships

November 13, 2024

Our File No. 1000-043-27

Derek Dreger, P.Eng., PMP, FEC
WSP Canada Inc.
1600 Buffalo Place,
Winnipeg, MB
R3T 6B8

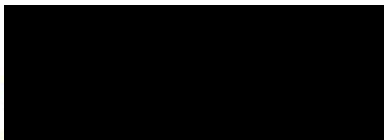
**RE: CQA Geosynthetics Monitoring Report for
Prairie Green IWMF Search Facility Pad- Mob 1**

TREK Geotechnical Inc. is pleased to submit our report for the Quality Assurance inspection services for the Prairie Green IWMF Search Facility Pad-Mob 1.

Please contact Angela Fidler-Kliewer if you have any questions. Thank you for the opportunity to serve you on this assignment.

Sincerely,

TREK Geotechnical Inc.
Per:



Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

cc: Angela Fidler-Kliewer C. Tech. (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	AFK	October 3, 2024	Final Report
1	AFK	November 13, 2024	Final Report

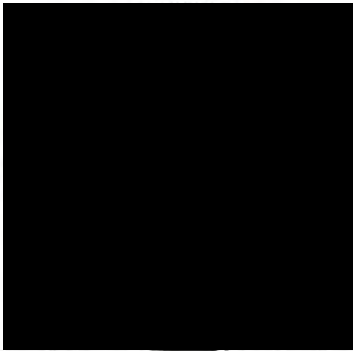
Authorization Signatures

Prepared By:



Angela Fidler-Kliewer C. Tech.
Manager of Laboratory and Field Services

Reviewed By:



Nelson Ferreira, Ph.D., P.Eng.
Geotechnical Engineer, Principal

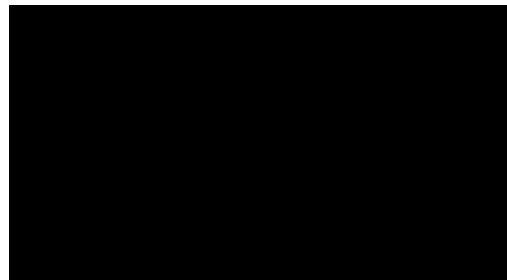


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Drawing 1 As-built Primary 60-mil HDPE Geosynthetic Liner

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A-1 - Geosynthetic and GCL Manufacturer's Quality Control Documentation

A-2 - Certificate of Acceptance- Subgrade

A-3 - Geomembrane Deployment Inspection Summary

A-4 - Geomembrane Trial Seam Summary

A-5 - Geomembrane Weld Inspection

A-6 - Geomembrane Seam Destructive Test Summary

- Fusion and Extrusion Seam Destructive Test Record

A-7 - Geomembrane Seam Pressure Test Log

A-8 - Geomembrane Defect Repair Summary

A-9 - Geomembrane Repair Log

A-10 - Geomembrane Seam Vacuum Test Log

Appendix B Photos

1.0 Introduction

1.1 Background

The Prairie Green Integrated Waste Management Facility is located in the Rural Municipality of Rosser, close to the City of Winnipeg (Township 12, Range 2 East of the Principal Meridian). Waste Connections of Canada Inc. (WCC) is the owner and operates the facility.

This report summarizes the Quality Assurance (QA) inspections and testing services associated with construction of the Search Facility Pad the work associated with installing a GCL and HDPE Geomembrane liner – Mob 1. The area constructed is about 1.2 Ha of a total of approximately 2.7 HA of pad to be constructed and comprises the building area in the South section of the pad.

The QA work was conducted in accordance with the Contract Documents and Project Specifications provided by WSP Canada Inc. The construction of geosynthetics for the Search Facility Pad - Mob 1 commenced on September 14, 2024, and was completed on September 24, 2024.

1.2 Companies Involved in the Construction of the Search Facility Pad

The following sections summarize the roles and responsibilities of the companies involved in the design, construction, supervision, review, coordination and quality assurance services associated with the construction of Search Facility Pad – Mob 1.

WSP Canada Inc. (Designer):

- Search Facility Pad – Mob 1 design, excluding geotechnical design, and
- Preparation of construction documents, project specifications and tender
- Contract Administration during construction including QA testing of materials (excluding GCL and HDPE placement)

Earthmax Construction Inc (Prime Contractor) with Titan Environmental Containment Ltd. (Sub-Contractor):

- The prime contractor for the construction of Search Facility pad is Earth Max Construction Inc. (Earthmax) from Arborg, Manitoba. They performed the earthworks, including placement of the granular fill, and sand fill placement
- Titan Environmental Containment Ltd (Titan) was responsible for the installation of the GCL and the 1.5 mm (60 mil) thick High-Density Polyethylene (HDPE) membrane.

TREK Geotechnical Inc. (CQA Inspection):

- Overall review and inspection of the geosynthetics installation
- QA inspection, testing and approval of the GCL and 1.5 mm (60 mil) HDPE membrane liner materials including review of manufacturer's factory quality control and materials testing, field liner sheet installation, non-destructive seam testing, destructive sampling and testing of field seams, repairs and vacuum box testing

1.3 GCL Liner Materials

The geosynthetic clay liner (GCL) used on this project consisted of Bentoliner provided by Solmax Geosynthetic LLC. A total of 27 rolls of GCL were delivered and inventoried on site, comprising of 4.27 m wide and 45.72 m long panels. The GCL was installed on the prepared subgrade by HDPE membrane. TREK monitored the installation of the liners including overlaps, tears, defects and subsequent repairs to the material. All materials utilized, as well as the installation process, met specifications and were inspected as per the Contract Documents and Project Specification. The manufacturer's Quality Control (QC) documentation of the GCL material delivered to site is presented in Appendix A-1.

1.4 GCL Panel Deployment

Panel deployment for the liner was carried out between September 18, 2024 and September 20, 2024. Approximately 4,965 m² of GCL material was placed out of 17,888 m².

Placement of the GCL was accomplished using an excavator and manual labour. A minimum overlap of 300 mm was maintained between adjoining panels. Powdered bentonite was placed and spread manually in the overlap.

During deployment of the GCL panels, TREK personnel carried out the following inspection and testing:

- measurements of the panel length;
- confirmation of panel overlap and bentonite placement in the seams;
- visual observations of overall material quality;

Upon completion of the GCL installation, the works were inspected by the Geosynthetics Installer (Titan) and the liner CQA Inspector (TREK), prior to HDPE geomembrane liner installation.

2.0 HDPE Geomembrane Liner Installation

The following section summarizes the installation of the 1.5 mm thick (60 mil), smooth HDPE membrane liner system. All materials utilized, as well as the installation process, met specifications and were inspected as per the Contract Documents and Project Specification.

2.1 Search Facility Pad Subgrade

Prior to the GCL and Geomembrane deployment, the sub-grade was inspected by the Titan Environmental, Earthmax and Trek Geotechnical and was formally accepted by Titan. Copies of the soil surface acceptance certificates are presented in Appendix A-2.

2.2 Membrane Liner Materials

The membrane (liner) material used on this contract consisted of 1.5 mm thick (60 mil), smooth and high-density polyethylene (HDPE) installed by Titan.

A total of 21 rolls of 7.5 m wide and 170 m long panels of smooth membrane were delivered and inventoried onsite for this project. The HDPE liner materials were manufactured and supplied by Solmax. The manufacturer's Quality Control (QC) documentation for the membrane materials was provided by Solmax and indicates that all membrane used in the Search Facility Pad - Mob 1 is in compliance with the project specifications.

2.3 HDPE Liner Panel Deployment

Panel deployment for the HDPE liner was carried out between September 18, 2024 and September 20, 2024. Repair operations on the Search Facility Pad – Mob 1 took place until September 24, 2024. Approximately 12,355 m² of HDPE liner material was placed out of 28,076 m².

During deployment of the primary HDPE liner panels, TREK personnel carried out the following inspection and testing:

- measurements of the panel thickness
- confirmation of panel overlaps
- visual observations of overall sheet quality
- assignment of a unique identification number for each panel placed

Placement of the HDPE liner was accomplished using an excavator and manual labour. A minimum

overlap of 150 mm was typically maintained between adjoining panels. The average panel thickness was determined by averaging the measurements made along each of the leading, two sides and trailing edges utilizing a Starret Micrometer.

Panel numbers were assigned a unique identification number according to the order in which they were installed. Deployment of the HDPE liner consisted of panels P1 to P23, respectively. The arrangement and designation of the various panels for the HDPE liner are presented on Drawing 1. The deployment Inspection Logs are provided in Appendix A-3.

Upon completion of the HDPE liner installation, the works were inspected by Titan and TREK personnel.

2.4 Trial Seams

The welding equipment used by Titan included double hot wedge fusion welders (production welding along panel seams and cap repairs) and hand-held extrusion fillet welders (for detailing, liner repairs, and reconstruction of failed fusion seam lengths).

TREK personnel monitored trial seams during daily start-up, and at approximately every five hours during continuous operation of each welding apparatus. Six sample coupons were cut from each test sample for tensile strength testing as follows:

- Four coupons were tested in the peel mode in accordance with ASTM D6392
- Two coupons were tested in the shear mode in accordance with ASTM D6392

A summary of the daily trial seaming for the equipment used during each workday is provided in Appendix A-4. All passing trial seams test results met the project specifications.

2.5 Production Seams

The HDPE liner seaming process proceeded in conjunction with the panel deployment. The majority of the seams were welded using a double hot wedge fusion welder. Some seams required repairs based on field test results and the reconstructed seams were made using a hand-held extrusion welding apparatus. Fusion and extrusion seams were subjected to non-destructive and destructive testing.

All seams (including repairs) welds were observed and documented by TREK personnel. A summary of the panel fusion and extrusion seaming are provided in Appendix A-5.

2.5.1 Non-Destructive Testing

All non-destructive seam testing was performed by Titan personnel and observed by TREK personnel on a full-time basis. Two types of non-destructive testing were used on this project:

- Air pressure tests on fusion seams
- Vacuum box tests on extrusion seams, patches and beads

Air pressure testing comprised of the following procedure:

1. Sealing off the air channel between the inside and outside tracks of the double fusion weld
2. Inserting a pressure gauge into the air channel
3. Using a portable compressor or pump to pressurize the air channel to a minimum pressure of 210 kPa (30 psi)
4. Inspecting the seam along its entire length to confirm that entire seam was pressurized
5. Observing the pressure gauge over a five-minute period. The test is considered a pass (successful) if the pressure drop is less than 21 kPa (3 psi) over this period
6. Making an incision into the air channel, at the end of the test seam to release the pressurized air

Vacuum box testing comprised of the following procedure:

1. Applying a soapy water solution to the area to be tested
2. Placing a rigid-walled box over the area to be tested The box was constructed with a clear Plexi-glass top and/or sides with a neoprene gasket around the bottom of the box to facilitate a seal between the box and the HDPE liner
3. Applying a vacuum of 21 kPa to 35 kPa (3 psi to 5 psi) to the inside of the box for a minimum of ten seconds using a portable vacuum pump
4. Observing for air bubbles, which, if they occur, are indicative of defects or discontinuities of the welding procedure

Any leaks or discontinuities observed and detected during either testing method were considered a failure (non-conformance). The failed areas were marked and subsequently repaired in accordance with the project specifications and were retested using the procedures described above. All repaired areas were then re-tested and met the acceptance criteria.

Results of the non-destructive testing are provided in Appendix A-7 for the air pressure testing and in Appendix A-10 for the vacuum box testing. All non-destructive testing completed on both fusion and extrusion seaming comply with project specifications.

2.5.2 Destructive Testing

Destructive test samples of panel fusion welded seams were taken at an average of approximately one for every 144 m of fusion seam length. TREK personnel selected all test locations.

For each destructive sample, ten coupons were cut from the seam and tested in the field by TREK. TREK retained the remaining part of the samples for their archives. The destructive coupons that were tested in the field consisted of five coupons tested for peel adhesion strength (peel test mode ASTM D6392) and five tested for seam strength at yield (shear test mode ASTM D6392)

The specified acceptance criteria for destructive tests are as follows:

- Fusion and extrusion seam under peel mode:
 - Peel strength for the seam is not to be less than 340 N/25 mm for extrusion and 398 N/25 mm for fusion;

- Fusion and extrusion seam under shear mode:
 - Yield strength for the seam is not to be less than 525 N/25 mm.

Four out of five coupons were required to meet or exceed the acceptance criteria for peel and shear strength failure modes.

A total of twelve fusion destructive tests (DSF designation) and eleven extrusion tests (DSX designation) were conducted of the HDPE liner. Seven fusion destructive tests failed, and each failed test was traced along the fusion seam activity log to obtain one passing destructive before and after the failed destructive. The failed sections of seams were subsequently extrusion welded and non-destructively tested with the vacuum box. All extrusion destructive tests completed comply with project specifications.

The destructive testing results are provided in Appendix A-6.

2.6 Repair of Installation Defects

All defects observed on the HDPE liner were assigned a unique identification number and marked by TREK personnel for repair. The defects were repaired by extrusion welding methods. The repairs were then tested (non-destructive) by Titan personnel by vacuum box test method. Once a noted defect was repaired and tested, it was documented as a “pass” and no other testing was required.

Defect repair locations are shown on Figure 1 for the HDPE liner. The documentation (repairs made and non-destructive testing) of defects and repairs to the seams and panels are included in Appendices A-8 and A-10 for the HDPE liner within the Search Facility Pad – Mob 1.

A HDPE liner boot was installed around the Leachate Holding Tank. The boot was constructed and extruded as per drawing detail D on Drawing 6 along with rubber gaskets and stainless-steel clamps to secure the geomembrane to the Leachate Holding Tank.

3.0 Summary

TREK personnel provided construction/quality assurance inspections, and supported WSP Canada Inc. with contract administration. The following activities and components were observed, monitored, inspected and/or reviewed for approval and conformance with specifications:

- Geosynthetic clay liner installation, placement and seaming procedures;
- 1.5 mm (60 mil) HDPE membrane installation, placement, seaming, non-destructive and destructive seam testing and repairs;

Based on the results of the field monitoring, observations, inspections and testing, the Search Facility Pad – Mob 1 was constructed in accordance with the project specifications and to current accepted industry standards.

4.0 Closure

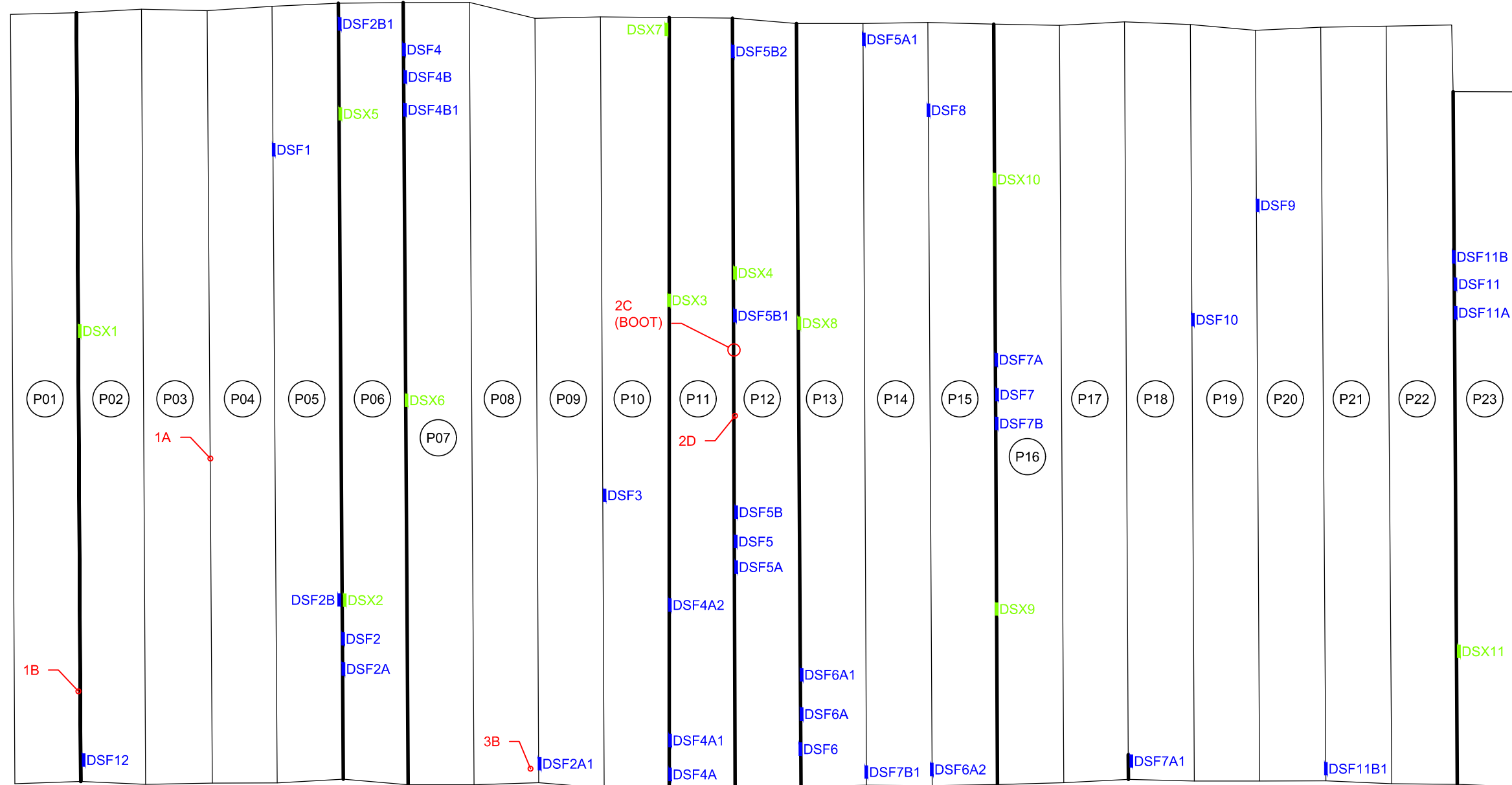
The geotechnical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The information and findings of this report were based on the tests, measurements, and observations made by TREK during construction and are only applicable to those elements. TREK is not responsible for conformance of any elements that were not observed or tested.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of WSP Canada Inc. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be used or relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

Z:\Projects\1000 Soils Lab\1000 Lab Projects\1000-043 WSP\1000-043-27 Prairie Green Landfill Search Facility Pad Construction\CAD\Fig 01 2024-09-25 PGI Search Facility Pad 0_A 1000-043-27.dwg, 2024-09-25 9:18:09 AM



- 4C UNIQUE DEFECT IDENTIFICATION NUMBER
- DSF12 6U FUSION DESTRUCTIVE LOCATION AND DESIGNATION
- DSX1 EXTRUSION DESTRUCTIVE DESIGNATION

- FUSION SEAM
- EXTRUSION SEAM RECONSTRUCTION
- P01 PANEL DESIGNATION NUMBER

- NOTES:**
1. PANEL LOCATIONS ARE BASED ON SURVEY COMPLETED BY TREK GEOTECHNICAL.
 2. THE DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING LETTER.

Figure 01
Geomembrane Panel Layout
MOB 1

Appendix A-I

**GCL and Geomembrane
Manufacturer's Quality Control
Documents**

Submittal #6.0 - Nonwoven Geotextile Cushion

Revision	0	Submittal Manager	Julian Kornelsen (Earth Max Construction Inc)
Status	Open	Date Created	Aug 14, 2024
		Spec Section	
Responsible Contractor	Earth Max Construction Inc	Received From	
Final Due Date		Lead Time	
		Cost Code	
Location		Type	Shop Drawing
Approvers			
Ball in Court	Julian Kornelsen (Earth Max Construction Inc)		
Distribution			
Description	Nonwoven Geotextile Cushion		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					TDS_S_E1600.pdf

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub- contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input checked="" type="checkbox"/> No Comment <input type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">Project No.</td> <td>CA0039180.5749</td> </tr> <tr> <td>Project Name</td> <td>Search Pad Construction</td> </tr> <tr> <td>Reviewed By</td> <td>F. Gondim</td> </tr> <tr> <td>Date:</td> <td>August 14, 2024</td> </tr> </table>	Project No.	CA0039180.5749	Project Name	Search Pad Construction	Reviewed By	F. Gondim	Date:	August 14, 2024
Project No.	CA0039180.5749								
Project Name	Search Pad Construction								
Reviewed By	F. Gondim								
Date:	August 14, 2024								

MIRAFI E1600



MIRAFI® E1600 is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. MIRAFI E1600 is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

TenCate Geosynthetics Americas (A Solmax Company) is accredited by Geosynthetic Accreditation Institute – Laboratory Accreditation Program ([GAI-LAP](http://GAI-LAP.com)).

MIRAFI E1600 meets Build America, Buy America Act, Pub. L. No. 117-58, div. G §§ 70901-52.

MECHANICAL PROPERTIES	TEST METHOD	UNIT	MINIMUM AVERAGE ROLL VALUE
Grab Tensile Strength	ASTM D4632	lbs (N)	425 (1891)
Grab Tensile Elongation	ASTM D4632	%	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	155 (690)
CBR Puncture Strength	ASTM D6241	lbs (N)	1200 (5340)
			MAXIMUM OPENING SIZE
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	100 (0.15)
			MINIMUM ROLL VALUE
Permittivity	ASTM D4491	sec ⁻¹	0.6
Permeability	ASTM D4491	cm/sec	0.15
Flow Rate	ASTM D4491	gal/min/ft ² (l/min/m ²)	40 (1630)
			MINIMUM TEST VALUE
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	80
PHYSICAL PROPERTIES	TEST METHOD	UNIT	TYPICAL ROLL VALUE
Weight	ASTM D5261	oz/yd ² (g/m ²)	16.0 (542)
			TYPICAL ROLL VALUE
Roll Dimensions (width x length)		ft (m)	15 x 300 (4.5 x 91)
Roll Area		yd ² (m ²)	500 (418)
Roll Weight		lb (kg)	516 (234)

365 South Holland Drive Pendergrass, GA 30567

Tel +1 706 693 2226 www.tencategeo.us



Solmax is not a design or engineering professional and has not performed any such design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation, or specification.
FGS000828 ETQR04



Submittal #7.0 - GCL

Revision	0	Submittal Manager	Julian Kornelsen (Earth Max Construction Inc)
Status	Open	Date Created	Aug 14, 2024
		Spec Section	
Responsible Contractor	Earth Max Construction Inc	Received From	
Final Due Date		Lead Time	
		Cost Code	
Location		Type	Shop Drawing
Approvers			
Ball in Court	Julian Kornelsen (Earth Max Construction Inc)		
Distribution			
Description	GCL		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					TR-401bmflw - 4.34 kg mpu.pdf

WSP - Submittal Review

WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub- contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.

<input checked="" type="checkbox"/> No Comment <input type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<table border="0" style="width: 100%;"> <tr> <td style="width: 150px;">Project No.</td> <td>CA0039180.5749</td> </tr> <tr> <td>Project Name</td> <td>Search Pad Construction</td> </tr> <tr> <td>Reviewed By</td> <td>F. Gondim</td> </tr> <tr> <td>Date:</td> <td>August 14, 2024</td> </tr> </table>	Project No.	CA0039180.5749	Project Name	Search Pad Construction	Reviewed By	F. Gondim	Date:	August 14, 2024
Project No.	CA0039180.5749								
Project Name	Search Pad Construction								
Reviewed By	F. Gondim								
Date:	August 14, 2024								

BENTOMAT® FLW CERTIFIED PROPERTIES

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY	REQUIRED VALUES
Cap Nonwoven Geotextile Mass/Unit Area ¹	ASTM D 5261	1/20,000 m ²	200 g/m ² MARV
Carrier Scrim Nonwoven Geotextile Mass/Unit Area ¹	ASTM D 5261	1/20,000 m ²	200 g/m ² MARV
Bentonite Swell Index ²	ASTM D 5890	1/50,000 kg	24 mL/2g min
Bentonite Fluid Loss ²	ASTM D 5891	1/50,000 kg	18 mL max
Bentonite Moisture Content ²	ASTM D 2216	1/50,000 kg	12% max
Bentonite Mass/Unit Area ³	ASTM D 5993	1/4,000 m ²	4.34 kg/m ² MARV
GCL Tensile Strength ⁴	ASTM D 6768	1/4,000 m ²	8.8 kN/m MARV
GCL Peel Strength ⁴	ASTM D 6496	1/4,000 m ²	610 N/m MARV
GCL Index Flux ⁵	ASTM D 5887	1/25,000 m ²	1 x 10 ⁻⁸ m ³ /m ² /sec max.
GCL Hydraulic Conductivity ⁵	ASTM D 5887	1/25,000 m ²	5 x 10 ⁻⁹ cm/sec max.
GCL Hydrated Internal Shear Strength ⁶	ASTM D 6243	Periodically	24 kPa Typical

Bentomat FLW is a reinforced GCL consisting of a layer of granular sodium bentonite between a nonwoven geotextile and a scrim reinforced nonwoven geotextile, which are needlepunched together.

Notes

¹ Geotextile property tests performed on the geotextile components before they are incorporated into the finished GCL product.

² Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

³ Bentonite mass/area reported at 0 percent moisture content.

⁴ All tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496.

⁵ Index flux and permeability testing with deaired distilled/deionized water at 551kPa cell pressure, 531 kPa headwater pressure and 517 kPa tailwater pressure. This flux value is equivalent to a permeability of 5x10⁻⁹ cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

⁶ Peak values measured at 9.6 kPa normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

CETCO has developed an edge enhancement system that eliminates the need to use additional granular sodium bentonite within the overlap area of the seams. We call this edge enhancement, SuperGroove™, and it comes standard on both longitudinal edges of Bentomat® FLW. It should be noted that SuperGroove™ does not appear on the end-of-roll overlaps and recommend the continued use of supplemental bentonite for all end-of-roll seams.

TR 401-FLW-35
03/2014

800.527.9948 Fax 847.577.5566

For the most up-to-date product information, please visit our website, www.cetco.com.

A wholly owned subsidiary of AMCOL International Corporation. The information and data contained herein are believed to be accurate and reliable, CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.



LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: P06811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

WSP - Submittal Review		WSP Comments:	
<p>WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.</p>		<p>Please provide conformance testing data for Oven Aging at 85C and UV Resistance.</p>	
<input type="checkbox"/> No Comment <input checked="" type="checkbox"/> Reviewed as Noted <input type="checkbox"/> Amend and Resubmit <input type="checkbox"/> Rejected	<p>Project No. CA0039180.5749</p> <p>Project Name Search Pad Construction</p> <p>Reviewed By W. Francey</p> <p>Date: September 6, 2024</p>	<p>Other properties meet the Specification</p>	

ROLL NUMBER	RESIN LOT NUMBER	MANUFACT. DATE	RESIN MELT INDEX 190/2.16 g/10 min D1238	RESIN DENSITY g/cc D1505	OIT min D8117	HPOIT min D5885	ESCR SP-NCTL hours D5397
Product Code : 1101438							
HDPE 60 mils / 1.50 mm Black Smooth			1.0	> 0.932	100		500
1002-121848	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121849	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121850	PRA820560	2024-03-08	0.07	0.937	120		>500 Certified 1002-121801
1002-121856	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121858	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121860	PRA820550	2024-03-08	0.07	0.938	120		>500 Certified 1002-121854
1002-121861	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121863	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121865	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-121866	PRA820550	2024-03-09	0.07	0.938	120		>500 Certified 1002-121854
1002-122271	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122272	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122273	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234
1002-122276	PRB821070	2024-04-08	0.09	0.938	120		>500 Certified 1002-122234

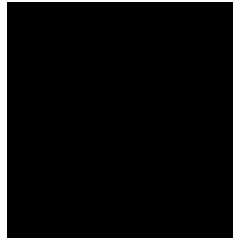
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LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: PO6811
SALES ORDER: SO-003722
PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

1002-122279	PRB821070	2024-04-08	0.09	0.938	120	>500 Certified 1002-122234
1002-122280	PRB821070	2024-04-08	0.09	0.938	120	>500 Certified 1002-122234
1002-122284	PRB821070	2024-04-09	0.09	0.938	120	>500 Certified 1002-122234
1002-122285	PRB821070	2024-04-09	0.09	0.938	120	>500 Certified 1002-122234
1002-122302	PRB820750	2024-04-10	0.08	0.938	120	>500 Certified 1002-122299
1002-122303	PRB820750	2024-04-10	0.08	0.938	120	>500 Certified 1002-122299

QUANTITY (ROLLS): 20

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TEST RESULTS

PROJECT NUMBER: PO6811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

PRODUCT: 1101438

CE Certificate = HD-60-SS-BB

HDPE 60 mils / 1.50 mm Black Smooth

Properties	Thickness ave/min.	GeoM Density	Carbon Black Content	Carbon Black Dispersion	Tensile				Tear Resist.	Puncture Resist.	Dimension Stability	Asperity Height In/Out mm
					Yield Strength	Elong.	Break Strength	Elong.				
Unit	mm	g/cc	%	Cat 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5199	D792	D4218	D5596	D6693				D1004	D4833	D1204	
Frequency	Each roll	Every 10 rolls	Every 2 rolls	Every 10 rolls	Every 2 rolls				Every 5 rolls	Every 5 rolls		
Specification	1.50 / 1.35	≥ 0.940	2.0 - 3.0	Cat. 1 / Cat.	23	13	43	700	187	534		
1002-121848 MD XD	1.52 / 1.49	0.947	2.34	10/10 views	27.3 27.7	17.4 16.6	52.2 53.9	840 898	226 240	618		
1002-121849 MD XD	1.53 / 1.49	0.947	2.34	10/10 views	27.3 27.7	17.4 16.6	52.2 53.9	840 898	226 240	618		
1002-121850 MD XD	1.53 / 1.50	0.947	2.30	10/10 views	26.3 28.0	18.1 15.5	53.4 52.5	874 889	226 240	618		
1002-121856 MD XD	1.55 / 1.51	0.947	2.28	10/10 views	27.3 27.8	18.3 16.3	53.6 54.8	858 916	223 240	605		
1002-121858 MD XD	1.55 / 1.51	0.947	2.32	10/10 views	26.6 28.0	18.3 16.9	52.9 53.9	851 900	220 236	618		
1002-121860 MD XD	1.55 / 1.52	0.947	2.31	10/10 views	26.8 28.0	17.8 15.7	53.6 54.3	859 905	220 236	618		
1002-121861 MD XD	1.56 / 1.53	0.947	2.31	10/10 views	26.8 28.0	17.8 15.7	53.6 54.3	859 905	220 236	618		
1002-121863 MD XD	1.54 / 1.51	0.946	2.18	10/10 views	25.9 27.9	19.0 15.6	52.2 54.8	847 908	222 231	632		
1002-121865 MD XD	1.55 / 1.51	0.946	2.21	10/10 views	26.7 27.9	17.9 16.3	53.2 54.6	855 904	222 231	632		
1002-121866 MD XD	1.55 / 1.52	0.946	2.33	10/10 views	26.9 29.1	18.2 16.6	53.6 55.7	846 919	222 231	632		
1002-122271 MD XD	1.59 / 1.56	0.947	2.35	10/10 views	23.3 23.4	18.2 16.3	44.8 46.9	780 851	212 227	614		
1002-122272 MD XD	1.57 / 1.52	0.947	2.69	10/10 views	25.3 26.2	17.3 15.5	50.1 50.8	834 855	212 227	614		
1002-122273 MD XD	1.58 / 1.52	0.947	2.69	10/10 views	25.3 26.2	17.3 15.5	50.1 50.8	834 855	212 227	614		

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TEST RESULTS

PROJECT NUMBER: PO6811

SALES ORDER: SO-003722

PACKING SLIP NUMBER: Pre-SO-003722-1

PROJECT NAME : STOK ILE DES CHENES, MB

1002-122276	MD XD	1.57 / 1.51	0.948	2.66	10/10 views	24.1 25.5	17.6 15.6	47.8 48.7	807 845	219 236	632		
1002-122279	MD XD	1.56 / 1.51	0.948	2.67	10/10 views	24.7 26.1	17.8 16.3	50.8 50.6	825 870	219 236	632		
1002-122280	MD XD	1.56 / 1.54	0.947	2.60	10/10 views	24.4 23.8	17.9 18.0	49.2 49.4	810 840	222 236	641		
1002-122284	MD XD	1.55 / 1.47	0.947	2.54	10/10 views	23.2 24.5	19.2 16.6	48.5 50.3	820 880	222 236	641		
1002-122285	MD XD	1.55 / 1.52	0.947	2.54	10/10 views	23.2 24.5	19.2 16.6	48.5 50.3	820 880	211 231	618		
1002-122302	MD XD	1.53 / 1.50	0.947	2.65	10/10 views	23.5 23.8	18.6 17.5	48.9 49.7	825 890	222 231	614		
1002-122303	MD XD	1.56 / 1.52	0.947	2.65	10/10 views	23.5 23.8	18.6 17.5	48.9 49.7	825 890	222 231	614		

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Solmax International Inc.

2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:


Delivery #: 81084339
PO #: 4158
Weight: 185200.000 LB
Ship Date: 02/13/2024
Package: BULK
Mode: Hopper Car
Car #: AOKX602291
Seal No: 360701

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRA820560

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10min
HLMI Flow Rate	ASTM D1238	11.00	g/10min
Density	D1505 or D4883	0.9370	g/cm3
Production Date		01/10/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

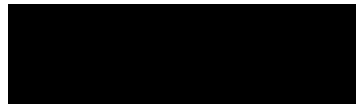
Delivery #: 81087531
PO #: 4158
Weight: 184800.000 LB
Ship Date: 02/17/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX817097
Seal No: 360702

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRA820550

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.070	g/10min
HLMI Flow Rate	ASTM D1238	9.90	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		01/10/2024	

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Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

Delivery #: 81096119
PO #: 4244
Weight: 185000.000 LB
Ship Date: 03/01/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX815756
Seal No: 377727

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRB821070

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.090	g/10min
HLMI Flow Rate	ASTM D1238	13.10	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		02/15/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Desbiens
Fax:

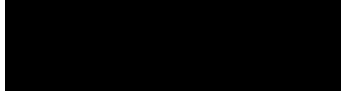
Delivery # 81105699
PO #: 4244
Weight: 180900.000 LB
Ship Date: 03/16/2024
Package: BULK
Mode: Hopper Car
Car #: CPCX816668
Seal No: 371583

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRB820750

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10min
HLMI Flow Rate	ASTM D1238	13.20	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		02/11/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

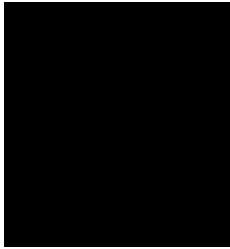


Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806



LIST OF GEOMEMBRANE ROLLS



PROJECT NUMBER: P07947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

WSP - Submittal Review		WSP Comments:
<p>WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.</p>		<p>Please provide conformance testing data for Oven Aging at 85C and UV Resistance.</p> <p>Other properties meet the Specification</p>
<input type="checkbox"/> No Comment	Project No. CA0039180.5749	
<input checked="" type="checkbox"/> Reviewed as Noted	Project Name Search Pad Construction	
<input type="checkbox"/> Amend and Resubmit	Reviewed By W. Francey	
<input type="checkbox"/> Rejected	Date: September 6, 2024	

ROLL NUMBER	RESIN LOT NUMBER	MANUFACT. DATE	RESIN MELT INDEX 190/2.16 g/10 min D1238	RESIN DENSITY g/cc D1505	OIT min D8117	HPOIT min D5885	ESCR SP-NCTL hours D5397
Product Code : 1101438							
HDPE 60 mils / 1.50 mm Black Smooth			1.0	> 0.932	100		500
1002-122819	PRF821720	2024-08-26	0.09	0.938	120		>500 Certified 1002-122821
1005-076005	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076006	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076007	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076008	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076009	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076010	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076011	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076012	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076013	D240320543	2024-08-16	0.10	0.938	139		>500 Certified 1005-075996
1005-076014	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996
1005-076015	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996
1005-076016	D240320543	2024-08-17	0.10	0.938	139		>500 Certified 1005-075996

QUANTITY (ROLLS): 13

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



SOLMAX

MANUFACTURING QUALITY CONTROL

TEST RESULTS

PROJECT NUMBER: PO7947

SALES ORDER: SO-003996

PACKING SLIP NUMBER: Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

PRODUCT: 1101438

CE Certificate = HD-60-SS-BB

HDPE 60 mils / 1.50 mm Black Smooth

Properties	Thickness ave/min.	GeoM Density	Carbon Black Content	Carbon Black Dispersion	Tensile				Tear Resist.	Puncture Resist.	Dimension Stability	Asperity Height In/Out mm
					Yield Strength	Elong.	Break Strength	Elong.				
Unit	mm	g/cc	%	Cat 1 and 2	kN/m	%	kN/m	%	N	N	%	mm
Test Method	D5199	D792	D4218	D5596	D6693				D1004	D4833	D1204	
Frequency	Each roll	Every 10 rolls	Every 2 rolls	Every 10 rolls	Every 2 rolls				Every 5 rolls	Every 5 rolls		
Specification	1.50 / 1.35	≥ 0.940	2.0 - 3.0	Cat. 1 / Cat.	23	13	43	700	187	534		
1002-122819 MD XD	1.55 / 1.51	0.944	2.08	10/10 views	23.1 23.8	18.1 16.9	46.8 51.0	784 897	214 222	592		
1005-076005 MD XD	1.54 / 1.50	0.944	2.55	10/10 views	23.8 25.1	17.5 16.1	49.0 50.1	799 856	205 222	609		
1005-076006 MD XD	1.52 / 1.49	0.944	2.70	10/10 views	24.5 23.4	19.5 16.0	46.6 51.7	753 894	205 222	609		
1005-076007 MD XD	1.56 / 1.50	0.946	2.70	10/10 views	24.5 23.4	19.5 16.0	46.6 51.7	753 894	212 231	609		
1005-076008 MD XD	1.56 / 1.48	0.946	2.67	10/10 views	24.4 24.6	18.8 15.4	51.3 53.1	815 928	212 231	609		
1005-076009 MD XD	1.55 / 1.48	0.946	2.67	10/10 views	24.4 24.6	18.8 15.4	51.3 53.1	815 928	212 231	609		
1005-076010 MD XD	1.55 / 1.47	0.946	2.79	10/10 views	23.7 25.1	18.4 16.6	50.1 53.6	806 907	212 231	609		
1005-076011 MD XD	1.56 / 1.51	0.946	2.79	10/10 views	23.7 25.1	18.4 16.6	50.1 53.6	806 907	212 231	609		
1005-076012 MD XD	1.55 / 1.50	0.944	2.75	10/10 views	23.6 23.9	18.2 16.7	49.0 52.2	802 910	211 236	614		
1005-076013 MD XD	1.55 / 1.52	0.944	2.75	10/10 views	23.6 23.9	18.2 16.7	49.0 52.2	802 910	211 236	614		
1005-076014 MD XD	1.55 / 1.51	0.944	2.61	10/10 views	23.8 23.8	18.6 16.7	49.7 52.4	800 900	211 236	614		
1005-076015 MD XD	1.54 / 1.51	0.944	2.61	10/10 views	23.8 23.8	18.6 16.7	49.7 52.4	800 900	211 236	614		
1005-076016 MD XD	1.57 / 1.51	0.944	2.45	10/10 views	23.7 23.9	18.0 16.2	48.0 50.6	800 900	211 236	614		

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.

2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM



SOLMAX

MANUFACTURING QUALITY CONTROL



TEST RESULTS

PROJECT NUMBER:	PO7947
SALES ORDER:	SO-003996
PACKING SLIP NUMBER:	Pre-SO-003996-1

PROJECT NAME : PRAIRIE GREEN LF

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.

Solmax International Inc.
2801 MARIE-VICTORIN,, VARENNES, QC, CANADA, J3X 0J4

SOLMAX.COM

Certificate of Analysis

Shipped To: SOLMAX: VARENNES
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Giguere
Fax:

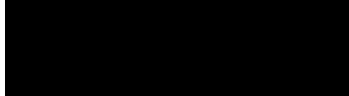
Delivery #: 81177768
PO #: 4563
Weight: 208400.000 LB
Ship Date: 07/04/2024
Package: BULK
Mode: Hopper Car
Car #: SHQX041855
Seal No: 394968

Product:
MARLEX K306 POLYETHYLENE in Bulk
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: PRF821720

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.090	g/10min
HLMI Flow Rate	ASTM D1238	12.70	g/10min
Density	D1505 or D4883	0.9380	g/cm3
Production Date		06/30/2024	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPCChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Steven Beck
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806-4498



Bayport Polymers LLC
12212 Port Road
Pasadena, TX 77507

JAMI GRANGE
12212 PORT ROAD
PASADENA TX 77507

SHIPPED TO:
SOLMAX INTERNATIONAL INC
2801 MARIE VICTORIN
VARENNES-QUEBEC QC J3X 1P7
CANADA

Material: Our / Your reference

MDPE 37120 (441840) /

Please find below test data and pertinent information on Bayport Polymers LLC.
Polyethylene material shipped to your plant.

Batch D240320543 **Quantity** 185,750 LB **Railcar** BPTX729101

Quality certificate

Date

06/04/2024

Purchase order item/date

PO-004493 / 05/16/2024

Delivery item/date

88111709 000001 / 06/03/2024

Order item

33470824 000001

Customer number

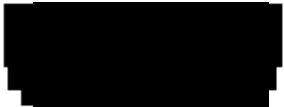
81137450

Characteristic	Unit	Value
Density	g/cc	0.938
Melt Index 21.6/190	g/10 min	11.1
Railcar Prefix	-	BPTX
Railcar Number	-	729101
Railcar Seal Numbers	-	10904



JAMI GRANGE
12212 PORT ROAD
PASADENA TX 77507

Delivery item/date **Page**
88111709 000001 / 06/19/2024 2



Jeremy Gasper
Laboratory Superintendent
12212 Port Road, Pasadena, Texas 77507
P.O. Box 5010, LaPorte, Texas 77572-5010

TITAN ENVIR. CONTAINMENT LTD.
 777 QUEST BOULEVARD
 ILE DES CHENES, MB, R0A 0T1
 CANADA

Canada, September 10, 2024

Project Name: PRAIRIE GREEN LF
Purchase Order: PO7947
Sales Order: SO-003996
ATTN: Stephane Trudeau

WSP - Submittal Review	
WSP Canada Inc. have reviewed this submission for general conformance with the design aspects of the project. This review shall not relieve the Contractor or the Sub-contractor for errors or omissions or of meeting the requirements of the contract documents. WSP Canada Inc. assumes no responsibility for correctness of dimensions or details.	
<input checked="" type="checkbox"/> No Comment	Project No. CA0039180.5749
<input type="checkbox"/> Reviewed as Noted	Project Name Search Pad Construction
<input type="checkbox"/> Amend and Resubmit	Reviewed By W. Francey
<input type="checkbox"/> Rejected	Date: September 11, 2024

To whom it may concern,

Solmax International hereby certifies that 1101547 (HDPE 60 mils / 1.50 mm Black Textured) and 1101438 (HDPE 60 mils / 1.50 mm Black Smooth) geomembrane supplied for the above-mentioned sales order meets or exceeds GM-13 requirements on Oven Aging, UV Resistance.

(1.50 mm Black Textured)

- Oven aging

(% retained after 90 days)	ASTM D5721	82%
HPOIT (min.avg)	ASTM D5885	1607 minutes
- UV resistance

(% retained after 1,600 hrs)	ASTM D7238	82%
HP OIT (min.avg)	ASTM D5885	1728 minutes

(1.50 mm Black Smooth)

- Oven aging

(% retained after 90 days)	ASTM D5721	81%
HPOIT (min.avg)	ASTM D5885	1387 minutes
- UV resistance

(% retained after 1,600 hrs)	ASTM D7238	85%
HP OIT (min.avg)	ASTM D5885	1442 minutes

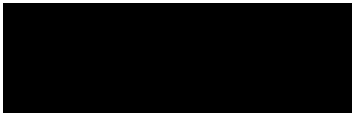
Solmax International Inc

2801 Marie-Victorin Rte., Varennes, Quebec, Canada J3X 0J4
 (+1) 450 929-1234

You will find attached test report on roll produced using the same resin formulation that has been used to manufacture the above product.

Hoping the above information is satisfactory. Please, do not hesitate to contact us if you require any additional information.

Sincerely,



Claude Cormier

Coordonnateur qualité | Quality Control Manager/Chef de service qualité

|

Identification:

Type of Material :	<u>HDPE</u>	Formulation :	<u>HD53-45</u>
Roll Number:	<u>1002-118857</u>	Resin Type :	<u>Bavstar 37120</u>
Production Date :	<u>2023-05-30</u>	Lot Number :	<u>D220521102</u>

Oxidative Induction Time (ASTM D8117)

	Individual Data			Avg.	S.D.	% CV
OIT (minutes)	144	138		141	4	3.0

High Pressure Oxidative Induction Time (ASTM D5885)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes)	1802	1607		1705	138	8.1

UV Resistance (ASTM D7238)

- The resistance to degradation was determined in accordance with ASTM D7238 ;
- Apparatus used : Q-PANEL QUV/se - Lamp: UVA-340;
- Duration of the test: 1600 hours of UV exposure (total of 1920h);
- Cycle : 80 cycles of UVA (20h of light at 75°C followed by 4h of condensation at 60°C)

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1802	1607		1705	138	8.1
HP OIT (minutes) : ASTM D5885 - After 1600h of UV	1492	1391		1442	72	5.0
PERCENTAGE RETAINED:	85 %			Note: No visual change after 1600 hrs		

Air-Oven Aging (ASTM D5721)

- The resistance to degradation was determined in accordance with ASTM D5721;
- Duration of the test: The geomembrane was exposed to 90 days in an air oven maintained at 85°C ± 0.5°C;
- Rotation of the exposed specimens : once per wee

	Individual Data			Avg.	S.D.	% CV
OIT (minutes) : ASTM D8117 - Initial	144	138		141	4	3.0
OIT (minutes) : ASTM D8117 - After 90 days of Oven Aging	21	23		22	1	6.2
PERCENTAGE RETAINED:	16 %					

	Individual Data			Avg.	S.D.	% CV
HP OIT (minutes) : ASTM D5885 - Initial	1802	1607		1705	138	8.1
HP OIT (minutes) : ASTM D5885 - After 90 days of Oven Aging	1317	1457		1387	99	7.1
PERCENTAGE RETAINED:	81 %			Note: No visual change after 90 days		

The tests were performed by Solmax. The laboratories of Solmax are accredited by the GRI.



Simon Gilbert St-Pierre, P.Eng.
Technical Services

Identification:

Type of Material :	HDPE	Formulation :	HD06-71
Roll Number:	1005-074521	Resin Type :	Chevron-USA K306
Production Date :	2024-05-13	Lot Number :	PRD610190

Oxidative Induction Time (ASTM D8117)

OIT (minutes)	Individual Data		Avg.	S.D.	% CV
	192	186	189	4	2.2

High Pressure Oxidative Induction Time (ASTM D5885)

HP OIT (minutes)	Individual Data		Avg.	S.D.	% CV
	1686	1673	1680	9	0.5

UV Resistance (ASTM D7238)

- The resistance to degradation was determined in accordance with ASTM D7238 ;
- Apparatus used : Q-PANEL QUV/se - Lamp: UVA-340;
- Duration of the test: 1600 hours of UV exposure (total of 1920h);
- Cycle : 80 cycles of UVA (20h of light at 75°C followed by 4h of condensation at 60°C)

HP OIT (minutes) : ASTM D5885 - Initial	Individual Data		Avg.	S.D.	% CV
	1686	1673	1680	9	0.5
HP OIT (minutes) : ASTM D5885 - After 1600h of UV	Individual Data		Avg.	S.D.	% CV
	1378	1364	1371	10	0.7

PERCENTAGE RETAINED: 82 %

Note: No visual change after 1600 hrs

Air-Oven Aging (ASTM D5721)

- The resistance to degradation was determined in accordance with ASTM D5721;
- Duration of the test: The geomembrane was exposed to 90 days in an air oven maintained at 85°C ± 0.5°C;
- Rotation of the exposed specimens : once per wee

OIT (minutes) : ASTM D8117 - Initial	Individual Data		Avg.	S.D.	% CV
	192	186	189	4	2.2
OIT (minutes) : ASTM D8117 - After 90 days of Oven Aging	Individual Data		Avg.	S.D.	% CV
	66	82	74	11	15.3

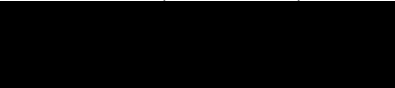
PERCENTAGE RETAINED: 39 %

HP OIT (minutes) : ASTM D5885 - Initial	Individual Data		Avg.	S.D.	% CV
	1686	1673	1680	9	0.5
HP OIT (minutes) : ASTM D5885 - After 90 days of Oven Aging	Individual Data		Avg.	S.D.	% CV
	1351	1395	1373	31	2.3

PERCENTAGE RETAINED: 82 %

Note: No visual change after 90 days

The tests were performed by Solmax. The laboratories of Solmax are accredited by the GRI.



Simon Gilbert St-Pierre, P.Eng.
 Technical Services

Appendix A-2

Certificate of Acceptance – Subgrade



SUB-GRADE ACCEPTANCE

PROJECT: _____ LOCATION: _____
PROJECT #: _____ CONTRACTOR: _____
OWNER: _____ QA/QC: _____
ENGINEER: _____ DATE: _____

This document certifies that on _____, the project superintendant, _____, for TITAN ENVIRONMENTAL CONTAINMENT has inspected the surface of the sub-grade and has found that it meets the installation of the geomembrane and geosynthetics as per engineer specifications.

TITAN ENVIRONMENTAL CONTAINMENT accepts only the surface of the sub-grade and holds no responsibility of the structural strength of the containment system used on this project. Any and all failure causing damage to the geomembranes and geosynthetics being installed on this project will be repaired or replaced at the General contractors or Owners expense.

TITAN ENVIRONMENTAL CONTAINMENT will only accept Sub-grade on a daily installation and will not be held accountable for any damages to Sub-grade out side our control.

Area Being Accepted: _____

TITAN REPRESENTATIVE

GENERAL CONTRACTOR, OWNER REPRESENTATIVE

DATE

DATE

Appendix A-3

Geomembrane Deployment Inspection Summary

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 18-Sep-24
 SHEET NUMBER: 1

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P01				PANEL P02				PANEL P03			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76009				76009				122819			
DEPLOYED LENGTH	79.4				79.5				79.9			
AMBIENT AIR TEMP.	19				19				21			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	60	60	58	61	60	58	60	62	60	62	62	61
	60	60	58	60	60	58	60	60	58	62	61	62
	60	60	60	60	60	60	60	60	60	62	61	61
	60	60	60	61	60	58	60	61	60	61	61	61
AVERAGE	60	60	59	61	60	59	60	61	60	62	61	61

DESCRIPTION	PANEL P04				PANEL				PANEL			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122819											
DEPLOYED LENGTH	79.9											
AMBIENT AIR TEMP.	21											
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
	61	61	62	61								
	61	59	60	60								
	60	59										
	60	58										
AVERAGE	61	60	60	61								

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 19-Sep-24
 SHEET NUMBER: 2

TRANSPORT EQUIPMENT: Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P05				PANEL P06				PANEL P07			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76016				76017				76010			
DEPLOYED LENGTH	80.4				80.9				80.6			
AMBIENT AIR TEMP.	19				20				20			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS												
	60	59	60	60	60	60	60	60	61	60	60	60
	60	59	60	60	59	60	59	60	60	60	60	59
		60	60			60	60			60	59	
		60	60			60	60			60	59	
AVERAGE	60	60	60	60	60	60	60	60	61	60	60	60

DESCRIPTION	PANEL P08				PANEL P09				PANEL P10			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76010				76006				76006			
DEPLOYED LENGTH	81.8				79.8				80			
AMBIENT AIR TEMP.	20				20				20			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS												
	61	60	60	60	60	58	59	59	60	60	59	60
	59	61	59	60	60	60	59	60	59	59	58	60
		60	59			59	58			60	61	
		60	60			60	60			61	61	
AVERAGE	60	60	60	60	60	59	59	60	60	60	60	60

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 20-Sep-24
 SHEET NUMBER: 3

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P11				PANEL P12				PANEL P13			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	76014				76014				122273			
DEPLOYED LENGTH	79.5				79.4				78.3			
AMBIENT AIR TEMP.	16				16				17			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS	57	58	59	61	61	60	58	61	61	61	61	60
	60	59	59	61	61	60	58	61	61	60	61	60
		60	60			60	57			60	61	
		59	60			60	58			61	61	
AVERAGE	59	59	60	61	61	60	58	61	61	61	61	60

DESCRIPTION	PANEL P14				PANEL P15				PANEL P16			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122273				76005				76005			
DEPLOYED LENGTH	80				78.7				78.7			
AMBIENT AIR TEMP.	17				20				20			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR	KC				KC				KC			
SHEET THICKNESS	60	60	61	60	60	60	60	61	60	60	60	61
	60	61	60	60	60	61	59	60	61	60	60	61
		61	60			60	59			59	60	
		60	60			60	60			59	60	
AVERAGE	60	61	60	60	60	60	60	61	61	60	60	61

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY PRIMARY
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 20-Sep-24
 SHEET NUMBER: 4

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL P17				PANEL P18				PANEL P19			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	121861				121861				122284			
DEPLOYED LENGTH	78.6				78.8				78.1			
AMBIENT AIR TEMP.	20				20				23			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	60	61	60	60	61	60	60	59	58	60	60	60
	60	61	61	60	60	61	60	60	59	59	60	61
		60	60			60	60			60	60	
		60	60			60	59			60	60	
AVERAGE	60	61	60	60	61	60	60	60	59	60	60	61

DESCRIPTION	PANEL P20				PANEL P21				PANEL P22			
	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL	LEAD	L SIDE	R SIDE	TRAIL
ROLL NUMBER	122284				122279				122279			
DEPLOYED LENGTH	77.7				78.2				78.1			
AMBIENT AIR TEMP.	23				23				22			
OBSERVED OVERLAP	150 mm				150 mm				150 mm			
REMARKS												
MONITOR												
SHEET THICKNESS												
	60	60	60	60	60	60	60	60	60	60	60	61
	60	60	60	60	60	60	60	61	60	59	60	61
		60	60			60	59			59	60	
		59	61			60	60			59	60	
AVERAGE	60	60	60	60	60	60	60	61	60	59	60	61

REVIEWED BY: AFK
 DATE: October 1, 2024

GEOMEMBRANE PANEL DEPLOYMENT LOG

PROJECT NUMBER: 1000-043-27 PROJECT TITLE: PGL Search Facility Pad Construction
 OWNER: Waste Connections of Canada CONTRACTOR: Titan
 LOCATION: Prairie Green IWMF CLIENT: WSP Canada

GEOMEMBRANE: SECONDARY **PRIMARY**
 SUBGRADE CONDITIONS: Good
 REMARKS:

DATE: 20-Sep-24
 SHEET NUMBER: 5

TRANSPORT EQUIPMENT Excavator and Spreader Bar
 MATERIAL: 60 mil HDPE

DESCRIPTION	PANEL NUMBER	P23	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER		122272		
DEPLOYED LENGTH		72.1		
AMBIENT AIR TEMP.		22		
OBSERVED OVERLAP		150 mm	150 mm	150 mm
REMARKS				
MONITOR				
<hr/>				
SHEET THICKNESS	LEAD	L SIDE	R SIDE	TRAIL
	62	62	61	62
	60	63	61	61
		62	61	
		61	61	
AVERAGE	61	62	61	62

DESCRIPTION	PANEL NUMBER	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER			
DEPLOYED LENGTH			
AMBIENT AIR TEMP.			
OBSERVED OVERLAP		150 mm	150 mm
REMARKS			
MONITOR			
<hr/>			
SHEET THICKNESS	LEAD	L SIDE	R SIDE
AVERAGE			

REVIEWED BY: AFK
 DATE: October 1, 2024

Appendix A-4

Geomembrane Trial Seam Summary



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-09-18
 SHEET NUMBER: 1

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF1	9:52	WW46	BB	19	560		860	F			FAIL	AFK	50% PEEL not used
								125/136	150				
TF2	10:13	WW49	JH	19	560		460	F			FAIL	AFK	50% PEEL not used
								139					
TF3	10:35	WW43	BB	19	520		460	FTB	FTB	FTB	PASS	AFK	
								132/138/147/142	128/142/129/149	158/166			
TF4	10:51	WW7	TC	19	550		860	FTB	FTB	FTB	PASS	AFK	
								129/133/131/138	126/135/139/139	150/153			
TF5	10:59	WW44	JH	19	500		460	F			FAIL	AFK	50% PEEL not used
								146/138/134	141/138				

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-09-19
 SHEET NUMBER: 2

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF6	9:10	WW43	BB	19	520		460	F			FAIL	AFK	70% PEEL not used
								132/132/99	143/141				
TF7	9:31	WW39	CN	19	520		460	FTB	FTB	FTB	PASS	AFK	
								133/132/136/132	139/132	141/143			
TF8	9:50	WW7	TC	19	550		860	FTB	FTB	FTB	PASS	AFK	
								126/138/128/128	130/132/139/143	146/150			
TF9	9:58	WW29	BB	19	540		860	FTB	FTB	FTB	PASS	AFK	
								144/141/135/139	147/143/144/135	157/156			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 2024-09-20
 SHEET NUMBER: 3

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TF10	10:43	WW29	DP	15	520		860	FTB	FTB	FTB	PASS	AFK	
								130/135/139/141	138/142/140/148	158/160			
TF11	10:44	WW39	CN	15	520		460	FTB	FTB	FTB	PASS	AFK	
								144/138/139/148	138/144/141/136	147/154			
TF12	14:50	WW29	DP	21	560		860	FTB	FTB	FTB	PASS	AFK	
								124/130/124/129	123/130/127/125	138/140			
TF13	15:12	WW39	CN	21	520		460	FTB	FTB	FTB	PASS	AFK	
								119/131/127/136	124/127/124/130	141/136			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 22-Sep-24
 SHEET NUMBER: 1

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX-1	8:00	EXT 40	RN	6	245	242		F			FAIL	AFK	60% PEEL
								99,110,105,110					
TX-1A	8:23	EXT 40	RN	8	250	250		FTB		FTB	PASS	AFK	
								132,106,114,131		161,159			
TX-2	13:55	EXT 40	RN	17	250	250		FTB		FTB	PASS	DS	
								114,117,110,134		134,132			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

TF - # = FUSION
 TX - # = EXTRUSION

DATE: 23-Sep-24
 SHEET NUMBER: 2

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX-3	7:55	EXT 41	DP	12		250	250	FTB		FTB	Pass	DS	
								96,88,105,97		162,158			
TX-4	7:55	EXT 40	RN	12		250	250	F			FAIL	DS	50% peel
								75,138					
TX-4A	8:29	EXT 40	RN	12		250	250	FTB		FTB	PASS	DS	
								112,101,110,154		160,153			
TX-5	13:24	EXT 40	RN	19		250	250	FTB		FTB	PASS	DS	
								137,143,141,141		149,152			
TX-6	15:00	EXT 41	DP	19		250	250	FTB		FTB	PASS	DS	
								141,131,115,146		150,151			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE TRIAL SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE: 24-Sep-24
 SHEET NUMBER: 3

TF - # = FUSION
 TX - # = EXTRUSION

SAMPLE NUMBER	APROX. TIME	WELDING MACHINE NUMBER	WELD TECH.	TEMPERATURES				TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				AMBIENT AIR TEMP.	PREHEAT OR MACHINE SPEED	EXTRUDER	NOZZLE OR WEDGE	INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
TX-7	7:55	EXT 41	DP	10		250	250	FTB		FTB	PASS	DS	
								86,82,84,83		168,166			
TX-8	8:07	EXT 40	RN	10		250	250	FTB		FTB	PASS	DS	
								145,129,104,131		147,148			

Note: FTB (film tear bond)
 **Pass: Fusion: Peel 91 lb/in Sheer 120 lb/in
 Extrusion: Peel 78 lb/in Sheer 120lb/in

REVIEWED BY: AFK
 DATE: 01-Oct-24

Appendix A-5

Geomembrane Seam Welding Inspection



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 18, 2024

SHEET NUMBER 1

X FUSION

EXTRUSION

MACHINE # WW43

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF3	10:35	BB

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P1/P2	NEOS SEOS	10:47	22	BB	520	460		79	77/2	DSF12	AF	capped	09-20-24	DS
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 18, 2024

SHEET NUMBER 2

X FUSION

EXTRUSION

MACHINE # WW7

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF4	10:51	TC

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P3/P4	NEOS SEOS	10:59	22	TC	860	550		80	80		AF		09-20-24	DS	
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 19, 2024

SHEET NUMBER 3

X FUSION

EXTRUSION

MACHINE # WW7

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF8	9:50	TC

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P4/P5	SEOS	NEOS	10:10	20	TC	550	860	80	145/15	DSF1	DS		09-20-24	DS	
2	P7/P8	NEOS	SEOS	11:21	20	TC	550	860	82	97		DS		09-20-24	DS	
3	P9/P10	SEOS	SEOS	14:18	20	TC	550	860	80	146/31	DSF3	DS		09-21-24	AFK	
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 19, 2024

SHEET NUMBER 4

X FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF7	9:31	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE		
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR	TEST DATE	MON.
							WEDGE OR BARREL	WEDGE OR NOZZLE								
1	P2/P3	SEOS	NEOS	9:36	20	CN	520	460	80	80	DS	DS	DSF2B1	09-02-24	DS	
2	P5/P6	NEOS	SEOS	10:31	20	CN	520	460	80	145/15	DSF2	DS	capped	09-20-24	DS	
3	P8/P9	SEOS	NEOS	14:06	20	CN	520	460	80	95	DS	DS	DSF2A1	09-21-24	DS	
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 20, 2024

SHEET NUMBER 5

FUSION

EXTRUSION

MACHINE # WW39

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF11	10:44	CN
TF13	15:12	CN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
							WEDGE OR BARREL NOZZLE	WEDGE OR BARREL NOZZLE							
1	P11/P12	NEOS 2C	11:34	17	CN	520	460		33	128		AFK	capped	09-22-24	DS
2	P11/P12	2C SEOS	11:52	17	CN	520	460		45	145/25	DSF5	AFK	capped	09-22-24	DS
3	P13/P14	NEOS SEOS	13:48	20	CN	520	460		78	103		AFK	DSF7B1	09-22-24	DS
4	P15/P16	SEOS NEOS	19:30	20	CN	520	460		79	143/39	DSF7	AFK	capped	09-22-24	DS
5	P17/P18	SEOS NEOS	15:39	20	CN	520	460		79	118		AFK	DSF7A1	09-22-24	DS
6	P18/P19	NEOS SEOS	17:36	20	CN	520	460		78	148/58	DSF10	AFK		09-22-24	DS
7	P20/P21	NEOS SEOS	18:16	20	CN	520	460		78	126		AFK		09-22-24	DS
8	P22/P23	NEOS SEOS	18:58	18	CN	520	460		72	146/52	DSF11	AFK		09-22-24	DS
9															
10															
11															
12															
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 19, 2024

SHEET NUMBER 6

X FUSION

EXTRUSION

MACHINE # WW29

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF9	9:58	BB

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
							WEDGE OR BARREL NOZZLE	WEDGE OR BARREL NOZZLE							
1	P6/P7	SEOS NEOS	10:50	20	BB	540	860		81	86/76	DSF4	AFK	capped	09-21-24	AFK
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

DATE Sept 20, 2024

SHEET NUMBER 7

X FUSION

EXTRUSION

MACHINE # WW29

PASSING TRIAL SEAMS

NO.	TIME	TECH ID
TF10	10:43	DP
TF12	14:50	DP

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	P10/P11	SEOS NEOS	11:16	15	DP	550	860		80	156		AFK	capped	09-22-24	DS
2	P12/P13	SEOS NEOS	11:54	16	DP	550	860		78	161/73	DSF6	AFK	capped	09-22-24	DS
3	P14/P15	SEOS NEOS	14:11	20	DP	550	860		79	143/9	DSF8	AFK		09-22-24	DS
4	P16/P17	NEOS SEOS	15:05	20	DP	560	860		79	88		AFK		09-22-24	DS
5	P19/P20	SEOS NEOS	17:52	20	DP	560	860		78	148/18	DSF9	AFK		09-22-24	DS
6	P21/P22	SEOS NEOS	18:31	20	DP	560	860		78	96		AFK		09-22-24	DS
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-22

SHEET NUMBER 1

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 40

NO.	TIME	TECH ID
TX-1A	8:23	RN
TX-2	13:55	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P6/P7	2B NEOS	9:31	9	RN	250	250		4	4				09-23-24	KC		
2	P1/P2	SEOS NEOS	14:17	17	RN	250	250		75	50/29	DSX1	KC		09-23-24	DS		
3	P5/P6	SEOS 39.0MS	16:45	17	RN	250	250		49	28	DSX2	KC		09-23-24	KC		
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	

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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

PASSING TRIAL SEAMS

DATE 2024-09-23

SHEET NUMBER 2

FUSION

EXTRUSION

MACHINE # EXT 41

NO.	TIME	TECH ID
TX-3	7:55	DP
TX-6	15:00	DP

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P10/P11	SEOS 53M SEOS	8:31	12	DP	250	250		53	50/3.0	DSX3	KC		09-23-24	KC		
2	P11/P12	SEOS 2C	10:05	14	DP	250	250		44	47		KC		09-23-24	DS		
3	P11/P12	2C NEOS	11:20	16	DP	250	250		32	50/28	DSX4	KC		09-23-24	KC		
4	P10/P11	53m N of SEOS NEOS	12:10	17	DP	250	250		25	50/3	DSX7	AFK		09-23-24	KC		
5	P12/P13	SEOS NEOS	15:22	17	DP	250	250		75	50/28	DSX8	AFK		09-24-24	KC		
6	P15/P16	SEOS 50m N	17:46	17	DP	250	250		50	49/29	DSX9	AFK		09-24-24	DS		
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	

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 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-23

SHEET NUMBER 3

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 41

NO.	TIME	TECH ID
TX-4A	8:29	RN
TX-5	13:24	RN

28

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE	
	START POINT	FINISH POINT					DIGITAL SET	INDICATOR						TEST DATE	MON.
1	49m N of SEOS	NEOS	8:57	12	RN	250	250		30	50/8	DSX5	KC		09-23-24	KC
2	SEOS	2B	11:07	15	RN	250	250		74	50/32	DSX6	AFK		09-23-24	KC
3	NEOS	26m N	17:55	17	RN	250	250		26	50/8	DSX10	AFK		09-24-24	DS
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-24

SHEET NUMBER 4

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 40

NO.	TIME	TECH ID
TX-8	8:07	RN

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P22/P23	NEOS 25m S	8:50	16	RN	250	250		25	33		AFK		09-24-24	DS		
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

** COLUMNS TO BE USED
 BY THE DATA REVIEWED ONLY

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM LOG

PROJECT NUMBER: 1000-089-11
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 mil HDPE

DATE 2024-09-24

SHEET NUMBER 5

PASSING TRIAL SEAMS

FUSION
 EXTRUSION
 MACHINE # EXT 41

NO.	TIME	TECH ID
TX-7	7:55	DP

29

SEAM NUMBER	SEAM SECTION *		APPROX. START TIME	AMB. AIR TEMP. C	WELD TECH.	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES		APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON - DESTRUCTIVE			
	START POINT	FINISH POINT					DIGITAL SET							INDICATOR		TEST DATE	MON.
							WEDGE OR BARREL	NOZZLE						WEDGE OR BARREL	NOZZLE		
1	P22/P23	SEOS 45m N	8:45	16	DP	250	250		45	48/33	DSX11	AFK		09-24-24	DS		
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS).
 A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM

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REVIEWED BY: AFK
 DATE: 01-Oct-24

Appendix A-6

Geomembrane Seam Destructive Test Summary

- **Tensiometer Certificate of Calibration**
 - **Seam Destructive Test Summary**
-

#10



CALIBRATION CERTIFICATE

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell
 Range: 0 - 750 lbs. Tension
 Model No: M2405-750W
 Serial No: 029951

Calibration Apparatus: Pro-Cal unit, model TC-0100/A

A/D Module Model No: T-029
 A/D Module Serial No: 1415029951
 Channel No: N/A

Dead Weight: W1: 2, W2: 152, W3: 302
 Reference Cell: R1: 2, R2: 152, R3: 302

Indicator reading with no load: 0

Offset: -3.158184 Scale: 3.328007

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F
 Excitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards
 Manufacture recommendation to Calibrate load cells annually. Valid for one year of date shown.

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

IM [Redacted] Date: 1/22/2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 21, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF-1	2024-09-19	P4/P5 65m N OF SEOS	1C	FTB 131,141,138,140,139	FTB 130,139,140,127,136	FTB 177,181,181,180,180	PASS	DS	
DSF-2	2024-09-19	P5/P6 65m S OF NEOS	1D	F F F 46/105/44	F 131		FAIL	DS	100% peel
DSF-3	2024-09-19	P9/P10 49m S OF NEOS	2A	FTB 108,114,117,117,115	FTB 131,130,137,144,137	FTB 169,170,166,169,169	PASS	DS	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 21, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF4	2024-09-18	5m S OF NEOS	2B	P6/P7			FAIL	AFK	50% Peel
				F F					
DSF5	2024-09-20	25m N OF SEOS	2E	P11/P12			FAIL	AFK	100% Peel
				F F	124,126				
DSF6	2024-09-20	5m N OF SEOS	2F	P12/P13			FAIL	AFK	50% Peel
				F F					
DSF7	2024-09-20	40m N OF SEOS	2C	P15/P16			FAIL	AFK	100% Peel
				F F					
DSF2B	2024-09-19	3m N OF DSF22	2J	P5/P6			FAIL	AFK	100% Peel
				F F					
DSF2A	2024-09-19	3m S POF DSF2	2H	P5/P6			FAIL	AFK	100% Peel
				F F					
DSF4B	2024-09-19	3m S OF DSF4	2K	P6/P7			FAIL	AFK	100% Peel
				F F					
DSF4A	2024-09-20	2m N OF SEOS	2G	P10/P11			FAIL	AFK	100% Peel
				F F					
DSF8	2024-09-20	70m N OF SEOS	2L	P14/P15	FTB	FTB	PASS	AFK	
				F F	116,118,113,118,120	143,144,147,144,149			
DSF9	2024-09-20	40m N OF SEOS	2C	P19/P20	FTB	FTB	PASS	AFK	
				F F	120,162,110,117,104	142,138,149,139,144			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 22, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF10	2024-09-20	P18/P19 30m S OF NEOS	2N	FTB	FTB	FTB	PASS	AFK	
				110,114,110,109,118	109,111,113,109,110	140,140,150,143,143			
DSF11	2024-09-20	P22/P23 20m SO OF NEOS	2P	F	F		FAIL	AFK	100% Peel
				123,86	115				
DSF12	2024-09-18	P1/P2 2m N OF SEOS	2Q	F F			FAIL	DS	100% Peel
				105,41,106,63	122,120				
DSF4B1	2024-09-18	P6/P7 3m S OF DSF4B	2S	F F			FAIL	DS	100% Peel
				111,54					
DSF4A1	2024-09-18	P10/P11 3m N OF DSF4A	2R	F F			FAIL	DS	100% Peel
				74,79					
DSF2A1	2024-09-19	P8/P9 2m N OF SEOS	2U	FTB	FTB	FTB	PASS	DS	
				113,120,105,114,108	116,111,111,104,107	144,142,145,139,139			
DSF2B1	2024-09-19	P5/P6 3m N OF SEOS	2T	FTB	FTB	FTB	PASS	DS	
				111,111,105,108,108	118,116,124,107,119	148,147,149,150,149			
DSF4A2	2024-09-18	P10/P11 15m N OF DSF4A1	2U	F F			FAIL	DS	100% Peel
				78, 100					
DSF6A	2024-09-20	P12/P13 3m N OF DSF6	2V	F F			FAIL	DS	75% Peel
				93,118					
DSF5B	2024-09-20	P11/P12 3m N OF DSF5	2W	F F			FAIL	DS	100% Peel
				95,91					

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 22, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF5A	2024-09-20	P11/P12 3m S OF DSF5	2X	F F			FAIL	DS	100% Peel
				110,67,83	126				
DSF5B1	2024-09-20	P11/P12 2m N OF 2C	1G	F F			FAIL	DS	100% Peel
				116,110,28,32	128,128				
DSF5A1	2024-09-20	P13/P14 2m S OF NEOS	1F	FTB	FTB	FTB	PASS	DS	
				116,111,117,114,114	129,125,117,122,125	158,162,160,163,162			
DSF5B2	2024-09-20	P11/P12 4m S OF NEOS	1H	FTB	FTB	FTB	PASS	DS	
				112,115,113,114,116	131,133,130,131,129	151,150,151,153,148			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 22, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSF 6A1	2024-09-20	P122/P13 3m N OF DSF6A	1J	F F			FAIL	DS	100% Peel
				111,128,132,95	132,134				
DSF6A2	2024-09-20	P14/P15 2m N OF SEOS	1K	FTB	FTB	FTB	PASS	DS	
				131,123,142,128,131	148,153,123,148,144	174,174,174,176,176			
DSF7B	2024-09-02	P15/P16 3m S OF DSF7	1L	F F			FAIL	DS	100% Peel
				118,49,119,106	132,134				
DSF 7A	2024-09-20	P15/P16 3m N OF DSF7	1M	F F			FAIL	DS	25% Peel
				111,116					
DSF 7A1	2024-09-20	P17/P18 2m N OF SEOS	1N	FTB	FTB	FTB	PASS	DS	
				121,119,117,120,115	131,131,131,134,150	185,184,181,82,184			
DSF 7B1	2024-09-20	P13/P14 2m N OF SEOS	1P	FTB	FTB	FTB	PASS	DS	
				124,123,68,127,126	150,135,130,140,135	180,178,176,181,180			
DSF11B	2024-09-20	P22/P23 3m NOF DSF 11	1Q	F	F		FAIL	DS	100% Peel
				124,128,128,64	130,124,126				
DSF11A	2024-09-20	P22/P23 3m S OF DSF 11	1P	F F			FAIL	DS	100% Peel
				69,81					
DSF 11B1	2024-09-20	P20/P21 2m N OF SEOS	1R	FTB	FTB	FTB	PASS	DS	
				136,134,116,137,132	143,134,134,139,130	167,168,167,170,167			

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 23, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL MODE STRENGTH	OUTSIDE PEEL MODE STRENGTH	SHEAR MODE STRENGTH			
DSX1	2024-09-22	P1/P2 46 m N OF SEOS	1S	FTB		FTB	PASS	DS	
				108,113,109,115,100		172,167,165,158,163			
DSX2	2024-09-22	P5/P6 18m N of SEOS	1T	FTB		FTB	PASS	DS	
				98,98,100,114,104		154,153,153,153,152			
DSX3	2024-09-23	P10/P11 50 m N OF SOES	1U	FTB		FTB	PASS	DS	
				80,95,111,94,93		155,160,158,157,156			
DSX4	2024-09-24	P11/P12 7m N OF 2C	1V	FTB		FTB	PASS	DS	
				102,115,96,103,78		157,152,157,153,153			
DSX5	2024-09-24	P5/P6 11m S OF NEOS	1W	FTB		FTB	PASS	DS	
				102,131,87,92,86		156,153,158,156,158			
DSX6	2024-02-23	P6/P7 39m N OF SEOS	1X	FTB		FTB	PASS	DS	
				100,100,134,92,100		155.155.158.156.157			
DSX7	2024-09-23	P10/P11 2m S OFF NEOS	3A	FTB		FTB	PASS	DS	
				109,110,92,115,108		156,152,143,156,154			
DSX8	2024-09-23	P12/P13 47m N OF SEOS	3C	FTB		FTB	PASS	DS	
				98,86,86,100,93		163,163,160,159,155			

**Pass: Peel: 78 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024



GEOMEMBRANE DESTRUCTIVE TESTING SUMMARY LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

DATE: September 24, 2024

SAMPLE NUMBER	DATE	APPROXIMATE LOCATION	REPAIR CODE	TEST RESULTS			PASS OR FAIL	MON.	REMARKS
				INSIDE PEEL <u>MODE</u> STRENGTH	OUTSIDE PEEL <u>MODE</u> STRENGTH	SHEAR <u>MODE</u> STRENGTH			
DSX9	2024-09-23	P15/P16 18m N OF SEOS	3D	FTB 111,96,104,93,87		FTB 169,162,160,155,176	PASS	DS	
DSX10	2024-09-23	P15/P16 15m S OF NEOS	3E	FTB 109,119,119,113,127		FTB 165,166,162,161,160	PASS	DS	
DSX11	2024-09-24	P22/P23 15m N OF SEOS	3F	FTB 106,95,95,99,103		FTB 180,178,174,170,172	PASS	DS	

**Pass: Peel: 91 lb/in
 Sheer: 120 lb/in

REVIEWED BY: AFK
 DATE: October 2, 2024

Appendix A-7

Geomembrane Seam Pressure Test Summary



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 20-Sep-24
 Sheet Number 1

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P2/P3	SEOS	NEOS	1	JP	11:51	11:56	49	48	YES	PASS		X	DS	
2	P1/P2	SEOS	1B	1	JP	13:52	13:57	56	53	YES	PASS	X		DS	
3	P1/P2	1B	NEOS	2	JP	13:58	14:03	56	53	YES	PASS		X	DS	
4	P3/P4	SEOS	1A	1	JP	14:14	14:19	56	54	YES	PASS	X		DS	
5	P3/P4	1A	NEOS	2	JP	14:20	14:25	53	52	YES	PASS		X	DS	
6	P4/P5	SEOS	NEOS	1	JP	14:36	14:41	53	51	YES	PASS		X	DS	
7	P5/P6	SEOS	NEOS	2	JP	14:50	14:55	54	53	YES	PASS		X	DS	
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 21-Sep-24
 Sheet Number 2

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P6/P7	SEOS	NEOS	1	JP	9:15	9:20	59	58	YES	PASS		X	AFK	
2	P7/P8	SEOS	NEOS	2	JP	9:18	9:23	60	59	YES	PASS		X	AFK	
3	P8/P9	SEOS	NEOS	1	JP	9:27	9:32	60	60	YES	PASS		X	AFK	
4	P9/P10	SEOS	NEOS	2	JP	9:28	9:33	59	59	YES	PASS		X	AFK	
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 01-Oct-24



GEOMEMBRANE SEAM PRESSURE TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE
 CLIENT: WSP Canada

Date : 22-Sep-24

Sheet Number 3

	SEAM, NUMBER	SEAM SECTION *		PRESS GAUGE NUMBER	TECH ID	TIME		PRESSURE		OBS. TEST	RESULTS PASS/P	SEAM COMPLETE		MON	REMARKS
		FROM	TO			START	FINISH	INITIAL	FINAL			NO	YES		
1	P10/P11	SEOS	NEOS	1	JP	9:05	9:10	54	52	YES	PASS		X	DS	
2	P11/P12	2E	SEOS	1	JP	9:15	9:20	59	58	YES	PASS	X		DS	
3	P11/P12	2E	2D	2	JP	9:15	9:20	58	57	YES	PASS	X		DS	
4	P11/P12	2D	2C	1	JP	9:22	9:27	59	58	YES	PASS	X		DS	
5	P11/P12	2C	NEOS	2	JP	9:23	9:28	59	58	YES	PASS		X	DS	
6	P12/P13	SEOS	NEOS	1	JP	9:32	9:37	59	58	YES	PASS		X	DS	
7	P13/P14	SEOS	NEOS	2	JP	9:32	9:37	60	59	YES	PASS		X	DS	
8	P14/P15	SEOS	NEOS	1	JP	9:43	9:48	61	60	YES	PASS		X	DS	
9	P15/P16	SEOS	NEOS	2	JP	9:43	9:48	58	58	YES	PASS		X	DS	
10	P16/P17	SEOS	NEOS	1	JP	9:53	9:58	61	60	YES	PASS		X	DS	
11	P17/P18	SEOS	NEOS	2	JP	9:53	9:58	59	58	YES	PASS		X	DS	
12	P18/P19	SEOS	NEOS	1	JP	10:06	10:11	59	57	YES	PASS		X	DS	
13	P19/P20	SEOS	NEOS	2	JP	10:06	10:11	59	59	YES	PASS		X	DS	
14	P20/P21	SEOS	NEOS	1	JP	10:21	10:26	58	56	YES	PASS		X	DS	
15	P21/P22	SEOS	NEOS	1	JP	10:31	10:36	58	56	YES	PASS		X	DS	
16	P22/P23	SEOS	NEOS	1	JP	11:14	11:19	57	55	YES	PASS		X	DS	
17															
18															
19															
20															

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF.PT.)

REVIEWED BY: AFK
 DATE: 01-Oct-24

Appendix A-8

Geomembrane Defect Summary



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 1

DEFECT CODE	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION			REMARKS	**	**
		DEFECT LOCATION DESCRIPTION	DEFECT TYPE	MON.		REPAIR DATE	TEST DATE
A	P3/P4	33.6m N OF SEOS	BO	DS		09-22-24	09-23-24
B	P1/P2	8.8m N OF SEOS	BO	DS		09-22-24	09-23-24
C	P4/P5	65m N OF SEOS	DSF1	DS		09-22-24	09-23-24
D	P5/P6	65m S OF NEOS	DSF2	DS		09-22-24	09-23-24
E	P22/P23	2m N OF SEOS	EXT	DS		09-22-24	09-24-24
F	P13/P14	2m S OF NEOS	DSF5A1	DS		09-23-24	09-23-24
G	P11/P12	2m N OF 22C	DSF5B1	AFK		09-23-24	09-23-24
H	P11/P12	4m W OF SEOS	DSF5B2	DS		09-23-24	09-23-24
J	P12/P13	3m N OF DSF6A	DSF6A1	DS		09-23-24	09-24-24
K	P14/P15	2m N OF SEOS	DSF6A2	DS		09-23-24	09-24-24
L	P15/P16	3m S OF DSF7	DSF7B	DS		09-23-24	09-24-24
M	P15/P16	3m N OF DSF7	DSF7A	DS		09-23-24	09-24-24
N	P17/P18	2m N OF SEOS	DSF7A1	DS		09-24-24	09-24-24
P	P22/P23	3m S OF DSF11	DSF11A	DS		09-23-24	09-24-24
Q	P22/P23	3m N OF DSF11	DSF11B	DS		09-24-24	09-24-24
R	P20/P21	2m N OF SEOS	DSF11B1	DS		09-24-24	09-24-24
S	P1/P2	46m N OF SEOS	DSX1	DS		09-23-24	09-23-24
T	P5/P6	18m N OF SEOS	DSX2	DS		09-23-24	09-23-24
U	P10/P11	50m N OF SOES	DSX3	DS		09-23-24	09-23-24
V	P11/P12	7m N OF 2C	DSX4	DS		09-23-24	09-23-24
W	P5/P6	11m S OF NEOS	DSX5	DS		09-23-24	09-23-24
X	P6/P7	39m N OF SEOS	DSX6	DS		09-23-24	09-23-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 02-Oct-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 2

DEFECT CODE	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION			REMARKS	**	**
		DEFECT LOCATION DESCRIPTION	DEFECT TYPE	MON.		REPAIR DATE	TEST DATE
A	P9/P10	49m S OF NEOS	DSF3	AFK		09-22-24	09-23-24
B	P6/P7	5m S OF NEOS	DSF4	AFK		09-22-24	09-23-24
C	P11/P12	33m S OF NEOS	BOOT	AFK		09-22-24	09-23-24
D	P11/P12	44m S OF NEOS	BO	AFK		09-22-24	09-23-24
E	P11/P12	25m N OF SEOS	DSF5	AFK		09-22-24	09-23-24
F	P12/P13	5m N OF SEOS	DSF6	AFK		09-22-24	09-24-24
G	P10/P11	2m N OF SEOS	DSF4A	AFK		09-23-24	09-23-24
H	P5/P6	3m S OF DSF2	DSF2A	AFK		09-22-24	09-23-24
J	P5/P6	3m N OF DSF2	DSF2B	AFK		09-22-24	09-23-24
K	P6/P7	3m S OF DSF4	DSF4B	AFK		09-23-24	09-23-24
L	P14/P15	70m N OF SEOS	DSF8	AFK		09-22-24	09-24-24
M	P19/P20	18m S OF NEOS	DSF9	AFK		09-24-24	09-24-24
N	P18/P19	30m S OF NEOS	DSF10	AFK		09-24-24	09-24-24
P	P22/P23	20m S OF NEOS	DSF11	AFK		09-23-24	09-23-24
Q	P1/P2	2m N OF SEOS	DSF12	AFK		09-24-24	09-24-24
R	P10/P11	3m N OF DSF4A	DSF4A1	AFK		09-23-24	09-23-24
S	P6/P7	3m S OF DSF4B	DSF4B1	AFK		09-23-24	09-23-24
T	P5/P6	2m S OF NEOS	DSF2B1	AFK		09-23-24	09-23-24
U	P10/P11	15m N OF DSF4A1	DSF4A2	AFK		09-23-24	09-23-24
V	P12/P13	3m N OF DSF6	DSF6A	AFK		09-23-24	09-24-24
W	P11/P12	3m N OF DSF5	DSF5B	AFK		09-23-24	09-23-24
X	P11/P12	3m S OF DSF5	DSF5A	AFK		09-23-24	09-23-24

AD- ANIMAL RELATED DAMAGE

B - UNDISPERSED RESIN BEAD

BO - FUSION WELDER BURN

CO - CHANGE OF OVERLAP

CR - CREASE

D - INSTALLATION DAMAGE

DS - # - DESTRUCTIVE TEST NUMBER

PT - PRESSURE TEST CUT

SI - SOIL SURFACE IRRECLARITY

WS - WELDER RESTART

INT - Intersection

WEOS - west end of seam

NEOS - north end of seam

EEOS - east end of seam

SEOS - south end of seam

SEOP - south end of panel

NEOP - north end of panel

WEOP - west end of panel

EEOP - east end of panel

EE - EARTHWORK EQUIPMENT DAMAGE

EXT - EXTENSION

FM - FISHMOUTH

FS - FAILED SEAM LENGTH

FTS - FIELD TEST STRIP

HT - HEAT TACK BURN

IO - INSUFFICIENT OVERLAP (UNDER SPEC)

MD - MAUFACTURER/DELIVERY DAMAGE

T - THREE PANEL INTERSECTION

WR - WRINKLE

REVIEWED BY: AFK

DATE: 02-Oct-24



GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:	1000-043-27	PROJECT TITLE:	LPG Search Facility Pad Construction
OWNER:	Waste Connections of Canada	CONTRACTOR:	Titan Environmental
LOCATION:	Prairie Green IWMF	MATERIAL:	60 mil HDPE
CLIENT:	WSP Canada		

SHEET NUMBER 3

DEFECT CODE	SEAM, PANEL OR REPAIR NO.	DEFECT LOCATION		DEFECT TYPE	MON.	REMARKS	**	**
		DEFECT LOCATION DESCRIPTION					REPAIR DATE	TEST DATE
A	P10/P11	2m S OF NEOS		DSX7	AFK		09-23-24	09-23-24
B	P8	2m N + 1m W OF SEOP		D	AFK		09-23-24	09-23-24
C	P12/P13	47m N OF SEOS		DSX8	AFK		09-23-24	09-24-24
D	P15/P16	18m N OF SEOS		DSX9	AFK		09-24-24	09-24-24
E	P15/P16	15m S OF NEOS		DSX10	AFK		09-24-24	09-24-24
F	P22/P23	15m N OF SEOS		DSX11	AFK		09-24-24	09-24-24
G								
H								
J								
K								
L								
M								
N								
P								
Q								
R								
S								
T								
U								
V								
W								
X								

<p>AD- ANIMAL RELATED DAMAGE B - UNDISPERSED RESIN BEAD BO - FUSION WELDER BURN CO - CHANGE OF OVERLAP CR - CREASE D - INSTALLATION DAMAGE DS - # - DESTRUCTIVE TEST NUMBER PT - PRESSURE TEST CUT SI - SOIL SURFACE IRRECLARITY WS - WELDER RESTART INT - Intersection WEOS - west end of seam NEOS - north end of seam EEOS - east end of seam SEOS - south end of seam</p>	<p>EE - EARTHWORK EQUIPMENT DAMAGE EXT - EXTENSION FM - FISHMOUTH FS - FAILED SEAM LENGTH FTS - FIELD TEST STRIP HT - HEAT TACK BURN IO - INSUFFICIENT OVERLAP (UNDER SPEC) MD - MAUFACTURER/DELIVERY DAMAGE T - THREE PANEL INTERSECTION WR - WRINKLE</p> <p style="text-align: right;">REVIEWED BY: AFK DATE: 02-Oct-24</p>
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SEOP - south end of panel
 NEOP - north end of panel
 WEOP - west end of panel
 SEOP - east end of panel

Appendix A-9

Geomembrane Repair Summary



GEOMEMBRANE REPAIR LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections
 LOCATION: Prairie Green IWMF

PROJECT TITLE: PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 CLIENT: WSP Canada

MACHINE NUMBER
 EXT40

NO.	TIME	TECH. ID
TX-1A	8:23	RN
TX-2	13:55	RN

DATE September 22, 2024

SHEET NUMBER 1

	DEFECT CODE	REPAIR DATE	APPROX. TIME	REPAIR TYPE	APPROX. DIMENSION	WELD TECH.	MON.	REMARKS
1	1B	2024-09-22	8:50	P	1 X 2.8	RN	KC	
2	1A	2024-09-22	9:00	P	0.6 X 0.6	RN	KC	
3	1D	2024-09-22	9:02	P	0.7 X 1.8	RN	KC	
4	1C	2024-09-22	9:16	P	0.6 X 1.4	RN	KC	
5	2A	2024-09-22	9:25	P	1.2 X 0.5	RN	KC	
6	2B	2024-09-22	9:31	P	1.5 X 0.8	RN	KC	
7	2D	2024-09-22	9:54	P	0.6 X 0.6	RN	KC	
8	2E	2024-09-22	9:57	P	1.5 X 0.7	RN	KC	
9	2C	2024-09-22	10:13	BOOT	2.5 X 2.5	RN	KC	
10	2F	2024-09-22	10:31	P	1.3 X 0.9	RN	KC	
11	2L	2024-09-22	10:40	P	1.5 X 0.7	RN	KC	
12	1E	2024-09-22	10:46	RS	1.7	RN	KC	
13	2H	2024-09-22	16:50	P	1.5 X 1.0	RN	KC	
14	2J	2024-09-22	17:00	P	2.0 X 1.0	RN	KC	
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

REPAIR TYPE :

RS - RECONSTRUCTED SEAM
 P - PATCH

G & W - GRIND WELD
 C - CAP

REVIEWED BY: AFK

DATE: 02-Oct-24

Appendix A-10

Geomembrane Seam and Repair Vacuum Test Summary



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 1

SEAMS											
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS	
	FROM	TO				NO	YES				
1	P1/P2	SEOS	NEOS	2024-09-23	BT	0		X	Y	DS	
2	P11/P12	SEOS	2C	2024-09-23	BT	0		X	Y	DS	
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	2P	2024-09-23	BT	0	Y	DS
22	1B	2024-09-23	BT	0	Y	DS
23	1S	2024-09-23	BT	0	Y	DS
24	1A	2024-09-23	BT	0	Y	DS
25	3B	2024-09-23	BT	0	Y	DS
26	2U	2024-09-23	BT	0	Y	DS
27	2X	2024-09-23	BT	0	Y	DS
28	2E	2024-09-23	BT	0	Y	DS
29	2W	2024-09-23	BT	0	Y	DS
30	2D	2024-09-23	BT	0	Y	DS
31	2C	2024-09-23	BT	0	Y	DS
32	1G	2024-09-23	BT	0	Y	DS
33						
34						
35						
36						
37						
38						
39						
40						
41						

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER

SEAMS										
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
	FROM	TO				NO	YES			
1	P5/P6	SEOS NEOS	2024-09-23	CN	0		X	Y	KC	
2	P6/P7	SEOS NEOS	2024-09-23	CN	0		X	Y	KC	
3	P10/P11	SEOS NEOS	2024-09-23	CN	0		X	Y	KC	
4	P11/P12	NEOS 2C	2024-09-23	CN	0		X	Y	KC	
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	2H	2024-09-23	CN	0	Y	KC
22	1D	2024-09-23	CN	0	Y	KC
23	1T	2024-09-23	CN	0	Y	KC
24	2J	2024-09-23	CN	0	Y	KC
25	2T	2024-09-23	CN	0	Y	KC
26	1W	2024-09-23	CN	0	Y	KC
27	1C	2024-09-23	CN	0	Y	KC
28	2B	2024-09-23	CN	0	Y	KC
29	2K	2024-09-23	CN	0	Y	KC
30	2S	2024-09-23	CN	0	Y	KC
31	1X	2024-09-23	CN	0	Y	KC
32	2A	2024-09-23	CN	0	Y	KC
33	2G	2024-09-23	CN	0	Y	KC
34	2U	2024-09-23	CN	0	Y	KC
35	1U	2024-09-23	CN	0	Y	KC
36	3A	2024-09-23	CN	0	Y	KC
37	1H	2024-09-23	CN	0	Y	KC
38	1V	2024-09-23	CN	0	Y	KC
39	2R	2024-09-23	CN	0	Y	KC
40						
41						

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 3

SEAMS										
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS
	FROM	TO				NO	YES			
1	P15/P16	SEOS NEOS	2024-09-24	BT	0		X	Y	DS	
2	P22/P23	NEOS 1P	2024-09-24	BT	0		X	Y	DS	
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	1P	2024-09-24	BT	0	Y	DS
22	1K	2024-09-24	BT	0	Y	DS
23	1L	2024-09-24	BT	0	Y	DS
24	2L	2024-09-24	BT	0	Y	DS
25	1M	2024-09-24	BT	0	Y	DS
26	3E	2024-09-24	BT	0	Y	DS
27	3D	2024-09-24	BT	0	Y	DS
28	1Q	2024-09-24	BT	0	Y	DS
29	1N	2024-09-24	BT	0	Y	DS
30	2Q	2024-09-24	BT	1	Y	DS
31						
32						
33						
34						
35						
36						
37						
38						
39						
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41						

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24



GEOMEMBRANE SEAM and REPAIR VACUUM TEST LOG

PROJECT NUMBER: 1000-043-27
 OWNER: Waste Connections of Canada
 LOCATION: Prairie Green IWMF
 CLIENT: WSP Canada

PROJECT TIT PGL Search Facility Pad Construction
 CONTRACTOR: Titan
 MATERIAL: 60 Mil HDPE

SHEET NUMBER 4

SEAMS											
SEAM NUMBER	SEAM SECTION *		TEST DATE	TECH ID	DEFECTS **	SEAM COMPLETE		OBS. TEST	MON.	REMARKS	
	FROM	TO				NO	YES				
1	P12/P13	SEOS	NEOS	2024-09-24	CN	0		X	Y	KC	
2	P22/P23	SEOS	1P	2024-09-24	CN	0		X	Y	KC	
3											
4											
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12											
13											
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15											
16											
17											
18											
19											
20											

REPAIRS						
DEFECT CODE	TEST DATE	TECH ID	DEFECTS **	OBS. TEST	MON.	REMARKS
21	2F	2024-09-24	CN	0	Y	KC
22	2V	2024-09-24	CN	0	Y	KC
23	1J	2024-09-24	CN	0	Y	KC
24	3C	2024-09-24	CN	0	Y	KC
25	1F	2024-09-24	CN	0	Y	KC
26	2N	2024-09-24	CN	0	Y	KC
27	2M	2024-09-24	CN	0	Y	KC
28	3F	2024-09-24	CN	0	Y	KC
29	1R	2024-09-24	CN	0	Y	KC
30	1E	2024-09-24	CN	0	Y	KC
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* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM (I.E. REFERENCE POINT, DISTANCE, DIRECTION FROM REF. PT.)
 ** RECORD QUANTITY OF LEAKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY: AFK
 DATE: 02-Oct-24

Appendix B

Construction Photo Summary



GCL Deployment



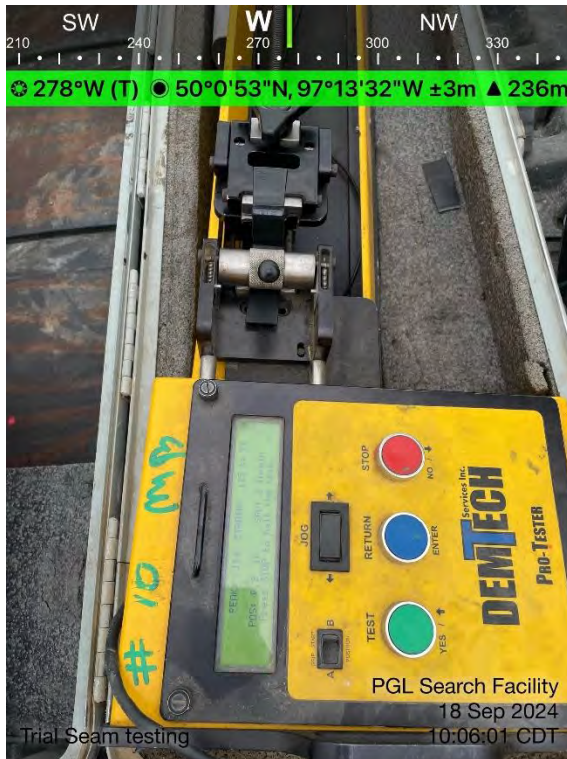
Bentonite in Seams



Smooth Geomembrane Deployment



Thickness verification of Smooth Geomembrane



Trial Seams testing of Fusion Welder



Fusion Welding Smooth Geomembrane



Pressure testing Fusion Seams



Extrusion Welding of Boot



Vacuum Box Testing of Extrusion
Welds

Appendix D

EP340.2 Equivalency Review Letter



November 11, 2024

Project No. CA0039180.5749

Chris Visser, P.Eng., Canadian Region Engineering Manager

Waste Connections of Canada Inc.

Prairie Green IWMF

375 Oak Point Highway

Winnipeg, MB R2R 1T9

RE: REVIEW OF ASAE STANDARD EP340.2 EQUIVALENCY FOR THE SEARCH FACILITY LINER SYSTEM INSTALLATION (CONDITION NO. 5.(E) OF THE NOTICE OF ALTERATION APPROVAL DATED AUGUST 20, 2024) – ENVIRONMENTAL ACT LICENCE NO. 2177 E R5 PRAIRIE GREEN INTEGRATED WASTE MANAGEMENT FACILITY, WINNIPEG, MANITOBA

Dear Mr. Visser,

This letter report presents WSP Canada Inc. (WSP) technical review of Condition No. 5.(e) of the Notice of Alteration Approval dated August 20, 2024 for the Prairie Green Integrated Waste Management Facility, which requires the liner system of the Search Facility to be installed following the American Society of Agricultural Engineers (ASAE) Standard EP340.2 (Installation of Flexible Membrane Linings) referred herein as Standard. It is noted that ASAE changed its name to American Society of Agricultural and Biological Engineers (ASABE) in 2005 to reflect biology in the profession.

WSP contacted the ASABE office to obtain a copy of the Standard, as its website accessed in August 2024 indicated that this Standard was lastly revised in 2008 and has been withdrawn. ASABE provided a copy of the Standard as a historical document.

It is understood that the Standard is a general guidance document that covers design, installation, and maintenance aspects of flexible liners, including site preparation, subgrade construction, liner storage, liner properties, liner panel placement, liner seaming, anchor trench dimensions, cover material, inspections and testing. The Standard includes sections dedicated to reservoir lining, pond lining, canal lining and membrane materials. The Standard is primarily focused on geomembranes, although the subgrade requirements are also applicable to geosynthetic clay liners (GCLs).

Although the Standard has been withdrawn, the Environmental Approvals Branch (EAB) indicated that compliance with the Standard is required for consistency with other environmental approvals issued by the EAB in Manitoba.

To assist Waste Connections of Canada Inc. on compliance with the requirements included in the Standard, WSP completed a thorough review to the Standard and compared it with the following documents applicable to the Search Facility Pad and Pond liner:

- Re-issued for Construction Drawings for the Search Facility Area sealed on September 9, 2024, project number CA0039180.5749 (re-issued for the reduced Pad area size and the north Pond);

- Technical Specifications for subgrade, crushed rock fill material, liner, geotextiles, sand protective layer and crushed rock cover material prepared by WSP;
- Relevant standard specifications for liners and geotextiles published by the Geosynthetic Institute; and
- HDPE and LLDPE Geomembrane Installation Specification issued by the International Association of Geosynthetic Installers, Revised on November 1, 2015.

A response to each section of the Standard is provided in the attached Table 1 to demonstrate that the project design drawings and specifications, which are in compliance with the specifications for materials and installation published by the Geosynthetic Institute and the International Association of Geosynthetic Installers, meet or exceed the Standard requirements and therefore address Condition No. 5.(e) of the Notice of Alteration Approval.

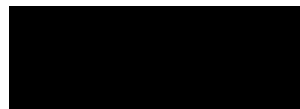
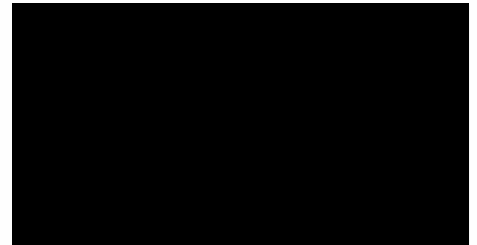
It is noted that Section 6 of the Standard is dedicated to Operation and Maintenance aspects of the liner system. Guidelines for the operation and maintenance of the liner system is provided in the attached Table 1 to fulfill this requirement. Also, refer to the Operation and Maintenance Manual submitted by Titan Environmental Containment (Appendix A).

We trust that the above satisfies your current needs. If you have any questions regarding this letter, please contact the undersigned.

WSP Canada Inc.



Fabiano Gondim, M.Eng., P.Eng. (ON, MB)
Senior Waste Engineer / Project Manager



Frank Barone, Ph.D., P.Eng (ON)
Senior Principal, Geo-Environmental Engineer

FRG/FSB/al

Attachments: Table 1: ASAE Standard EP340.2 Equivalency Review Summary
Appendix A: Operation and Maintenance Manual

[https://wsponlinecan.sharepoint.com/sites/ca-ca00353402891/shared documents/05. technical/ep340 standard review/ca0039180.5749_itr_ep340_std_equivalency_review-11nov2024.docx](https://wsponlinecan.sharepoint.com/sites/ca-ca00353402891/shared%20documents/05.%20technical/ep340%20standard%20review/ca0039180.5749_itr_ep340_std_equivalency_review-11nov2024.docx)

Table 1 – ASAE Standard EP340.2 Equivalency Review Table

Section No.	Section Title/Requirements	Considerations Included in the Design, Construction and Operational Phases of the Project That Would Address ASAE Standard EP340.2 Requirements
1	<p>Purpose and Scope</p>	<p>Acknowledged.</p>
1.1	<p>Flexible membranes are used extensively as seepage barriers for ponds, reservoirs, lagoons, landfills, waste ponds, and canals. These membranes, when properly installed, may be expected to render satisfactory service in controlling liquid loss and pollution.</p>	<p>Acknowledged.</p>
1.2	<p>Their use should be considered wherever liquid loss due to seepage is of such proportion as to prevent the facility from economically fulfilling its planned function, where the conservation of soil or liquid resources is being impaired, or where liquid leakage is damaging land or creating pollution and health hazards.</p>	<p>Acknowledged.</p>
1.3	<p>The purpose of this Engineering Practice is to provide the designer of water or specialty liquid, not hazardous waste, facilities with guidelines for the proper installation of membrane materials. It is not intended to serve as a complete set of specifications. Neither is it intended to replace the judgment of personnel who are intimately familiar with site conditions or the overriding circumstances of the project.</p>	<p>As shown on the Construction Drawings, the design includes a geotextile cushion under the geomembrane liner (Pad only) and a sand cushion layer above the geomembrane liner to mitigate mechanical damage concerns during installation, construction and operation.</p> <p>Delivery and storage of liner rolls shall be conducted such that rolls are protected from environmental damage and inspected prior to installation (Section 07 High Density Polyethylene Geomembrane, Part 1 and 3, Clause 1.10.1 and 3.4.1; and HDPE and LLDPE Geomembrane Installation Specification issued by the International Association of Geosynthetic Installers Revised on November 1, 2015 (IAGI Specification), Section 1.05).</p> <p>To mitigate damage from the subgrade surface, the entire surface shall be inspected for potential sources of damage prior to liner installation (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.2; Section 06 Specification for Geosynthetic Clay Liner, Part 3, Clause 3.1.3; and IAGI Specification, Section 3.07). Potential sources of damage will be removed, and if required, an extra layer of sand cushion shall be placed to smooth the surface of the liner subgrade in accordance with recommendations from the Engineer of Record. Equipment used during liner deployment shall not cause any damage to the liner. Apart from approved welding equipment, no mechanical equipment shall be allowed on the liner surface unless approved by the COA consultant (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.8; Section 06 Specification for Geosynthetic Clay Liner, Part 3, Section, 3.2.9).</p> <p>Field equipment, such as air channel pressure pumps, will be mounted on a cushion to protect the geomembrane during testing (IAGI Specification Part 3.05, Clause B.6).</p> <p>Prior to approval and construction of the sand cushion layer, the entire liner surface shall be inspected for mechanical damage and subsequently repaired as required (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3.9).</p> <p>Additionally, low ground pressure equipment requirements, operational procedures, and traffic restrictions during construction of the sand cushion layer were included in the specifications to mitigate this concern (Section 20 Specification for Sand Cushion, Part 3.1; and IAGI Specification, Section 3.02, Clause D).</p>
2	<p>General requirements</p>	<p>The project load and soil bearing capacity were considered in the design.</p> <p>The Pad liner will be installed on granular material (i.e., competent engineered subgrade) compacted using a smooth drum roller to a minimum compacted dry density of 98%, the Standard Proctor Maximum Dry Density. The compaction density will be monitored by the COA engineer prior to geomembrane installation (Section 10 Granular Subbase, Part 4).</p> <p>The liner in the pond bottom will be installed in the lower clay exposed surface (i.e., competent native soil).</p> <p>A granular layer was included above the sand cushion layer to provide a ballast for groundwater pressure and silt sloughing concerns on the side slopes of the Pond (see Drawings).</p> <p>The perimeter berms, pond side slopes, and Berm separating the Pad and Pond were designed to be structurally stable in the event of leakage through the liner.</p> <p>The Pad crushed rock subgrade leveling layer will be drum rolled to minimize the possibility of puncture or damage to the membrane when placed on the subgrade (see Drawings; and Section 10 Specification for Granular Subbase, Part 3, Clause 3.1.6). If required, an extra layer of sand cushion will be placed to smooth the liner subgrade.</p> <p>Additionally, the subgrade surface shall be inspected for potential sources or puncture damage, such as sharp or angular objects, prior to liner installation. This inspection is to be conducted by both the installer and COA consultant (IAGI Specification Part 3.01, Clause A; Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.2; and Section 06 Specification for Geosynthetic Clay Liner, Part 3, Clause 3.1.3).</p> <p>The Pond subgrade shall be smoothed such that stones (if present) do not protrude more than 12 mm and that the surface is free of voids (Section 06 Specification for Geosynthetic Clay Liner, Section 3, Clauses 3.1.1 and 3.1.2).</p>
2.1	<p>Since flexible membranes may be subject to mechanical damage during installation, it is important to consider beforehand the field procedure which will be utilized in the lining operation. The manufacturer or his local representative may provide assistance, especially in selecting the proper prefabricated membrane width and method of packaging or delivery.</p>	<p>It is desirable that soil subgrades be firm enough to support the personnel or equipment to be used during installation. All facilities should be designed so that they will not fail structurally without a lining since there is always the possibility of lining damage.</p>
2.2	<p>The surface of the soil subgrade should be finished smoothly and as projection-free as possible to minimize the possibility of puncture or damage to the membrane when placed on the subgrade.</p>	<p>The project load and soil bearing capacity were considered in the design.</p> <p>The Pad liner will be installed on granular material (i.e., competent engineered subgrade) compacted using a smooth drum roller to a minimum compacted dry density of 98%, the Standard Proctor Maximum Dry Density. The compaction density will be monitored by the COA engineer prior to geomembrane installation (Section 10 Granular Subbase, Part 4).</p> <p>The liner in the pond bottom will be installed in the lower clay exposed surface (i.e., competent native soil).</p> <p>A granular layer was included above the sand cushion layer to provide a ballast for groundwater pressure and silt sloughing concerns on the side slopes of the Pond (see Drawings).</p> <p>The perimeter berms, pond side slopes, and Berm separating the Pad and Pond were designed to be structurally stable in the event of leakage through the liner.</p> <p>The Pad crushed rock subgrade leveling layer will be drum rolled to minimize the possibility of puncture or damage to the membrane when placed on the subgrade (see Drawings; and Section 10 Specification for Granular Subbase, Part 3, Clause 3.1.6). If required, an extra layer of sand cushion will be placed to smooth the liner subgrade.</p> <p>Additionally, the subgrade surface shall be inspected for potential sources or puncture damage, such as sharp or angular objects, prior to liner installation. This inspection is to be conducted by both the installer and COA consultant (IAGI Specification Part 3.01, Clause A; Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.2; and Section 06 Specification for Geosynthetic Clay Liner, Part 3, Clause 3.1.3).</p> <p>The Pond subgrade shall be smoothed such that stones (if present) do not protrude more than 12 mm and that the surface is free of voids (Section 06 Specification for Geosynthetic Clay Liner, Section 3, Clauses 3.1.1 and 3.1.2).</p>

Section No.	Section Title/Requirements	Considerations included in the Design, Construction and Operational Phases of the Project That Would Address ASAE Standard EP340.2 Requirements
2.2.1	All soil clods, brush, roots, rocks, sod, or foreign material which might puncture the lining material shall be eliminated from the area. Rolling or surface compaction of the subgrade is encouraged to provide an extra measure of safety.	All topsoil (and hence vegetation) will be stripped prior to excavation. Subgrade inspections prior to liner installation are intended to identify, and prompt removal of, any foreign debris or material on the subgrade surface (IAGI Specification Part 3.01; Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.2; and Section 06 Specification for Geosynthetic Clay Liner Part 3, Clause 3.1.3). If required, an extra layer of sand cushion shall be placed to smooth the surface of the liner subgrade in accordance with recommendations from the Engineer of Record. The Pad crushed rock subgrade leveling layer is to be drum rolled to mitigate the possibility of puncture or damage to the membrane when placed on the subgrade (Drawings; Section 10 Specification for Granular Subbase, Part 3, Clause 3.1.6). The geomembrane subgrade shall be prepared in accordance with the project specifications, i.e., uniform, and free of sharp or angular objects that may damage the geomembrane (IAGI Specification, Section 3.01). The Pond subgrade will be smoothed such that stones (if present) do not protrude more than 12 mm (Section 06 Specification for Geosynthetic Clay Liner, Part 3, Clause 3.1.1). No excavation for the Pad is required for construction, and the existing ground will be properly graded with filled in depressions and proof rolled, which will mitigate this concern (see Drawings; and Section 10 Specification for Granular Subbase, Part 3, Clause 3.1.2). To mitigate this concern, the surface underlying the granular subbase of the Pad and Pond (i.e., ground surface) shall be fine graded, proof rolled, inspected, and approved by the COA consultant for compliance with contract documents prior to placement of the granular subbase (Section 10 Specification for Granular Subbase, Part 3, Clause 3.1.2). Both the Pad and Pond subgrades will be inspected and approved by the contractor and COA consultant (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.2; Section 06 Specification for Geosynthetic Clay Liner, Part 3, Clause 3.1.3; and IAGI Specification, Section 3.01, Clause B).
2.2.2	Backfilled depressions, including areas where stumps, trees or large rocks have been removed, are particularly subject to localized settling and should always be compacted with care.	A 542 g/m ² nonwoven geotextile cushion is included in the design where the geomembrane is placed over the crushed rock to provide protection or cushioning (see Drawings). If required, an extra layer of sand cushion will be placed to smooth the liner subgrade.
2.2.3	After subgrade preparation, the soil surface under the lining should be treated with a high quality, nonselective soil sterilant, if weed growth is considered to be a likely problem. Treatment of the subgrade with a sterilant may, however, pose a problem with shallow groundwater aquifers. The use of sterilants under these conditions should be evaluated in concert with state permitting authorities. Care should be taken not to apply sterilants outside the lined area if landscaping or grasses are to be established.	Not applicable, as weed growth is not considered to be a problem on the Pad or Pond subgrade. As indicated above, existing weeds are removed as the topsoil is stripped prior to construction.
2.3	When a flexible membrane lining is installed over deteriorated rigid (concrete) or semirigid (asphalt) linings, the same precautions regarding foreign materials or sharp projections which could puncture the membrane apply. The deteriorated structure should be inspected carefully and all such hazards smoothed. In addition, all visible cracks should be filled with mortar or other suitable material provided that material is compatible with the membrane.	Not applicable, as the geomembrane will not be installed over concrete or Asphalt (see Drawings).
2.3.1	While properly installed membrane linings are durable and watertight, they should not be relied upon for structural support. The structural stability of badly deteriorated and cracked rigid linings shall be ascertained prior to relining with a flexible membrane.	Not applicable, as the geomembrane will not be installed over rigid or semirigid linings (see Drawings).
2.4	Selection of the membrane thickness should be based on the soil texture, liquid characteristics and the susceptibility of the lining to damage during or after installation. The minimum thickness of rubber sheeting, either fabric reinforced or unsupported, is 0.75 mm (30 mil where 1 mil = 0.001 in.) regardless of the soil subgrade. The minimum thickness of plastic sheeting is 0.25 mm (10 mil) for sands (greater than 50% of the soil particles pass No. 4 sieve which includes soil groups SM, SP and SW as defined in ASTM Standard D2487; Classification of Soils for Engineering Purposes) and 0.50 mm (20 mil) for gravels (greater than 50% of the soil particles retained on No. 4 sieve which includes soil groups GC, GM, GP, and GW). The National Sanitation Foundation Standard NSF No. 54; Flexible Membrane Liners, can also be used as a guide when selecting minimum membrane thickness for specific applications.	The specified geomembrane is 1.5 mm thick (60 mil) (Section 07 Specification for High Density Polyethylene Geomembrane, Table 3). This thickness is 1.0 mm greater than the 0.5 mm minimum thickness specified for a gravel soil texture. The use of a 1.5 mm (60 mil) HDPE geomembrane in the Search Facility lining system was approved in the Prairie Green Integrated Waste Management Facility (Landfill) – Notice of Alteration Approval Letter dated August 20, 2024 (as part of Environment Act License No. 2177 E RS).
2.5	Membrane linings should be supplied in sections as large as practical. However, availability of equipment to handle large rolls or packages may limit the section size specified. Table 1 indicates the approximate unit weight of typical rubber and plastic sheeting.	Geomembrane rolls are to be minimum 6.5 m in width consisting of a continuous width seamless panel (Section 07 Specification for High Density Polyethylene Geomembrane, Part 2, Clause 2.2.6).
2.5.1	Joints are constructed in a controlled factory environment to fabricate large panels in order to minimize field seaming. Types of seam joints include: adhesive, bodied solvent, dielectric, extrusion welded, solvent, thermal, and vulcanized. A seam joint should provide adequate initial seam strength to meet installation and service requirements. Factory seams shall meet the physical property requirements for the specific flexible membrane material as outlined in the material property tables of NSF Standard No. 54; Flexible Membrane Liners.	Due to the scale of the Pad and Pond, field seaming the 1.5 mm HDPE geomembrane is required. Use of 6.5 m wide geomembrane roll widths will minimize field seaming compared to geomembrane rolls of smaller width. Field test seams will be produced and tested for adherence to Table 3 of the specifications prior to production seaming (Section 07 Specification for High Density Polyethylene Geomembrane, Table 3 and Clause 3.5.5; and IAGI Specification, Part 3.05, Clause A). Table 3 of this specification is based on the current Geosynthetic Research Institute's GM198 specification (Seam Strength and Related Properties of Thermally Bonded Homogeneous Polyolefin Geomembranes/Barriers). This standard has been revised in 2021 and specifies more stringent seam break strengths and more detailed focus-of-break requirements than the NSF Standard No. 54.

Section No.	Section Title/Requirements	Considerations included in the Design, Construction and Operational Phases of the Project That Would Address ASAE Standard EP340.2 Requirements
2.52	<p>Joints are constructed on site to complete the fabrication of the membrane from factory panels. Field seams are constructed in an uncontrolled outside environment. Field seaming should only be performed when weather conditions are favorable.</p> <p>The contact surfaces of the materials should be clean of dirt, dust, moisture, or other foreign materials.</p> <p>The materials to be field seamed shall lay flat against one another, shall be aligned with sufficient overlap, and shall be bonded in accordance with the supplier's recommended procedures. Wrinkles should be smoothed prior to seaming. Seams should be made so there are no loose edges.</p> <p>All seams on the slopes should be oriented perpendicular to the liquid surface whenever practical (with the slope) to reduce stress on the joint.</p> <p>Any seam which parallels the liquid surface should have the top sheet overlap the bottom sheet.</p>	<p>The Project Specification (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.5.4) and the IAGI Geomembrane Installation Specification (Part 3.03) outline the environmental requirements for field seaming. These requirements address acceptable seaming temperature ranges and address concerns related to excessive moisture and wind during seaming.</p> <p>Additionally, the IAGI Specification (Part 3.03, Clause A) indicates that cold weather geomembrane installations should follow the GRI GMB9 guideline (Cold Weather Seaming of Geomembranes) when geomembrane temperatures are between 0°C and -15°C. The Section 07 Specification for High Density Polyethylene Geomembrane (Clause 3.5.4.5) states that geomembranes should generally not be installed when temperatures are below 0°C; however, this standard references GRI GMB9 (Reference 1.4.1.a) to provide guidance on geomembrane seaming and testing when installation below 0°C is necessitated.</p> <p>Seam areas must be kept clean, dry, and sheltered from wind if required, during seaming operation (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.5.4.4).</p> <p>The Panels shall be overlapped to affect a good weld and allow for proper testing. (IAGI Specification, Section 3.02, Clause K).</p> <p>A minimum overlap of 125 mm is required (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.5.3.1). Wrinkles and "fishmouths" are to be minimized along seams (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.9; and IAGI Specification, Section 3.02, Clause I and Section 3.03, Clause E).</p> <p>The Search Facility Pad incorporates a 1% slope running 120 m northwards towards the Pond (see Drawings). This slope distance is shorter than the 170.7 m roll length of the approved HDPE geomembrane for this Project (Sohmax 1.5 mm HDPE geomembrane). Incorporation of geomembrane rolls longer than this slope length will help reduce the number of seams running perpendicular to the slope.</p> <p>On slopes steeper than 10 percent, all seams shall be oriented down slope and not across the slope. No horizontal seams shall occur less than 1.5 m (and preferably 3 m) from the crest or toe of such slopes (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.4; and IAGI Specification, Part 3.02, Clause J).</p> <p>Panels must be installed so overlaps are primarily downstream, and downwind (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.5).</p>
2.5.3	<p>Both factory and field seams shall be tested. Seams should be inspected by both non-destructive and destructive testing techniques to verify seam integrity. For destructive testing, seam samples should be taken from the panels at regular intervals. In addition, on-site seam samples can be made with identical liner material, adhesive, and technique which need not be taken from the actual field seam.</p>	<p>Section 07 Specification for High Density Polyethylene Geomembrane, Part 3.5 and the IAGI Specification (Section 3.05) outline the Non-Destructive and Destructive testing requirements and procedures for field seams.</p> <p>Destructive testing shall occur at minimum every 300 m of seam (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.5.7; and IAGI Specification, Section 3.06, Clause C.1).</p> <p>Test Seams are required at the start of each shift, or any change in seaming conditions (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3.5; and IAGI Specification, Section 3.05, Clause A).</p>
2.6	<p>Flexible membrane linings should not be stretched during installation and should be installed in a relaxed state or with slight slack in both directions to compensate for thermal shrinkage, settling of the sub-base, etc.</p>	<p>The geomembrane shall rest on the subgrade surface and should not "bridge over" voids or low areas of the subgrade (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.11; and IAGI Specification, Section 3.02, Clause H).</p>
2.7	<p>The use of cover material (earth, sand, gunite, concrete) is important for most membrane linings to reduce mechanical damage as well as reduce the seepage rate through holes. The sequence for placement of cover material must be determined by job and site peculiarities. In general, cover material on all slopes shall be placed beginning at the bottom and proceeding toward the top. Cover soil placement shall be conducted in such a manner that the lining will not be displaced or damaged by equipment or overburden. Sliding cover material over the lining should be avoided. The cover material shall not be placed when the temperature is below 5 °C (41 °F), unless the condition of the cover soil is such that its placement will not rupture the lining (relatively dry and free flowing). Care must be taken in the cover material placement when the air temperature is over 40 °C (104 °F), as the puncture resistance of plastic membranes diminishes as the temperature increases.</p>	<p>A sand cushion layer with a minimum thickness of 300 mm will be placed directly above the Geomembrane (see Drawings).</p> <p>Requirements for placing the sand cushion layer such that the geomembrane is not damaged are detailed in the specifications (Section 20 Specification for Sand Cushion, Part 2 and Part 3). These include controls on the gradation of the sand cushion fill and removal of deleterious material that could puncture the geomembrane during construction and facility operation, and requirements on the minimum sand fill thickness required for approved equipment traffic during construction of the sand cushion layer.</p> <p>Placement of the sand cushion layer is specified to occur at the coolest time of the day (e.g., early morning or evening) to mitigate wrinkle formation in the geomembrane due to solar radiation and heating (Section 20 Specification for Sand Cushion, Part 3, Clause 3.1.5).</p>
3	<p>Reservoir and Pond Lining</p>	<p>Acknowledged.</p>
3.1	<p>Agricultural or conservation reservoirs and ponds to be lined shall be designed to meet the general requirements of United States Department of Agriculture Soil Conservation Service Standards and Specifications, SCS 359, Waste Treatment Lagoon; SCS 378, Pond; SCS 425, Waste Storage Pond; SCS 436, Irrigation Storage Reservoirs; SCS 521, Pond Sealing or Lining; SCS 552, Irrigation Pit or Regulating Reservoirs, and SCS 648, Wildlife Watering Facilities</p>	<p>The geomembrane shall rest on the subgrade surface and should not "bridge over" voids or low areas of the subgrade (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.11; and IAGI Specification, Section 3.02, Clause H).</p>
3.2	<p>Whether a buried or exposed flexible membrane liner is used, it is mainly an economic decision depending on material cost, the particular application requirements, cost and availability of cover material, and effective life of the lining material.</p>	<p>Acknowledged.</p>
3.2.1	<p>Many liner materials are covered for one or more reasons: protection from solar radiation, particularly ultraviolet; protection from mechanical damage by maintenance machines and workers, by animals, or by vandals; reduction of temperature variation, and protection from lifting by wind. By burying the liner long-term watertight integrity is generally improved.</p>	<p>The Pad and Pond geomembranes will be covered by several layers (see Drawings). The first layer directly above the geomembrane is a sand cushion layer intended to protect the geomembrane from environmental damage, including those listed in the ASAE Standard EP340.2, both during construction and into operation.</p> <p>Prior to sand cushion layer placement, the contractor will provide site protection as required to prevent bird and/or animal attack on the geomembrane (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.14). This specification also highlights controls on activities, footwear, and equipment that could potentially damage the liner (Clauses 3.4.6 and 3.4.7).</p> <p>Smoking will not be permitted on the liner surface (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.4.7).</p>

Section No.	Section Title/Requirements	Considerations Included in the Design, Construction and Operational Phases of the Project That Would Address ASAE Standard EP340.2 Requirements
3.2.1.1	Where a membrane is to be buried in the structure for seepage control, the over excavation of the earthen structure must be considered in the design. Soil cover should be a minimum of 0.3 m (1 ft). The bottom 0.15 m (0.5 ft) next to the membrane should not be coarser than silt sand (soil group SM). Where a flexible membrane is to be buried for protection against mechanical damage, a minimum of 0.45 m (1.5 ft) of cover is required, with additional thickness desirable when the cover material is of high plasticity (see Fig. 1)	The bottom of the Pond was designed to have it placed on top of the native lower clay, which will require the silt layer within the Pond base footprint to be fully removed. Also, to mitigate silt sloughing, (4-horizontal); (Vertical) side slopes were designed for the Pond (see Drawings). A granular layer was included above the sand cushion layer to provide a ballast for groundwater pressure and silt sloughing concerns on the side slopes of the Pond (see Drawings). Above the Pond geomembrane, there is 0.3 m sand cushion layer providing protection to the geomembrane during installation and from puncture/identifications caused by the overlying Crushed Rock Fill during placement and facility operation. (see Drawings). Above the 0.3 m sand cushion layer is a geotextile separator and a 0.8 m thick Crushed Rock Fill layer, for a total thickness of 1.1 m above the Pond liner (see Drawings). This 1.1 m layer will also provide protection to the geomembrane from damage resulting from equipment and vehicle traffic during construction and operation. This requirement does not apply to the Pad because its entire area is above original ground, i.e., the Pad is in a fill situation.
3.2.1.2	Cover material shall be sufficiently stable to minimize erosion caused by wave action and liquid scouring on the sloping sides as the liquid level in the facility is varied. Likewise, all cover material must be sufficiently stable to resist sliding on the side slopes because of the weak shear plane created by the membrane. Side slopes for reservoirs utilizing buried linings should not be steeper than 3 to 1. In some cases side slope can be increased if a rigid cover of reinforced mortar or masonry is used provided the slope does not exceed the angle of repose for the embankment and the membrane is properly anchored before the rigid cover is applied.	The 0.8 m thick crushed rock layer will provide sufficient stability against erosion on the Pond slopes. The Pond incorporates 4 (Horizontal); (Vertical) side slopes and has been designed to be sufficiently stable to resist sliding both during construction and operation of the Facility (see Drawings). There are no exposed geomembranes in the design (see Drawings).
3.2.2	Materials which are exposed are generally resistant to deterioration from weathering, various kinds of mechanical damage, etc. For reservoirs, mechanical damage can often be minimized by prevention of public access and fencing to control animal access.	
3.2.2.1	Where exposed membrane linings are to be utilized in earthen structures, the side slope of the reservoir may be increased to as much as 2 to 1, depending on the material offered, provided this does not exceed the angle of repose for the embankment material	
3.2.2.2	Exposed membranes may be used to line deteriorated rigid reservoir structures having side walls or abutments steeper than 1 to 1. The membrane may require anchoring depending on the material selected. This may be done either mechanically or with suitable adhesives recommended by the membrane manufacturer. Reinforced nailing strips, rolled galvanized strips and aluminum bar stock are often used above the liquid level to hold the vertical membrane in position. Generally, only reinforced membranes should be used when slopes are steeper than 2 to 1.	
3.2.3	The minimum lined freeboard should be at least 0.3 m (1 ft) above the maximum level of the liquid surface in reservoirs of less than 0.4 ha (1 acre) surface. In larger reservoirs, additional bank height should be provided to prevent overtopping by wind-generated waves. Generally, add 0.3 m (1 ft) of lined bank height for every 240 m (800 ft) of additional wind reach, above 60 m (200 ft). The lined freeboard should be equivalent to the minimum permissible bank height to prevent overtopping of the reservoir liquid (see Fig. 1).	The Pond area is less than 0.4 hectares. There is 0.3 m of freeboard between the maximum water level and the top of the liner (see Drawings).
3.2.4	Provision must be made to prevent surface flooding from run-off around the reservoir perimeter due to poor drainage. The reservoir design should not permit surface run-off, or other incident liquid, from eroding the soil bank structure or seeping between the subgrade and the membrane	Surface Runoff from outside the Pond will be either directed away from the Pond or separated by above ground berms (see Drawings).
3.2.5	The flexible membrane lining shall be anchored about its perimeter at the top of the reservoir embankment. In earthen structures this may be accomplished by means of an anchor trench at least 0.3 m (1 ft) wide and 0.3 m (1 ft) deep or in accordance with the manufacturer's recommendation. The membrane should extend across the bottom and up the far side of the trench to form a "U" shape as shown in Fig. 1 or in accordance with the manufacturer's recommendation. The trench may be located either on the side slope of the embankment or on the bench level if one is established. When located on the bench level, the trench should not be closer than 0.6 m (2 ft) to the top of the side slope. Anchor trenches shall be carefully backfilled and compacted after the membrane is in place	The geomembrane on the West, North, and East slopes of the Pond will be installed in an anchor trench 0.6 m deep and 0.6 m wide. The anchor trench is located approximately 2.5 m from the top of the interior side slopes (see Drawings). The geomembrane on the South side of the Pond will terminate at either a similar perimeter berm or within the Pad area at elevation 233.05 m above sea level (mASL) (see Drawings). Anchor trenches backfilled with crushed rock will self-compact. Anchor trenches backfilled with soil will be compacted to 95% of maximum dry density in 150 mm compacted thickness layers (Section 05 Common Excavation, Embankment and Compaction, Part 3, Clause 3.6.3). The anchor trench design is consistent with the geomembrane manufacturer's recommendations.
3.2.6	Fill pipes, drains, overflow structures, gauge supports, or other features that penetrate the membrane lining shall be suitably finished and sealed to prevent leakage. The ground-surrounding structures must be properly compacted to minimize differential settlement which could result in damage to the membrane.	The Pad geomembrane will be penetrated by a 2000-gallon prefabricated concrete leachate holding tank (see Drawings). In this location, the geomembrane will extend 0.3 m vertically up a concrete riser where it is then secured with stainless steel clamps and a rubber gasket to the concrete riser. The leachate holding tank will be installed on a 300 mm thick crushed rock bedding placed on the lower clay, i.e., competent soils. The granular backfill overlying the geomembrane and around the leachate holding tank will be compacted using a smooth drum roller to a minimum compacted dry density of 98%, the Standard Proctor Maximum Dry Density. The compaction density will be monitored by the CQA engineer prior to geomembrane installation (Section 10 Granular Subbase, Part 4). Penetrations shall be installed as shown in the project drawings and shall be constructed from the base geomembrane material. Following installation, penetrations are to be tested by non-destructive or field spark testing (IAGI Specification, Section 3.04). The surfaces of the Pond side slopes where the Pad tubing outlets will discharge collected water will be protected by riprap aprons. The riprap aprons will provide erosion protection to the crushed rock cover (see Drawings).
3.2.7	In lined reservoirs where the flexible membrane is buried, the liquid entrance-way should be protected with an additional heavy covering of large gravel or riprap to protect the earthen covering from erosion. A de-energizing structure may also be needed to reduce turbulence of the entering liquid, particularly if the intake structure is a pipe or flume. Likewise, drainage outlets should utilize vortex breakers to minimize disturbance of the protective earthen cover. In lined reservoirs where an exposed membrane is utilized, similar precautions are recommended to insure lining stability and positioning.	

Section No.	Section Title/Requirements	Considerations Included in the Design, Construction and Operational Phases of the Project That Would Address ASAE Standard EP340.2 Requirements
3.2.8	Where groundwater tables intercept the reservoir invert, where it is anticipated that gas or liquid/water may accumulate under the lining, or where exposed liners may be damaged by wind, a pressure relief system should be provided. Various methods can be used to control the problems depending on their nature and severity. These include weighting the liner with a protective cover and/or various pressure relief systems. Systems useful in relieving either gas or water pressures include (a) perforated pipe wrapped in a geotextile placed in trenches under the liner and vented to the atmosphere and (b) open granular filled trenches with vents to the atmosphere and possibly drain outlets if excessive groundwater is anticipated. Systems used in relieving gas pressure include (a) open granular fill or geotextile drainage fabric over the subgrade, (b) sloped bottom and sides, (c) three-sided gas units, and (d) wind cowls. Consideration should be given to using a soil cover as a complement to the pressure relief system.	A 1.1 m thick cover material over the Pond liner will provide a ballast to address groundwater pressure and silt sloughing concerns (see Drawings). The design considered potential liner uplifting associated with gas buildup under the liner, and the requirement to install a gas venting system. It was determined that a gas venting system for the Pond and Pond liners is not required.
4	Canal Lining	Not applicable, as there are no canals in the design.
4.1	Irrigation canals and ditches to be lined shall be designed to meet the general requirements of existing USDA Soil Conservation Service Standards and Specifications, or existing United States Department of Interior Bureau of Reclamation Standards where applicable. In this case, however, a flexible membrane lining is to be utilized as the impervious material to control seepage.	
4.1.1	A lined irrigation canal shall have enough capacity to function as designed without danger of overtopping.	
4.2	Flexible membrane linings should be buried using suitable cover to protect them from damage, exposure to the elements, and injury by turbulent water, stock, plant growth, and maintenance equipment. The depth of cover depends on cover material, size of canal, water velocity, and canal slopes. The minimum recommended cover depth is 0.25 m (0.83 ft) plus 25 mm (1 in.) for each 0.3 m (1 ft) of water depth. To minimize costs, approved excavated material should be used for up to one-half the cover requirement, Fig. 3. The upper layer should be sand and gravel cover which is well graded. If possible, the sand and gravel material should be obtained from an approved borrow area. Using material that requires no blending lowers cost.	
4.2.1	Canals with buried membrane linings must be constructed so that side slopes will be stable. Slope requirements will vary with different types of cover soil, but shall not be steeper than 2 to 1.	
4.2.2	Stream velocities in canals lined with buried flexible membranes shall not exceed the nonerosive velocity for the earth cover material. Local information on velocity limits for specific soils should be used when available; however, design stream velocity generally should not exceed 1 m/s (3 ft/s).	
4.2.3	The canal cross section shall be sized for sufficient capacity to carry the required flow under maximum retardance conditions. In new construction, the prism should reflect an economical shape based on hydraulic design. A Manning roughness coefficient, n, of 0.025 is usually used for canals with capacities less than 2.8 m ³ /s (100 ft ³ /s), and 0.025 to 0.0225 for larger capacities.	
4.2.4	Water surface elevations shall be established to provide adequate hydraulic head for successful operation of all ditches or other conveyance structures diverting from the canal. A minimum head of 0.15 m (0.5 ft) shall be provided, with 0.3 m (1 ft) preferred.	
4.2.5	The lined freeboard allowed in canals should not be less than 0.15 m (0.5 ft) above maximum design operating level, increasing to 1 m (3 ft) as the canal capacity increases from 0.3 to 400 m ³ /s (110 to 14,000 ft ³ /s). The design bank height above the maximum surface level should be twice the permissible lined freeboard (see Fig. 2); in addition, provision should be made to prevent soil bank erosion from surface run-off around the canal perimeter caused by poor drainage.	
4.2.6	The buried membrane lining should be anchored on each side of the canal along the berm so that the specified freeboard will be maintained. The membrane should be anchored as shown in Fig. 3. The upstream and downstream ends of the membrane sections should be overlapped in the downstream direction a minimum of 1 m (3 ft). The placement of the protective cover material will secure the lap joint. Since the cover material will be utilized to stabilize the membrane, care should be taken to insure full cover depth over the upstream end of the first section of lining.	
4.2.7	In some instances, notably the rehabilitation of deteriorated rigid canal linings (cracked concrete or asphalt), it may be desirable and economical to install a flexible membrane lining inside the structure over the old lining. This should be considered only after the possibility of damage to the exposed lining from cleaning equipment, vandals or other causes has been carefully weighed. The specifications for this type of construction should be left up to the designer who should consider the climate, age of concrete, type of cracking, and the structure size.	
5	Membrane Materials	
5.1	The sheet, including factory seams if present, shall be watertight and visually free of pinholes, particles of foreign matter, undispersed raw material and other manufacturing defects that might affect serviceability. If irregularities in the form of pock-marks appear excessive in a sheet or portion thereof, its rejection should be negotiated between the manufacturer and the owner. Rubber and plastic materials supplied for installation as flexible linings shall be compounded of high quality ingredients to produce durable, watertight membranes. Ingredients shall be thoroughly mixed to insure complete dispersion throughout the compound prior to processing into sheeting. The finished membrane material shall be free from defects which would affect its long-term serviceability as an impermeable lining. Note: Pock-marks are oblong depressions, cavities or craters on the surface of the sheet which may have dimensions of 3 mm (0.12 in.) by 1.5 mm (0.062 in.) and may have a depth approaching half the sheet thickness.	The specification (Section 07 Specification for High Density Polyethylene Geomembrane, Part 2.2) outlines the required properties of the HOPE Geomembrane. The geomembrane is to be free of pinholes, blisters, undispersed raw material, striations, roughness, or any sign of contamination by foreign matter (Section 07 Specification for High Density Polyethylene Geomembrane, Part 2, Clause 2.2.5). Quality control certificates for the manufactured geomembrane are to be submitted to the Engineer or CQA Consultant prior to delivery of the materials. Among these is a certification that the geomembrane supplied for the project complies with the specified requirements (Section 07 Specification for High Density Polyethylene Geomembrane, Part 1, Clause 1.6.1.1).

Section No.	Section Title/Requirements	Considerations included in the Design, Construction and Operational Phases of the Project That Would Address ASAE Standard EP340.2 Requirements
5.1.1	<p>Where membrane material is purchased under job specifications which detail the physical size of sheeting pieces, actual material dimensions shall not be smaller than specified. The measurements shall be made at ambient temperature in a relaxed state, or under light tension to remove wrinkles.</p> <p>Thickness tolerances shall be as outlined in the materials property tables of NSF Standard No. 54, Flexible Membrane Liners</p>	<p>The approved 1.5 mm HDPE geomembranes are manufactured by Solmax and are wider than the project specified width of 6.5 m (i.e., they are 6.66 m wide for both smooth and textured geomembranes).</p>
5.1.2	<p>Purchasing authorities vary in their requirements as to material sampling and certification. It is not the intention of these guidelines to restrict this authority. At the very minimum, the purchasing agency should insist on contractor or material supplier certification that the material supplied for the project meets or exceeds the physical and performance properties referenced in paragraph 5.2. Such certification shall include identification of material, quantity represented, and certified physical property test results covering all of the specification test requirements.</p>	<p>The contractor is to perform a minimum of one complete set of quality control tests on the geomembrane rolls as per the properties and testing frequencies outlined in Tables 1 and 2 of Section 07 Specification for High Density Polyethylene Geomembrane. Tolerances for geomembrane thickness in these tables are based on GRI GM13, which meet or exceed the requirements of NSF Standard No. 54.</p> <p>The contractor is to perform a minimum of one complete set of quality control tests on the geomembrane rolls as per the properties and testing frequencies outlined in Tables 1 and 2 of Section 07 Specification for High Density Polyethylene Geomembrane.</p> <p>The geomembrane material is required to meet the properties as outlined in the industry standard Specification (GRI GM13). The GRI GM13 properties meet or exceed the requirements of NSF Standard No. 54 (Section 07 Specification for High Density Polyethylene Geomembrane, Tables 1 and 2).</p>
5.1.3	<p>Unless otherwise specified the flexible membrane lining shall be packaged for shipment in rolls or accordion folded. The packages shall be suitably protected so that the material will not be damaged by commercial carrier shipment. The flexible membrane lining shall be properly protected, as specified by the manufacturer, against weather elements during transportation and storage.</p>	<p>The manufacturer quality control certificates required include (Section 07 Specification for High Density Polyethylene Geomembrane, Part 1.6.1):</p> <ol style="list-style-type: none"> Origin of resin, brand name, number, and production date. Certificates that all resin used in the manufacture of the geomembrane for this project complies with the requirements specified. Quality Control certificates issued by the resin supplier. Quality Control certificates and certification that the geomembrane supplied complies with the project requirements specified. Certification that the geomembrane and extrudate rod have the same properties.
5.1.4	<p>The details of roll or package marking shall be outlined in the job specifications. As a minimum, each roll or container of lining material shall be marked or identified with the name of the material, the quantity contained therein (area and thickness), the name of the supplier, and the contract or project identification number.</p>	<p>The HDPE Geomembrane must be protected from direct sunlight, excessive heat, mud, debris, dust, and deformation (Section 07 Specification for High Density Polyethylene Geomembrane, Part 3, Clause 3.1.10, IAGI Specification, Section 1.05).</p> <p>Extensively damaged rolls shall be rejected and replaced (Section 07 Specification for High Density Polyethylene Geomembrane 3.4.1).</p> <p>Each roll to be clearly marked on the roll with the following information (Section 07 Specification for High Density Polyethylene Geomembrane, Part 2.2.7):</p> <ol style="list-style-type: none"> Manufacturer Name. Product Type/ID Thickness. Resin Lot Number. Roll Number. Roll Dimensions. Roll Weight.
5.2	<p>Minimum physical requirements for some commercially available materials which may be used as flexible membrane linings are outlined in material property tables on the NSF Standard No. 54, Flexible Membrane Liners. The following membrane materials are included in the NSF publication:</p> <ul style="list-style-type: none"> Polyvinyl chloride (PVC) Oil resistant polyvinyl chloride (PVC-OR) Chlorinated polyethylene (CPE) Butyl rubber (IIR) Polychloroprene (CR) High density polyethylene (HDPE) Ethylene-propylene diene terpolymer (EPDM) Epichlorohydrin polymers (CO) Polyethylene ethylene propylene alloy (PE-EP-A) High density polyethylene elastomeric alloy (HDPE-A) Chlorosulfonated polyethylene (CSPE) Chlorosulfonated polyethylene low water absorption (CSPE-LW) Thermoplastic nitrile-PVC (TN-PVC) Thermoplastic EPDM (T-EPDM) Ethylene interpolymer alloy (EIA) Chlorinated polyethylene alloy (CPE-A) <p>Other materials may be used for a particular application and may be so specified. The physical requirements listed are intended to ensure good workmanship and quality, but are not necessarily adequate for design purposes depending on specific performance requirements. Minimum physical requirements for low density polyethylene can be found in ASTM Standard D3020. Specifications for Polyethylene and Ethylene Copolymer Plastic Sheeting for Pond, Canal, and Reservoir Lining. Some materials are unsupported while others are fabric reinforced. Materials differ significantly in their chemical resistance and should be carefully selected for compatibility with the liquid to be stored or conveyed.</p>	<p>The geomembrane used is HDPE Geomembrane. The geomembrane is required to meet the properties as outlined in the industry standard specification (i.e., GRI GM13). The GRI GM13 properties meet or exceed the requirements of NSF Standard No. 54 (Section 07 Specification for High Density Polyethylene Geomembrane, Tables 1 and 2, IAGI Specification, Section 2.02, Clause A).</p>

Section No.	Section Title/Requirements	Considerations Included in the Design, Construction and Operational Phases of the Project That Would Address ASAE Standard EP340.2 Requirements
6	<p>Operation and Maintenance</p> <p>The owner should be provided with guidelines for operation and maintenance of the liner system, which should include recommendations on subjects such as:</p> <ul style="list-style-type: none"> • Frequency of documentation of inspection • Testing and repair of liner • Monitoring of waste characteristics • Monitoring of observation wells • Animal and plant control • Erosion control • Security and safety • Unacceptable practices 	<p>The following guidelines for operation and maintenance of the liner systems are provided to the owner to address clause 6.1 of the ASAE Standard EP340.2.</p> <ul style="list-style-type: none"> • The owner will operate, inspect and maintain the liner system using the same practices as the existing lined cells that are currently operating at the Prairie Green Landfill • Inspections for exposed liner or leaks indicating potential liner damage should be included in the existing Prairie Green Landfill inspection program. • Defects will be properly repaired by a certified geosynthetic installer. • Damage due to erosion will be repaired by the Landfill personnel as per the existing maintenance program. • The facility is currently located within an operating landfill site that is fenced and secured. • If liner is found to be exposed, it should be promptly repaired to original conditions as shown on the Drawings. Any portion of the sand cushion layer that is exposed should be treated as a warning for immediate repair before the liner is exposed. • If depression or loss of material are noted in the pad by operations, these areas should be promptly repaired by placement of granular material as per Construction Drawings. • The monitoring of vegetation (e.g. woody plant growth) and grass cutting around the Search Facility shall continue as part of the existing maintenance program for Prairie Green Landfill. • The groundwater monitoring will continue as part of the existing monitoring program for the Prairie Green Landfill. <p>Also, refer to the Operation and Maintenance Manual submitted by Titan Environmental Containment.</p>

APPENDIX A

Operation and Maintenance Manual



OPERATION AND MAINTENANCE MANUAL

IMPORTANT NOTE

The Titan O&M Manual is intended as a guideline only for geomembrane installation. This manual does not supercede the project specific specification.

TABLE OF CONTENTS

1.0 INTRODUCTION

This manual addresses the maintenance necessary to ensure the long-term performance of the geomembrane.

2.0 PRECAUTIONS

- 2.1 Once installed, all precaution must be made to ensure that the liner integrity is not compromised by any rips or holes.
- 2.2 There should be no smoking while on the liner.
- 2.3 Sharp objects can cause punctures to the liner. Any/all sharp objects found near or against the liner shall be removed immediately to avoid any potential damage.

3.0 ROUTINE INSPECTION

- 3.1 Once every 3 months, a detailed walk around the liner should be preformed. The liner should be visually inspected for holes, blisters, protrusions, and any other damage that might have occurred from outside sources.
- 3.2 If any damage is found, the area should be marked and notified to Titan for repair.

4.0 REPAIR PROCEDURES

- 4.1 Any portion of the geomembrane showing a flaw shall be repaired. A **qualified technician is required** to complete any repairs. Several procedures exist for repairs depending on the severity of the damage:

Procedures available for repair:

- 4.1.1 **Patching:** Used to repair large holes, tears, and destructive sample locations. All patches shall extend at least six (6) inches (147mm) beyond the edges of the defect and all corners of patches shall be rounded. This method requires extrusion welding to weld the patching material to existing liner.
- 4.1.2 **Spot welding or seaming:** Used to repair small tears, pin holes or other minor localized flaws with extrusion welding.

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