Appendix C

2025 Supplemental Soil Gas Investigation

Technical Memorandum

To: Larry Hines, Pure Muskegon LLC (Pure Muskegon)
From: Diane Biehl, Barr Engineering Co. (Barr)
Subject: 2025 Supplemental Soil Gas Investigation Results
Date: June 27, 2025
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At the request of Pure Muskegon, LLC (Pure Muskegon) and in consultation with Parkland Properties of Michigan (Parkland), Muskegon County, and the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Barr Engineering Co. (Barr) completed a supplemental soil gas investigation at a property located at 2400 Lakeshore Drive in the City of Muskegon, Michigan (Property). This supplemental soil gas investigation work was approved for reimbursement under work plan #WP02 for funding by EGLE under the site-specific Remediation Grant as amended. The purpose of this technical memorandum is to summarize the results of the supplemental soil gas investigation.

In August of 2024, a Response Activity Plan (ResAP) was developed on behalf of Parkland and Pure Muskegon and issued to the Remediation and Redevelopment Division (RRD) of EGLE, to solicit EGLE approval of response activities to mitigate potential exposures associated with the volatilization to indoor air and inhalation (VI) exposure pathway and potential fire and explosivity hazards associated with the presence of methane in soil gas and groundwater on the Property. The ResAP described engineering and institutional controls proposed to address potential exposures to volatile organic compounds (VOCs), including methane, semi-volatile organic compounds (SVOCs), hydrogen sulfide, and ammonia, via the VI pathway, and potential fire and explosivity hazards associated with the presence of methane in soil gas and groundwater on the Property.

During review of the ResAP, it was determined that additional sampling of existing soil gas wells on the property for methane, differential pressure and other VOCs could be useful to further refining the conceptual site model (CSM) for the Property.

Work plan #WP02 was developed by Barr in response to that feedback and was implemented by Barr in March of 2025. Detailed results of the supplemental investigative activities are summarized in the sections below. The results are presented with consideration of a phased development approach proposed by Parkland during a call with EGLE on June 6, 2025. The phased development approach is summarized on Figure 1 and identifies the priority area for residential construction as Phase 1.

1 Soil-Gas Sampling and Analytical Results

Soil gas wells on the Property were constructed in clusters at 25 locations. Each well cluster location includes a two soil gas wells – one screened 2 feet below ground surface (bgs; shallow) and a second screened 5 feet bgs (deep). The shallow soil gas wells were installed by Barr in 2024, and the deep soil gas wells were installed by Environmental Resources Group, LLC (ERG) in 2023. Barr collected soil gas samples from 29 soil gas wells between March 26 and March 29, 2025. At the time of sampling, 21 of the

previously installed wells were unable to be sampled (16 wells were damaged or could not be located, and the screens of five wells were infiltrated by groundwater). Details regarding well sampling locations are detailed below:

- five clusters were not sampled (VP-8, -11, -16, -20, and -21)
- one of the two wells were sampled in 11 clusters (VP-2, -3, -4, -6, -7, -12, -15, -22, -23, -24, and -25)
- Both wells were sampled at nine clusters (VP-1, -5, -9, -10, -13, -14, -17, -18, and -19)
- 19 of the 25 shallow wells were sampled
- 10 of the 25 deep bgs wells were sampled

Figure 1 summarizes the locations of soil gas wells sampled during this investigation. Figure 1 also summarizes the location and conditions of soil gas wells that could not be sampled.

Soil gas samples were collected following EGLE recommended soil gas sample collection methods. Soil gas samples were field screened for methane, carbon dioxide and oxygen using a GEM™ 5000 landfill gas meter. Soil gas samples were also screened using a PID. Field measurements of differential pressure between the screened interval of the soil gas well and the atmosphere were taken from each accessible soil gas well using an Alnor® micromanometer[1]. Differential pressure measurements were screened against indoor risk values in ASTM E2993 – 16[2]. Barometric pressure and temperature were also recorded. Soil gas sampling logs are included in Appendix A.

All soil gas samples were analyzed for methane, oxygen, nitrogen, carbon dioxide, carbon monoxide, and VOCs. The soil gas samples were shipped to Air Technology Laboratories, Inc. in City of Industry, California for analysis. Laboratory analytical reports for soil gas samples are included in Appendix B.

Soil gas results were screened against Site Specific Volatilization to Indoor Air Criteria (SSVIAC) developed by EGLE[3]. Applicable SSVIAC are defined below:

- SSVIAC Table 1 (Nonresidential Part 201 SSVIAC adjusted for a 12-hour workday exposure)
  - Site-specific values applicable to a nonresidential structure that has areas > 50,000 square feet of continuously open space with no areas or portions with < 50,000 square of continuously open space that has a slab-on-grade foundation, the depth to groundwater submitted for this facility (i.e., 3.5 feet), and USDA soil type of sand.

- SSVIAC Table 2 (Nonresidential Part 201 SSVIAC adjusted for a 12-hour workday exposure)
  - Site-specific values applicable to a nonresidential structure that has areas < 50,000 square feet of continuously open space that has a slab-on-grade foundation, the depth to groundwater submitted for this facility (i.e., 3.5 feet), and USDA soil type of sand.

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1 In January 2025, Barr fitted exposed soil gas tubing from available soil gas wells with valves. Valves were left closed until the time of sampling in March 2025 to allow pressure in the soil gas wells to accumulate prior to the collection of field measurements. At each soil gas well, differential pressure field measurements were collected immediately upon opening the valve on the exposed soil gas tubing, and prior to the collection of other field measurements or analytical samples.

2 American Society of Testing and Materials International. E2993 – 16: Standard Guide for Evaluating Potential Hazard as a Result of Methane in the Vadose Zone. May 2016.

3 Site specific guidance provided by the EGLE RRD Grand Rapids District Office on December 9, 2024 via email. Tables 1 through 4 were used in this memorandum.

- SSVIAC Table 3 (Residential Part 201 SSVIAC)
    - Site-specific values applicable to a residential structure with less than six floors that has a slab-on-grade foundation, the depth to groundwater submitted for this facility (i.e., 3.5 feet), and USDA soil type of sand.

- SSVIAC Table 4 (Residential Part 201 SSVIAC)
    - Site-specific values applicable to a residential high rise with six floors or more that has a slab-on-grade foundation, the depth to groundwater submitted for this facility (i.e., 3.5 feet), and USDA soil type of sand.

Field and analytical soil gas sampling results are summarized in Table 1. Differential pressure results are summarized in Table 2. Discussion of the results is presented in the following sections.

1.1 Methane, Atmospheric Gases, and VOC Results in Soil Gas

Soil gas samples were analyzed for methane, oxygen, nitrogen, carbon dioxide, carbon monoxide and VOCs. Non-methane VOCs, including acetone, carbon disulfide, methyl ethyl ketone, and toluene, were detected in 22 of the 29 soil gas samples and methane was detected in 16 of the 29 soil gas samples collected as part of this scope of work. Non-methane VOCs were not detected in any sample at a concentration exceeding any of the SSVIAC.

Methane exceeded the SSVIAC in six samples: VP-5-24S, VP-5-23D, VP-6-24S, VP-9-24S, VP-9-23D, and VP-23-24S. In soil gas samples taken from soil gas wells that had detections of methane, oxygen concentrations were typically much lower than atmospheric conditions, ranging from non-detectable concentrations to 19%(v/v) and carbon dioxide concentrations were elevated - 2 to 32 %(v/v), suggesting an anoxic environment which is consistent with the presence/generation of methane. Figure 2 shows the soil gas methane sampling results from 2024 and 2025 with exceedances highlighted. Table 1 summarizes the analytical results from soil gas sampling in 2024 and 2025.

1.2 Field Sampling Results

Field-collected oxygen and carbon dioxide data generally agree with laboratory analytical data for soil gas samples. Field-collected methane data was inconsistent with laboratory analytical data suggesting methane values for soil gas samples were too close to the GEM™ 5000s detection limit to effectively distinguish samples from noise. Table 1 summarizes collected field data in 2024 and 2025.

Differential pressure was collected prior to sampling each soil gas well. The absolute values of all differential pressure values collected are significantly below the ASTM E2993-16[4] risk threshold value of 2 inches water column ("W.C.). The highest observed positive differential pressure was 0.04" W.C. from VP-19-23D (5 ft) before well purging was completed. The highest observed differential pressure absolute value was 0.87" W.C. from VP-13-23D (5 ft) before well purging was completed. Approximately 38% of the measured differential pressure values were negative prior to purging, which is suggestive of the potential for air to flow into the soil gas. Approximately 10% of the measured differential pressure values were positive, which is suggestive of the potential for soil gas to flow from the soil to the atmosphere, however, all differential pressures collected were substantially below the ASTM E2993-16 risk threshold

[4] American Society of Testing and Materials International. E2993 – 16: Standard Guide for Evaluating Potential Hazard as a Result of Methane in the Vadose Zone. May 2016.

value of 2 inches water. The remaining differential pressure values were measured as 0. Recorded barometric pressures at the time of sample collection were generally consistent throughout this sampling effort. Table 2 summarizes differential pressure and barometric pressure data.

2 Conclusions

Barr conducted the supplemental methane soil gas investigation at the Property to assess methane and VOC concentrations in the existing soil gas wells on the Property to further refine the Property CSM. The findings and conclusions from the above sections are summarized below.

- Non-methane VOC concentrations in soil gas from all locations sampled were below all SSVIAC for the Property.
- Methane concentrations in soil gas at 2 ft bgs were below all SSVIAC except for five locations:
  - VP-3-24S, VP-4-24S, VP-6-24S within the eastern side of the Phase 1 area
  - VP-9-24S within the northern portion of the Phase 1 area
  - VP-22-24S within the western portion of the Phase 2 area
- Methane concentrations in soil gas at 5 ft bgs were below all SSVIAC except for one location:
  - VP-9-23D within the northern portion of the Phase 1 area

  Of the nine locations where both of the nested wells were sampled, methane concentrations were generally similar at the 2 foot and 5 foot depth intervals.
- Of the 19 wells sampled in both 2024 and 2025, observed methane concentrations at VP-24S and VP-4S were greater in 2025. The variability observed in subsurface methane concentrations is expected and assessment of that variability was a primary goal of the additional sampling reported here. The observed variations do not change the conceptual site model for this area of the Property nor do they lead to additional requirements related to proposed redevelopment of the Property.
- The combined concentrations of methane and carbon dioxide in soil gas wells are less than 90% and therefore do not suggest the presence of "undiluted" biogas as defined in the ASTM 2993 - 16[5] risk assessment framework.
- All differential pressures collected were substantially below the ASTM E2993-16 risk threshold value of 2 inches water. Negative differential pressure values are attributed to changes in temperature through the investigation, and spring snow melt conditions at the time of sample collection.

Attachments:

Table 1 – Summary of Soil Gas Field and Analytical Data
Table 2 – Summary of Differential Pressure Results
Figure 1 – Soil Gas and Pilot Extraction Well Locations
Figure 2 – Soil Gas Methane Results
Appendix A – Sampling Logs
Appendix B – 2024 Analytical Report

[5] American Society of Testing and Materials International. E2993 – 16: Standard Guide for Evaluating Potential Hazard as a Result of Methane in the Vadose Zone. May 2016.

Tables

Table 2
Summary of Soil Gas Field and Analytical Data
2025 Supplemental Soil Gas Investigation - 2400 Lakeshore Drive, Muskegon, Michigan
Pure Muskegon, LLC

LEGEND

Site-Specific Vapor Intrusion Criteria (SSVIAC) shown were issued by EGLE for location ID #61000066 2400 Lakeshore Drive, Muskegon on 12/9/2024. Tables 1-4.

Footnotes

N Sample Type: Normal
> Greater than
ND Not detected
J+ The result is an estimated quantity and may be biased high.
U The analyte was analyzed for, but was not detected.

2024 ug/m3 methane values were calculated based on a molecular weight of 16.04 g/mol, 25°C, and 24.45 L/mol.

Location						VP-1-23D	VP-1-24S	VP-1-24S	VP-2-23D	VP-2-24S	VP-3-24S	VP-3-24S	VP-4-24S	VP-4-24S	VP-5-23D	VP-5-24S	VP-5-24S	VP-6-24S	VP-6-24S	VP-7-24S
Date						3/26/2025	2/08/2024	3/26/2025	3/28/2025	2/08/2024	2/08/2024	3/26/2025	2/08/2024	3/26/2025	3/26/2025	2/08/2024	3/26/2025	2/08/2024	3/26/2025	2/08/2024
Depth						5 ft	2 ft	2 ft	5 ft	2 ft	2 ft	2 ft	2 ft	2 ft	5 ft	2 ft	2 ft	2 ft	2 ft	2 ft
Sample Type						N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parameter	Units	Table 1 - Nonresidential 12-hour Soil Vapor	Table 2 - Nonresidential 12-hour Soil Vapor	Table 3 - Residential Soil Vapor	Table 4 - Residential Soil Vapor															
Last Updated		12/09/2024	12/09/2024	12/09/2024	12/09/2024															
Exceedance Key		**Bold**	Underline	Shade	Border															
General Parameters																				
Carbon dioxide (CO2)	% v/v					4.4	2.6	2.0	2.4	1.2	9.0	9.4	0.63	24	32	1.3	3.2	22	22	2.3
Carbon monoxide	% v/v					< 0.0027 U	< 0.0024 U	< 0.0024 U	< 0.0024 U	< 0.0027 U	< 0.0024 U	< 0.0022 U	< 0.0027 U	< 0.0024 U	< 0.0024 U	< 0.0024 U	< 0.0026 U	< 0.0025 U	< 0.0025 U	< 0.0025 U
Methane	% v/v					< 0.0027 U	< 0.0024 U	0.0063	0.014	0.011	12	13	1.1	64	54	1.1	0.021	25	20	< 0.0025 U
Nitrogen, gas (N2)	% v/v					83	85	81	86	81	77	76	81	12	13	78	77	52	57	78
Oxygen + Argon	% v/v					13	12	17	12	18	2.0	1.4	17	< 1.2 U	< 1.2 U	20	19	< 1.3 U	< 1.3 U	19
Carbon dioxide (CO2)	ug/m3					79000000	--	37000000	42000000	--	--	170000000	--	430000000	580000000	--	58000000	--	390000000	--
Carbon monoxide	ug/m3					< 31000 U	--	< 28000 U	< 28000 U	--	--	< 25000 U	--	< 28000 U	< 28000 U	--	< 30000 U	--	< 29000 U	--
Methane	ug/m3	**8400000 (GG)**	8400000 (GG)	8400000 (GG)	8400000 (GG)	< 18000 U	< 16000 U	41000	94000	72000	**79000000**	**88000000**	7200000	**420000000**	**350000000**	7200000	140000	**160000000**	**130000000**	< 16000 U
Nitrogen, gas (N2)	ug/m3					950000000	--	930000000	980000000	--	--	870000000	--	1400000000	1500000000	--	890000000	--	650000000	--
Oxygen + Argon	ug/m3					170000000	--	220000000	160000000	--	--	19000000	--	< 16000000 U	< 16000000 U	--	250000000	--	< 17000000 U	--
Field Measurements																				
Ambient temperature	deg F					34	--	32	47	40	40	39	46	39	40	53	40	--	40	53
Barometric pressure	in Hg					29.57	29.26	29.55	29.25	--	29.26	29.58	29.25	30.26	29.58	--	29.58	29.18	29.58	29.23
Carbon Dioxide (CO2), background	%					0	0.2	0	0	0.2	0.2	0	0.1	0	0	--	0	0.1	0	0.1
Carbon Dioxide (CO2), in hose	%					--	4.3	--	--	1.8	10.4	--	1.0	--	--	1.4	--	22.6	--	2.5
Carbon Dioxide (CO2), in hose	ppm					> 10000	--	> 10000	> 10000	--	--	> 10000	--	> 10000	> 10000	--	> 10000	--	> 10000	--
Differential pressure	in H2O					0.00	0.01	0.00	-0.66	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.00	0.00
Methane (CH4), background	%					0	0.1	0	0	0.1	0.1	0	0.1	0	0	0.1	0	0.1	0	0.1
Methane (CH4), in hose	%					0	0.1	3	0	0.1	12.8	1.4	1.3	65.5	3.7	0.9	1.0	25.3	2.4	0.1
Methane (CH4), in well	%					--	0.1	--	--	0.1	12.8	--	1.3	--	--	0.9	--	25.3	--	0.1
Oxygen (O2), background	%					20.9	20.5	20.9	20.9	20.6	21.0	20.9	21.1	20.9	20.9	21.2	20.9	21.2	20.9	20.9
Oxygen (O2), in hose	%					14.2	9.0	11.1	14.1	17.1	0.5	4.4	13.3	3.1	3.7	19.9	13.5	0.3	3.8	18.7
PID, background	ppm					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PID, in hose	ppm					0	0.1	0	0	0	0	0.6	0	0.8	1.3	0	0.1	0.4	0.8	0
Semivolatile Organic Compounds																				
Hydrogen sulfide	ppmv	NR	NR	NR	NR	--	< 0.48 U	--	--	< 0.53 U	< 0.48 U	--	< 0.53 U	--	--	< 0.48 U	--	< 0.51 U	--	< 0.49 U
Volatile Organic Compounds																				
1,1,1-Trichloroethane	ug/m3	230000 (EE)st	230000 (EE)st	170000 (EE)st	170000 (EE)st	< 15 U	--	< 13 U	< 13 U	--	--	< 12 U	--	< 13 U	< 13 U	--	< 14 U	--	< 14 U	--
1,1,2,2-Tetrachloroethane	ug/m3	69 ca	69 ca	15 ca	15 ca	< 19 U	--	< 17 U	< 17 U	--	--	< 15 U	--	< 17 U	< 17 U	--	< 18 U	--	< 17 U	--
1,1,2-Trichloroethane	ug/m3	20 nc	20 nc	7.0 nc	7.0 nc	< 15 U	--	< 13 U	< 13 U	--	--	< 12 U	--	< 13 U	< 13 U	--	< 14 U	--	< 14 U	--
1,1-Dichloroethane	ug/m3	2500 ca	2500 ca	530 ca	530 ca	< 11 U	--	< 9.7 U	< 9.7 U	--	--	< 8.9 U	--	< 9.7 U	< 9.7 U	--	< 10 U	--	< 10 U	--
1,1-Dichloroethylene	ug/m3	20000 nc	20000 nc	7000 nc	7000 nc	< 11 U	--	< 9.5 U	< 9.5 U	--	--	< 8.7 U	--	< 9.5 U	< 9.5 U	--	< 10 U	--	< 10 U	--
1,2,4-Trichlorobenzene	ug/m3	200 nc	200 nc	70 nc	70 nc	< 41 U	--	< 36 U	< 36 U	--	--	< 33 U	--	< 36 U	< 36 U	--	< 38 U	--	< 38 U	--
1,2,4-Trimethylbenzene	ug/m3	6100 (JT)nc	6100 (JT)nc	2100 (JT)nc	2100 (JT)nc	< 13 U	--	< 12 U	< 12 U	--	--	< 11 U	--	< 12 U	< 12 U	--	< 13 U	--	< 12 U	--
1,2-Dibromoethane (EDB)	ug/m3	6.6 ca	6.6 ca	1.4 ca	1.4 ca	< 21 U	--	< 18 U	< 18 U	--	--	< 17 U	--	< 18 U	< 18 U	--	< 20 U	--	< 19 U	--
1,2-Dichlorobenzene	ug/m3	31000 nc	31000 nc	10000 nc	10000 nc	< 16 U	--	< 14 U	< 14 U	--	--	< 13 U	--	< 14 U	< 14 U	--	< 16 U	--	< 15 U	--
1,2-Dichloroethane	ug/m3	150 ca	150 ca	33 ca	33 ca	< 11 U	--	< 9.7 U	< 9.7 U	--	--	< 8.9 U	--	< 9.7 U	< 9.7 U	--	< 10 U	--	< 10 U	--
1,2-Dichloroethylene, cis	ug/m3	820 nc	820 nc	280 nc	280 nc	< 11 U	--	< 9.5 U	< 9.5 U	--	--	< 8.7 U	--	< 9.5 U	< 9.5 U	--	< 10 U	--	< 10 U	--
1,2-Dichloroethylene, trans	ug/m3	8200 nc	8200 nc	2800 nc	2800 nc	< 11 U	--	< 9.5 U	< 9.5 U	--	--	< 8.7 U	--	< 9.5 U	< 9.5 U	--	< 10 U	--	< 10 U	--
1,2-Dichloropropane	ug/m3	410 nc	410 nc	140 nc	140 nc	< 13 U	--	< 11 U	< 11 U	--	--	< 10 U	--	< 11 U	< 11 U	--	< 12 U	--	< 12 U	--
1,2-Dichlorotetrafluoroethane (Freon 114)	ug/m3					< 19 U	--	< 17 U	< 17 U	--	--	< 15 U	--	< 17 U	< 17 U	--	< 18 U	--	< 18 U	--
1,3,5-Trimethylbenzene	ug/m3	6100 (JT)nc	6100 (JT)nc	2100 (JT)nc	2100 (JT)nc	< 13 U	--	< 12 U	< 12 U	--	--	< 11 U	--	< 12 U	< 12 U	--	< 13 U	--	< 12 U	--
1,3-Dichlorobenzene	ug/m3	310 nc	310 nc	100 nc	100 nc	< 16 U	--	< 14 U	< 14 U	--	--	< 13 U	--	< 14 U	< 14 U	--	< 16 U	--	< 15 U	--
1,3-Dichloropropene, cis	ug/m3					< 12 U	--	< 11 U	< 11 U	--	--	< 10.0 U	--	< 11 U	< 11 U	--	< 12 U	--	< 11 U	--
1,3-Dichloropropene, trans	ug/m3					< 25 U	--	< 22 U	< 22 U	--	--	< 20 U	--	< 22 U	< 22 U	--	< 24 U	--	< 23 U	--
1,4-Dichlorobenzene	ug/m3	1000 ca	1000 ca	220 ca	220 ca	< 16 U	--	< 14 U	< 14 U	--	--	< 13 U	--	< 14 U	< 14 U	--	< 16 U	--	< 15 U	--
2-Hexanone	ug/m3	3100 nc	3100 nc	1000 nc	1000 nc	< 11 U	--	< 9.9 U	< 9.9 U	--	--	< 9.0 U	--	< 9.9 U	< 9.9 U	--	< 11 U	--	< 10 U	--
4-Ethyltoluene	ug/m3					< 13 U	--	< 12 U	< 12 U	--	--	< 11 U	--	< 12 U	< 12 U	--	< 13 U	--	< 12 U	--
Acetone	ug/m3	1000000 (EE)st	1000000 (EE)st	1000000 (EE)st	1000000 (EE)st	< 32 U	--	< 29 U	59	--	--	< 26 U	--	100	30	--	36	--	44	--
Benzene	ug/m3	510 ca	510 ca	110 ca	110 ca	< 8.7 U	--	< 7.7 U	9.4	--	--	< 7.0 U	--	10	< 7.7 U	--	< 8.3 U	--	< 8.1 U	--
Benzyl chloride	ug/m3	80 ca	80 ca	17 ca	17 ca	< 14 U	--	< 12 U	< 12 U	--	--	< 11 U	--	< 12 U	< 12 U	--	< 13 U	--	< 13 U	--
Bromodichloromethane	ug/m3	200 nc	200 nc	48 ca	48 ca	< 18 U	--	< 16 U	< 16 U	--	--	< 15 U	--	< 16 U	< 16 U	--	< 17 U	--	< 17 U	--
Bromoform	ug/m3	3600 ca	3600 ca	770 ca	770 ca	< 28 U	--	< 25 U	< 25 U	--	--	< 23 U	--	< 25 U	< 25 U	--	< 27 U	--	< 26 U	--
Bromomethane	ug/m3	1000 nc	1000 nc	350 nc	350 nc	< 11 U	--	< 9.3 U	< 9.3 U	--	--	< 8.5 U	--	< 9.3 U	< 9.3 U	--	< 10 U	--	< 9.8 U	--
Carbon disulfide	ug/m3	72000 nc	72000 nc	24000 nc	24000 nc	< 8.5 U	--	< 7.5 U	13	--	--	44	--	84	82	--	17	--	22	--
Carbon tetrachloride	ug/m3	710 ca	710 ca	150 ca	150 ca	< 17 U	--	< 15 U	< 15 U	--	--	< 14 U	--	< 15 U	< 15 U	--	< 16 U	--	< 16 U	--
Chlorobenzene	ug/m3	5100 nc	5100 nc	1700 nc	1700 nc	< 13 U	--	< 11 U	< 11 U	--	--	< 10 U	--	< 11 U	< 11 U	--	< 12 U	--	< 12 U	--
Chlorodibromomethane	ug/m3	170 ca	170 ca	14 (MM)mut	14 (MM)mut	< 23 U	--	< 21 U	< 21 U	--	--	< 19 U	--	< 21 U	< 21 U	--	< 22 U	--	< 22 U	--
Chloroethane	ug/m3	410000 nc	410000 nc	140000 nc	140000 nc	< 36 U	--	< 32 U	< 32 U	--	--	< 29 U	--	< 32 U	< 32 U	--	< 34 U	--	< 33 U	--
Chloroform	ug/m3	170 ca	170 ca	37 ca	37 ca	< 13 U	--	< 12 U	< 12 U	--	--	< 11 U	--	< 12 U	< 12 U	--	< 13 U	--	< 12 U	--
Chloromethane	ug/m3	9200 nc	9200 nc	3100 nc	3100 nc	< 5.6 U	--	< 5.0 U	< 5.0 U	--	--	< 4.5 U	--	< 5.0 U	< 5.0 U	--	< 5.4 U	--	< 5.2 U	--
Dichlorodifluoromethane (Freon-12)	ug/m3	34000 nc	34000 nc	11000 nc	11000 nc	< 14 U	--	< 12 U	< 12 U	--	--	< 11 U	--	< 12 U	< 12 U	--	< 13 U	--	< 12 U	--
Ethyl benzene	ug/m3	1600 ca	1600 ca	340 ca	340 ca	< 12 U	--	< 10 U	< 10 U	--	--	< 9.5 U	--	< 10 U	< 10 U	--	< 11 U	--	< 11 U	--
Hexachlorobutadiene	ug/m3	180 ca	180 ca	39 ca	39 ca	< 29 U	--	< 26 U	< 26 U	--	--	< 23 U	--	< 26 U	< 26 U	--	< 28 U	--	< 27 U	--
Methyl ethyl ketone (2-butanone)	ug/m3	330000 (DD)dev	330000 (DD)dev	170000 (DD)dev	170000 (DD)dev	< 40 U	--	< 35 U	< 35 U	--	--	< 32 U	--	76	< 35 U	--	< 38 U	--	< 37 U	--
Methyl isobutyl ketone (MIBK)	ug/m3	27000 (EE)st	27000 (EE)st	27000 (EE)st	27000 (EE)st	< 11 U	--	< 9.9 U	< 9.9 U	--	--	< 9.0 U	--	< 9.9 U	< 9.9 U	--	< 11 U	--	< 10 U	--
Methyl tertiary butyl ether (MTBE)	ug/m3	15000 ca	15000 ca	3300 ca	3300 ca	< 9.9 U	--	< 8.7 U	< 8.7 U	--	--	< 7.9 U	--	< 8.7 U	< 8.7 U	--	< 9.3 U	--	< 9.1 U	--
Methylene chloride	ug/m3	61000 nc	61000 nc	21000 nc	21000 nc	< 9.5 U	--	< 8.4 U	< 8.4 U	--	--	< 7.6 U	--	< 8.4 U	< 8.4 U	--	< 9.0 U	--	< 8.8 U	--
Styrene	ug/m3	7000 ca	7000 ca	1500 ca	1500 ca	< 12 U	--	< 10 U	< 10 U	--	--	< 9.3 U	--	< 10 U	< 10 U	--	< 11 U	--	< 11 U	--
Tetrachloroethylene	ug/m3	2700 (EE)st	2700 (EE)st	1400 (EE)st	1400 (EE)st	< 19 U	--	< 16 U	< 16 U	--	--	< 15 U	--	< 16 U	< 16 U	--	< 18 U	--	< 17 U	--
Toluene	ug/m3	250000 (EE)st	250000 (EE)st	170000 nc	170000 nc	< 10 U	--	< 9.1 U	< 9.1 U	--	--	< 8.3 U	--	21	< 9.1 U	--	< 9.8 U	--	< 9.5 U	--
Trichloroethylene (TCE)	ug/m3	130 (DD)dev	130 (DD)dev	67 (DD)dev	67 (DD)dev	< 15 U	--	< 13 U	< 13 U	--	--	< 12 U	--	< 13 U	< 13 U	--	< 14 U	--	< 14 U	--
Trichlorofluoromethane (Freon-11)	ug/m3	45000 nc	45000 nc	15000 nc	15000 nc	< 15 U	--	< 14 U	< 14 U	--	--	< 12 U	--	< 14 U	< 14 U	--	< 15 U	--	< 14 U	--
Trichlorotrifluoroethane (Freon 113)	ug/m3	1900000 nc	1900000 nc	660000 nc	660000 nc	< 21 U	--	< 18 U	< 18 U	--	--	< 17 U	--	< 18 U	< 18 U	--	< 20 U	--	< 19 U	--
Vinyl acetate	ug/m3	20000 nc	20000 nc	7000 nc	7000 nc	< 9.6 U	--	< 8.5 U	< 8.5 U	--	--	< 7.7 U	--	< 8.5 U	< 8.5 U	--	< 9.1 U	--	< 8.9 U	--
Vinyl chloride	ug/m3	910 ca	910 ca	54 (MM)mut	54 (MM)mut	< 7.0 U	--	< 6.2 U	< 6.2 U	--	--	< 5.6 U	--	< 6.2 U	< 6.2 U	--	< 6.6 U	--	< 6.5 U	--
Xylene, m & p	ug/m3					< 24 U	--	< 21 U	< 21 U	--	--	< 19 U	--	< 21 U	< 21 U	--	< 23 U	--	< 22 U	--
Xylene, o	ug/m3					< 12 U	--	< 10 U	< 10 U	--	--	< 9.5 U	--	11	< 10 U	--	< 11 U	--	< 11 U	--
Xylene, total (Calculated)	ug/m3	22000 (J)nc	22000 (J)nc	7600 (J)nc	7600 (J)nc	ND	--	ND	ND	--	--	ND	--	11	ND	--	ND	--	ND	--

Table 2
Summary of Soil Gas Field and Analytical Data
2025 Supplemental Soil Gas Investigation - 2400 Lakeshore Drive, Muskegon, Michigan
Pure Muskegon, LLC

Parameter	Units	Table 1 - Nonresidential 12-hour Soil Vapor	Table 2 - Nonresidential 12-hour Soil Vapor	Table 3 - Residential Soil Vapor	Table 4 - Residential Soil Vapor	Location	VP-7-24S	VP-8-24S	VP-9-23D	VP-9-24S	VP-9-24S	VP-10-23D	VP-10-24S	VP-10-24S	VP-11-24S	VP-12-24S	VP-12-24S	VP-13-23D	VP-13-24S	VP-13-24S	VP-14-23D	VP-14-24S	VP-14-24S	VP-15-24S	VP-15-24S	VP-16-24S
						Date	3/26/2025	2/08/2024	3/27/2025	2/09/2024	3/27/2025	3/27/2025	2/09/2024	3/27/2025	2/09/2024	2/09/2024	3/28/2025	3/27/2025	2/09/2024	3/27/2025	3/27/2025	2/09/2024	3/29/2025	2/13/2024	3/29/2025	2/09/2024
						Depth	2 ft	2 ft	5 ft	2 ft	2 ft	5 ft	2 ft	2 ft	2 ft	2 ft	2 ft	5 ft	2 ft	2 ft	5 ft	2 ft	2 ft	2 ft	2 ft	2 ft
						Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Last Updated		12/09/2024	12/09/2024	12/09/2024	12/09/2024																					
Exceedance Key		**Bold**	Underline	Shade	Border																					
General Parameters																										
Carbon dioxide (CO2)	% v/v						2.3	1.4	9.5	9.2	11	1.5	6.9	7.3	0.32	3.0	5.5	0.19	0.094	0.099	0.65	0.41	0.60	< 0.024 U	< 0.026 U	< 0.025 U
Carbon monoxide	% v/v						< 0.0024 U	< 0.0025 U	< 0.0024 U	< 0.0027 U	< 0.0023 U	< 0.0024 U	< 0.0027 U	< 0.0024 U	< 0.0026 U	< 0.0025 U	< 0.0025 U	< 0.0024 U	< 0.0025 U	< 0.0027 U	< 0.0024 U	< 0.0028 U	< 0.0024 U	< 0.0024 U	< 0.0026 U	< 0.0025 U
Methane	% v/v						0.014	0.0060	1.9	1.1	3.5	< 0.0024 U	< 0.0027 U	0.0056	< 0.0026 U	< 0.0025 U	< 0.0025 U	< 0.0024 U	0.0059	< 0.0027 U	< 0.0024 U	< 0.0028 U	< 0.0024 U	0.037	0.0047	< 0.0025 U
Nitrogen, gas (N2)	% v/v						79	79	86	88	84	78	83	83	79	80	80	79	79	79	79	79	79	79	79	79
Oxygen + Argon	% v/v						19	20	2.9	1.6	1.5	20	9.5	9.7	21	17	14	21	21	21	20	21	21	21	21	21
Carbon dioxide (CO2)	ug/m3						42000000	--	170000000	--	190000000	27000000	--	130000000	--	--	99000000	3500000	--	1800000	12000000	--	11000000	--	< 470000 U	--
Carbon monoxide	ug/m3						< 28000 U	--	< 28000 U	--	< 26000 U	< 28000 U	--	< 28000 U	--	--	< 29000 U	< 28000 U	--	< 31000 U	< 28000 U	--	< 28000 U	--	< 30000 U	--
Methane	ug/m3	**8400000 (GG)**	8400000 (GG)	8400000 (GG)	8400000 (GG)		95000	39000	**12000000**	7200000	**23000000**	< 16000 U	< 18000 U	37000	< 17000 U	< 16000 U	< 17000 U	< 16000 U	39000	< 18000 U	< 16000 U	< 18000 U	< 16000 U	240000	31000	< 16000 U
Nitrogen, gas (N2)	ug/m3						900000000	--	980000000	--	970000000	900000000	--	950000000	--	--	920000000	900000000	--	900000000	900000000	--	900000000	--	910000000	--
Oxygen + Argon	ug/m3						250000000	--	38000000	--	19000000	260000000	--	130000000	--	--	180000000	280000000	--	280000000	270000000	--	270000000	--	270000000	--
Field Measurements																										
Ambient temperature	deg F						40	56	43	43	43	44	43	43	46	46	49	46	46	45	48	46	49	34	52	48
Barometric pressure	in Hg						29.58	29.18	29.52	29.12	29.48	29.52	29.15	29.52	29.15	29.14	29.26	29.52	29.16	29.52	29.49	29.14	29.19	29.35	29.19	29.13
Carbon Dioxide (CO2), background	%						0	--	0	0.1	0	6.0	0.1	0	0.1	0.1	0	0	0.1	0	0	0.1	0	0.1	0	0.1
Carbon Dioxide (CO2), in hose	%						--	1.7	--	9.5	--	--	7.5	--	0.4	3.1	--	--	0.2	--	--	0.5	--	0.2	--	0.1
Carbon Dioxide (CO2), in hose	ppm						> 10000	--	> 10000	--	> 10000	> 10000	--	> 10000	--	--	> 10000	1880	--	680	9520	--	9100	--	0	--
Differential pressure	in H2O						0.00	0.29	0.00	0.00	-0.22	0.00	0.00	0.00	0.00	-0.01	0.00	-0.87	0.00	0.00	-0.26	0.00	0.00	0.01	0.00	0.00
Methane (CH4), background	%						0	0.1	0	0.1	0	0	0.1	0	0.1	0.1	1.0	0	0.1	0	0	0.1	0	0.1	0	0.1
Methane (CH4), in hose	%						1.0	0.1	3.0	1.3	2.0	0	0.1	2.0	0.1	0.1	3.0	0	0.1	0	0	0.1	0	0.5	0	0.2
Methane (CH4), in well	%						--	0.1	--	1.3	--	--	0.1	--	0.1	0.1	--	--	0.1	--	--	0.1	--	0.1	--	0.2
Oxygen (O2), background	%						20.5	--	20.9	20.8	20.9	20.9	20.8	20.9	21.6	21.5	20.9	20.9	20.8	20.9	20.9	21.1	20.9	20.5	20.9	21.3
Oxygen (O2), in hose	%						18.0	19.4	3.8	0.7	4.9	17.8	9.4	6.3	21.5	16.8	14.2	20.2	21.1	20.9	20.9	21.5	20.4	17.6	20.1	20.9
PID, background	ppm						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PID, in hose	ppm						0	0	0	0	1.1	0	0.2	1.0	0	0	0	0	0	0	0	0	0	0	0	0.1
Semivolatile Organic Compounds																										
Hydrogen sulfide	ppmv	NR	NR	NR	NR		--	< 0.49 U	--	< 0.53 U	--	--	< 0.53 U	--	< 0.52 U	< 0.49 U	--	--	< 0.51 U	--	--	< 0.56 U	--	< 0.48 U	--	< 0.51 U
Volatile Organic Compounds																										
1,1,1-Trichloroethane	ug/m3	230000 (EE)st	230000 (EE)st	170000 (EE)st	170000 (EE)st		< 13 J	--	< 13 U	--	< 13 U	< 13 U	--	< 13 U	--	--	< 14 U	< 13 U	--	< 15 U	< 13 U	--	< 13 U	--	< 14 U	--
1,1,2,2-Tetrachloroethane	ug/m3	69 ca	69 ca	15 ca	15 ca		< 17 J	--	< 17 U	--	< 16 U	< 17 U	--	< 17 U	--	--	< 17 U	< 17 U	--	< 19 U	< 17 U	--	< 17 U	--	< 18 U	--
1,1,2-Trichloroethane	ug/m3	20 nc	20 nc	7.0 nc	7.0 nc		< 13 J	--	< 13 U	--	< 13 U	< 13 U	--	< 13 U	--	--	< 14 U	< 13 U	--	< 15 U	< 13 U	--	< 13 U	--	< 14 U	--
1,1-Dichloroethane	ug/m3	2500 ca	2500 ca	530 ca	530 ca		< 9.7 U	--	< 9.7 U	--	< 9.3 U	< 9.7 U	--	< 9.7 U	--	--	< 10 U	< 9.7 U	--	< 11 U	< 9.7 U	--	< 9.7 U	--	< 10 U	--
1,1-Dichloroethylene	ug/m3	20000 nc	20000 nc	7000 nc	7000 nc		< 9.5 U	--	< 9.5 U	--	< 9.1 U	< 9.5 U	--	< 9.5 U	--	--	< 10 U	< 9.5 U	--	< 11 U	< 9.5 U	--	< 9.5 U	--	< 10 U	--
1,2,4-Trichlorobenzene	ug/m3	200 nc	200 nc	70 nc	70 nc		< 36 J	--	< 36 U	--	< 34 U	< 36 U	--	< 36 U	--	--	< 38 U	< 36 U	--	< 41 U	< 36 U	--	< 36 U	--	< 38 U	--
1,2,4-Trimethylbenzene	ug/m3	6100 (JT)nc	6100 (JT)nc	2100 (JT)nc	2100 (JT)nc		< 12 J	--	< 12 U	--	< 11 U	< 12 U	--	< 12 U	--	--	< 12 U	< 12 U	--	< 13 U	< 12 U	--	< 12 U	--	< 13 U	--
1,2-Dibromoethane (EDB)	ug/m3	6.6 ca	6.6 ca	1.4 ca	1.4 ca		< 18 J	--	< 18 U	--	< 18 U	< 18 U	--	< 18 U	--	--	< 19 U	< 18 U	--	< 21 U	< 18 U	--	< 18 U	--	< 20 U	--
1,2-Dichlorobenzene	ug/m3	31000 nc	31000 nc	10000 nc	10000 nc		< 14 J	--	< 14 U	--	< 14 U	< 14 U	--	< 14 U	--	--	< 15 U	< 14 U	--	< 16 U	< 14 U	--	< 14 U	--	< 16 U	--
1,2-Dichloroethane	ug/m3	150 ca	150 ca	33 ca	33 ca		< 9.7 U	--	< 9.7 U	--	< 9.3 U	< 9.7 U	--	< 9.7 U	--	--	< 10 U	< 9.7 U	--	< 11 U	< 9.7 U	--	< 9.7 U	--	< 10 U	--
1,2-Dichloroethylene, cis	ug/m3	820 nc	820 nc	280 nc	280 nc		< 9.5 U	--	< 9.5 U	--	< 9.1 U	< 9.5 U	--	< 9.5 U	--	--	< 10 U	< 9.5 U	--	< 11 U	< 9.5 U	--	< 9.5 U	--	< 10 U	--
1,2-Dichloroethylene, trans	ug/m3	8200 nc	8200 nc	2800 nc	2800 nc		< 9.5 U	--	< 9.5 U	--	< 9.1 U	< 9.5 U	--	< 9.5 U	--	--	< 10 U	< 9.5 U	--	< 11 U	< 9.5 U	--	< 9.5 U	--	< 10 U	--
1,2-Dichloropropane	ug/m3	410 nc	410 nc	140 nc	140 nc		< 11 J	--	< 11 U	--	< 11 U	17	--	< 11 U	--	--	< 12 U	< 11 U	--	< 13 U	< 11 U	--	< 11 U	--	< 12 U	--
1,2-Dichlorotetrafluoroethane (Freon 114)	ug/m3						< 17 J	--	< 17 U	--	< 16 U	< 17 U	--	< 17 U	--	--	< 18 U	< 17 U	--	< 19 U	< 17 U	--	< 17 U	--	< 18 U	--
1,3,5-Trimethylbenzene	ug/m3	6100 (JT)nc	6100 (JT)nc	2100 (JT)nc	2100 (JT)nc		< 12 J	--	< 12 U	--	< 11 U	< 12 U	--	< 12 U	--	--	< 12 U	< 12 U	--	< 13 U	< 12 U	--	< 12 U	--	< 13 U	--
1,3-Dichlorobenzene	ug/m3	310 nc	310 nc	100 nc	100 nc		< 14 J	--	< 14 U	--	< 14 U	< 14 U	--	< 14 U	--	--	< 15 U	< 14 U	--	< 16 U	< 14 U	--	< 14 U	--	< 16 U	--
1,3-Dichloropropene, cis	ug/m3						< 11 J	--	< 11 U	--	< 10 U	< 11 U	--	< 11 U	--	--	< 11 U	< 11 U	--	< 12 U	< 11 U	--	< 11 U	--	< 12 U	--
1,3-Dichloropropene, trans	ug/m3						< 22 J	--	< 22 U	--	< 21 U	< 22 U	--	< 22 U	--	--	< 23 U	< 22 U	--	< 25 U	< 22 U	--	< 22 U	--	< 24 U	--
1,4-Dichlorobenzene	ug/m3	1000 ca	1000 ca	220 ca	220 ca		< 14 J	--	< 14 U	--	< 14 U	< 14 U	--	< 14 U	--	--	< 15 U	< 14 U	--	< 16 U	< 14 U	--	< 14 U	--	< 16 U	--
2-Hexanone	ug/m3	3100 nc	3100 nc	1000 nc	1000 nc		< 9.9 U	--	< 9.9 U	--	< 9.4 U	< 9.9 U	--	< 9.9 U	--	--	< 10 U	< 9.9 U	--	< 11 U	< 9.9 U	--	< 9.9 U	--	< 11 U	--
4-Ethyltoluene	ug/m3						< 12 J	--	< 12 U	--	< 11 U	< 12 U	--	< 12 U	--	--	< 12 U	< 12 U	--	< 13 U	< 12 U	--	< 12 U	--	< 13 U	--
Acetone	ug/m3	1000000 (EE)st	1000000 (EE)st	1000000 (EE)st	1000000 (EE)st		31	--	35	--	40	120	--	< 29 U	--	--	49	63	--	49	53	--	< 29 U	--	56	--
Benzene	ug/m3	510 ca	510 ca	110 ca	110 ca		< 7.7 U	--	< 7.7 U	--	< 7.3 U	< 7.7 U	--	< 7.7 U	--	--	< 8.1 U	< 7.7 U	--	< 8.7 U	< 7.7 U	--	< 7.7 U	--	< 8.3 U	--
Benzyl chloride	ug/m3	80 ca	80 ca	17 ca	17 ca		< 12 J	--	< 12 U	--	< 12 U	< 12 U	--	< 12 U	--	--	< 13 U	< 12 U	--	< 14 U	< 12 U	--	< 12 U	--	< 13 U	--
Bromodichloromethane	ug/m3	200 nc	200 nc	48 ca	48 ca		< 16 J	--	< 16 U	--	< 15 U	< 16 U	--	< 16 U	--	--	< 17 U	< 16 U	--	< 18 U	< 16 U	--	< 16 U	--	< 17 U	--
Bromoform	ug/m3	3600 ca	3600 ca	770 ca	770 ca		< 25 J	--	< 25 U	--	< 24 U	< 25 U	--	< 25 U	--	--	< 26 U	< 25 U	--	< 28 U	< 25 U	--	< 25 U	--	< 27 U	--
Bromomethane	ug/m3	1000 nc	1000 nc	350 nc	350 nc		< 9.3 U	--	< 9.3 U	--	< 8.9 U	< 9.3 U	--	< 9.3 U	--	--	< 9.8 U	< 9.3 U	--	< 11 U	< 9.3 U	--	< 9.3 U	--	< 10 U	--
Carbon disulfide	ug/m3	72000 nc	72000 nc	24000 nc	24000 nc		8.6	--	42	--	38	25	--	28	--	--	120	84	--	< 8.5 U	72	--	90	--	42	--
Carbon tetrachloride	ug/m3	710 ca	710 ca	150 ca	150 ca		< 15 J	--	< 15 U	--	< 14 U	< 15 U	--	< 15 U	--	--	< 16 U	< 15 U	--	< 17 U	< 15 U	--	< 15 U	--	< 16 U	--
Chlorobenzene	ug/m3	5100 nc	5100 nc	1700 nc	1700 nc		< 11 J	--	< 11 U	--	< 11 U	< 11 U	--	< 11 U	--	--	< 12 U	< 11 U	--	< 13 U	< 11 U	--	< 11 U	--	< 12 U	--
Chlorodibromomethane	ug/m3	170 ca	170 ca	14 (MM)mut	14 (MM)mut		< 21 J	--	< 21 U	--	< 20 U	< 21 U	--	< 21 U	--	--	< 22 U	< 21 U	--	< 23 U	< 21 U	--	< 21 U	--	< 22 U	--
Chloroethane	ug/m3	410000 nc	410000 nc	140000 nc	140000 nc		< 32 J	--	< 32 U	--	< 30 U	< 32 U	--	< 32 U	--	--	< 33 U	< 32 U	--	< 36 U	< 32 U	--	< 32 U	--	< 34 U	--
Chloroform	ug/m3	170 ca	170 ca	37 ca	37 ca		< 12 J	--	< 12 U	--	< 11 U	< 12 U	--	< 12 U	--	--	< 12 U	< 12 U	--	< 13 U	< 12 U	--	< 12 U	--	< 13 U	--
Chloromethane	ug/m3	9200 nc	9200 nc	3100 nc	3100 nc		< 5.0 U	--	< 5.0 U	--	< 4.7 U	< 5.0 U	--	< 5.0 U	--	--	< 5.2 U	< 5.0 U	--	< 5.6 U	< 5.0 U	--	< 5.0 U	--	< 5.4 U	--
Dichlorodifluoromethane (Freon-12)	ug/m3	34000 nc	34000 nc	11000 nc	11000 nc		< 12 J	--	< 12 U	--	< 11 U	< 12 U	--	< 12 U	--	--	< 12 U	< 12 U	--	< 14 U	< 12 U	--	< 12 U	--	< 13 U	--
Ethyl benzene	ug/m3	1600 ca	1600 ca	340 ca	340 ca		< 10 J	--	< 10 U	--	< 10.0 U	< 10 U	--	< 10 U	--	--	< 11 U	< 10 U	--	< 12 U	< 10 U	--	< 10 U	--	< 11 U	--
Hexachlorobutadiene	ug/m3	180 ca	180 ca	39 ca	39 ca		< 26 J	--	< 26 U	--	< 24 U	< 26 U	--	< 26 U	--	--	< 27 U	< 26 U	--	< 29 U	< 26 U	--	< 26 U	--	< 28 U	--
Methyl ethyl ketone (2-butanone)	ug/m3	330000 (DD)dev	330000 (DD)dev	170000 (DD)dev	170000 (DD)dev		< 35 J	--	< 35 U	--	< 34 U	180	--	< 35 U	--	--	< 37 U	< 35 U	--	< 40 U	< 35 U	--	< 35 U	--	< 38 U	--
Methyl isobutyl ketone (MIBK)	ug/m3	27000 (EE)st	27000 (EE)st	27000 (EE)st	27000 (EE)st		< 9.9 U	--	< 9.9 U	--	< 9.4 U	< 9.9 U	--	< 9.9 U	--	--	< 10 U	< 9.9 U	--	< 11 U	< 9.9 U	--	< 9.9 U	--	< 11 U	--
Methyl tertiary butyl ether (MTBE)	ug/m3	15000 ca	15000 ca	3300 ca	3300 ca		< 8.7 U	--	< 8.7 U	--	< 8.3 U	< 8.7 U	--	< 8.7 U	--	--	< 9.1 U	< 8.7 U	--	< 9.8 U	< 8.7 U	--	< 8.7 U	--	< 9.3 U	--
Methylene chloride	ug/m3	61000 nc	61000 nc	21000 nc	21000 nc		< 8.4 U	--	< 8.4 U	--	< 8.0 U	< 8.4 U	--	< 8.4 U	--	--	< 8.8 U	< 8.4 U	--	< 9.5 U	< 8.4 U	--	< 8.4 U	--	< 9.0 U	--
Styrene	ug/m3	7000 ca	7000 ca	1500 ca	1500 ca		< 10 J	--	< 10 U	--	< 9.8 U	29	--	< 10 U	--	--	< 11 U	< 10 U	--	< 12 U	< 10 U	--	< 10 U	--	< 11 U	--
Tetrachloroethylene	ug/m3	2700 (EE)st	2700 (EE)st	1400 (EE)st	1400 (EE)st		< 16 J	--	< 16 U	--	< 16 U	< 16 U	--	< 16 U	--	--	< 17 U	< 16 U	--	< 19 U	< 16 U	--	< 16 U	--	< 18 U	--
Toluene	ug/m3	250000 (EE)st	250000 (EE)st	170000 nc	170000 nc		< 9.1 U	--	13	--	< 8.6 U	100	--	< 9.1 U	--	--	< 9.5 U	< 9.1 U	--	< 10 U	11	--	< 9.1 U	--	< 9.8 U	--
Trichloroethylene (TCE)	ug/m3	130 (DD)dev	130 (DD)dev	67 (DD)dev	67 (DD)dev		< 13 J	--	< 13 U	--	< 12 U	< 13 U	--	< 13 U	--	--	< 14 U	< 13 U	--	< 15 U	< 13 U	--	< 13 U	--	< 14 U	--
Trichlorofluoromethane (Freon-11)	ug/m3	45000 nc	45000 nc	15000 nc	15000 nc		< 14 J	--	< 14 U	--	< 13 U	< 14 U	--	< 14 U	--	--	< 14 U	< 14 U	--	< 15 U	< 14 U	--	< 14 U	--	< 15 U	--
Trichlorotrifluoroethane (Freon 113)	ug/m3	1900000 nc	1900000 nc	660000 nc	660000 nc		< 18 J	--	< 18 U	--	< 18 U	< 18 U	--	< 18 U	--	--	< 19 U	< 18 U	--	< 21 U	< 18 U	--	< 18 U	--	< 20 U	--
Vinyl acetate	ug/m3	20000 nc	20000 nc	7000 nc	7000 nc		< 8.5 U	--	< 8.5 U	--	< 8.1 U	< 8.5 U	--	< 8.5 U	--	--	< 8.9 U	< 8.5 U	--	< 9.6 U	< 8.5 U	--	< 8.5 U	--	< 9.1 U	--
Vinyl chloride	ug/m3	910 ca	910 ca	54 (MM)mut	54 (MM)mut		< 6.2 U	--	< 6.2 U	--	< 5.9 U	< 6.2 U	--	< 6.2 U	--	--	< 6.5 U	< 6.2 U	--	< 7.0 U	< 6.2 U	--	< 6.2 U	--	< 6.6 U	--
Xylene, m & p	ug/m3						< 21 J	--	< 21 U	--	< 20 U	< 21 U	--	< 21 U	--	--	< 22 U	< 21 U	--	< 24 U	< 21 U	--	< 21 U	--	< 23 U	--
Xylene, o	ug/m3						< 10 J	--	< 10 U	--	< 10.0 U	11	--	< 10 U	--	--	< 11 U	< 10 U	--	< 12 U	< 10 U	--	< 10 U	--	< 11 U	--
Xylene, total (Calculated)	ug/m3	22000 (J)nc	22000 (J)nc	7600 (J)nc	7600 (J)nc		ND	--	ND	--	ND	11	--	ND	--	--	ND	ND	--	ND	ND	--	ND	--	ND	--

Table 2
Summary of Soil Gas Field and Analytical Data
2025 Supplemental Soil Gas Investigation - 2400 Lakeshore Drive, Muskegon, Michigan
Pure Muskegon, LLC

Parameter	Units	Table 1 - Nonresidential 12-hour Soil Vapor	Table 2 - Nonresidential 12-hour Soil Vapor	Table 3 - Residential Soil Vapor	Table 4 - Residential Soil Vapor	Location	VP-17-23D	VP-17-24S	VP-17-24S	VP-18-23D	VP-18-24S	VP-18-24S	VP-19-23D	VP-19-24S	VP-19-24S	VP-20-24S	VP-21-24S	VP-22-24S	VP-22-24S	VP-23-24S	VP-23-24S	VP-24-24S	VP-24-24S	VP-25-24	VP-25-24S
						Date	3/28/2025	2/09/2024	3/28/2025	3/28/2025	2/12/2024	3/28/2025	3/28/2025	2/12/2024	3/28/2025	2/12/2024	2/12/2024	2/12/2024	3/28/2025	2/12/2024	3/29/2025	2/12/2024	3/29/2025	2/12/2024	3/29/2025
						Depth	5 ft	2 ft	2 ft	5 ft	2 ft	2 ft	5 ft	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft
						Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Last Updated		12/09/2024	12/09/2024	12/09/2024	12/09/2024																				
Exceedance Key		**Bold**	Underline	Shade	Border																				
General Parameters																									
Carbon dioxide (CO2)	% v/v						4.6	4.4	7.5	8.2	0.60	0.64	1.3	0.083	0.88	< 0.024 U	0.43	2.9	14	2.0	1.3	1.3	0.91	0.40	0.37
Carbon monoxide	% v/v						< 0.0024 U	< 0.0027 U	< 0.0024 U	< 0.0026 U	< 0.0024 U	< 0.0024 U	< 0.0024 U	< 0.0024 U	< 0.0025 U	< 0.0024 U	< 0.0024 U	< 0.0024 U	< 0.0026 U	< 0.0025 U	< 0.0025 U	< 0.0024 U	< 0.0024 U	< 0.0025 U	< 0.0024 U
Methane	% v/v						< 0.0024 U	< 0.0027 U	0.24	1.1	0.0045	< 0.0024 U	< 0.0024 U	< 0.0024 U	0.0037	< 0.0024 U	< 0.0024 U	< 0.0024 U	10	< 0.0025 U	< 0.0025 U	< 0.0024 U	< 0.0024 U	0.0028	< 0.0024 U
Nitrogen, gas (N2)	% v/v						88	84	91	90	79	80	94	81	81	80	88	83	74	78	79	78	79	79	79
Oxygen + Argon	% v/v						7.7	12	1.6	1.5	20	19	4.2	19	18	20	12	14	1.5	20	20	20	20	21	21
Carbon dioxide (CO2)	ug/m3						83000000	--	130000000	150000000	--	12000000	24000000	--	16000000	--	--	--	240000000	--	23000000	--	16000000	--	6600000
Carbon monoxide	ug/m3						< 28000 U	--	< 28000 U	< 30000 U	--	< 28000 U	< 28000 U	--	< 29000 U	--	--	--	< 30000 U	--	< 28000 U	--	< 28000 U	--	< 28000 U
Methane	ug/m3	**8400000 (GG)**	8400000 (GG)	8400000 (GG)	8400000 (GG)		< 16000 U	< 18000 U	1600000	7500000	30000	< 16000 U	< 16000 U	< 16000 U	24000	< 16000 U	< 16000 U	< 16000 U	**67000000**	< 16000 U	< 16000 U	< 16000 U	< 16000 U	18000	< 16000 U
Nitrogen, gas (N2)	ug/m3						1000000000	--	1000000000	1000000000	--	910000000	1100000000	--	930000000	--	--	--	850000000	--	900000000	--	900000000	--	900000000
Oxygen + Argon	ug/m3						100000000	--	21000000	20000000	--	250000000	55000000	--	230000000	--	--	--	20000000	--	260000000	--	270000000	--	270000000
Field Measurements																									
Ambient temperature	deg F						49	47	48	50	31	50	55	--	56	32	34	34	57	36	47	36	47	35	47
Barometric pressure	in Hg						29.26	29.13	29.28	29.17	29.30	29.17	29.17	--	29.16	29.26	29.26	29.26	29.13	29.26	29.18	29.26	29.19	29.26	29.19
Carbon Dioxide (CO2), background	%						0	0.1	0	0	0.1	0	0	0.1	0	0.1	0.1	0.1	0	0.1	0	0.1	0	0.1	0
Carbon Dioxide (CO2), in hose	%						--	4.7	--	--	0.9	--	--	0.3	--	0.2	0.6	3.3	--	2.0	--	1.5	--	0.6	--
Carbon Dioxide (CO2), in hose	ppm						> 10000	--	> 10000	> 10000	--	8000	> 10000	--	> 10000	--	--	--	> 10000	--	> 10000	--	> 10000	--	4860
Differential pressure	in H2O						-0.19	0.01	0.00	-0.10	0.00	-0.50	0.00	0.00	-0.18	0.00	-0.02	0.00	-0.05	0.00	0.00	0.00	-0.25	0.00	-0.24
Methane (CH4), background	%						0	0.1	0	0	0.1	0	0	0.1	0	0.1	0.1	0.1	0	0.1	0	0.1	0	0.1	0
Methane (CH4), in hose	%						5	0.1	2.0	0	0.1	0	0	0.1	0	0.1	0.1	0.1	10.5	0.1	0	0.1	0	0.1	0
Methane (CH4), in well	%						--	0.1	--	--	0.1	--	--	0.1	--	0.1	0.1	0.1	--	0.1	--	0.1	--	0.1	--
Oxygen (O2), background	%						20.9	21.0	20.9	20.9	19.6	20.9	20.9	19.8	20.9	21.1	21.2	21.1	20.9	21.4	20.9	21.5	20.9	20.8	20.9
Oxygen (O2), in hose	%						2.7	11.4	8.0	4.3	18.6	18.2	6.1	16.1	19.3	20.1	10.6	14.3	4.1	19.9	20.4	20.5	20.9	20.5	20.9
PID, background	ppm						0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
PID, in hose	ppm						0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Semivolatile Organic Compounds																									
Hydrogen sulfide	ppmv	NR	NR	NR	NR		--	< 0.53 U	--	--	< 0.48 U	--	--	< 0.48 U	--	< 0.48 U	< 0.48 U	< 0.48 U	--	< 0.51 U	--	< 0.48 U	--	< 0.51 U	--
Volatile Organic Compounds																									
1,1,1-Trichloroethane	ug/m3	230000 (EE)st	230000 (EE)st	170000 (EE)st	170000 (EE)st		< 13 U	--	< 13 U	< 14 U	--	< 13 U	< 13 U	--	< 14 U	--	--	--	< 14 U	--	< 13 U	--	< 13 U	--	< 13 U
1,1,2,2-Tetrachloroethane	ug/m3	69 ca	69 ca	15 ca	15 ca		< 17 U	--	< 17 U	< 18 U	--	< 17 U	< 17 U	--	< 17 U	--	--	--	< 18 U	--	< 17 U	--	< 17 U	--	< 17 U
1,1,2-Trichloroethane	ug/m3	20 nc	20 nc	7.0 nc	7.0 nc		< 13 U	--	< 13 U	< 14 U	--	< 13 U	< 13 U	--	< 14 U	--	--	--	< 14 U	--	< 13 U	--	< 13 U	--	< 13 U
1,1-Dichloroethane	ug/m3	2500 ca	2500 ca	530 ca	530 ca		< 9.7 U	--	< 9.7 U	< 10 U	--	< 9.7 U	< 9.7 U	--	< 10 U	--	--	--	< 10 U	--	< 10.0 U	--	< 9.7 U	--	< 9.7 U
1,1-Dichloroethylene	ug/m3	20000 nc	20000 nc	7000 nc	7000 nc		< 9.5 U	--	< 9.5 U	< 10 U	--	< 9.5 U	< 9.5 U	--	< 10 U	--	--	--	< 10 U	--	< 9.8 U	--	< 9.5 U	--	< 9.5 U
1,2,4-Trichlorobenzene	ug/m3	200 nc	200 nc	70 nc	70 nc		< 36 U	--	< 36 U	< 38 U	--	< 36 U	< 36 U	--	< 38 U	--	--	--	< 38 U	--	< 37 U	--	< 36 U	--	< 36 U
1,2,4-Trimethylbenzene	ug/m3	6100 (JT)nc	6100 (JT)nc	2100 (JT)nc	2100 (JT)nc		< 12 U	--	< 12 U	< 13 U	--	< 12 U	< 12 U	--	< 12 U	--	--	--	< 13 U	--	< 12 U	--	< 12 U	--	< 12 U
1,2-Dibromoethane (EDB)	ug/m3	6.6 ca	6.6 ca	1.4 ca	1.4 ca		< 18 U	--	< 18 U	< 20 U	--	< 18 U	< 18 U	--	< 19 U	--	--	--	< 20 U	--	< 19 U	--	< 18 U	--	< 18 U
1,2-Dichlorobenzene	ug/m3	31000 nc	31000 nc	10000 nc	10000 nc		< 14 U	--	< 14 U	< 16 U	--	< 14 U	< 14 U	--	< 15 U	--	--	--	< 16 U	--	< 15 U	--	< 14 U	--	< 14 U
1,2-Dichloroethane	ug/m3	150 ca	150 ca	33 ca	33 ca		< 9.7 U	--	< 9.7 U	< 10 U	--	< 9.7 U	< 9.7 U	--	< 10 U	--	--	--	< 10 U	--	< 10.0 U	--	< 9.7 U	--	< 9.7 U
1,2-Dichloroethylene, cis	ug/m3	820 nc	820 nc	280 nc	280 nc		< 9.5 U	--	< 9.5 U	< 10 U	--	< 9.5 U	< 9.5 U	--	< 10 U	--	--	--	< 10 U	--	< 9.8 U	--	< 9.5 U	--	< 9.5 U
1,2-Dichloroethylene, trans	ug/m3	8200 nc	8200 nc	2800 nc	2800 nc		< 9.5 U	--	< 9.5 U	< 10 U	--	< 9.5 U	< 9.5 U	--	< 10 U	--	--	--	< 10 U	--	< 9.8 U	--	< 9.5 U	--	< 9.5 U
1,2-Dichloropropane	ug/m3	410 nc	410 nc	140 nc	140 nc		< 11 U	--	< 11 U	< 12 U	--	< 11 U	< 11 U	--	< 12 U	--	--	--	< 12 U	--	< 11 U	--	< 11 U	--	< 11 U
1,2-Dichlorotetrafluoroethane (Freon 114)	ug/m3						< 17 U	--	< 17 U	< 18 U	--	< 17 U	< 17 U	--	< 18 U	--	--	--	< 18 U	--	< 17 U	--	< 17 U	--	< 17 U
1,3,5-Trimethylbenzene	ug/m3	6100 (JT)nc	6100 (JT)nc	2100 (JT)nc	2100 (JT)nc		< 12 U	--	< 12 U	< 13 U	--	< 12 U	< 12 U	--	< 12 U	--	--	--	< 13 U	--	< 12 U	--	< 12 U	--	< 12 U
1,3-Dichlorobenzene	ug/m3	310 nc	310 nc	100 nc	100 nc		< 14 U	--	< 14 U	< 16 U	--	< 14 U	< 14 U	--	< 15 U	--	--	--	< 16 U	--	< 15 U	--	< 14 U	--	< 14 U
1,3-Dichloropropane, cis	ug/m3						< 11 U	--	< 11 U	< 12 U	--	< 11 U	< 11 U	--	< 11 U	--	--	--	< 12 U	--	< 11 U	--	< 11 U	--	< 11 U
1,3-Dichloropropene, trans	ug/m3						< 22 U	--	< 22 U	< 24 U	--	< 22 U	< 22 U	--	< 23 U	--	--	--	< 24 U	--	< 22 U	--	< 22 U	--	< 22 U
1,4-Dichlorobenzene	ug/m3	1000 ca	1000 ca	220 ca	220 ca		< 14 U	--	< 14 U	< 16 U	--	< 14 U	< 14 U	--	< 15 U	--	--	--	< 16 U	--	< 15 U	--	< 14 U	--	< 14 U
2-Hexanone	ug/m3	3100 nc	3100 nc	1000 nc	1000 nc		< 9.9 U	--	< 9.9 U	< 11 U	--	< 9.9 U	< 9.9 U	--	< 10 U	--	--	--	< 11 U	--	< 10 U	--	< 9.9 U	--	< 9.9 U
4-Ethyltoluene	ug/m3						< 12 U	--	< 12 U	< 13 U	--	< 12 U	< 12 U	--	< 12 U	--	--	--	< 13 U	--	< 12 U	--	< 12 U	--	< 12 U
Acetone	ug/m3	1000000 (EE)st	1000000 (EE)st	1000000 (EE)st	1000000 (EE)st		30	--	29 J+	31 J+	--	36 J+	62 J+	--	68 J+	--	--	--	95	--	36	--	< 29 U	--	< 29 U
Benzene	ug/m3	510 ca	510 ca	110 ca	110 ca		8.9	--	< 7.7 U	< 8.3 U	--	< 7.7 U	< 7.7 U	--	< 8.1 U	--	--	--	17	--	< 7.9 U	--	< 7.7 U	--	< 7.7 U
Benzyl chloride	ug/m3	80 ca	80 ca	17 ca	17 ca		< 12 U	--	< 12 U	< 13 U	--	< 12 U	< 12 U	--	< 13 U	--	--	--	< 13 U	--	< 13 U	--	< 12 U	--	< 12 U
Bromodichloromethane	ug/m3	200 nc	200 nc	48 ca	48 ca		< 16 U	--	< 16 U	< 17 U	--	< 16 U	< 16 U	--	< 17 U	--	--	--	< 17 U	--	< 17 U	--	< 16 U	--	< 16 U
Bromoform	ug/m3	3600 ca	3600 ca	770 ca	770 ca		< 25 U	--	< 25 U	< 27 U	--	< 25 U	< 25 U	--	< 26 U	--	--	--	< 27 U	--	< 25 U	--	< 25 U	--	< 25 U
Bromomethane	ug/m3	1000 nc	1000 nc	350 nc	350 nc		< 9.3 U	--	< 9.3 U	< 10 U	--	< 9.3 U	< 9.3 U	--	< 9.8 U	--	--	--	< 10 U	--	< 9.6 U	--	< 9.3 U	--	< 9.3 U
Carbon disulfide	ug/m3	72000 nc	72000 nc	24000 nc	24000 nc		20	--	16	11	--	19	82	--	19	--	--	--	33	--	28	--	34	--	7.6
Carbon tetrachloride	ug/m3	710 ca	710 ca	150 ca	150 ca		< 15 U	--	< 15 U	< 16 U	--	< 15 U	< 15 U	--	< 16 U	--	--	--	< 16 U	--	< 16 U	--	< 15 U	--	< 15 U
Chlorobenzene	ug/m3	5100 nc	5100 nc	1700 nc	1700 nc		< 11 U	--	< 11 U	< 12 U	--	< 11 U	< 11 U	--	< 12 U	--	--	--	< 12 U	--	< 11 U	--	< 11 U	--	< 11 U
Chlorodibromomethane	ug/m3	170 ca	170 ca	14 (MM)mut	14 (MM)mut		< 21 U	--	< 21 U	< 22 U	--	< 21 U	< 21 U	--	< 22 U	--	--	--	< 22 U	--	< 21 U	--	< 21 U	--	< 21 U
Chloroethane	ug/m3	410000 nc	410000 nc	140000 nc	140000 nc		< 32 U	--	< 32 U	< 34 U	--	< 32 U	< 32 U	--	< 33 U	--	--	--	< 34 U	--	< 33 U	--	< 32 U	--	< 32 U
Chloroform	ug/m3	170 ca	170 ca	37 ca	37 ca		< 12 U	--	< 12 U	< 13 U	--	< 12 U	< 12 U	--	< 12 U	--	--	--	< 13 U	--	< 12 U	--	< 12 U	--	< 12 U
Chloromethane	ug/m3	9200 nc	9200 nc	3100 nc	3100 nc		< 5.0 U	--	9.8	< 5.4 U	--	< 5.0 U	38	--	< 5.2 U	--	--	--	< 5.4 U	--	< 5.1 U	--	< 5.0 U	--	< 5.0 U
Dichlorodifluoromethane (Freon-12)	ug/m3	34000 nc	34000 nc	11000 nc	11000 nc		< 12 U	--	< 12 U	< 13 U	--	< 12 U	< 12 U	--	< 12 U	--	--	--	< 13 U	--	< 12 U	--	< 12 U	--	< 12 U
Ethyl benzene	ug/m3	1600 ca	1600 ca	340 ca	340 ca		< 10 U	--	< 10 U	< 11 U	--	< 10 U	< 10 U	--	< 11 U	--	--	--	< 11 U	--	< 11 U	--	< 10 U	--	< 10 U
Hexachlorobutadiene	ug/m3	180 ca	180 ca	39 ca	39 ca		< 26 U	--	< 26 U	< 28 U	--	< 26 U	< 26 U	--	< 27 U	--	--	--	< 28 U	--	< 26 U	--	< 26 U	--	< 26 U
Methyl ethyl ketone (2-butanone)	ug/m3	330000 (DD)dev	330000 (DD)dev	170000 (DD)dev	170000 (DD)dev		< 35 U	--	< 35 U	< 38 U	--	< 35 U	< 35 U	--	46	--	--	--	89	--	< 36 U	--	< 35 U	--	< 35 U
Methyl isobutyl ketone (MIBK)	ug/m3	27000 (EE)st	27000 (EE)st	27000 (EE)st	27000 (EE)st		< 9.9 U	--	< 9.9 U	< 11 U	--	< 9.9 U	< 9.9 U	--	< 10 U	--	--	--	< 11 U	--	< 10 U	--	< 9.9 U	--	< 9.9 U
Methyl tertiary butyl ether (MTBE)	ug/m3	15000 ca	15000 ca	3300 ca	3300 ca		< 8.7 U	--	< 8.7 U	< 9.3 U	--	< 8.7 U	< 8.7 U	--	< 9.1 U	--	--	--	< 9.3 U	--	< 8.9 U	--	< 8.7 U	--	< 8.7 U
Methylene chloride	ug/m3	61000 nc	61000 nc	21000 nc	21000 nc		< 8.4 U	--	< 8.4 U	< 9.0 U	--	< 8.4 U	< 8.4 U	--	< 8.8 U	--	--	--	< 9.0 U	--	< 8.6 U	--	< 8.4 U	--	< 8.4 U
Styrene	ug/m3	7000 ca	7000 ca	1500 ca	1500 ca		< 10 U	--	< 10 U	< 11 U	--	< 10 U	< 10 U	--	< 11 U	--	--	--	< 11 U	--	< 11 U	--	< 10 U	--	< 10 U
Tetrachloroethylene	ug/m3	2700 (EE)st	2700 (EE)st	1400 (EE)st	1400 (EE)st		< 16 U	--	< 16 U	< 18 U	--	< 16 U	< 16 U	--	< 17 U	--	--	--	< 18 U	--	< 17 U	--	< 16 U	--	< 16 U
Toluene	ug/m3	250000 (EE)st	250000 (EE)st	170000 nc	170000 nc		< 9.1 U	--	< 9.1 U	< 9.8 U	--	< 9.1 U	< 9.1 U	--	< 9.5 U	--	--	--	< 9.8 U	--	< 9.3 U	--	< 9.1 U	--	< 9.1 U
Trichloroethylene (TCE)	ug/m3	130 (DD)dev	130 (DD)dev	67 (DD)dev	67 (DD)dev		< 13 U	--	< 13 U	< 14 U	--	< 13 U	< 13 U	--	< 14 U	--	--	--	< 14 U	--	< 13 U	--	< 13 U	--	< 13 U
Trichlorofluoromethane (Freon-11)	ug/m3	45000 nc	45000 nc	15000 nc	15000 nc		< 14 U	--	< 14 U	< 15 U	--	< 14 U	110	--	29	--	--	--	< 15 U	--	< 14 U	--	< 14 U	--	< 14 U
Trichlorotrifluoroethane (Freon 113)	ug/m3	1900000 nc	1900000 nc	660000 nc	660000 nc		< 18 U	--	< 18 U	< 20 U	--	< 18 U	< 18 U	--	< 19 U	--	--	--	< 20 U	--	< 19 U	--	< 18 U	--	< 18 U
Vinyl acetate	ug/m3	20000 nc	20000 nc	7000 nc	7000 nc		< 8.5 U	--	< 8.5 U	< 9.1 U	--	< 8.5 U	< 8.5 U	--	< 8.9 U	--	--	--	< 9.1 U	--	< 8.7 U	--	< 8.5 U	--	< 8.5 U
Vinyl chloride	ug/m3	910 ca	910 ca	54 (MM)mut	54 (MM)mut		< 6.2 U	--	< 6.2 U	< 6.6 U	--	< 6.2 U	< 6.2 U	--	< 6.5 U	--	--	--	< 6.6 U	--	< 6.3 U	--	< 6.2 U	--	< 6.2 U
Xylene, m & p	ug/m3						< 21 U	--	< 21 U	< 23 U	--	< 21 U	< 21 U	--	< 22 U	--	--	--	< 23 U	--	< 21 U	--	< 21 U	--	< 21 U
Xylene, o	ug/m3						< 10 U	--	< 10 U	< 11 U	--	< 10 U	< 10 U	--	< 11 U	--	--	--	< 11 U	--	< 11 U	--	< 10 U	--	< 10 U
Xylene, total (Calculated)	ug/m3	22000 (J)nc	22000 (J)nc	7600 (J)nc	7600 (J)nc		ND	--	ND	ND	--	ND	ND	--	ND	--	--	--	ND	--	ND	--	ND	--	ND

Data Footnotes and Qualifiers

Barr Standard Footnotes and Qualifiers

--	Not analyzed/Not available.
N	Sample Type: Normal
ND	Not detected.
>	Greater than
J+	The result is an estimated quantity and may be biased high.
U	The analyte was analyzed for, but was not detected.

Table 1 - Nonresidential 12-hour Soil Vapor

(DD)dev	Hazardous substance causes developmental effects. Residential SSVIAC are protective of both prenatal exposure using a pregnant female receptor and postnatal exposure using a child receptor. Nonresidential SSVIAC are protective of prenatal exposure using a pregnant female receptor. Prenatal developmental effects may occur after an acute (i.e. short-term) or full-term exposure. Developmental
(EE)st	The acceptable air concentration (AAC) for the volatile hazardous substances is not derived using standard methods. The hazardous substance may cause adverse human health effects for less than chronic exposures (i.e. short-term or acute). The AAC for these hazardous substances is the acute or intermediate minimum risk level (MRL) developed by the Agency for Toxic Substances and Disease Registry (ATSDR), a United States Environmental Protection Agency Integrated Risk Information System (IRIS) acute reference concentration, or EGLE's Air Quality Division acute initial threshold screening level (ITSL). Short-term
(GG)	Health-based SSVIAC for soil vapor are not available due to insufficient toxicological data. The soil vapor value addresses the health and safety concerns of explosive, flammable, and asphyxiant properties of gas phase methane. The acceptable soil vapor concentration is derived based on 25% of the lower explosive level (LEL) for methane.
(JT)nc	Hazardous substance may be present in several isomer forms. The health-based SSVIAC may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive health-based SSVIAC of the detected isomers. Non-Carcinogenetic
ca	Carcinogenetic
nc	Non-Carcinogenetic
NR	The hazardous substance has not been previously evaluated by the Remediation and Redevelopment Division Toxicology Unit. The identification, collection, and evaluation of toxicological literature and chemical-physical data cannot be completed within the timeframe requested.

Table 2 - Nonresidential 12-hour Soil Vapor

(DD)dev	Hazardous substance causes developmental effects. Residential SSVIAC are protective of both prenatal exposure using a pregnant female receptor and postnatal exposure using a child receptor. Nonresidential SSVIAC are protective of prenatal exposure using a pregnant female receptor. Prenatal developmental effects may occur after an acute (i.e. short-term) or full-term exposure. Developmental
(EE)st	The acceptable air concentration (AAC) for the volatile hazardous substances is not derived using standard methods. The hazardous substance may cause adverse human health effects for less than chronic exposures (i.e. short-term or acute). The AAC for these hazardous substances is the acute or intermediate minimum risk level (MRL) developed by the Agency for Toxic Substances and Disease Registry (ATSDR), a United States Environmental Protection Agency Integrated Risk Information System (IRIS) acute reference concentration, or EGLE's Air Quality Division acute initial threshold screening level (ITSL). Short-term
(GG)	Health-based SSVIAC for soil vapor are not available due to insufficient toxicological data. The soil vapor value addresses the health and safety concerns of explosive, flammable, and asphyxiant properties of gas phase methane. The acceptable soil vapor concentration is derived based on 25% of the lower explosive level (LEL) for methane.
(JT)nc	Hazardous substance may be present in several isomer forms. The health-based SSVIAC may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive health-based SSVIAC of the detected isomers. Non-Carcinogenetic
ca	Carcinogenetic
nc	Non-Carcinogenetic
NR	The hazardous substance has not been previously evaluated by the Remediation and Redevelopment Division Toxicology Unit. The identification, collection, and evaluation of toxicological literature and chemical-physical data cannot be completed within the timeframe requested.

Table 3 - Residential Soil Vapor

(DD)dev	Hazardous substance causes developmental effects. Residential SSVIAC are protective of both prenatal exposure using a pregnant female receptor and postnatal exposure using a child receptor. Nonresidential SSVIAC are protective of prenatal exposure using a pregnant female receptor. Prenatal developmental effects may occur after an acute (i.e. short-term) or full-term exposure. Developmental

Data Footnotes and Qualifiers

(EE)st	The acceptable air concentration (AAC) for the volatile hazardous substances is not derived using standard methods. The hazardous substance may cause adverse human health effects for less than chronic exposures (i.e. short-term or acute). The AAC for these hazardous substances is the acute or intermediate minimum risk level (MRL) developed by the Agency for Toxic Substances and Disease Registry (ATSDR), a United States Environmental Protection Agency Integrated Risk Information System (IRIS) acute reference concentration, or EGLE's Air Quality Division acute initial threshold screening level (ITSL). Short-term
nc	Non-Carcinogenetic
(GG)	Health-based SSVIAC for soil vapor are not available due to insufficient toxicological data. The soil vapor value addresses the health and safety concerns of explosive, flammable, and asphyxiant properties of gas phase methane. The acceptable soil vapor concentration is derived based on 25% of the lower explosive level (LEL) for methane.
(JT)nc	Hazardous substance may be present in several isomer forms. The health-based SSVIAC may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive health-based SSVIAC of the detected isomers. Non-Carcinogenetic
(MM)mut	Hazardous substance is a carcinogen with a mutagenic mode of action. The cancer potency values used in calculating health-based SSVIAC are modified using age-dependent adjustment factors for those carcinogenic chemicals identified as mutagenic.Mutagenic cancer
ca	Carcinogenetic
NR	The hazardous substance has not been previously evaluated by the Remediation and Redevelopment Division Toxicology Unit. The identification, collection, and evaluation of toxicological literature and chemical-physical data cannot be completed within the timeframe requested.

Table 4 - Residential Soil Vapor

(DD)dev	Hazardous substance causes developmental effects. Residential SSVIAC are protective of both prenatal exposure using a pregnant female receptor and postnatal exposure using a child receptor. Nonresidential SSVIAC are protective of prenatal exposure using a pregnant female receptor. Prenatal developmental effects may occur after an acute (i.e. short-term) or full-term exposure. Developmental
(EE)st	The acceptable air concentration (AAC) for the volatile hazardous substances is not derived using standard methods. The hazardous substance may cause adverse human health effects for less than chronic exposures (i.e. short-term or acute). The AAC for these hazardous substances is the acute or intermediate minimum risk level (MRL) developed by the Agency for Toxic Substances and Disease Registry (ATSDR), a United States Environmental Protection Agency Integrated Risk Information System (IRIS) acute reference concentration, or EGLE's Air Quality Division acute initial threshold screening level (ITSL). Short-term
nc	Non-Carcinogenetic
(GG)	Health-based SSVIAC for soil vapor are not available due to insufficient toxicological data. The soil vapor value addresses the health and safety concerns of explosive, flammable, and asphyxiant properties of gas phase methane. The acceptable soil vapor concentration is derived based on 25% of the lower explosive level (LEL) for methane.
(JT)nc	Hazardous substance may be present in several isomer forms. The health-based SSVIAC may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive health-based SSVIAC of the detected isomers. Non-Carcinogenetic
(MM)mut	Hazardous substance is a carcinogen with a mutagenic mode of action. The cancer potency values used in calculating health-based SSVIAC are modified using age-dependent adjustment factors for those carcinogenic chemicals identified as mutagenic.Mutagenic cancer
ca	Carcinogenetic
NR	The hazardous substance has not been previously evaluated by the Remediation and Redevelopment Division Toxicology Unit. The identification, collection, and evaluation of toxicological literature and chemical-physical data cannot be completed within the timeframe requested.

Table 2

Summary of Differential Pressure Results

2025 Supplemental Soil Gas Investigation - 2400 Lakeshore Drive, Muskegon, Michigan

Pure Muskegon, LLC

Footnotes

N Sample Type: Normal

-- Not measured; well damaged or water present in well

Parameter			Differential pressure	Barometric pressure	Ambient temperature
Analysis			Field	Field	Field
Units			in H2O	in Hg	deg F
Location	Date	Depth			
VP-1-24S (2')	3/26/2025	2 ft	**0.00**	**29.55**	**32**
VP-1-23D (5')	3/26/2025	5 ft	**0.00**	**29.57**	**34**
VP-2-24S (2')	--	2 ft			
VP-2-23D (5')	3/28/2025	5 ft	**-0.66**	**29.25**	**47**
VP-3-24S (2')	3/26/2025	2 ft	**0.00**	**29.58**	**39**
VP-3-23D (5')	--	5 ft			
VP-4-24S (2')	3/26/2025	2 ft	**0.01**	**30.26**	**39**
VP-4-23D (5')	--	5 ft			
VP-5-24S (2')	3/26/2025	2 ft	**0.00**	**29.58**	**40**
VP-5-23D (5')	3/26/2025	5 ft	**0.01**	**29.58**	**40**
VP-6-24S (2')	3/26/2025	2 ft	**0.00**	**29.58**	**40**
VP-6-23D (5')	--	5 ft			
VP-7-24S (2')	3/26/2025	2 ft	**0.00**	**29.58**	**40**
VP-7-23D (5')	--	5 ft			
VP-8-24S (2')	--	2 ft			
VP-8-23D (5')	--	5 ft			
VP-9-24S (2')	3/27/2025	2 ft	**-0.22**	**29.48**	**43**
VP-9-23D (5')	3/27/2025	5 ft	**0.00**	**29.52**	**43**
VP-10-24S (2')	3/27/2025	2 ft	**0.00**	**29.52**	**43**
VP-10-23D (5')	3/27/2025	5 ft	**0.00**	**29.52**	**44**
VP-11-24S (2')	--	2 ft			
VP-11-23D (5')	--	5 ft			
VP-12-24S (2')	3/28/2025	2 ft	**0.00**	**29.26**	**49**
VP-12-23D (5')	--	5 ft			
VP-13-24S (2')	3/27/2025	2 ft	**0.00**	**29.52**	**45**
VP-13-23D (5')	3/27/2025	5 ft	**-0.87**	**29.52**	**46**
VP-14-24S (2')	3/29/2025	2 ft	**0.00**	**29.19**	**49**
VP-14-23D (5')	3/27/2025	5 ft	**-0.26**	**29.49**	**48**
VP-15-24S (2')	3/29/2025	2 ft	**0.00**	**29.19**	**52**
VP-15-23D (5')	--	5 ft			
VP-16-24S (2')	--	2 ft			
VP-16-23D (5')	--	5 ft			
VP-17-24S (2')	3/28/2025	2 ft	**0.00**	**29.28**	**48**
VP-17-23D (5')	3/28/2025	5 ft	**-0.19**	**29.26**	**49**
VP-18-24S (2')	3/28/2025	2 ft	**-0.50**	**29.17**	**50**
VP-18-23D (5')	3/28/2025	5 ft	**-0.10**	**29.17**	**50**
VP-19-24S (2')	3/28/2025	2 ft	**-0.18**	**29.16**	**56**
VP-19-23D (5')	3/28/2025	5 ft	**0.04**	**29.17**	**55**
VP-20-24S (2')	--	2 ft			
VP-20-23D (5')	--	5 ft			
VP-21-24S (2')	--	2 ft			
VP-21-23D (5')	--	5 ft			
VP-22-24S (2')	3/28/2025	2 ft	**-0.05**	**29.13**	**57**
VP-22-23D (5')	--	5 ft			
VP-23-24S (2')	3/29/2025	2 ft	**0.00**	**29.18**	**47**
VP-23-23D (5')	--	5 ft			
VP-24-24S (2')	3/29/2025	2 ft	**-0.25**	**29.19**	**47**
VP-24-23D (5')	--	5 ft			
VP-25-24S (2')	3/29/2025	2 ft	**-0.24**	**29.19**	**47**
VP-25-23D (5')	--	5 ft			

Figures

▼ Soil Gas Well

Phasing Plan

Phase 1

Phase 2

Notes:

- Shallow soil gas wells shown were installed to 2' below ground surface (bgs) by Barr in January and February 2024. Locations shown for soil gas wells are coincident with deep soil gas wells installed at 5' bgs by Environmental Resource Group, LLC (ERG) in September 2023.
- Phase 1 polygon based on Final PUD Plan - Phasing Plan drawing by Nederveld, dated June 19, 2025. Extents are approximate.
- Phase 2 polygon based on Final PUD Plan - Phasing Plan drawing by Nederveld, dated May 14, 2025. Extents are approximate.

0 300 600

Feet

Imagery: Nearmap 4/27/2025

Soil Gas Well Locations

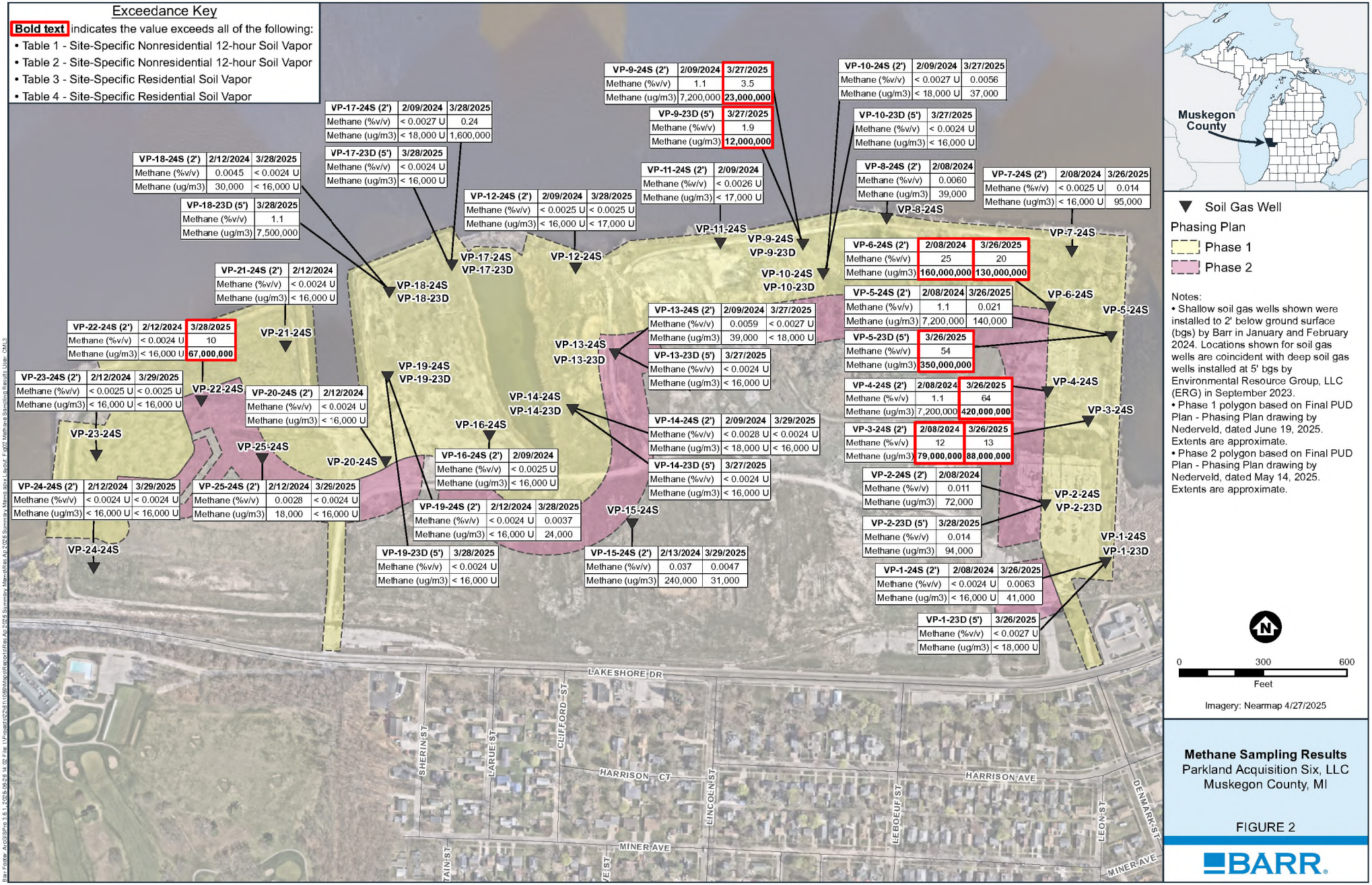
Parkland Acquisition Six, LLC

Muskegon County, MI

FIGURE 1

BARR

Ben Foster AcGIS Pro 3.5.1 2025-09-26 14:02 File: I:\Projects\23\61\058\Maps\Reports\Rev Apr 2025 Summary Memo\Rev Apr 2025 Summary Memo.aprx\Layout: Fig01 Sampling Locations Use: CMLS



Methane Sampling Results
Parkland Acquisition Six, LLC
Muskegon County, MI

FIGURE 2

BARR

Ben Foster AcdiSRG 9.1.5 | 2026-03-18 | VLOD File: I:\Projects\23681\1058\Mxd\Reports\Res Ap 2025 Summary Memo\Res Ap 2025 Summary Memo.grw | Layout: Fig02 Methane Sampling Results | User: CMLS

Appendix A

Sampling Logs

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11
Sample ID: VP-1-24S(2')
Date: 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-1-24S (2') | Gauge#: Not applicable
Canister serial # : N6557 | Flow Regulator #: 3658
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30 mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
0850	120	

Total Volume: 30 mL
Purge Volume = 3* Total Volume: 90 mL
Total Volume Purged: 120 mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		41	0.0	--
2		26.6	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): No

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 11.1
Background Oxygen (%): 20.9
Methane present in hose: 3%

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.001"

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 32 deg F
Wind Speed: calm
Wind Direction: --
Precipitation: None
Barometric Pressure: 29.55"

Volume of Sample: 1 Liter
Initial Canister Vacuum: --
Final Canister Vacuum: --

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0857
Sample End Time: 0903

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-1-23D (5')
Date : 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-1-23D (5') | Gauge#: Not applicable
Canister serial # : N6570 | Flow Regulator #: 3114

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1000	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180 mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		35.4	0.0	--
2		33.7	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): No

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 14.2
Background Oxygen (%): 20.9
Methane present in hose: 0.0%

Carbon Dioxide in hose (%): 0.0
Background Carbon Dioxide (%): 0.0
Background methane: 0.1

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 34 deg F
Wind Speed: 5 mph
Wind Direction: NNE
Precipitation: None
Barometric Pressure: 29.57"

Volume of Sample: 1 Liter
Initial Canister Vacuum: -210
Final Canister Vacuum: -1.0

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1008
Sample End Time: 1013

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-3-24S (2')
Date: 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-3-24S (2') | Gauge#: Not applicable
Canister serial # : N3674 | Flow Regulator #: 3650
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
1125	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		38.6	0.0	--
2		24.6	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): No

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 4.4
Background Oxygen (%): 20.9
Methane present in hose: 1.4

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.6
Background PID (ppm): 0.0
Pressure differential: -0.002

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 39 deg F
Wind Speed: 6 mph
Wind Direction: NNW
Precipitation: None
Barometric Pressure: 29.58"

Volume of Sample: 1 Liter
Initial Canister Vacuum: -26
Final Canister Vacuum: -2

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1134
Sample End Time: 1140

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-4-24S (2')
Date: 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-4-24S (2') | Gauge#: Not applicable
Canister serial # : N3156 | Flow Regulator #: 3134
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
1150	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL
Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		41.8	0.0	--
2		39.7	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): yes, 6.6%*
*measured 6.6%on helium detector piror to applying helium

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 3.1
Background Oxygen (%): 20.9
Methane present in hose: 65.5
Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0
PID in hose (ppm): 0.8
Background PID (ppm): 0.0
Pressure differential: 0.006

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 39 deg F
Wind Speed: 5 mph
Wind Direction: NNW
Precipitation: None
Barometric Pressure: 30.26

Volume of Sample: 1 Liter
Initial Canister Vacuum: -22
Final Canister Vacuum: -2

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1159
Sample End Time: 1205

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-5-24S (2')
Date: 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-5-24S (2') | Gauge#: Not applicable
Canister serial # : A7784 | Flow Regulator #: 3576

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1235	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		37.1	0.0	--
2		28.7	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 13.5
Background Oxygen (%): 20.9
Methane present in hose: 1.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.1
Background PID (ppm): 0.0
Pressure differential: 0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 40 deg F
Wind Speed: 10 mph
Wind Direction: NNW
Precipitation: None
Barometric Pressure: 29.58

Volume of Sample: 1 Liter
Initial Canister Vacuum: -20
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1241
Sample End Time: 1246

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-5-23D (5')
Date: 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) / Bottle Vac

Duplicate Collected?: YES (NO) NA

Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-5-23D (5') | Gauge#: Not applicable
Canister serial # : 5320 | Flow Regulator #: 3508

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1250	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		34.6	3.9	--
2		32.4	3.9	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): yes, 3.9%

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 3.7
Background Oxygen (%): 20.9
Methane present in hose: 3.7

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 1.3
Background PID (ppm): 0.0
Pressure differential: 0.007

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 40 deg F
Wind Speed: 10 mph
Wind Direction: NNW
Precipitation: None
Barometric Pressure: 29.58

Volume of Sample: 1 Liter
Initial Canister Vacuum: -18
Final Canister Vacuum: 0

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1250
Sample End Time: 1302

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-7-24S (2')
Date: 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-7-24S (2') | Gauge#: Not applicable
Canister serial # : A8087 | Flow Regulator #: 3649

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1340	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		39.6	0.1	--
2		34.1	0.1	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 18.0
Background Oxygen (%): 20.9
Methane present in hose: 1.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: 0.000

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 40 deg F
Wind Speed: 10 mph
Wind Direction: NNW
Precipitation: None
Barometric Pressure: 29.58

Volume of Sample: 1 Liter
Initial Canister Vacuum: -24
Final Canister Vacuum: -2

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1346
Sample End Time: 1352

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed? YES (NO) NA
Cap on vapor pin/well? (YES) NO NA
Well/Sampling Point Closed? (YES) NO NA

Vapor pin/well capped? (YES) NO NA
Well cover bolted snugly? YES NO (NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-6-24S (2')
Date: 3/26/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-6-24S (2') | Gauge#: Not applicable
Canister serial # : A8092 | Flow Regulator #: 3066

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1358	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		35.4	0.0	--
2		27.1	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 3.8
Background Oxygen (%): 20.9
Methane present in hose: 2.4

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.8
Background PID (ppm): 0.0
Pressure differential: 0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 40 deg F
Wind Speed: 10 mph
Wind Direction: WNW
Precipitation: None
Barometric Pressure: 29.58

Volume of Sample: 1 Liter
Initial Canister Vacuum: -20
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1403
Sample End Time: 1408

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-9-24S (2')
Date: 3/27/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-9-24S (2') | Gauge#: Not applicable
Canister serial # : 5268 | Flow Regulator #: 3604

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
1020	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		28.1	0.0	--
2		19.9	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 4.9
Background Oxygen (%): 20.9
Methane present in hose: 2.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 1.1
Background PID (ppm): 0.0
Pressure differential: -0.215

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 43 deg F
Wind Speed: 9 mph
Wind Direction: SW
Precipitation: None
Barometric Pressure: 29.48

Volume of Sample: 1 Liter
Initial Canister Vacuum: -24
Final Canister Vacuum: -2

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1008
Sample End Time: 1016

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-9-23D (5')
Date: 3/27/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-9-23D (5') | Gauge#: Not applicable
Canister serial # : 3436 | Flow Regulator #: --

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1040	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		28.4	0.0	--
2		23.7	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 3.8
Background Oxygen (%): 20.9
Methane present in hose: 3.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: 0.000

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 43 deg F
Wind Speed: 7 mph
Wind Direction: SW
Precipitation: None
Barometric Pressure: 29.52

Volume of Sample: 1 Liter
Initial Canister Vacuum: -22
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1047
Sample End Time: 1053

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	(NO)	NA

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-10-24S (2')
Date: 3/27/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) / Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-10-24S (2') | Gauge#: Not applicable
Canister serial # : 5271 | Flow Regulator #: 3603

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
1110	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		32.8	0.0	--
2		24.6	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 6.3
Background Oxygen (%): 20.9
Methane present in hose: 2.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 1.0
Background PID (ppm): 0.0
Pressure differential: -0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 43 deg F
Wind Speed: 7 mph
Wind Direction: W
Precipitation: None
Barometric Pressure: 29.52

Volume of Sample: 1 Liter
Initial Canister Vacuum: -22
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1116
Sample End Time: 1121

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-10-23D (5')
Date: 3/27/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) / Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-10-23D (5') | Gauge#: Not applicable
Canister serial # : A7643 | Flow Regulator #: 3210

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Time	removed (mL)	Rate (ml/min)
1145	180	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		36.1	0.0	--
2		24.8	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 17.8
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 6.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.002

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 44 deg F
Wind Speed: 7 mph
Wind Direction: W
Precipitation: None
Barometric Pressure: 29.52

Volume of Sample: 1 Liter
Initial Canister Vacuum: -24
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1150
Sample End Time: 1155

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-13-24S (2')
Date: 3/27/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-13-24S (2') | Gauge#: Not applicable
Canister serial # : N3693 | Flow Regulator #: 3547
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
1240	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		30.8	0.0	--
2		24.7	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.9
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): 680 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: 0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 45 deg F
Wind Speed: 5 mph
Wind Direction: W
Precipitation: None
Barometric Pressure: 29.52

Volume of Sample: 1 Liter
Initial Canister Vacuum: -18
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1242
Sample End Time: 1252

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-13-23D (5')
Date: 3/27/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-13-23D (5') | Gauge#: Not applicable
Canister serial # : 5915 | Flow Regulator #: 3566
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1325	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		32.2	0.0	--
2		19.6	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.2
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): 1,880 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.865; 0.000 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 46 deg F
Wind Speed: 6 mph
Wind Direction: W
Precipitation: None
Barometric Pressure: 29.52

Volume of Sample: 1 Liter
Initial Canister Vacuum: -20
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1331
Sample End Time: 1337

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-14-23D (5')
Date: 3/27/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-14-23D (5') | Gauge#: Not applicable
Canister serial # : A7791 | Flow Regulator #: 3575

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Time	removed (mL)	Rate (ml/min)
1415	180	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		31.4	0.0	--
2		33.3	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.9
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): 9,520 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.264; 0.020 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 48 deg F
Wind Speed: 3 mph
Wind Direction: Varies
Precipitation: None
Barometric Pressure: 29.49

Volume of Sample: 1 Liter
Initial Canister Vacuum: -21
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1423
Sample End Time: 1429

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-2-23D (5')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-2-23D (5') | Gauge#: Not applicable
Canister serial # : A8080 | Flow Regulator #: 3655

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
0810	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		27.8	0.0	--
2		24.4	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 14.1
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.657; 0.021 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 47 deg F
Wind Speed: 7 mph
Wind Direction: Varies
Precipitation: None
Barometric Pressure: 29.25

Volume of Sample: 1 Liter
Initial Canister Vacuum: -24
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0815
Sample End Time: 0822

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-12-24S (2')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-12-24S (2') | Gauge#: Not applicable
Canister serial # : 6136 | Flow Regulator #: 3586
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
0840	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL
Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		28.1	0.0	--
2		30.2	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 14.2
Background Oxygen (%): 20.9
Methane present in hose: 3.0
Carbon Dioxide in hose (%):>10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 1.0
PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: 0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 49 deg F
Wind Speed: 12 mph
Wind Direction: SE
Precipitation: None
Barometric Pressure: 29.26

Volume of Sample: 1 Liter
Initial Canister Vacuum: -18
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0849
Sample End Time: 0854

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-17-23D (5')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-17-23D (5') | Gauge#: Not applicable
Canister serial # : 5902 | Flow Regulator #: 3212
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
0910	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		37.5	0.0	--
2		32.9	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 2.7
Background Oxygen (%): 20.9
Methane present in hose: 5

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.190; 0.000 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 49 deg F
Wind Speed: 12 mph
Wind Direction: SE
Precipitation: None
Barometric Pressure: 29.26

Volume of Sample: 1 Liter
Initial Canister Vacuum: -19
Final Canister Vacuum: 0

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0914
Sample End Time: 0919

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-17-24S (2')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-17-24S (2') | Gauge#: Not applicable
Canister serial # : -- | Flow Regulator #: 3640

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
0900	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		35.5	0.0	--
2		41.2	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 8.0
Background Oxygen (%): 20.9
Methane present in hose: 2.0

Carbon Dioxide in hose (%):>10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 48 deg F
Wind Speed: 5 mph
Wind Direction: S
Precipitation: None
Barometric Pressure: 29.28

Volume of Sample: 1 Liter
Initial Canister Vacuum: -22
Final Canister Vacuum: 0

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0925
Sample End Time: 0931

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-18-23D (5')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-18-23D (5') | Gauge#: Not applicable
Canister serial # : A7798 | Flow Regulator #: 3548

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1105	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		34.4	0.0	--
2		31.3	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 4.3
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.2
Background PID (ppm): 0.0
Pressure differential: -0.104; -0.001 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 50 deg F
Wind Speed: 14 mph
Wind Direction: SSE
Precipitation: sprinkle
Barometric Pressure: 29.17

Volume of Sample: 1 Liter
Initial Canister Vacuum: -18
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1115
Sample End Time: 1121

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-18-24S (2')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) / Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-18-24S (2') | Gauge#: Not applicable
Canister serial # : 5924 | Flow Regulator #: 3504

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1118	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		35.4	0.0	--
2		27.4	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 18.2
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): 8,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.498; 0.002 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 50 deg F
Wind Speed: 14 mph
Wind Direction: S
Precipitation: sprinkle
Barometric Pressure: 29.28

Volume of Sample: 1 Liter
Initial Canister Vacuum: -22
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1123
Sample End Time: 1128

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-19-23D (5')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-19-23D (5') | Gauge#: Not applicable
Canister serial # : 6133 | Flow Regulator #: 3557

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 6 feet
Well Tubing Volume: 60mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1215	180	

Total Volume 60mL
Purge Volume = 3* Total Volume: 180mL

Total Volume Purged (L): 180mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		36.6	0.0	--
2		30.4	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 6.1
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: 0.040; 0.004 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 55 deg F
Wind Speed: 7 mph
Wind Direction: Varies
Precipitation: none
Barometric Pressure: 29.17

Volume of Sample: 1 Liter
Initial Canister Vacuum: -19
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1220
Sample End Time: 1226

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-19-24S (2')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-19-24S (2') | Gauge#: Not applicable
Canister serial # : 6132 | Flow Regulator #: 3523

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1240	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		40.1	0.0	--
2		32.8	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 19.3
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.183; -0.002 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 56 deg F
Wind Speed: 5 mph
Wind Direction: ENE
Precipitation: none
Barometric Pressure: 29.16

Volume of Sample: 1 Liter
Initial Canister Vacuum: -19
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1245
Sample End Time: 1252

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-22-24S (2')
Date: 3/28/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-22-24S (2') | Gauge#: Not applicable
Canister serial # : N6535 | Flow Regulator #: 3555

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
1310	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		36.4	0.0	--
2		35.8	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 4.1
Background Oxygen (%): 20.9
Methane present in hose: 10.5

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.048; -0.001 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 57 deg F
Wind Speed: 18 mph
Wind Direction: ENE
Precipitation: none
Barometric Pressure: 29.13

Volume of Sample: 1 Liter
Initial Canister Vacuum: -19
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1315
Sample End Time: 1320

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	(NO)	NA	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-14-23S (2')
Date: 3/29/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-14-24S (2') | Gauge#: Not applicable
Canister serial # : 5927 | Flow Regulator #: 3518

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 5 feet
Sample Depth: 5 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
--	120	

Total Volume 60mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		44.4	0.0	--
2		38.7	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.4
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): 9,100 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.001

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 49 deg F
Wind Speed: calm
Wind Direction: none
Precipitation: none
Barometric Pressure: 29.19

Volume of Sample: 1 Liter
Initial Canister Vacuum: -20
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1004
Sample End Time: 1010

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-15-24S (2')
Date: 3/29/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) / Bottle Vac

Duplicate Collected?: YES (NO) NA

Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-15-24S (2') | Gauge#: Not applicable
Canister serial # : N6560 | Flow Regulator #: 3257

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
1025	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		30.7	0.0	--
2		27.8	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): yes; 0.4%

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.1
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): 0.0
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.002

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 52 deg F
Wind Speed: 6 mph
Wind Direction: ENE
Precipitation: none
Barometric Pressure: 29.19

Volume of Sample: 1 Liter
Initial Canister Vacuum: -19
Final Canister Vacuum: -2

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 1033
Sample End Time: 1038

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-23-24S (2')
Date: 3/29/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-23-24S (2') | Gauge#: Not applicable
Canister serial # : N3688 | Flow Regulator #: 3538

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
0845	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		35.1	0.0	--
2		34.1	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.4
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: 0.000

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 47 deg F
Wind Speed: 3 mph
Wind Direction: SW
Precipitation: none
Barometric Pressure: 29.18

Volume of Sample: 1 Liter
Initial Canister Vacuum: -22
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0849
Sample End Time: 0855

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA	
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)	

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-24-24S (2')
Date: 3/29/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-24-24S (2') | Gauge#: Not applicable
Canister serial # : N3691 | Flow Regulator #: 3532
Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well?	(YES)	NO	NA	REMEDIED	Standing water present?	YES	(NO)	NA	If yes, don't sample
Is protective casing in good repair?	(YES)	NO	NA	REMEDIED	Has it rained >0.5" in last 24 hours	YES	(NO)	NA	If yes, don't sample
					Cap on well?	(YES)	NO	NA	REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Time	removed (mL)	Rate (ml/min)
--	120	

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		30.1	0.0	--
2		28.9	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.9
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): >10,000 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.1
Background PID (ppm): 0.0
Pressure differential: -0.248; -0.001 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 47 deg F
Wind Speed: 3 mph | Wind Direction: SW
Precipitation: none | Barometric Pressure: 29.19

Volume of Sample: 1 Liter
Initial Canister Vacuum: -18
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0915
Sample End Time: 0920

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed?	YES	(NO)	NA					
Cap on vapor pin/well?	(YES)	NO	NA	Vapor pin/well capped?	(YES)	NO	NA
Well/Sampling Point Closed?	(YES)	NO	NA	Well cover bolted snugly?	YES	NO	(NA)

Barr Engineering Company
Soil Gas Sampling
Low-Flow Sampling Field Log

Client: Pure Muskegon
Site: Muskegon, MI
Project Number: 22611059.11

Sample ID: VP-25-24S (2')
Date: 3/29/2025

SAMPLING PERSONNEL

Sample Collection By: AWB | Others Present: None | Sampling Order:

EQUIPMENT USED

Type of sample taken? (Summa® canister) Bottle Vac
Duplicate Collected?: YES (NO) NA
Analytical Method: ASTM D1946, EPA TO-15

Sample ID: VP-25-24S (2') | Gauge#: Not applicable
Canister serial # : N3692 | Flow Regulator #: 3263

Sample ID: Not applicable | Gauge#: Not applicable
Canister serial # : Not applicable | Flow Regulator #: Not applicable

INSPECTION

Label on well? (YES) NO NA REMEDIED
Is protective casing in good repair? (YES) NO NA REMEDIED

Standing water present? YES (NO) NA If yes, don't sample
Has it rained >0.5" in last 24 hours YES (NO) NA If yes, don't sample
Cap on well? (YES) NO NA REMEDIED

Notes:

Well Purging

Total Depth: 2 feet
Sample Depth: 2 feet

Time	removed (mL)	Rate (ml/min)
0820	120	

Well Tubing diameter: 1/4"
Well Tubing and Screen Length: 3 feet
Well Tubing Volume: 30mL
Sample Tubing Diameter: Not applicable
Sample Tubing length: Not applicable
Sample Tubing volume: Not applicable

Volume of Air per Foot:
1/4" well: 9.65 mL
3/16" tubing: 5.43 mL

Total Volume 30mL
Purge Volume = 3* Total Volume: 90mL

Total Volume Purged (L): 120mL
Purge Air Disposal: Atmospheric

TRACER GAS TESTING

Test #	Qualitative / quantitative	Concentration in Enclosure (y/n) or (ppm)	Concentration in hose (y/n) or (ppm)	Concentration in Enclosure (y/n) or (ppm)
1		30.8	0.0	--
2		29.7	0.0	--

Tracer Gas Used: Helium
Background Tracer Gas Present? (y/n) or (ppm): no

Is the system sealed? (YES) NO NA

Notes: Test 1 was completed prior to sampling. The sample was collected with shroud in place and helium in the shroud. A second leak test (Test 2) was completed following collection of the sample.

FIELD SCREENING

Oxygen present in hose (%): 20.9
Background Oxygen (%): 20.9
Methane present in hose: 0.0

Carbon Dioxide in hose (%): 4,860 ppm
Background Carbon Dioxide (%): 0.0
Background methane: 0.0

PID in hose (ppm): 0.0
Background PID (ppm): 0.0
Pressure differential: -0.238; -0.001 after purging

Notes:

SAMPLE COLLECTION

Weather:
Temperature: 47 deg F
Wind Speed: 3 mph
Wind Direction: SW
Precipitation: none
Barometric Pressure: 29.19

Volume of Sample: 1 Liter
Initial Canister Vacuum: -20
Final Canister Vacuum: -1

Duplicate
Sample Start Time: Not applicable
Sample End Time: Not applicable
Volume of Sample: Not applicable
Initial Vacuum: Not applicable
Final Vacuum: Not applicable

Sample Start Time: 0828
Sample End Time: 0834

PARAMETERS ANALYZED:
Fixed Gasses (CH4, O2, CO2, CO, N2)
VOCs

FINAL INSPECTION

Repairs needed? YES (NO) NA
Cap on vapor pin/well? (YES) NO NA
Well/Sampling Point Closed? (YES) NO NA

Vapor pin/well capped? (YES) NO NA
Well cover bolted snugly? YES NO (NA)

Appendix B

2024 Analytical Reports

Air TECHNOLOGY Laboratories, Inc.

June 26, 2025

LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C, ASTM D1946, RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

ALASKA CS-LAP 24-002
EPA Methods TO14A, TO15

Barr Engineering
ATTN: Diane Biehl
3033 Orchard Vista
Grand Rapid, MI 49546

LABORATORY TEST RESULTS

Project Reference: Pure Muskegon
Project Number: 22611059.09
Lab Number: S040301-01/29

Enclosed are REVISED results for sample(s) received 4/03/24 by Air Technology Laboratories and replaces in its entirety all previous versions. Samples were received intact. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- The report has been revised to update Sample ID's, per the clients request.
- The report has been revised to include units in ug/m3, per the clients request.
- Modifications to EPA TO-15 – quadratic regression calibration was required for acetone, benzyl chloride, and 1,2,4-trichlorobenzene. Acetone exhibited a high recovery in the continuing calibration verification in Batch No. 240422MS2A1 indicating possible high bias. Results were flagged with the Q qualifier.
- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

Preliminary results were e-mailed to Diane Biehl on 4/23/24.

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Ave., Suite 130
City of Industry, CA 91748
Ph: 626-964-4032
Fx: 626-964-5832

CHAIN OF CUSTODY RECORD

TURNAROUND TIME: Standard ☐ 48 hours ☐ | Same Day ☐ 72 hours ☐ | 24 hours ☐ 96 hours ☐ | Other:

DELIVERABLES: EDD ☐ EDF ☐ LEVEL 3 ☐ LEVEL 4 ☐

PAGE: 1 OF 3

Condition upon receipt: Sealed Yes ☐ No ☐ | Intact Yes ☐ No ☐ | Chilled _____ deg C

Project No.:	22611059.09
Project Name:	Duro Muskegon
Report To:	Diane Biehl
Company:	Barr Engineering
Street:	3033 Orchard Vista
City/State/Zip:	Grand Rapids, MI 49546
Phone& Fax:	616-512-7000
e-mail:	dbiehl@barr.com

BILLING

P.O. No.:	
Bill to:	

ANALYSIS REQUEST

LAB USE ONLY	SAMPLE IDENTIFICATION		SAMPLE DATE	SAMPLE TIME	MATRIX	CONTAINER TYPE	* ASTM D1946 + CO Fixed Gases	TO-15				
S040301-01	VP-1-23S	6/17 request change: VP-1-24S	3/26/25	0910	SG	Can	X	X				
-02	VP-1-23D			1015								
-03	VP-3-23S	6/17 request change: VP-3-24S		1140								
-04	VP-4-23S	6/17 request change: VP-4-24S		1205								
-05	VP-5-23S	6/17 request change: VP-5-24S		1246								
-06	VP-5-23D			1302								
-07	VP-7-23S	6/17 request change: VP-7-24S		1352								
-08	VP-6-23S	6/17 request change: VP-6-24S		1408								
-09	VP-9-23S	6/17 request change: VP-9-24S	3/27/25	1016								
-10	VP-9-23D		3/27/25	1053								

AUTHORIZATION TO PERFORM WORK	COMPANY	DATE/TIME	
SAMPLED BY	COMPANY Barr	DATE/TIME 4/1/2025	
RELINQUISHED BY	DATE/TIME 4/1/25	RECEIVED BY	DATE/TIME
RELINQUISHED BY FEDEX	DATE/TIME 10:45 4/3/25	RECEIVED BY	DATE/TIME 10:45 4/3/25
RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME

COMMENTS
* Incl CO confirmation email DBiehl @ 4/3/25 13:45

METHOD OF TRANSPORT (circle one): Walk-In (FedEx) UPS Courier ATLI Other _____

DISTRIBUTION: White & Yellow - Lab Copies / Pink - Customer Copy

Preservation: H=HCL N=None / Container: B=Bag C=Can V=VOA O=Other

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Ave., Suite 130
City of Industry, CA 91748
Ph: 626-964-4032
Fx: 626-964-5832

CHAIN OF CUSTODY RECORD

PAGE: 2 OF 3

TURNAROUND TIME
Standard ☐ 48 hours ☐
Same Day ☐ 72 hours ☐
24 hours ☐ 96 hours ☐
Other:

DELIVERABLES
EDD ☐
EDF ☐
LEVEL 3 ☐
LEVEL 4 ☐

Condition upon receipt:
Sealed Yes ☐ No ☐
Intact Yes ☐ No ☐
Chilled _____ deg C

Project No.: 22611059.09
Project Name: Pure Muskegon
Report To: Diane Biehl
Company: Barr Engineering
Street: 3039 Orchard Vista
City/State/Zip: Grand Rapids, MI 49546
Phone& Fax: 616-512-7000
e-mail: dbiehl@barr.com

BILLING
P.O. No.:
Bill to:

ANALYSIS REQUEST

LAB USE ONLY	SAMPLE IDENTIFICATION		SAMPLE DATE	SAMPLE TIME	MATRIX	CONTAINER TYPE	Fixed Gases ASTM D1946 + CO	TO-15				
S040301-11	✓ VP-10-23S	6/17 request change: VP-10-24S	3/27/25	1121	SG	Can	X	X				
-12	✓ VP-10-23D			1155								
-13	✓ VP-13-23S	6/17 request change: VP-13-24S		1252								
-14	✓ VP-13-23D			1337								
-15	✓ VP-14-23D			1429								
-16	✓ VP-2-23D		3/28/25	0822								
-17	✓ VP-12-23S	6/17 request change: VP-12-24S		0854								
-18	✓ VP-17-23D			0919								
-19	✓ VP-17-23S	6/17 request change: VP-17-24S		0931								
-20	✓ VP-18-23D			1121								

AUTHORIZATION TO PERFORM WORK	COMPANY	DATE/TIME

SAMPLED BY	COMPANY	DATE/TIME
AJ Bragenitz	Barr	4/1/25 @ 1520

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
	4/1/25 @ 1600		
FEDEX	10:45 4/3/25		10:45 4/3/25
RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME

METHOD OF TRANSPORT (circle one): Walk-In (FedEx) UPS Courier ATLI Other _____

COMMENTS

DISTRIBUTION: White & Yellow - Lab Copies / Pink - Customer Copy

Preservation: H=HCL N=None / Container: B=Bag C=Can V=VOA O=Other

AirTECHNOLOGY Laboratories, Inc.

18501 E. Gale Ave., Suite 130
City of Industry, CA 91748
Ph: 626-964-4032
Fx: 626-964-5832

CHAIN OF CUSTODY RECORD

TURNAROUND TIME: Standard ☐ 48 hours ☐ | Same Day ☐ 72 hours ☐ | 24 hours ☐ 96 hours ☐ | Other:

DELIVERABLES: EDD ☐ | EDF ☐ | LEVEL 3 ☐ | LEVEL 4 ☐

PAGE: 3 OF 3

Condition upon receipt: Sealed Yes ☐ No ☐ | Intact Yes ☐ No ☐ | Chilled _____ deg C

Project No.:	22611059.09
Project Name:	Pure Muskegon
Report To:	Diane Bicht
Company:	Barr Engineering
Street:	3033 Orchard Vista Grand Rp
City/State/Zip:	Grand Rapids, MI 49546
Phone& Fax:	616-571-7000
e-mail:	dbicht@barr.com

BILLING

P.O. No.:

Bill to:

ANALYSIS REQUEST

LAB USE ONLY	SAMPLE IDENTIFICATION	SAMPLE DATE	SAMPLE TIME	MATRIX	CONTAINER TYPE	Ethanol Glycol + cs* ASTM D1946	TO-15				
S040301-21	VP-18-23S 6/17 request change: VP-18-24S	3/28/25	1123	SG	Can	X	X				
-22	VP-19-23		1226								
-23	VP-19-23S 6/17 request change: VP-19-24S		1252								
-24	VP-22-23S 6/17 request change: VP-22-24S		1320								
-25	VP-25-23S 6/17 request change: VP-25-24S	3/29/25	0834								
-26	VP-23-23S 6/17 request change: VP-23-24S		0835								
-27	VP-24-23S 6/17 request change: VP-24-24S		0920								
-28	VP-14-23S 6/17 request change: VP-14-24S		1010								
-29	VP-15-23S 6/17 request change: VP-15-24S		1039								

AUTHORIZATION TO PERFORM WORK	COMPANY	DATE/TIME	
SAMPLED BY: Al Bergemann	COMPANY: Barr	DATE/TIME: 4/1/25	
RELINQUISHED BY	DATE/TIME: 4/1/25	RECEIVED BY	DATE/TIME
RELINQUISHED BY: FEDEX	DATE/TIME: 10:45 4/3/25	RECEIVED BY	DATE/TIME: 10:45 4/3/25
RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME

METHOD OF TRANSPORT (circle one): Walk-In FedEx UPS Courier ATLI Other _____

COMMENTS

DISTRIBUTION: White & Yellow - Lab Copies / Pink - Customer Copy

Preservation: H=HCL N=None / Container: B=Bag C=Can V=VOA O=Other

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-01		S040301-02		S040301-03		S040301-04	
Client Sample I.D.:	VP-1-24S		VP-1-23D		VP-3-24S		VP-4-24S	
Date/Time Sampled:	3/26/25 9:03		3/26/25 10:13		3/26/25 11:40		3/26/25 12:05	
Date/Time Analyzed:	4/21/25 13:01		4/21/25 13:40		4/21/25 14:18		4/21/25 14:56	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.4		2.7		2.2		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Dichlorodifluoromethane (12)	ND	12	ND	14	ND	11	ND	12
Chloromethane	ND	5.0	ND	5.6	ND	4.5	ND	5.0
1,2-Cl-1,1,2,2-F ethane (114)	ND	17	ND	19	ND	15	ND	17
Vinyl Chloride	ND	6.2	ND	7.0	ND	5.6	ND	6.2
Bromomethane	ND	9.3	ND	11	ND	8.5	ND	9.3
Chloroethane	ND	32	ND	36	ND	29	ND	32
Trichlorofluoromethane (11)	ND	14	ND	15	ND	12	ND	14
1,1-Dichloroethene	ND	9.5	ND	11	ND	8.7	ND	9.5
Carbon Disulfide	ND	7.5	ND	8.5	44	6.8	84	7.5
1,1,2-Cl 1,2,2-F ethane (113)	ND	18	ND	21	ND	17	ND	18
Acetone	ND	29	ND	32	ND	26	100	29
Methylene Chloride	ND	8.4	ND	9.5	ND	7.6	ND	8.4
t-1,2-Dichloroethene	ND	9.5	ND	11	ND	8.7	ND	9.5
1,1-Dichloroethane	ND	9.7	ND	11	ND	8.9	ND	9.7
Vinyl Acetate	ND	8.5	ND	9.6	ND	7.7	ND	8.5
c-1,2-Dichloroethene	ND	9.5	ND	11	ND	8.7	ND	9.5
2-Butanone	ND	35	ND	40	ND	32	76	35
t-Butyl Methyl Ether (MTBE)	ND	8.7	ND	9.9	ND	7.9	ND	8.7
Chloroform	ND	12	ND	13	ND	11	ND	12
1,1,1-Trichloroethane	ND	13	ND	15	ND	12	ND	13
Carbon Tetrachloride	ND	15	ND	17	ND	14	ND	15
Benzene	ND	7.7	ND	8.7	ND	7.0	10	7.7
1,2-Dichloroethane	ND	9.7	ND	11	ND	8.9	ND	9.7
Trichloroethene	ND	13	ND	15	ND	12	ND	13
1,2-Dichloropropane	ND	11	ND	13	ND	10	ND	11
Bromodichloromethane	ND	16	ND	18	ND	15	ND	16
c-1,3-Dichloropropene	ND	11	ND	12	ND	10.0	ND	11
4-Methyl-2-Pentanone	ND	9.9	ND	11	ND	9.0	ND	9.9
Toluene	ND	9.1	ND	10	ND	8.3	21	9.1
t-1,3-Dichloropropene	ND	22	ND	25	ND	20	ND	22

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-01		S040301-02		S040301-03		S040301-04	
Client Sample I.D.:	VP-1-24S		VP-1-23D		VP-3-24S		VP-4-24S	
Date/Time Sampled:	3/26/25 9:03		3/26/25 10:13		3/26/25 11:40		3/26/25 12:05	
Date/Time Analyzed:	4/21/25 13:01		4/21/25 13:40		4/21/25 14:18		4/21/25 14:56	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.4		2.7		2.2		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	13	ND	15	ND	12	ND	13
Tetrachloroethene	ND	16	ND	19	ND	15	ND	16
2-Hexanone	ND	9.9	ND	11	ND	9.0	ND	9.9
Dibromochloromethane	ND	21	ND	23	ND	19	ND	21
1,2-Dibromoethane	ND	18	ND	21	ND	17	ND	18
Chlorobenzene	ND	11	ND	13	ND	10	ND	11
Ethylbenzene	ND	10	ND	12	ND	9.5	ND	10
p,&m-Xylene	ND	21	ND	24	ND	19	ND	21
o-Xylene	ND	10	ND	12	ND	9.5	11	10
Styrene	ND	10	ND	12	ND	9.3	ND	10
Bromoform	ND	25	ND	28	ND	23	ND	25
1,1,2,2-Tetrachloroethane	ND	17	ND	19	ND	15	ND	17
Benzyl Chloride	ND	12	ND	14	ND	11	ND	12
4-Ethyl Toluene	ND	12	ND	13	ND	11	ND	12
1,3,5-Trimethylbenzene	ND	12	ND	13	ND	11	ND	12
1,2,4-Trimethylbenzene	ND	12	ND	13	ND	11	ND	12
1,3-Dichlorobenzene	ND	14	ND	16	ND	13	ND	14
1,4-Dichlorobenzene	ND	14	ND	16	ND	13	ND	14
1,2-Dichlorobenzene	ND	14	ND	16	ND	13	ND	14
1,2,4-Trichlorobenzene	ND	36	ND	41	ND	33	ND	36
Hexachlorobutadiene	ND	26	ND	29	ND	23	ND	26

RL = Reporting Limit
ND = Not Detected (below RL)

Reviewed/Approved By: _____ Date 6-25-25
Mark Johnson
Operations Manager

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-05		S040301-06		S040301-07		S040301-08	
Client Sample I.D.:	VP-5-24S		VP-5-23D		VP-7-24S		VP-6-24S	
Date/Time Sampled:	3/26/25 12:46		3/26/25 13:02		3/26/25 13:52		3/26/25 14:08	
Date/Time Analyzed:	4/21/25 15:35		4/21/25 16:14		4/21/25 16:52		4/21/25 17:30	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.6		2.4		2.4		2.5	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Dichlorodifluoromethane (12)	ND	13	ND	12	ND	12	ND	12
Chloromethane	ND	5.4	ND	5.0	ND	5.0	ND	5.2
1,2-Cl-1,1,2,2-F ethane (114)	ND	18	ND	17	ND	17	ND	18
Vinyl Chloride	ND	6.6	ND	6.2	ND	6.2	ND	6.5
Bromomethane	ND	10	ND	9.3	ND	9.3	ND	9.8
Chloroethane	ND	34	ND	32	ND	32	ND	33
Trichlorofluoromethane (11)	ND	15	ND	14	ND	14	ND	14
1,1-Dichloroethene	ND	10	ND	9.5	ND	9.5	ND	10
Carbon Disulfide	17	8.1	82	7.5	8.6	7.5	22	7.9
1,1,2-Cl 1,2,2-F ethane (113)	ND	20	ND	18	ND	18	ND	19
Acetone	36	31	30	29	31	29	44	30
Methylene Chloride	ND	9.0	ND	8.4	ND	8.4	ND	8.8
t-1,2-Dichloroethene	ND	10	ND	9.5	ND	9.5	ND	10
1,1-Dichloroethane	ND	10	ND	9.7	ND	9.7	ND	10
Vinyl Acetate	ND	9.1	ND	8.5	ND	8.5	ND	8.9
c-1,2-Dichloroethene	ND	10	ND	9.5	ND	9.5	ND	10
2-Butanone	ND	38	ND	35	ND	35	ND	37
t-Butyl Methyl Ether (MTBE)	ND	9.3	ND	8.7	ND	8.7	ND	9.1
Chloroform	ND	13	ND	12	ND	12	ND	12
1,1,1-Trichloroethane	ND	14	ND	13	ND	13	ND	14
Carbon Tetrachloride	ND	16	ND	15	ND	15	ND	16
Benzene	ND	8.3	ND	7.7	ND	7.7	ND	8.1
1,2-Dichloroethane	ND	10	ND	9.7	ND	9.7	ND	10
Trichloroethene	ND	14	ND	13	ND	13	ND	14
1,2-Dichloropropane	ND	12	ND	11	ND	11	ND	12
Bromodichloromethane	ND	17	ND	16	ND	16	ND	17
c-1,3-Dichloropropene	ND	12	ND	11	ND	11	ND	11
4-Methyl-2-Pentanone	ND	11	ND	9.9	ND	9.9	ND	10
Toluene	ND	9.8	ND	9.1	ND	9.1	ND	9.5
t-1,3-Dichloropropene	ND	24	ND	22	ND	22	ND	23

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-05		S040301-06		S040301-07		S040301-08	
Client Sample I.D.:	VP-5-24S		VP-5-23D		VP-7-24S		VP-6-24S	
Date/Time Sampled:	3/26/25 12:46		3/26/25 13:02		3/26/25 13:52		3/26/25 14:08	
Date/Time Analyzed:	4/21/25 15:35		4/21/25 16:14		4/21/25 16:52		4/21/25 17:30	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.6		2.4		2.4		2.5	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	14	ND	13	ND	13	ND	14
Tetrachloroethene	ND	18	ND	16	ND	16	ND	17
2-Hexanone	ND	11	ND	9.9	ND	9.9	ND	10
Dibromochloromethane	ND	22	ND	21	ND	21	ND	22
1,2-Dibromoethane	ND	20	ND	18	ND	18	ND	19
Chlorobenzene	ND	12	ND	11	ND	11	ND	12
Ethylbenzene	ND	11	ND	10	ND	10	ND	11
p,&m-Xylene	ND	23	ND	21	ND	21	ND	22
o-Xylene	ND	11	ND	10	ND	10	ND	11
Styrene	ND	11	ND	10	ND	10	ND	11
Bromoform	ND	27	ND	25	ND	25	ND	26
1,1,2,2-Tetrachloroethane	ND	18	ND	17	ND	17	ND	17
Benzyl Chloride	ND	13	ND	12	ND	12	ND	13
4-Ethyl Toluene	ND	13	ND	12	ND	12	ND	12
1,3,5-Trimethylbenzene	ND	13	ND	12	ND	12	ND	12
1,2,4-Trimethylbenzene	ND	13	ND	12	ND	12	ND	12
1,3-Dichlorobenzene	ND	16	ND	14	ND	14	ND	15
1,4-Dichlorobenzene	ND	16	ND	14	ND	14	ND	15
1,2-Dichlorobenzene	ND	16	ND	14	ND	14	ND	15
1,2,4-Trichlorobenzene	ND	38	ND	36	ND	36	ND	38
Hexachlorobutadiene	ND	28	ND	26	ND	26	ND	27

RL = Reporting Limit
ND = Not Detected (below RL)

Reviewed/Approved By: _____ Date 6-25-25
Mark Johnson
Operations Manager

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-09		S040301-10		S040301-11		S040301-12	
Client Sample I.D.:	VP-9-24S		VP-9-23D		VP-10-24S		VP-10-23D	
Date/Time Sampled:	3/27/25 10:16		3/27/25 10:53		3/27/25 11:21		3/27/25 11:55	
Date/Time Analyzed:	4/21/25 18:09		4/21/25 18:47		4/21/25 19:26		4/21/25 20:04	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.3		2.4		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Dichlorodifluoromethane (12)	ND	11	ND	12	ND	12	ND	12
Chloromethane	ND	4.7	ND	5.0	ND	5.0	ND	5.0
1,2-Cl-1,1,2,2-F ethane (114)	ND	16	ND	17	ND	17	ND	17
Vinyl Chloride	ND	5.9	ND	6.2	ND	6.2	ND	6.2
Bromomethane	ND	8.9	ND	9.3	ND	9.3	ND	9.3
Chloroethane	ND	30	ND	32	ND	32	ND	32
Trichlorofluoromethane (11)	ND	13	ND	14	ND	14	ND	14
1,1-Dichloroethene	ND	9.1	ND	9.5	ND	9.5	ND	9.5
Carbon Disulfide	38	7.1	42	7.5	28	7.5	25	7.5
1,1,2-Cl 1,2,2-F ethane (113)	ND	18	ND	18	ND	18	ND	18
Acetone	40	27	35	29	ND	29	120	29
Methylene Chloride	ND	8.0	ND	8.4	ND	8.4	ND	8.4
t-1,2-Dichloroethene	ND	9.1	ND	9.5	ND	9.5	ND	9.5
1,1-Dichloroethane	ND	9.3	ND	9.7	ND	9.7	ND	9.7
Vinyl Acetate	ND	8.1	ND	8.5	ND	8.5	ND	8.5
c-1,2-Dichloroethene	ND	9.1	ND	9.5	ND	9.5	ND	9.5
2-Butanone	ND	34	ND	35	ND	35	180	35
t-Butyl Methyl Ether (MTBE)	ND	8.3	ND	8.7	ND	8.7	ND	8.7
Chloroform	ND	11	ND	12	ND	12	ND	12
1,1,1-Trichloroethane	ND	13	ND	13	ND	13	ND	13
Carbon Tetrachloride	ND	14	ND	15	ND	15	ND	15
Benzene	ND	7.3	ND	7.7	ND	7.7	ND	7.7
1,2-Dichloroethane	ND	9.3	ND	9.7	ND	9.7	ND	9.7
Trichloroethene	ND	12	ND	13	ND	13	ND	13
1,2-Dichloropropane	ND	11	ND	11	ND	11	17	11
Bromodichloromethane	ND	15	ND	16	ND	16	ND	16
c-1,3-Dichloropropene	ND	10	ND	11	ND	11	ND	11
4-Methyl-2-Pentanone	ND	9.4	ND	9.9	ND	9.9	ND	9.9
Toluene	ND	8.6	13	9.1	ND	9.1	100	9.1
t-1,3-Dichloropropene	ND	21	ND	22	ND	22	ND	22

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-09		S040301-10		S040301-11		S040301-12	
Client Sample I.D.:	VP-9-24S		VP-9-23D		VP-10-24S		VP-10-23D	
Date/Time Sampled:	3/27/25 10:16		3/27/25 10:53		3/27/25 11:21		3/27/25 11:55	
Date/Time Analyzed:	4/21/25 18:09		4/21/25 18:47		4/21/25 19:26		4/21/25 20:04	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.3		2.4		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	13	ND	13	ND	13	ND	13
Tetrachloroethene	ND	16	ND	16	ND	16	ND	16
2-Hexanone	ND	9.4	ND	9.9	ND	9.9	ND	9.9
Dibromochloromethane	ND	20	ND	21	ND	21	ND	21
1,2-Dibromoethane	ND	18	ND	18	ND	18	ND	18
Chlorobenzene	ND	11	ND	11	ND	11	ND	11
Ethylbenzene	ND	10.0	ND	10	ND	10	ND	10
p,&m-Xylene	ND	20	ND	21	ND	21	ND	21
o-Xylene	ND	10.0	ND	10	ND	10	11	10
Styrene	ND	9.8	ND	10	ND	10	29	10
Bromoform	ND	24	ND	25	ND	25	ND	25
1,1,2,2-Tetrachloroethane	ND	16	ND	17	ND	17	ND	17
Benzyl Chloride	ND	12	ND	12	ND	12	ND	12
4-Ethyl Toluene	ND	11	ND	12	ND	12	ND	12
1,3,5-Trimethylbenzene	ND	11	ND	12	ND	12	ND	12
1,2,4-Trimethylbenzene	ND	11	ND	12	ND	12	ND	12
1,3-Dichlorobenzene	ND	14	ND	14	ND	14	ND	14
1,4-Dichlorobenzene	ND	14	ND	14	ND	14	ND	14
1,2-Dichlorobenzene	ND	14	ND	14	ND	14	ND	14
1,2,4-Trichlorobenzene	ND	34	ND	36	ND	36	ND	36
Hexachlorobutadiene	ND	24	ND	26	ND	26	ND	26

RL = Reporting Limit
ND = Not Detected (below RL)

Reviewed/Approved By: Amika Sotelo-Sanchez
Mark Johnson
Operations Manager

Date 6-25-25

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-13		S040301-14		S040301-15		S040301-16	
Client Sample I.D.:	VP-13-24S		VP-13-23D		VP-14-23D		VP-2-23D	
Date/Time Sampled:	3/27/25 12:52		3/27/25 13:37		3/27/25 14:29		3/28/25 8:22	
Date/Time Analyzed:	4/21/25 20:42		4/21/25 21:19		4/21/25 21:57		4/21/25 22:34	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.7		2.4		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Dichlorodifluoromethane (12)	ND	14	ND	12	ND	12	ND	12
Chloromethane	ND	5.6	ND	5.0	ND	5.0	ND	5.0
1,2-Cl-1,1,2,2-F ethane (114)	ND	19	ND	17	ND	17	ND	17
Vinyl Chloride	ND	7.0	ND	6.2	ND	6.2	ND	6.2
Bromomethane	ND	11	ND	9.3	ND	9.3	ND	9.3
Chloroethane	ND	36	ND	32	ND	32	ND	32
Trichlorofluoromethane (11)	ND	15	ND	14	ND	14	ND	14
1,1-Dichloroethene	ND	11	ND	9.5	ND	9.5	ND	9.5
Carbon Disulfide	ND	8.5	84	7.5	72	7.5	13	7.5
1,1,2-Cl 1,2,2-F ethane (113)	ND	21	ND	18	ND	18	ND	18
Acetone	49	32	63	29	53	29	59	29
Methylene Chloride	ND	9.5	ND	8.4	ND	8.4	ND	8.4
t-1,2-Dichloroethene	ND	11	ND	9.5	ND	9.5	ND	9.5
1,1-Dichloroethane	ND	11	ND	9.7	ND	9.7	ND	9.7
Vinyl Acetate	ND	9.6	ND	8.5	ND	8.5	ND	8.5
c-1,2-Dichloroethene	ND	11	ND	9.5	ND	9.5	ND	9.5
2-Butanone	ND	40	ND	35	ND	35	ND	35
t-Butyl Methyl Ether (MTBE)	ND	9.8	ND	8.7	ND	8.7	ND	8.7
Chloroform	ND	13	ND	12	ND	12	ND	12
1,1,1-Trichloroethane	ND	15	ND	13	ND	13	ND	13
Carbon Tetrachloride	ND	17	ND	15	ND	15	ND	15
Benzene	ND	8.7	ND	7.7	ND	7.7	9.4	7.7
1,2-Dichloroethane	ND	11	ND	9.7	ND	9.7	ND	9.7
Trichloroethene	ND	15	ND	13	ND	13	ND	13
1,2-Dichloropropane	ND	13	ND	11	ND	11	ND	11
Bromodichloromethane	ND	18	ND	16	ND	16	ND	16
c-1,3-Dichloropropene	ND	12	ND	11	ND	11	ND	11
4-Methyl-2-Pentanone	ND	11	ND	9.9	ND	9.9	ND	9.9
Toluene	ND	10	ND	9.1	11	9.1	ND	9.1
t-1,3-Dichloropropene	ND	25	ND	22	ND	22	ND	22

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-13		S040301-14		S040301-15		S040301-16	
Client Sample I.D.:	VP-13-24S		VP-13-23D		VP-14-23D		VP-2-23D	
Date/Time Sampled:	3/27/25 12:52		3/27/25 13:37		3/27/25 14:29		3/28/25 8:22	
Date/Time Analyzed:	4/21/25 20:42		4/21/25 21:19		4/21/25 21:57		4/21/25 22:34	
QC Batch No.:	250421MS2A1		250421MS2A1		250421MS2A1		250421MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.7		2.4		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	15	ND	13	ND	13	ND	13
Tetrachloroethene	ND	19	ND	16	ND	16	ND	16
2-Hexanone	ND	11	ND	9.9	ND	9.9	ND	9.9
Dibromochloromethane	ND	23	ND	21	ND	21	ND	21
1,2-Dibromoethane	ND	21	ND	18	ND	18	ND	18
Chlorobenzene	ND	13	ND	11	ND	11	ND	11
Ethylbenzene	ND	12	ND	10	ND	10	ND	10
p,&m-Xylene	ND	24	ND	21	ND	21	ND	21
o-Xylene	ND	12	ND	10	ND	10	ND	10
Styrene	ND	12	ND	10	ND	10	ND	10
Bromoform	ND	28	ND	25	ND	25	ND	25
1,1,2,2-Tetrachloroethane	ND	19	ND	17	ND	17	ND	17
Benzyl Chloride	ND	14	ND	12	ND	12	ND	12
4-Ethyl Toluene	ND	13	ND	12	ND	12	ND	12
1,3,5-Trimethylbenzene	ND	13	ND	12	ND	12	ND	12
1,2,4-Trimethylbenzene	ND	13	ND	12	ND	12	ND	12
1,3-Dichlorobenzene	ND	16	ND	14	ND	14	ND	14
1,4-Dichlorobenzene	ND	16	ND	14	ND	14	ND	14
1,2-Dichlorobenzene	ND	16	ND	14	ND	14	ND	14
1,2,4-Trichlorobenzene	ND	41	ND	36	ND	36	ND	36
Hexachlorobutadiene	ND	29	ND	26	ND	26	ND	26

RL = Reporting Limit
ND = Not Detected (below RL)

Reviewed/Approved By: _____ Date 6-25-25
Mark Johnson
Operations Manager

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-17		S040301-18		S040301-19		S040301-20	
Client Sample I.D.:	VP-12-24S		VP-17-23D		VP-17-24S		VP-18-23D	
Date/Time Sampled:	3/28/25 8:54		3/28/25 9:19		3/28/25 9:31		3/28/25 11:21	
Date/Time Analyzed:	4/21/25 23:12		4/21/25 23:49		4/22/25 15:10		4/22/25 15:48	
QC Batch No.:	250421MS2A1		250421MS2A1		250422MS2A1		250422MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.5		2.4		2.4		2.6	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Dichlorodifluoromethane (12)	ND	12	ND	12	ND	12	ND	13
Chloromethane	ND	5.2	ND	5.0	9.8	5.0	ND	5.4
1,2-Cl-1,1,2,2-F ethane (114)	ND	18	ND	17	ND	17	ND	18
Vinyl Chloride	ND	6.5	ND	6.2	ND	6.2	ND	6.6
Bromomethane	ND	9.8	ND	9.3	ND	9.3	ND	10
Chloroethane	ND	33	ND	32	ND	32	ND	34
Trichlorofluoromethane (11)	ND	14	ND	14	ND	14	ND	15
1,1-Dichloroethene	ND	10	ND	9.5	ND	9.5	ND	10
Carbon Disulfide	120	7.9	20	7.5	16	7.5	11	8.1
1,1,2-Cl 1,2,2-F ethane (113)	ND	19	ND	18	ND	18	ND	20
Acetone	49	30	30	29	29 Q	29	31 Q	31
Methylene Chloride	ND	8.8	ND	8.4	ND	8.4	ND	9.0
t-1,2-Dichloroethene	ND	10	ND	9.5	ND	9.5	ND	10
1,1-Dichloroethane	ND	10	ND	9.7	ND	9.7	ND	10
Vinyl Acetate	ND	8.9	ND	8.5	ND	8.5	ND	9.1
c-1,2-Dichloroethene	ND	10	ND	9.5	ND	9.5	ND	10
2-Butanone	ND	37	ND	35	ND	35	ND	38
t-Butyl Methyl Ether (MTBE)	ND	9.1	ND	8.7	ND	8.7	ND	9.3
Chloroform	ND	12	ND	12	ND	12	ND	13
1,1,1-Trichloroethane	ND	14	ND	13	ND	13	ND	14
Carbon Tetrachloride	ND	16	ND	15	ND	15	ND	16
Benzene	ND	8.1	8.9	7.7	ND	7.7	ND	8.3
1,2-Dichloroethane	ND	10	ND	9.7	ND	9.7	ND	10
Trichloroethene	ND	14	ND	13	ND	13	ND	14
1,2-Dichloropropane	ND	12	ND	11	ND	11	ND	12
Bromodichloromethane	ND	17	ND	16	ND	16	ND	17
c-1,3-Dichloropropene	ND	11	ND	11	ND	11	ND	12
4-Methyl-2-Pentanone	ND	10	ND	9.9	ND	9.9	ND	11
Toluene	ND	9.5	ND	9.1	ND	9.1	ND	9.8
t-1,3-Dichloropropene	ND	23	ND	22	ND	22	ND	24

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-17		S040301-18		S040301-19		S040301-20	
Client Sample I.D.:	VP-12-24S		VP-17-23D		VP-17-24S		VP-18-23D	
Date/Time Sampled:	3/28/25 8:54		3/28/25 9:19		3/28/25 9:31		3/28/25 11:21	
Date/Time Analyzed:	4/21/25 23:12		4/21/25 23:49		4/22/25 15:10		4/22/25 15:48	
QC Batch No.:	250421MS2A1		250421MS2A1		250422MS2A1		250422MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.5		2.4		2.4		2.6	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	14	ND	13	ND	13	ND	14
Tetrachloroethene	ND	17	ND	16	ND	16	ND	18
2-Hexanone	ND	10	ND	9.9	ND	9.9	ND	11
Dibromochloromethane	ND	22	ND	21	ND	21	ND	22
1,2-Dibromoethane	ND	19	ND	18	ND	18	ND	20
Chlorobenzene	ND	12	ND	11	ND	11	ND	12
Ethylbenzene	ND	11	ND	10	ND	10	ND	11
p,&m-Xylene	ND	22	ND	21	ND	21	ND	23
o-Xylene	ND	11	ND	10	ND	10	ND	11
Styrene	ND	11	ND	10	ND	10	ND	11
Bromoform	ND	26	ND	25	ND	25	ND	27
1,1,2,2-Tetrachloroethane	ND	17	ND	17	ND	17	ND	18
Benzyl Chloride	ND	13	ND	12	ND	12	ND	13
4-Ethyl Toluene	ND	12	ND	12	ND	12	ND	13
1,3,5-Trimethylbenzene	ND	12	ND	12	ND	12	ND	13
1,2,4-Trimethylbenzene	ND	12	ND	12	ND	12	ND	13
1,3-Dichlorobenzene	ND	15	ND	14	ND	14	ND	16
1,4-Dichlorobenzene	ND	15	ND	14	ND	14	ND	16
1,2-Dichlorobenzene	ND	15	ND	14	ND	14	ND	16
1,2,4-Trichlorobenzene	ND	38	ND	36	ND	36	ND	38
Hexachlorobutadiene	ND	27	ND	26	ND	26	ND	28

RL = Reporting Limit
ND = Not Detected (below RL)
Q = See Report Narrative

Reviewed/Approved By: Amina Sotelo-Sanchez for
Mark Johnson
Operations Manager

Date 6-25-25

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-21		S040301-22		S040301-23		S040301-24	
Client Sample I.D.:	VP-18-24S		VP-19-23D		VP-19-24S		VP-22-24S	
Date/Time Sampled:	3/28/25 11:23		3/28/25 12:26		3/28/25 12:52		3/28/25 13:20	
Date/Time Analyzed:	4/22/25 16:26		4/22/25 17:04		4/22/25 17:43		4/23/25 12:21	
QC Batch No.:	250422MS2A1		250422MS2A1		250422MS2A1		250423MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.4		2.4		2.5		2.6	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Dichlorodifluoromethane (12)	ND	12	ND	12	ND	12	ND	13
Chloromethane	ND	5.0	38	5.0	ND	5.2	ND	5.4
1,2-Cl-1,1,2,2-F ethane (114)	ND	17	ND	17	ND	18	ND	18
Vinyl Chloride	ND	6.2	ND	6.2	ND	6.5	ND	6.6
Bromomethane	ND	9.3	ND	9.3	ND	9.8	ND	10
Chloroethane	ND	32	ND	32	ND	33	ND	34
Trichlorofluoromethane (11)	ND	14	110	14	29	14	ND	15
1,1-Dichloroethene	ND	9.5	ND	9.5	ND	10	ND	10
Carbon Disulfide	19	7.5	82	7.5	19	7.9	33	8.1
1,1,2-Cl 1,2,2-F ethane (113)	ND	18	ND	18	ND	19	ND	20
Acetone	36 Q	29	62 Q	29	68 Q	30	95	31
Methylene Chloride	ND	8.4	ND	8.4	ND	8.8	ND	9.0
t-1,2-Dichloroethene	ND	9.5	ND	9.5	ND	10	ND	10
1,1-Dichloroethane	ND	9.7	ND	9.7	ND	10	ND	10
Vinyl Acetate	ND	8.5	ND	8.5	ND	8.9	ND	9.1
c-1,2-Dichloroethene	ND	9.5	ND	9.5	ND	10	ND	10
2-Butanone	ND	35	ND	35	46	37	89	38
t-Butyl Methyl Ether (MTBE)	ND	8.7	ND	8.7	ND	9.1	ND	9.3
Chloroform	ND	12	ND	12	ND	12	ND	13
1,1,1-Trichloroethane	ND	13	ND	13	ND	14	ND	14
Carbon Tetrachloride	ND	15	ND	15	ND	16	ND	16
Benzene	ND	7.7	ND	7.7	ND	8.1	17	8.3
1,2-Dichloroethane	ND	9.7	ND	9.7	ND	10	ND	10
Trichloroethene	ND	13	ND	13	ND	14	ND	14
1,2-Dichloropropane	ND	11	ND	11	ND	12	ND	12
Bromodichloromethane	ND	16	ND	16	ND	17	ND	17
c-1,3-Dichloropropene	ND	11	ND	11	ND	11	ND	12
4-Methyl-2-Pentanone	ND	9.9	ND	9.9	ND	10	ND	11
Toluene	ND	9.1	ND	9.1	ND	9.5	ND	9.8
t-1,3-Dichloropropene	ND	22	ND	22	ND	23	ND	24

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-21		S040301-22		S040301-23		S040301-24	
Client Sample I.D.:	VP-18-24S		VP-19-23D		VP-19-24S		VP-22-24S	
Date/Time Sampled:	3/28/25 11:23		3/28/25 12:26		3/28/25 12:52		3/28/25 13:20	
Date/Time Analyzed:	4/22/25 16:26		4/22/25 17:04		4/22/25 17:43		4/23/25 12:21	
QC Batch No.:	250422MS2A1		250422MS2A1		250422MS2A1		250423MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.4		2.4		2.5		2.6	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	13	ND	13	ND	14	ND	14
Tetrachloroethene	ND	16	ND	16	ND	17	ND	18
2-Hexanone	ND	9.9	ND	9.9	ND	10	ND	11
Dibromochloromethane	ND	21	ND	21	ND	22	ND	22
1,2-Dibromoethane	ND	18	ND	18	ND	19	ND	20
Chlorobenzene	ND	11	ND	11	ND	12	ND	12
Ethylbenzene	ND	10	ND	10	ND	11	ND	11
p,&m-Xylene	ND	21	ND	21	ND	22	ND	23
o-Xylene	ND	10	ND	10	ND	11	ND	11
Styrene	ND	10	ND	10	ND	11	ND	11
Bromoform	ND	25	ND	25	ND	26	ND	27
1,1,2,2-Tetrachloroethane	ND	17	ND	17	ND	17	ND	18
Benzyl Chloride	ND	12	ND	12	ND	13	ND	13
4-Ethyl Toluene	ND	12	ND	12	ND	12	ND	13
1,3,5-Trimethylbenzene	ND	12	ND	12	ND	12	ND	13
1,2,4-Trimethylbenzene	ND	12	ND	12	ND	12	ND	13
1,3-Dichlorobenzene	ND	14	ND	14	ND	15	ND	16
1,4-Dichlorobenzene	ND	14	ND	14	ND	15	ND	16
1,2-Dichlorobenzene	ND	14	ND	14	ND	15	ND	16
1,2,4-Trichlorobenzene	ND	36	ND	36	ND	38	ND	38
Hexachlorobutadiene	ND	26	ND	26	ND	27	ND	28

RL = Reporting Limit
ND = Not Detected (below RL)
Q = See Report Narrative

Reviewed/Approved By: Anika Sánchez
Mark Johnson
Operations Manager

Date 6-25-25

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-25		S040301-26		S040301-27		S040301-28	
Client Sample I.D.:	VP-25-24S		VP-23-24S		VP-24-24S		VP-14-24S	
Date/Time Sampled:	3/29/25 8:34		3/29/25 8:55		3/29/25 9:20		3/29/25 10:10	
Date/Time Analyzed:	4/23/25 13:53		4/23/25 14:31		4/23/25 15:09		4/23/25 15:47	
QC Batch No.:	250423MS2A1		250423MS2A1		250423MS2A1		250423MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.4		2.5		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Dichlorodifluoromethane (12)	ND	12	ND	12	ND	12	ND	12
Chloromethane	ND	5.0	ND	5.1	ND	5.0	ND	5.0
1,2-Cl-1,1,2,2-F ethane (114)	ND	17	ND	17	ND	17	ND	17
Vinyl Chloride	ND	6.2	ND	6.3	ND	6.2	ND	6.2
Bromomethane	ND	9.3	ND	9.6	ND	9.3	ND	9.3
Chloroethane	ND	32	ND	33	ND	32	ND	32
Trichlorofluoromethane (11)	ND	14	ND	14	ND	14	ND	14
1,1-Dichloroethene	ND	9.5	ND	9.8	ND	9.5	ND	9.5
Carbon Disulfide	7.6	7.5	28	7.7	34	7.5	90	7.5
1,1,2-Cl 1,2,2-F ethane (113)	ND	18	ND	19	ND	18	ND	18
Acetone	ND	29	36	29	ND	29	ND	29
Methylene Chloride	ND	8.4	ND	8.6	ND	8.4	ND	8.4
t-1,2-Dichloroethene	ND	9.5	ND	9.8	ND	9.5	ND	9.5
1,1-Dichloroethane	ND	9.7	ND	10.0	ND	9.7	ND	9.7
Vinyl Acetate	ND	8.5	ND	8.7	ND	8.5	ND	8.5
c-1,2-Dichloroethene	ND	9.5	ND	9.8	ND	9.5	ND	9.5
2-Butanone	ND	35	ND	36	ND	35	ND	35
t-Butyl Methyl Ether (MTBE)	ND	8.7	ND	8.9	ND	8.7	ND	8.7
Chloroform	ND	12	ND	12	ND	12	ND	12
1,1,1-Trichloroethane	ND	13	ND	13	ND	13	ND	13
Carbon Tetrachloride	ND	15	ND	16	ND	15	ND	15
Benzene	ND	7.7	ND	7.9	ND	7.7	ND	7.7
1,2-Dichloroethane	ND	9.7	ND	10.0	ND	9.7	ND	9.7
Trichloroethene	ND	13	ND	13	ND	13	ND	13
1,2-Dichloropropane	ND	11	ND	11	ND	11	ND	11
Bromodichloromethane	ND	16	ND	17	ND	16	ND	16
c-1,3-Dichloropropene	ND	11	ND	11	ND	11	ND	11
4-Methyl-2-Pentanone	ND	9.9	ND	10	ND	9.9	ND	9.9
Toluene	ND	9.1	ND	9.3	ND	9.1	ND	9.1
t-1,3-Dichloropropene	ND	22	ND	22	ND	22	ND	22

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-25		S040301-26		S040301-27		S040301-28	
Client Sample I.D.:	VP-25-24S		VP-23-24S		VP-24-24S		VP-14-24S	
Date/Time Sampled:	3/29/25 8:34		3/29/25 8:55		3/29/25 9:20		3/29/25 10:10	
Date/Time Analyzed:	4/23/25 13:53		4/23/25 14:31		4/23/25 15:09		4/23/25 15:47	
QC Batch No.:	250423MS2A1		250423MS2A1		250423MS2A1		250423MS2A1	
Analyst Initials:	RC		RC		RC		RC	
Dilution Factor:	2.4		2.5		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	13	ND	13	ND	13	ND	13
Tetrachloroethene	ND	16	ND	17	ND	16	ND	16
2-Hexanone	ND	9.9	ND	10	ND	9.9	ND	9.9
Dibromochloromethane	ND	21	ND	21	ND	21	ND	21
1,2-Dibromoethane	ND	18	ND	19	ND	18	ND	18
Chlorobenzene	ND	11	ND	11	ND	11	ND	11
Ethylbenzene	ND	10	ND	11	ND	10	ND	10
p,&m-Xylene	ND	21	ND	21	ND	21	ND	21
o-Xylene	ND	10	ND	11	ND	10	ND	10
Styrene	ND	10	ND	11	ND	10	ND	10
Bromoform	ND	25	ND	25	ND	25	ND	25
1,1,2,2-Tetrachloroethane	ND	17	ND	17	ND	17	ND	17
Benzyl Chloride	ND	12	ND	13	ND	12	ND	12
4-Ethyl Toluene	ND	12	ND	12	ND	12	ND	12
1,3,5-Trimethylbenzene	ND	12	ND	12	ND	12	ND	12
1,2,4-Trimethylbenzene	ND	12	ND	12	ND	12	ND	12
1,3-Dichlorobenzene	ND	14	ND	15	ND	14	ND	14
1,4-Dichlorobenzene	ND	14	ND	15	ND	14	ND	14
1,2-Dichlorobenzene	ND	14	ND	15	ND	14	ND	14
1,2,4-Trichlorobenzene	ND	36	ND	37	ND	36	ND	36
Hexachlorobutadiene	ND	26	ND	26	ND	26	ND	26

RL = Reporting Limit
ND = Not Detected (below RL)

Reviewed/Approved By: Anita Sattelmeyer for
Mark Johnson
Operations Manager

Date 6-25-25

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-29							
Client Sample I.D.:	VP-15-24S							
Date/Time Sampled:	3/29/25 10:39							
Date/Time Analyzed:	4/23/25 16:25							
QC Batch No.:	250423MS2A1							
Analyst Initials:	RC							
Dilution Factor:	2.6							

ANALYTE	Result ug/m3	RL ug/m3						
Dichlorodifluoromethane (12)	ND	13						
Chloromethane	ND	5.4						
1,2-Cl-1,1,2,2-F ethane (114)	ND	18						
Vinyl Chloride	ND	6.6						
Bromomethane	ND	10						
Chloroethane	ND	34						
Trichlorofluoromethane (11)	ND	15						
1,1-Dichloroethene	ND	10						
Carbon Disulfide	42	8.1						
1,1,2-Cl 1,2,2-F ethane (113)	ND	20						
Acetone	56	31						
Methylene Chloride	ND	9.0						
t-1,2-Dichloroethene	ND	10						
1,1-Dichloroethane	ND	10						
Vinyl Acetate	ND	9.1						
c-1,2-Dichloroethene	ND	10						
2-Butanone	ND	38						
t-Butyl Methyl Ether (MTBE)	ND	9.3						
Chloroform	ND	13						
1,1,1-Trichloroethane	ND	14						
Carbon Tetrachloride	ND	16						
Benzene	ND	8.3						
1,2-Dichloroethane	ND	10						
Trichloroethene	ND	14						
1,2-Dichloropropane	ND	12						
Bromodichloromethane	ND	17						
c-1,3-Dichloropropene	ND	12						
4-Methyl-2-Pentanone	ND	11						
Toluene	ND	9.8						
t-1,3-Dichloropropene	ND	24						

AirTECHNOLOGY Laboratories, Inc.
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Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	S040301-29
Client Sample I.D.:	VP-15-24S
Date/Time Sampled:	3/29/25 10:39
Date/Time Analyzed:	4/23/25 16:25
QC Batch No.:	250423MS2A1
Analyst Initials:	RC
Dilution Factor:	2.6

ANALYTE	Result ug/m3	RL ug/m3
1,1,2-Trichloroethane	ND	14
Tetrachloroethene	ND	18
2-Hexanone	ND	11
Dibromochloromethane	ND	22
1,2-Dibromoethane	ND	20
Chlorobenzene	ND	12
Ethylbenzene	ND	11
p,&m-Xylene	ND	23
o-Xylene	ND	11
Styrene	ND	11
Bromoform	ND	27
1,1,2,2-Tetrachloroethane	ND	18
Benzyl Chloride	ND	13
4-Ethyl Toluene	ND	13
1,3,5-Trimethylbenzene	ND	13
1,2,4-Trimethylbenzene	ND	13
1,3-Dichlorobenzene	ND	16
1,4-Dichlorobenzene	ND	16
1,2-Dichlorobenzene	ND	16
1,2,4-Trichlorobenzene	ND	38
Hexachlorobutadiene	ND	28

RL = Reporting Limit
ND = Not Detected (below RL)

Reviewed/Approved By: Mark Johnson
Operations Manager

Date 6-25-25

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	METHOD_BLANK		METHOD_BLANK		METHOD_BLANK			
Client Sample I.D.:	--		--		--			
Date/Time Sampled:	--		--		--			
Date/Time Analyzed:	4/21/25 12:09		4/22/25 10:34		4/23/25 11:43			
QC Batch No.:	250421MS2A1		250422MS2A1		250423MS2A1			
Analyst Initials:	RC		RC		RC			
Dilution Factor:	0.20		0.20		0.20			
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3		
Dichlorodifluoromethane (12)	ND	0.99	ND	0.99	ND	0.99		
Chloromethane	ND	0.41	ND	0.41	ND	0.41		
1,2-Cl-1,1,2,2-F ethane (114)	ND	1.4	ND	1.4	ND	1.4		
Vinyl Chloride	ND	0.51	ND	0.51	ND	0.51		
Bromomethane	ND	0.78	ND	0.78	ND	0.78		
Chloroethane	ND	2.6	ND	2.6	ND	2.6		
Trichlorofluoromethane (11)	ND	1.1	ND	1.1	ND	1.1		
1,1-Dichloroethene	ND	0.79	ND	0.79	ND	0.79		
Carbon Disulfide	ND	0.62	ND	0.62	ND	0.62		
1,1,2-Cl 1,2,2-F ethane (113)	ND	1.5	ND	1.5	ND	1.5		
Acetone	ND	2.4	ND	2.4	ND	2.4		
Methylene Chloride	ND	0.69	ND	0.69	ND	0.69		
t-1,2-Dichloroethene	ND	0.79	ND	0.79	ND	0.79		
1,1-Dichloroethane	ND	0.81	ND	0.81	ND	0.81		
Vinyl Acetate	ND	0.70	ND	0.70	ND	0.70		
c-1,2-Dichloroethene	ND	0.79	ND	0.79	ND	0.79		
2-Butanone	ND	2.9	ND	2.9	ND	2.9		
t-Butyl Methyl Ether (MTBE)	ND	0.72	ND	0.72	ND	0.72		
Chloroform	ND	0.98	ND	0.98	ND	0.98		
1,1,1-Trichloroethane	ND	1.1	ND	1.1	ND	1.1		
Carbon Tetrachloride	ND	1.3	ND	1.3	ND	1.3		
Benzene	ND	0.64	ND	0.64	ND	0.64		
1,2-Dichloroethane	ND	0.81	ND	0.81	ND	0.81		
Trichloroethene	ND	1.1	ND	1.1	ND	1.1		
1,2-Dichloropropane	ND	0.92	ND	0.92	ND	0.92		
Bromodichloromethane	ND	1.3	ND	1.3	ND	1.3		
c-1,3-Dichloropropene	ND	0.91	ND	0.91	ND	0.91		
4-Methyl-2-Pentanone	ND	0.82	ND	0.82	ND	0.82		
Toluene	ND	0.75	ND	0.75	ND	0.75		
t-1,3-Dichloropropene	ND	1.8	ND	1.8	ND	1.8		

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

EPA Method TO-15

Lab No.:	METHOD_BLANK		METHOD_BLANK		METHOD_BLANK			
Client Sample I.D.:	--		--		--			
Date/Time Sampled:	--		--		--			
Date/Time Analyzed:	4/21/25 12:09		4/22/25 10:34		4/23/25 11:43			
QC Batch No.:	250421MS2A1		250422MS2A1		250423MS2A1			
Analyst Initials:	RC		RC		RC			
Dilution Factor:	0.20		0.20		0.20			
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3		
1,1,2-Trichloroethane	ND	1.1	ND	1.1	ND	1.1		
Tetrachloroethene	ND	1.4	ND	1.4	ND	1.4		
2-Hexanone	ND	0.82	ND	0.82	ND	0.82		
Dibromochloromethane	ND	1.7	ND	1.7	ND	1.7		
1,2-Dibromoethane	ND	1.5	ND	1.5	ND	1.5		
Chlorobenzene	ND	0.92	ND	0.92	ND	0.92		
Ethylbenzene	ND	0.87	ND	0.87	ND	0.87		
p,&m-Xylene	ND	1.7	ND	1.7	ND	1.7		
o-Xylene	ND	0.87	ND	0.87	ND	0.87		
Styrene	ND	0.85	ND	0.85	ND	0.85		
Bromoform	ND	2.1	ND	2.1	ND	2.1		
1,1,2,2-Tetrachloroethane	ND	1.4	ND	1.4	ND	1.4		
Benzyl Chloride	ND	1.0	ND	1.0	ND	1.0		
4-Ethyl Toluene	ND	0.98	ND	0.98	ND	0.98		
1,3,5-Trimethylbenzene	ND	0.98	ND	0.98	ND	0.98		
1,2,4-Trimethylbenzene	ND	0.98	ND	0.98	ND	0.98		
1,3-Dichlorobenzene	ND	1.2	ND	1.2	ND	1.2		
1,4-Dichlorobenzene	ND	1.2	ND	1.2	ND	1.2		
1,2-Dichlorobenzene	ND	1.2	ND	1.2	ND	1.2		
1,2,4-Trichlorobenzene	ND	3.0	ND	3.0	ND	3.0		
Hexachlorobutadiene	ND	2.1	ND	2.1	ND	2.1		

RL = Reporting Limit
ND = Not Detected (below RL)

Reviewed/Approved By: Anika Sotelo-Sanchez
Mark Johnson
Operations Manager

Date 5-06-25

The cover letter is an integral part of this analytical report

AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

LCS/LCSD Recovery and RPD Summary Report

QC Batch #: 250421MS2A1

Matrix: Air

Reporting Units: ug/m3

EPA Method TO-15
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	4/21/25 12:09			4/21/25 10:51		4/21/25 11:30					
Analyst Initials:	AS			AS		AS					
Dilution Factor:	0.20			1.0		1.0					
ANALYTE	Result ug/m3	RL ug/m3	AMT. ug/m3	Result ug/m3	% Rec.	Result ug/m3	% Rec.	RPD	Low %Rec	High %Rec	Max. RPD
1,1-Dichloroethene	ND	0.79	40	43.6	110	44.8	113	2.8	70	130	30
Methylene Chloride	ND	0.69	35	39.0	112	40.4	116	3.5	70	130	30
Trichloroethene	ND	1.1	54	61.1	114	61.4	114	0.4	70	130	30
Toluene	ND	0.75	38	41.3	110	40.6	108	1.7	70	130	30
1,1,2,2-Tetrachloroethane	ND	1.4	69	73.3	107	74.8	109	2.0	70	130	30

ND = Not Detected (below RL)
RL = Reporting Limit

Reviewed/Approved By: Anika Sotelo Sanchez for
Mark Johnson
Operations Manager

Date: 5-06-25

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LCS/LCSD Recovery and RPD Summary Report

QC Batch #: 250422MS2A1

Matrix: Air

Reporting Units: ug/m3

EPA Method TO-15
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	4/22/25 10:34			4/22/25 6:48		4/22/25 7:52					
Analyst Initials:	RC			RC		RC					
Dilution Factor:	0.20			1.0		1.0					
ANALYTE	Result ug/m3	RL ug/m3	AMT. ug/m3	Result ug/m3	% Rec.	Result ug/m3	% Rec.	RPD	Low %Rec	High %Rec	Max. RPD
1,1-Dichloroethene	ND	0.79	40	48.4	122	46.6	118	3.8	70	130	30
Methylene Chloride	ND	0.69	35	41.3	119	40.6	117	1.6	70	130	30
Trichloroethene	ND	1.1	54	61.3	114	61.3	114	0.1	70	130	30
Toluene	ND	0.75	38	41.6	110	41.9	111	0.8	70	130	30
1,1,2,2-Tetrachloroethane	ND	1.4	69	77.3	113	74.7	109	3.4	70	130	30

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Reviewed/Approved By: Mark Johnson
Operations Manager

Date: 5-06-25

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LCS/LCSD Recovery and RPD Summary Report

QC Batch #: 250423MS2A1

Matrix: Air

Reporting Units: ug/m3

EPA Method TO-15
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	4/23/25 11:43			4/23/25 10:26		4/23/25 11:04					
Analyst Initials:	RC			RC		RC					
Dilution Factor:	0.20			1.0		1.0					
ANALYTE	Result ug/m3	RL ug/m3	AMT. ug/m3	Result ug/m3	% Rec.	Result ug/m3	% Rec.	RPD	Low %Rec	High %Rec	Max. RPD
1,1-Dichloroethene	ND	0.79	40	41.7	105	42.3	107	1.5	70	130	30
Methylene Chloride	ND	0.69	35	36.7	106	37.4	108	1.7	70	130	30
Trichloroethene	ND	1.1	54	57.4	107	57.1	106	0.5	70	130	30
Toluene	ND	0.75	38	38.9	103	38.8	103	0.4	70	130	30
1,1,2,2-Tetrachloroethane	ND	1.4	69	70.7	103	71.8	105	1.6	70	130	30

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Reviewed/Approved By: Anita Sotelo Sanchez
Mark Johnson
Operations Manager

Date: 5-06-25

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AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-01		S040301-02		S040301-03		S040301-04	
Client Sample I.D.:	VP-1-24S		VP-1-23D		VP-3-24S		VP-4-24S	
Date/Time Sampled:	3/26/25 9:03		3/26/25 10:13		3/26/25 11:40		3/26/25 12:05	
Date/Time Analyzed:	4/11/25 13:27		4/11/25 13:41		4/11/25 13:56		4/11/25 14:10	
QC Batch No.:	250411GC8A1		250411GC8A1		250411GC8A1		250411GC8A1	
Analyst Initials:	KD		KD		KD		KD	
Dilution Factor:	2.4		2.7		2.2		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Carbon Dioxide	37,000,000	430,000	79,000,000	490,000	170,000,000	390,000	430,000,000	430,000
Oxygen/Argon	220,000,000	16,000,000	170,000,000	18,000,000	19,000,000	14,000,000	ND	16,000,000
Nitrogen	930,000,000	28,000,000	950,000,000	31,000,000	870,000,000	25,000,000	140,000,000	28,000,000
Methane	41,000	16,000	ND	18,000	88,000,000	14,000	420,000,000	16,000
Carbon Monoxide	ND	28,000	ND	31,000	ND	25,000	ND	28,000

Results normalized including non-methane hydrocarbons

ND = Not Detected (below RL)
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Reviewed/Approved By: _____ Date 6-25-25
Mark Johnson
Operations Manager

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Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-05		S040301-06		S040301-07		S040301-08	
Client Sample I.D.:	VP-5-24S		VP-5-23D		VP-7-24S		VP-6-24S	
Date/Time Sampled:	3/26/25 12:46		3/26/25 13:02		3/26/25 13:52		3/26/25 14:08	
Date/Time Analyzed:	4/11/25 14:25		4/11/25 14:39		4/11/25 14:54		4/11/25 15:08	
QC Batch No.:	250411GC8A1		250411GC8A1		250411GC8A1		250411GC8A1	
Analyst Initials:	KD		KD		KD		KD	
Dilution Factor:	2.6		2.4		2.4		2.5	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Carbon Dioxide	58,000,000	470,000	580,000,000	430,000	42,000,000	430,000	390,000,000	450,000
Oxygen/Argon	250,000,000	17,000,000	ND	16,000,000	250,000,000	16,000,000	ND	17,000,000
Nitrogen	890,000,000	30,000,000	150,000,000	28,000,000	900,000,000	28,000,000	650,000,000	29,000,000
Methane	140,000	17,000	350,000,000	16,000	95,000	16,000	130,000,000	17,000
Carbon Monoxide	ND	30,000	ND	28,000	ND	28,000	ND	29,000

Results normalized including non-methane hydrocarbons

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Reviewed/Approved By: Anika Sotelo Sanchez
Mark Johnson
Operations Manager

Date 6-25-25

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18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-09		S040301-10		S040301-11		S040301-12	
Client Sample I.D.:	VP-9-24S		VP-9-23D		VP-10-24S		VP-10-23D	
Date/Time Sampled:	3/27/25 10:16		3/27/25 10:53		3/27/25 11:21		3/27/25 11:55	
Date/Time Analyzed:	4/11/25 15:23		4/11/25 15:37		4/11/25 15:52		4/11/25 16:06	
QC Batch No.:	250411GC8A1		250411GC8A1		250411GC8A1		250411GC8A1	
Analyst Initials:	KD		KD		KD		KD	
Dilution Factor:	2.3		2.4		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Carbon Dioxide	190,000,000	410,000	170,000,000	430,000	130,000,000	430,000	27,000,000	430,000
Oxygen/Argon	19,000,000	15,000,000	38,000,000	16,000,000	130,000,000	16,000,000	260,000,000	16,000,000
Nitrogen	970,000,000	26,000,000	980,000,000	28,000,000	950,000,000	28,000,000	900,000,000	28,000,000
Methane	23,000,000	15,000	12,000,000	16,000	37,000	16,000	ND	16,000
Carbon Monoxide	ND	26,000	ND	28,000	ND	28,000	ND	28,000

Results normalized including non-methane hydrocarbons

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Reviewed/Approved By: Amila Sahle-Sanchez
Mark Johnson
Operations Manager

Date 6-25-25

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AirTECHNOLOGY Laboratories, Inc.
18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-13		S040301-14		S040301-15		S040301-16	
Client Sample I.D.:	VP-13-24S		VP-13-23D		VP-14-23D		VP-2-23D	
Date/Time Sampled:	3/27/25 12:52		3/27/25 13:37		3/27/25 14:29		3/28/25 8:22	
Date/Time Analyzed:	4/11/25 16:21		4/11/25 16:35		4/11/25 16:50		4/11/25 17:04	
QC Batch No.:	250411GC8A1		250411GC8A1		250411GC8A1		250411GC8A1	
Analyst Initials:	KD		KD		KD		KD	
Dilution Factor:	2.7		2.4		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Carbon Dioxide	1,800,000	490,000	3,500,000	430,000	12,000,000	430,000	43,000,000	430,000
Oxygen/Argon	280,000,000	18,000,000	280,000,000	16,000,000	270,000,000	16,000,000	160,000,000	16,000,000
Nitrogen	900,000,000	31,000,000	900,000,000	28,000,000	900,000,000	28,000,000	980,000,000	28,000,000
Methane	ND	18,000	ND	16,000	ND	16,000	94,000	16,000
Carbon Monoxide	ND	31,000	ND	28,000	ND	28,000	ND	28,000

Results normalized including non-methane hydrocarbons

ND = Not Detected (below RL)
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Reviewed/Approved By: Mark Johnson
Operations Manager

Date 6-25-25

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Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-17		S040301-18		S040301-19		S040301-20	
Client Sample I.D.:	VP-12-24S		VP-17-23D		VP-17-24S		VP-18-23D	
Date/Time Sampled:	3/28/25 8:54		3/28/25 9:19		3/28/25 9:31		3/28/25 11:21	
Date/Time Analyzed:	4/11/25 17:19		4/11/25 17:33		4/15/25 11:31		4/15/25 11:46	
QC Batch No.:	250411GC8A1		250411GC8A1		250415GC8A1		250415GC8A1	
Analyst Initials:	KD		KD		KD		KD	
Dilution Factor:	2.5		2.4		2.4		2.6	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Carbon Dioxide	99,000,000	450,000	83,000,000	430,000	130,000,000	430,000	150,000,000	470,000
Oxygen/Argon	180,000,000	17,000,000	100,000,000	16,000,000	21,000,000	16,000,000	20,000,000	17,000,000
Nitrogen	920,000,000	29,000,000	1,000,000,000	28,000,000	1,000,000,000	28,000,000	1,000,000,000	30,000,000
Methane	ND	17,000	ND	16,000	1,600,000	16,000	7,500,000	17,000
Carbon Monoxide	ND	29,000	ND	28,000	ND	28,000	ND	30,000

Results normalized including non-methane hydrocarbons

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Operations Manager

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Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-21		S040301-22		S040301-23		S040301-24	
Client Sample I.D.:	VP-18-24S		VP-19-23D		VP-19-24S		VP-22-24S	
Date/Time Sampled:	3/28/25 11:23		3/28/25 12:26		3/28/25 12:52		3/28/25 13:20	
Date/Time Analyzed:	4/15/25 12:00		4/15/25 12:15		4/15/25 12:30		4/15/25 12:44	
QC Batch No.:	250415GC8A1		250415GC8A1		250415GC8A1		250415GC8A1	
Analyst Initials:	KD		KD		KD		KD	
Dilution Factor:	2.4		2.4		2.5		2.6	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Carbon Dioxide	12,000,000	430,000	24,000,000	430,000	16,000,000	450,000	240,000,000	470,000
Oxygen/Argon	250,000,000	16,000,000	55,000,000	16,000,000	230,000,000	17,000,000	20,000,000	17,000,000
Nitrogen	910,000,000	28,000,000	1,100,000,000	28,000,000	930,000,000	29,000,000	850,000,000	30,000,000
Methane	ND	16,000	ND	16,000	24,000	17,000	67,000,000	17,000
Carbon Monoxide	ND	28,000	ND	28,000	ND	29,000	ND	30,000

Results normalized including non-methane hydrocarbons

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RL = Reporting Limit

Reviewed/Approved By: Anika Sotelo Sanchez
Mark Johnson
Operations Manager

Date 6-25-25

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Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-25		S040301-26		S040301-27		S040301-28	
Client Sample I.D.:	VP-25-24S		VP-23-24S		VP-24-24S		VP-14-24S	
Date/Time Sampled:	3/29/25 8:34		3/29/25 8:55		3/29/25 9:20		3/29/25 10:10	
Date/Time Analyzed:	4/15/25 12:59		4/15/25 13:13		4/15/25 13:27		4/15/25 13:42	
QC Batch No.:	250415GC8A1		250415GC8A1		250415GC8A1		250415GC8A1	
Analyst Initials:	KD		KD		KD		KD	
Dilution Factor:	2.4		2.5		2.4		2.4	
ANALYTE	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3	Result ug/m3	RL ug/m3
Carbon Dioxide	6,600,000	430,000	23,000,000	440,000	16,000,000	430,000	11,000,000	430,000
Oxygen/Argon	270,000,000	16,000,000	260,000,000	16,000,000	270,000,000	16,000,000	270,000,000	16,000,000
Nitrogen	900,000,000	28,000,000	900,000,000	28,000,000	900,000,000	28,000,000	900,000,000	28,000,000
Methane	ND	16,000	ND	16,000	ND	16,000	ND	16,000
Carbon Monoxide	ND	28,000	ND	28,000	ND	28,000	ND	28,000

Results normalized including non-methane hydrocarbons

ND = Not Detected (below RL)
RL = Reporting Limit

Reviewed/Approved By: Mark Johnson
Operations Manager

Date 6-25-25

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18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

Client: Barr Engineering
Attn: Diane Biehl
Project Name: Pure Muskegon
Project No.: 22611059.09
Date Received: 04/03/25
Matrix: Air
Reporting Units: ug/m3

ASTM D1946

Lab No.:	S040301-29							
Client Sample I.D.:	VP-15-24S							
Date/Time Sampled:	3/29/25 10:39							
Date/Time Analyzed:	4/15/25 13:56							
QC Batch No.:	250415GC8A1							
Analyst Initials:	KD							
Dilution Factor:	2.6							
ANALYTE	Result ug/m3	RL ug/m3						
Carbon Dioxide	ND	470,000						
Oxygen/Argon	270,000,000	17,000,000						
Nitrogen	910,000,000	30,000,000						
Methane	31,000	17,000						
Carbon Monoxide	ND	30,000						

Results normalized including non-methane hydrocarbons

ND = Not Detected (below RL)
RL = Reporting Limit

Reviewed/Approved By: Mark Johnson
Operations Manager

Date 6-25-25

The cover letter is an integral part of this analytical report

18501 E. Gale Avenue, Suite 130 ♦ City of Industry, CA 91748 ♦ Ph: (626) 964-4032 ♦ Fx: (626) 964-5832

QC Batch No: 250411GC8A1
Matrix: Air
Reporting Units: ug/m3

ASTM D1946
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date Analyzed:	4/11/25 12:14			4/11/25 11:16		4/11/25 11:31					
Analyst Initials:	KD			KD		KD					
Dilution Factor:	1.0			1.0		1.0			Limits		
ANALYTE	Result ug/m3	RL ug/m3	SPIKE AMT. ug/m3	Result ug/m3	% Rec.	Result ug/m3	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Carbon Dioxide	ND	180,000	180,000,000	189,000,000	105	188,000,000	104	0.4	70	130	30
Oxygen/Argon	ND	6,500,000	200,000,000	197,000,000	100	196,000,000	100	0.2	70	130	30
Nitrogen	ND	11,000,000	800,000,000	828,000,000	104	825,000,000	103	0.3	70	130	30
Methane	ND	6,600	660,000	673,000	102	672,000	101	0.3	70	130	30
Carbon Monoxide	ND	11,000	1,200,000	1,270,000	109	1,260,000	109	0.7	70	130	30

ND = Not Detected (below RL)
RL = Reporting Limit

Reviewed/Approved By: Anika Sotto-Sanchez
Mark Johnson
Operations Manager

Date 5-06-25

The cover letter is an integral part of this analytical report

QC Batch No: 250415GC8A1
Matrix: Air
Reporting Units: ug/m3

ASTM D1946
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date Analyzed:	4/15/25 9:03			4/15/25 14:40		4/15/25 14:55					
Analyst Initials:	KD			KD		KD					
Dilution Factor:	1.0			1.0		1.0			Limits		
ANALYTE	Result ug/m3	RL ug/m3	SPIKE AMT. ug/m3	Result ug/m3	% Rec.	Result ug/m3	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Carbon Dioxide	ND	180,000	180,000,000	201,000,000	111	200,000,000	111	0.1	70	130	30
Oxygen/Argon	ND	6,500,000	200,000,000	210,000,000	107	210,000,000	106	0.3	70	130	30
Nitrogen	ND	11,000,000	800,000,000	891,000,000	111	889,000,000	111	0.2	70	130	30
Methane	ND	6,600	660,000	675,000	102	670,000	101	0.7	70	130	30
Carbon Monoxide	ND	11,000	1,200,000	1,280,000	111	1,270,000	110	0.6	70	130	30

ND = Not Detected (below RL)
RL = Reporting Limit

Reviewed/Approved By: _____ **Date** 5-06-25
Mark Johnson
Operations Manager

The cover letter is an integral part of this analytical report

Appendix D

Geologic Modeling Technical Memorandum and Property Boring Logs

resourceful. naturally.
engineering and environmental consultants

BARR

Technical Memorandum

To: Project File
From: Stephen Johnson, Liz Evenocheck
Subject: Pure Muskegon Geologic Model Development
Date: September 27, 2022
Project: Pure Muskegon, LLC – 22/61-1059
c:

Geologic information and basic geotechnical parameters were modeled in three-dimensions (3D) using Earth Volumetric Studio™ (EVS) software developed by C Tech Development Corporation (2022) for the property located at 2400 Lakeshore Drive, Muskegon, Michigan (the Site). The modeling process and results are documented below:

- The area to be modeled was defined and discretized into a model grid.
- Geologic/lithologic observations and basic geotechnical parameters were translated from boring logs into a table of the location coordinates (X and Y) and elevations (Z) of the top and bottom of each observation or geotechnical parameter.
- Lithologic observations were evaluated to define the stratigraphic units to be included in the model.
- Surfaces for the top and bottom of each stratigraphic unit were interpolated using the XYZ data.
- Stratigraphic layers were refined as needed where units pinch out.
- Geotechnical parameters were additionally interpolated within one stratigraphic unit.

Model Setup

A rectilinear horizontal grid for the Site was constructed in EVS using the Michigan State Plane South International Feet North American Datum of 1983 (NAD83) coordinate system. The horizontal grid spacing was set to 20 feet in both the X and Y directions, resulting in square cells. The top of the model was set to a combined topographic and bathymetric surface developed utilizing a 1-meter-resolution topographic digital elevation model (DEM) created from data collected in 2016 (USGS, 2018) and bathymetric data from a nautical chart last updated in 2021 (NOAA, 2015).

Geologic/lithologic observations from 78 borings completed at the Site were entered into a table of XYZ data. XY locations were available with site data provided to Barr, and the top and bottom of each lithologic interval within a boring were entered as feet below ground surface. If ground surface elevation

(Z) data was not available at a given location, the ground surface elevation was extracted from the USGS DEM. The 78 borings were selected to provide data across the area of the site and to the deepest depths drilled (i.e., shallower borings near deeper borings were excluded from the database as they would provide redundant information with deeper borings).

Based on review of boring logs and the historic understanding of the site, the following stratigraphic units were identified in order from shallowest (youngest) to deepest (oldest): anthropogenic fill and reworked native material, lacustrine organics (e.g., peat, organic silt), undisturbed native sands, and clay. Stratigraphic units can be composed of multiple lithologies but share similar depositional characteristics or settings. Based on lithologic observation from the boring logs, Site stratigraphy was assigned with consideration of the following:

- *Fill* is composed of sands, gravels, silts, clays, organics, building rubble, or lime that has been artificially placed or reworked by humans.
- *Organics* typically consists of peat, organic silt, or wood, but also could contain thin interbedded sands.
- *Native sands* are generally composed of fine to coarse sands or sand with silt or clay but can contain some layers that are primarily silt.
- *Clay* was recorded at the bottom of many deep borings. However, silt was observed between clay and the native sands above clay at some borings. At these locations, silt was included in the clay stratigraphic unit due to the silt's similarities to the clay's depositional environment and physical properties.

During review of site boring data, standard penetration test (SPT) results indicated large differences in the relative density and shear strength of the native sands. To better understand the distribution of different sand densities, N-values (a geotechnical value from the SPT results) were modeled throughout the native sand unit. The vertical grid spacing was set to 1.0 feet and was bound by the bottom of organics/top of native sand and the bottom of native sand stratigraphic surfaces. N-values collected only from native sand were modeled (no inclusion of N-value data from fill, organics, or clay).

Model Interpolation

Stratigraphic surfaces were interpolated using natural neighbor methods such that the resulting surfaces best fit the site data and conceptual site history. Natural neighbor interpolation is a method that utilizes a 'local' weighting approach to calculate the modeled value (elevation) of a grid node, using only those input points (stratigraphic unit elevations at boring locations) that are closest to the grid node being estimated, i.e., 'local'.

After interpolation, stratigraphic surfaces were combined using a top-down hierarchy, where lower surfaces pinch out against upper surfaces, i.e., where two independently interpolated surfaces meet, the upper surface dictates stratigraphy.

N-values were interpolated using 3D kriging, which is a method used to estimate the value of a variable throughout the model domain using some or all of the input values (e.g., N-values) and a statistical weight which increases with proximity of the input data to the grid node being estimated. Kriging is non-local interpolation and input points at all distances from the estimated node could be considered, not just those immediately adjacent. For kriging to calculate more certain results, the input values should be normally distributed. If the input values are not normally distributed, the data can be transformed before kriging. For this work, a review of the data indicated that logarithmic transformation produced data close to normal distribution; therefore, N-values were log base 10-transformed before kriging. Model results are transformed back from log values after kriging is complete. Kriging is done under the assumption that the known data values are more similar if closer together and more different if further apart (i.e., samples closer together are more alike). The relationship between distance and value similarity (known as covariance) is expressed in an experimental variogram, which is a plotted graph of covariance for sets of two known data points. Before running the kriging interpolation, a variogram model must be fit to the experimental variogram from which interpolation input parameters can be extracted. The log transformed N-value experimental variogram indicated an exponential variogram model was the most appropriate type. Interpolation parameters were set based on this model and the 3D kriging interpolation of N-values was ran.

Model Results

The uppermost surface of the model is the combined topographic and bathymetric surface. Elevation contours for this surface of the Site and surrounding area are shown on Figure 1. The modeled thickness and lateral extent of fill is shown on Figure 2. The thickness and extent of organics is shown on Figure 3. The depth to native sand as well as elevation contours representing the top of native sand surface are included on Figure 4. The extent and depth to medium dense native sand (>10 N) are shown in Figure 5. West to east cross sections depicting stratigraphy and modeled N-values are included on Figure 6 and Figure 7.

Geologic model results are an informed estimation reliant on input data interpretation and are most accurate adjacent to boring locations, i.e., model confidence is high near input data. Areas outside of site data or relatively large areas devoid of data exhibit lower model confidence. The results shown on Figures 2 through 7 are presented as the best fit interpretation and interpolation based on current site knowledge/data and may change due to collection of additional information.

Estimated model results are useful for site characterization and planning, but variations in subsurface conditions can exist. Boring logs should be referenced for subsurface conditions at boring locations, and model results in areas of lower confidence should be confirmed through additional exploration prior to site development.

Attachments

Figure 1 Topographic and Bathymetric Contours
Figure 2 Approximate Fill Thickness
Figure 3 Approximate Organics Thickness
Figure 4 Top of Native Sand Elevation
Figure 5 Depth to Medium Dense Sand (N-Value >10)
Figure 6 Cross Section A-A'
Figure 7 Cross Section B-B'

References

C Tech, 2022. Earth Volumetric Studio (EVS), Version 2022.4.0, April 2022, C Tech Development Corporation. https://www.ctech.com/products/earth-volumetric-studio/

National Oceanic and Atmospheric Administration (NOAA), 2015. Nautical Chart 14934, Muskegon Lake, 30th Ed. Dec 2015, last correction 9/16/2021. Downloaded 6/1/2022 from www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml

United States Geological Survey (USGS), 2018. 1-Meter DEM, MI Muskegon 2015, data collected 20160414-20160416 by the State of Michigan, published by USGS 20180131. Downloaded 6/1/2022 from www.usgs.gov/the-national-map-data-delivery

Topographic and Bathymetric Contours (NAVD 88)

Contour Interval

2 feet

10 feet

Lake Elevation April 2022
579.9 ft

Sources:

Topography: USGS, 2018, 1-Meter DEM, MI Muskegon 2015, data collected 20160414-20160416, published 20180131. Downloaded 20220601 from www.usgs.gov/the-national-map-data-delivery

Bathymetry: NOAA, 2015, Nautical Chart 14934, Muskegon Lake, 30th Ed. Dec 2015, last correction 9/16/2021. Downloaded 6/1/2022 from www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml

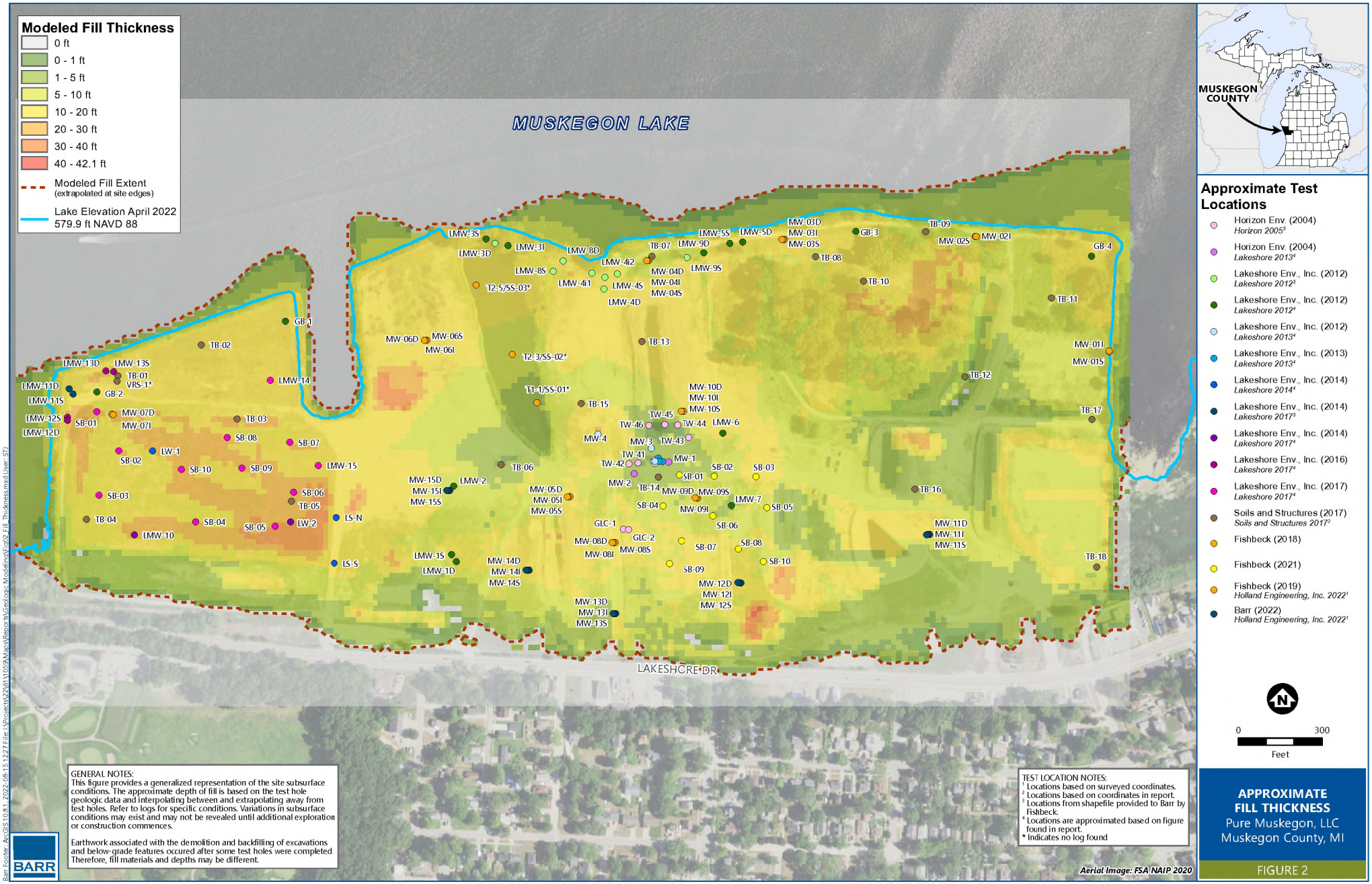
0 300
Feet

TOPOGRAPHIC AND BATHYMETRIC CONTOURS
Pure Muskegon, LLC
Muskegon County, MI

FIGURE 1

BARR

Barr Footer: ArcGIS 10.8.1, 2022-08-12 08:36 File: I:\Projects\2261\1059\Maps\Reports\Geology\Modeling\Fig01_TopoBath Contours.mxd User: STJ



GENERAL NOTES:
This figure provides a generalized representation of the site subsurface conditions. The approximate depth of fill is based on the test hole geologic data and interpolating between and extrapolating away from test holes. Refer to logs for specific conditions. Variations in subsurface conditions may exist and may not be revealed until additional exploration or construction commences.

Earthwork associated with the demolition and backfilling of excavations and below-grade features occured after some test holes were completed. Therefore, fill materials and depths may be different.

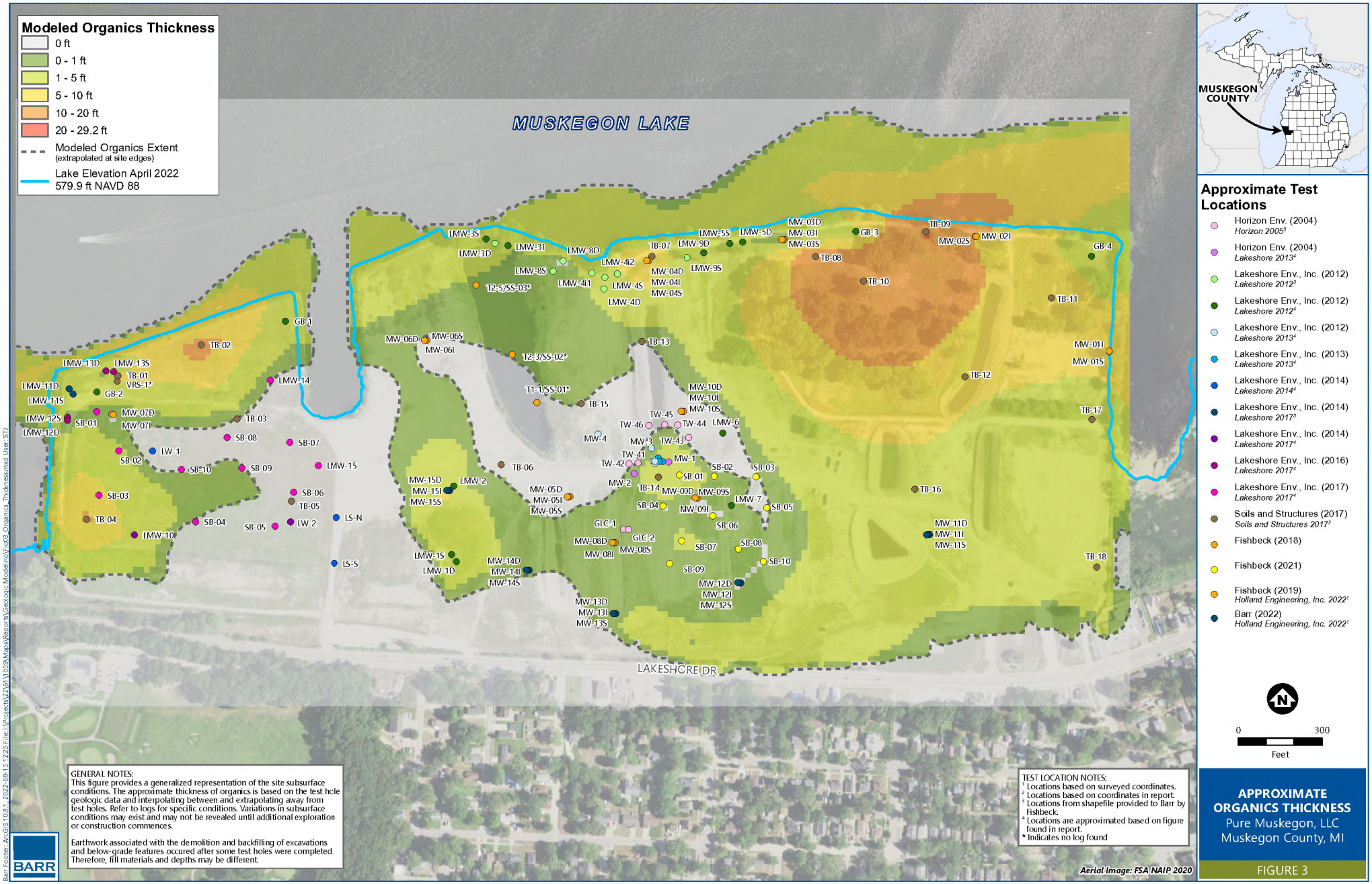
TEST LOCATION NOTES:
[1] Locations based on surveyed coordinates.
[2] Locations based on coordinates in report.
[3] Locations from shapefile provided to Barr by Fishbeck.
[4] Locations are approximated based on figure found in report.
* Indicates no log found

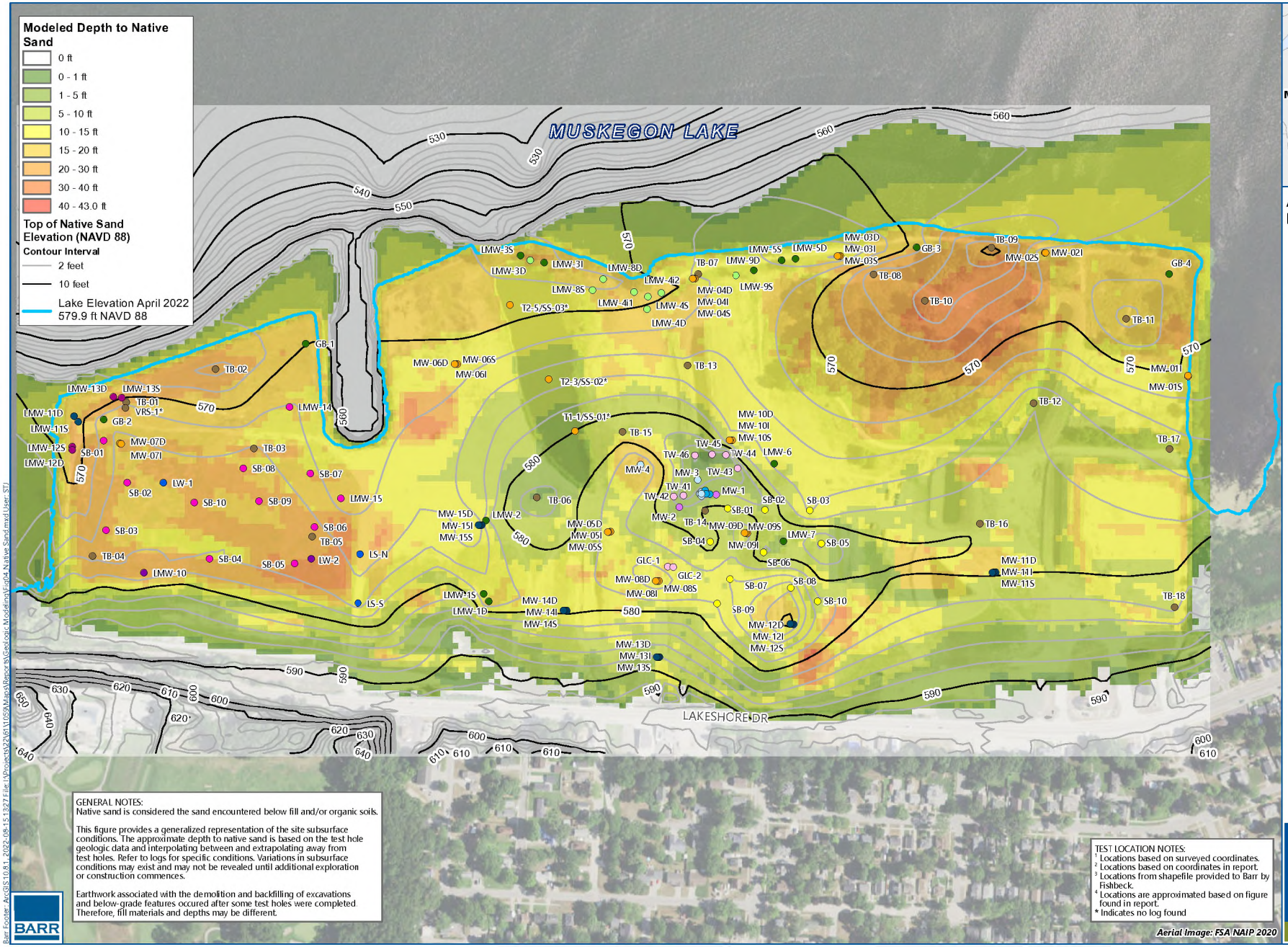
Aerial Image: FSA NAIP 2020

APPROXIMATE FILL THICKNESS
Pure Muskegon, LLC
Muskegon County, MI

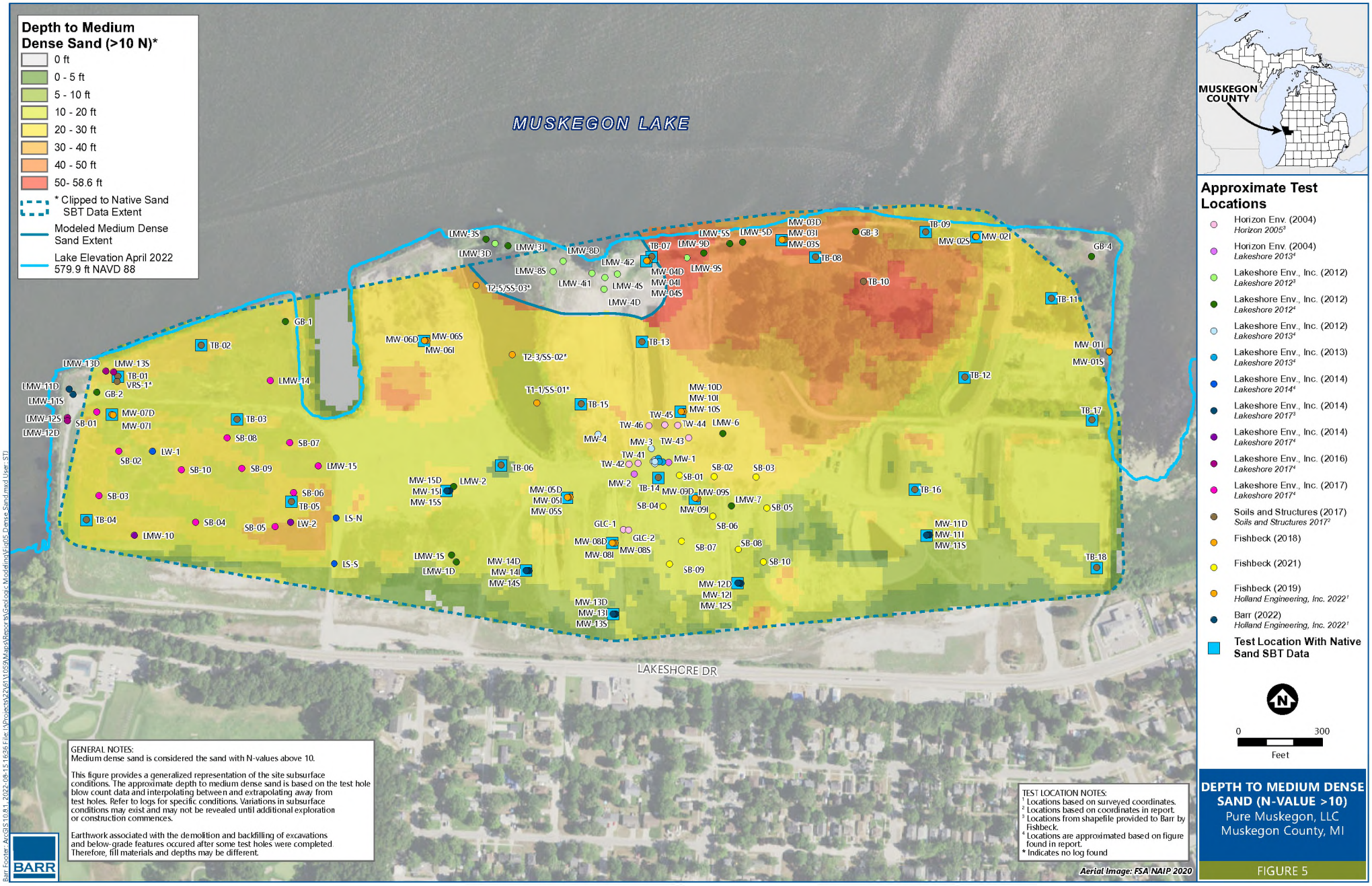
FIGURE 2

Barr Footer: ArcGIS 10.8.1, 2022-08-15 12:27 File: \\Projects\23\6511\053\Maps\Report\Geologic Modeling\Fig02-Fill_Thickness.mxd User: STJ


Modeled Organics Thickness
0 ft
0 - 1 ft
1 - 5 ft
5 - 10 ft
10 - 20 ft
20 - 29.2 ft
Modeled Organics Extent
(extrapolated at site edges)
Lake Elevation April 2022
579.9 ft NAVD 88
MUSKEGON LAKE
LAKESHORE DR
MUSKEGON COUNTY
Approximate Test Locations
Horizon Env. (2004)
Horizon 2005[3]
Horizon Env. (2004)
Lakeshore 2013[4]
Lakeshore Env., Inc. (2012)
Lakeshore 2012[3]
Lakeshore Env., Inc. (2012)
Lakeshore 2012[4]
Lakeshore Env., Inc. (2012)
Lakeshore 2013[4]
Lakeshore Env., Inc. (2013)
Lakeshore 2013[4]
Lakeshore Env., Inc. (2014)
Lakeshore 2014[4]
Lakeshore Env., Inc. (2014)
Lakeshore 2017[3]
Lakeshore Env., Inc. (2014)
Lakeshore 2017[4]
Lakeshore Env., Inc. (2016)
Lakeshore 2017[4]
Lakeshore Env., Inc. (2017)
Lakeshore 2017[4]
Soils and Structures (2017)
Soils and Structures 2017[2]
Fishbeck (2018)
Fishbeck (2021)
Fishbeck (2019)
Holland Engineering, Inc. 2022[1]
Barr (2022)
Holland Engineering, Inc. 2022[1]
0
300
Feet
GENERAL NOTES:
This figure provides a generalized representation of the site subsurface conditions. The approximate thickness of organics is based on the test hole geologic data and interpolating between and extrapolating away from test holes. Refer to logs for specific conditions. Variations in subsurface conditions may exist and may not be revealed until additional exploration or construction commences.
Earthwork associated with the demolition and backfilling of excavations and below-grade features occured after some test holes were completed. Therefore, fill materials and depths may be different.
TEST LOCATION NOTES:
[1] Locations based on surveyed coordinates.
[2] Locations based on coordinates in report.
[3] Locations from shapefile provided to Barr by Fishbeck.
[4] Locations are approximated based on figure found in report.
* Indicates no log found
Aerial Image: FSA NAIP 2020
BARR
APPROXIMATE ORGANICS THICKNESS
Pure Muskegon, LLC
Muskegon County, MI
FIGURE 3
Barr Footer: ArcGIS 10.8.1, 2022-08-15 12:25 File: I:\Projects\23\61\059\Maps\Report\Geologic Modeling\Fig03 Organics_Thickness.mxd User: STJ



Barr Footer: ArcGIS 10.8.1, 2022-08-15 13:27 File: I:\Projects\23\6511\059\Maps\Reports\Geologic Modeling\Fig04 Native Sand.mxd User: STJ



GENERAL NOTES:
Medium dense sand is considered the sand with N-values above 10.

This figure provides a generalized representation of the site subsurface conditions. The approximate depth to medium dense sand is based on the test hole blow count data and interpolating between and extrapolating away from test holes. Refer to logs for specific conditions. Variations in subsurface conditions may exist and may not be revealed until additional exploration or construction commences.

Earthwork associated with the demolition and backfilling of excavations and below-grade features occured after some test holes were completed. Therefore, fill materials and depths may be different.

TEST LOCATION NOTES:
[1] Locations based on surveyed coordinates.
[2] Locations based on coordinates in report.
[3] Locations from shapefile provided to Barr by Fishbeck.
[4] Locations are approximated based on figure found in report.
* Indicates no log found

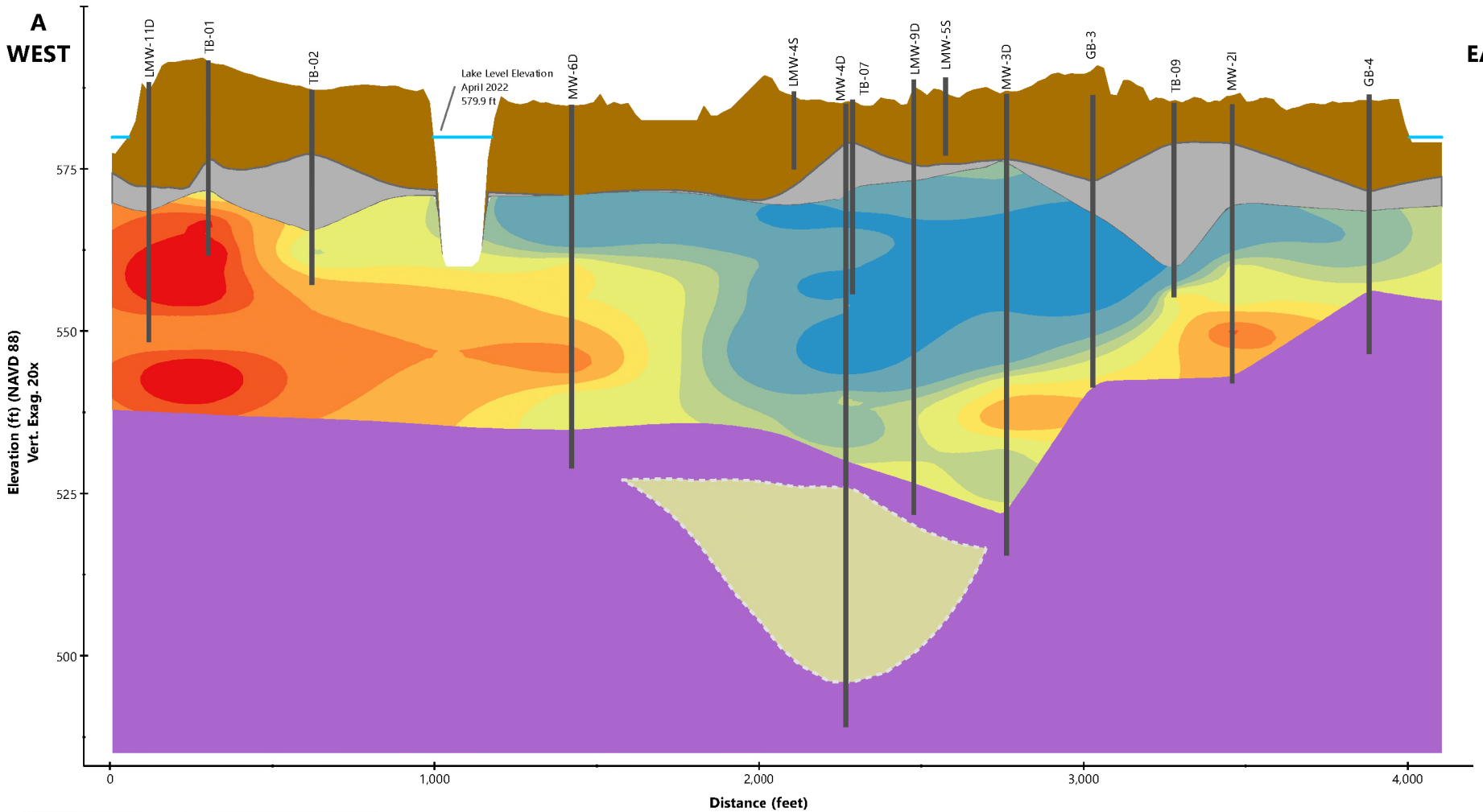
Aerial Image: FSA NAIP 2020

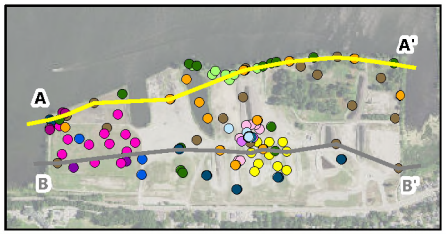
DEPTH TO MEDIUM DENSE SAND (N-VALUE >10)
Pure Muskegon, LLC
Muskegon County, MI

FIGURE 5

BARR

Barr Footer: ArcGIS 10.8.1, 2022-08-15 16:36 File: I:\Projects\2261\11059\Maps\Reports\Geologic Modeling\Fig05 Dense Sand.mxd User: STJ





GENERAL NOTES:
Native sand is considered the sand encountered below fill and/or organic soils. Deep sand was observed at a single location (MW-4D) and its lateral extent is unknown.

This figure provides a generalized representation of the site subsurface conditions. The modeled stratigraphy is based on the test hole geologic data and interpolating between and extrapolating away from test holes. Refer to logs for specific conditions. Variations in subsurface conditions may exist and may not be revealed until additional exploration or construction commences.

Earthwork associated with the demolition and backfilling of excavations and below-grade features occured after some test holes were completed. Therefore, fill materials and depths may be different.

Stratigraphy

- Fill
- Organics
- Native Sand (see legend to right)
- Clay
- Deep Sand (Extent Unknown)

Modeled Native Sand N-Values

0 - 1	15 - 20
1 - 5	20 - 30
5 - 7.5	30 - 40
7.5 - 10	40 - 50
10 - 15	50+

0 500
Feet

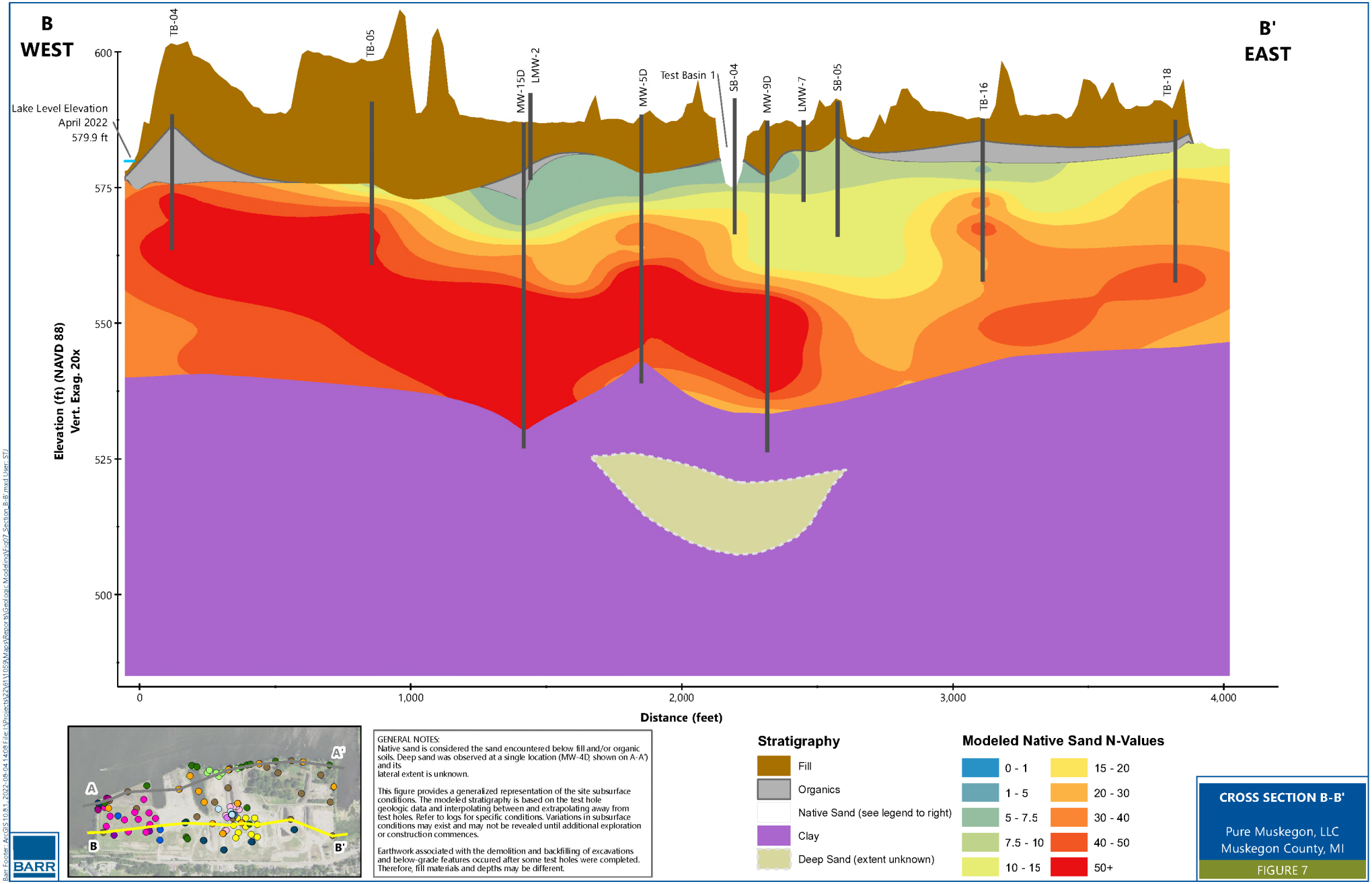
CROSS SECTION A-A'

Pure Muskegon, LLC
Muskegon County, MI

FIGURE 6

BARR

Barr Footer: ArcGIS 10.8.1, 2022-08-04 14:07 File: \\Projects\2261\1059\Maps\Reports\Geologic Modeling\Fig06 Section A-A'.mxd User: STJ



Barr Footer: ArcGIS 10.8.1, 2022-08-04 14:08 File: \\Projects\23\61\059\Maps\Reports\Geologic Modeling\Fig07 Section_B-B'.mxd User: STJ

Compilation of Site Boring Logs

Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-11D

Project:	Pure Muskegon	Surface Elevation:	590.8 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 631,083.5 ft E 12,608,008.2 ft	Completion Depth:	60.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	Surface Elev.: 590.8 ft					
590		FILL: SILTY SAND (SM): fine to medium grained; light to dark brown; moist; frequent brick and gravel debris.			SS1	100	17
		589.8 ft 1.0ft					
		FILL: POORLY GRADED SAND WITH SILT (SP-SM): fine to medium grained; brown; moist; medium dense to loose; frequent SILTY SAND (SM) layers.			SS2	73	6
	5	At 2.3', 4" layer of POORLY GRADED SAND WITH GRAVEL (SP), trace brick debris.					
585		At 2.5', 3" layer of white lime observed in the cuttings from MW-11D/I/S.			SS3	47	12
		At 6', driller reported hitting concrete debris.					
		582.3 ft					
		FILL: SILTY SAND (SM): fine to medium grained; dark brown; wet; very loose to medium dense. 8.5ft			SS4	53	3
	10				SS5	53	7
580		At 12', 2" layer of CLAYEY SILT WITH SAND (ML), decayed wood and fibrous wood, black, wet.					
		576.3 ft			SS6	53	11
		POORLY GRADED SAND (SP): fine grained; brown; wet; medium dense to loose. 14.5ft					
	15				SS7	43	10
575							
					SS8	67	8
	20						
570					SS9	50	7
		15-50' driller added water to borehole to combat heave.			SS10	80	5
	25						
565							
		562.3 ft					
		POORLY GRADED SAND (SP): fine grained; brown; wet; medium dense. 28.5ft			SS11	53	19
	30						
560							

Continued Next Page

STANDARD PENETRATION TEST DATA N in blows/ft ◎ (10, 20, 30, 40)
REC% ▬
RQD % ◆ (20, 40, 60, 80)
SHEAR STRENGTH, tsf □ Qp/2 (0, 2.5, 5)
NATURAL DRY DENSITY (pcf) ★ (80, 100, 120)
WATER CONTENT (%) × PL LL (20, 40, 60)

Date Boring Started:	4/5/22 10:30 am
Date Boring Completed:	4/5/22 11:20 am
Logged By:	JKP3
Drilling Contractor:	Stearns
Drill Rig:	CME 55 LCX

Water Levels (ft)

After Install	6.9
At Time of Drilling	7.1

Remarks: Offset 5' northwest of the initial deep boring and blind drilled to 45' to install well. Well screened from 43-48' bgs. Backfilled initial deep boring with hole plug from 55-60' (~3 bags), and grout from 0-55' (~5 bags grout and 120 gal water) Data taken from deep boring.
Weather: 35°F, Overcast

O:\GINT\PROJECTS\22611059 2400 LAKESHORE\22611059 LAKESHORE_MW_GEOTECH_NO ISTRUMENTATION.GPJ BARRLIBRARY.GLB BOREHOLE LOG REPORT BARR TEMPLATE.GDT

Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

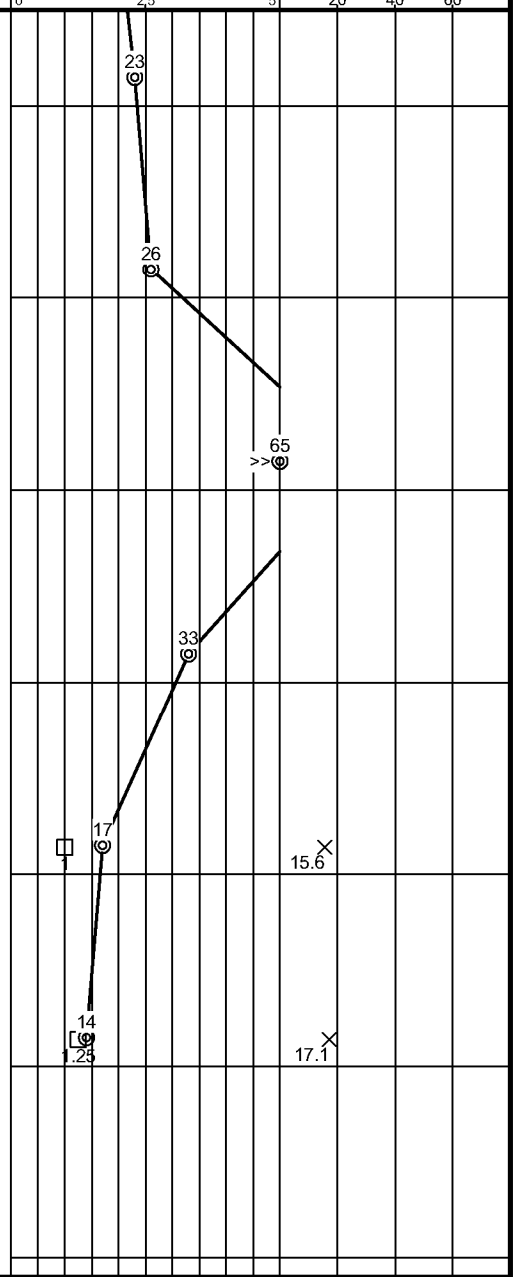
LOG OF BORING MW-11D

Project:	Pure Muskegon	Surface Elevation:	590.8 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 631,083.5 ft E 12,608,008.2 ft	Completion Depth:	60.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
		POORLY GRADED SAND (SP): fine grained; brown; wet; medium dense. *(Continued)*					
		555.8 ft			SS12	67	23
555	35	POORLY GRADED SAND (SP): fine grained; gray; wet; medium dense to very dense; occasional 1-2" LEAN CLAY (CL) layers. 35.0ft					
		At 37', driller reported harder drilling resistance.			SS13	47	26
550	40						
					SS14	80	65
545	45						
		541.8 ft					
		SILT WITH SAND (ML): fine grained; gray; moist; dense; interbedded with occasional 1-2" LEAN CLAY (CL) layers. 49.0ft			SS15	40	33
540	50	538.8 ft					
		SILTY LEAN CLAY (CL): brown; very stiff to stiff; trace sand. 52.0ft					
		From 52-60', driller reported harder drilling resistance.			SS16	100	17
535	55						
		530.8 ft			SS17	100	14
	60	Bottom of Boring at 60.0 feet 60.0ft					

STANDARD PENETRATION TEST DATA N in blows/ft
10 20 30 40
REC%
RQD %
20 40 60 80
SHEAR STRENGTH, tsf
Qp/2
0 2.5 5

NATURAL DRY DENSITY (pcf)
80 100 120
WATER CONTENT (%)
PL LL
20 40 60



Date Boring Started:	4/5/22 10:30 am
Date Boring Completed:	4/5/22 11:20 am
Logged By:	JKP3
Drilling Contractor:	Stearns
Drill Rig:	CME 55 LCX

Water Levels (ft)
After Install 6.9
At Time of Drilling 7.1

Remarks: Offset 5' northwest of the initial deep boring and blind drilled to 45' to install well. Well screened from 43-48' bgs. Backfilled initial deep boring with hole plug from 55-60' (~3 bags), and grout from 0-55' (~5 bags grout and 120 gal water) Data taken from deep boring.
Weather: 35°F, Overcast

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Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-12D

Project:	Pure Muskegon	Surface Elevation:	593.3 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 630,912.6 ft E 12,607,332.8 ft	Completion Depth:	57.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	Surface Elev.: 593.3 ft					
		FILL: SILTY SAND (SM): fine grained; brown; moist; medium dense.					
		At 1', 2" layer of white lime.					
		591.5 ft					
		At 1.5', 5" layer of blue/gray lime waste.					
590		1.8ft			SS1	100	16
		FILL: SILTY SAND (SM): fine to medium grained; gray; moist; loose to medium dense; frequent black fibrous wood debris.			SS2	60	5
	5	At 4.8', 3" layer of lime waste and black fibrous wood.			SS3	73	14
		584.8 ft					
585		FILL: POORLY GRADED SAND (SP): fine grained; gray; moist to wet; very loose to medium dense; occasional debris (wood, lime, concrete, lime waste, brick).			SS4	67	13
	10	From 11-12.5', iridescent sheen in split spoon.			SS5	47	7
580					SS6	73	10
	15				SS7	100	1
575		19-55' driller added water to borehold to combat heave.			SS8	67	25
	20	573.8 ft					
		19.5ft POORLY GRADED SAND (SP): fine grained; brown; wet; medium dense; trace silt.					
570					SS9	60	20
	25						
565					SS10	67	11
	30						

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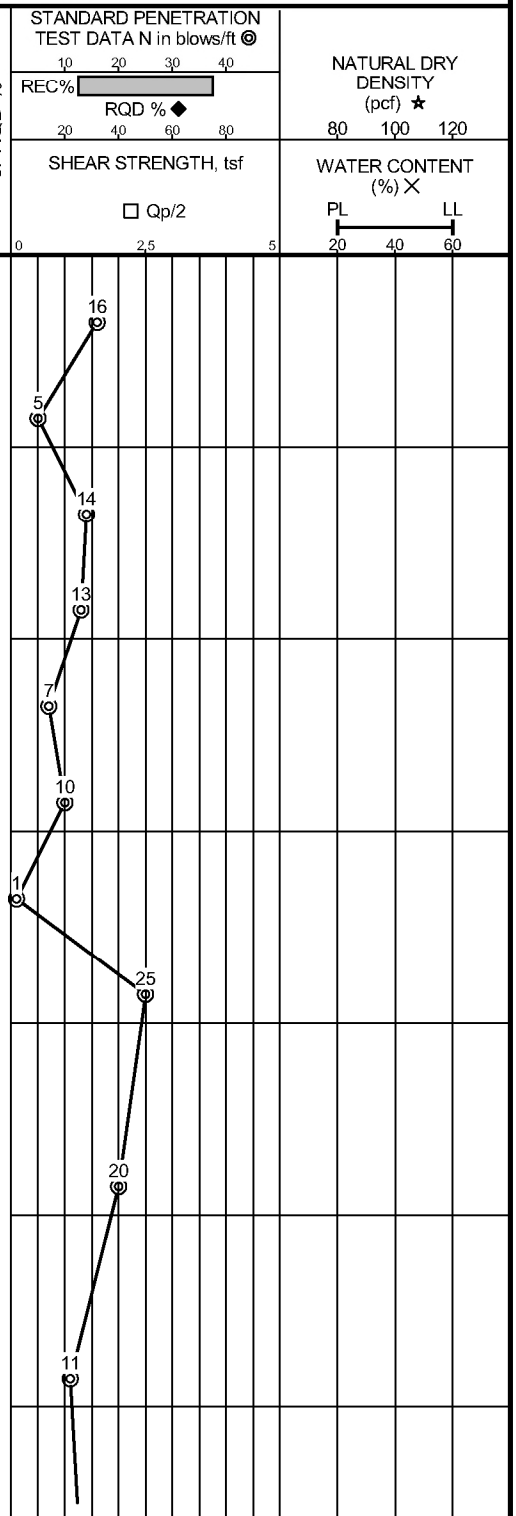

Date Boring Started:	4/6/22 3:00 pm	Water Levels (ft)		Remarks: Well installed and screened from 45-50'bgs.
Date Boring Completed:	4/7/22 9:15 am	After Install	8.0	
Logged By:	JKP3	At Time of Drilling	11.0	
Drilling Contractor:	Stearns			
Drill Rig:	CME 55 LCX			Weather: 45°F, Overcast

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Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

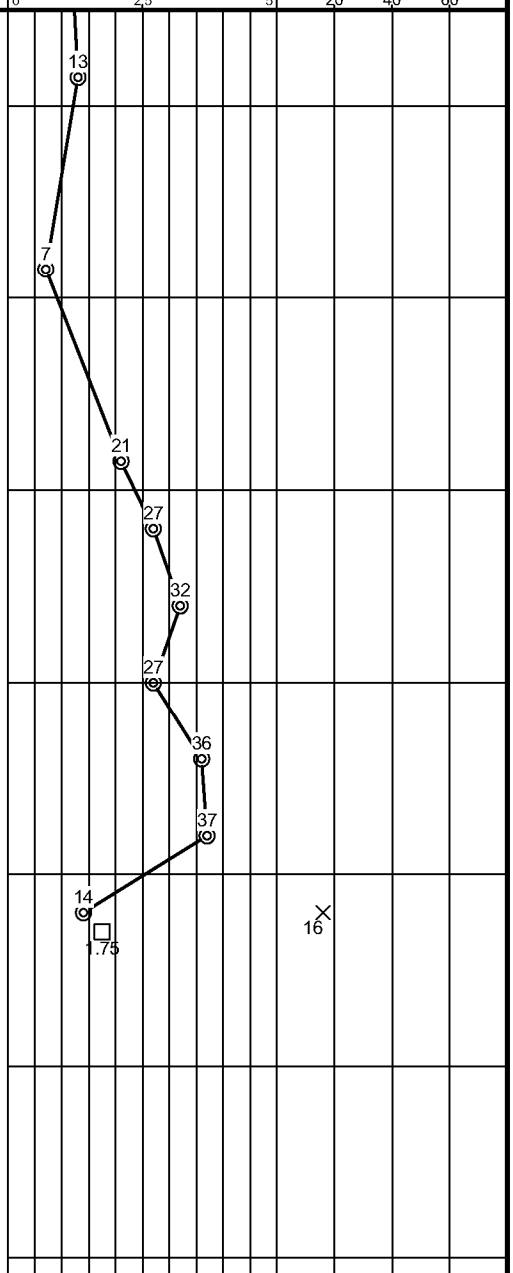
LOG OF BORING MW-12D

Project:	Pure Muskegon	Surface Elevation:	593.3 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 630,912.6 ft E 12,607,332.8 ft	Completion Depth:	57.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
560	35	POORLY GRADED SAND (SP): fine grained; brown; wet; medium dense; trace silt. *(Continued)* From 33.5-35', fine to medium grained, frequent shell pieces.			SS11	80	13
555	40	554.3 ft SILTY SAND (SM): fine grained; brown; wet; loose to medium dense. 39.0ft			SS12	60	7
550	45	From 44.5-46', occasional SILT (ML) seams and 2" LEAN CLAY (CL) layers.			SS13	87	21
		547.3 ft			SS14	30	27
545	50	SILTY SAND (SM): fine grained; gray; wet; medium dense to dense; interbedded with SILT (ML) layers, occasional 1" LEAN CLAY (CL) layers; silt increasing with depth. 46.0ft			NR15	0	32
					SS16	40	27
540	55				SS17	75	36
					SS18	65	37
		537.3 ft			SS19	80	14
		SILTY LEAN CLAY (CL): brown; moist; stiff; trace sand. 56.0ft 536.3 ft 57.0ft					
		Bottom of Boring at 57.0 feet					

STANDARD PENETRATION TEST DATA N in blows/ft ◎
10 20 30 40
REC% ▭
RQD % ◆
20 40 60 80
SHEAR STRENGTH, tsf
□ Qp/2
0 2.5 5

NATURAL DRY DENSITY (pcf) ★
80 100 120
WATER CONTENT (%) ×
PL LL
20 40 60



Date Boring Started:	4/6/22 3:00 pm	Water Levels (ft)		Remarks: Well installed and screened from 45-50'bgs.
Date Boring Completed:	4/7/22 9:15 am	▼ After Install	8.0	
Logged By:	JKP3	▼ At Time of Drilling	11.0	
Drilling Contractor:	Stearns			
Drill Rig:	CME 55 LCX			Weather: 45°F, Overcast

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Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-13D

Project:	Pure Muskegon	Surface Elevation:	592.4 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 630,801.6 ft E 12,606,883.8 ft	Completion Depth:	60.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	Surface Elev.: 592.4 ft					
590	0	FILL: SILTY SAND WITH GRAVEL (SM): fine to medium grained; brown; moist; medium dense.					
		At 1.5', 8" layer of white lime.					
		589.9 ft					
		From 2.2-2.5', concrete debris. 2.5ft			SS1	70	29
		FILL: SILTY SAND WITH GRAVEL (SM): fine grained; brown to dark gray; moist; medium dense; frequent debris (brick, gravel, lime, wood).			SS2	60	22
585	5	586.4 ft					
		FILL: SILTY SAND WITH GRAVEL (SM): fine to medium grained; dark brown; moist; medium dense; frequent brick debris. 6.0ft			SS3	70	11
		From 7-8', drilled through concrete in MW-13I/S.					
		Drilling rate of approximately 10min per foot and 30 min per foot, respectively. Replaced drill bit at MW-13S. 8.5ft			SS4	60	10
580	10	583.9 ft					
		POORLY GRADED SAND (SP): fine to medium grained; gray; wet; dense to medium dense.			SS5	60	41
					SS6	30	14
	15	576.4 ft					
575		POORLY GRADED SAND (SP): fine grained; dark gray; wet; dense to medium dense. 16.0ft			SS7	60	30
	20				SS8	60	21
570							
					SS9	60	49
565	25	20-55' driller added water to borehole to combat heave.					
					SS10	70	28
560	30						

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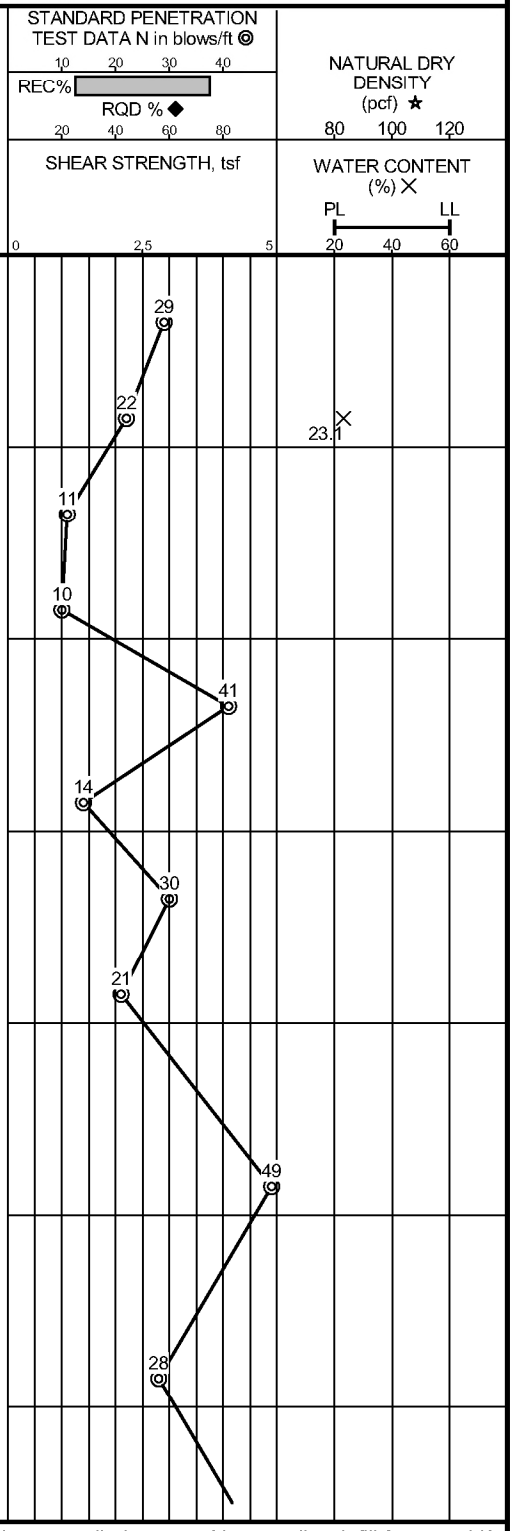

Date Boring Started:	4/8/22
Date Boring Completed:	4/8/22
Logged By:	AWB
Drilling Contractor:	Stearns
Drill Rig:	CME 55 LCX

Water Levels (ft)

After Install	6.3
At Time of Drilling	8.5

Remarks: Augers pulled up to 55' bgs to allow infill from 55-60'. Well installed and screend from 50-55'bgs.

Weather: 40°F, Overcast

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Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-13D

Project:	Pure Muskegon	Surface Elevation:	592.4 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 630,801.6 ft E 12,606,883.8 ft	Completion Depth:	60.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
		558.9 ft					
		POORLY GRADED SAND (SP): fine to medium grained; brown; wet; dense. 33.5ft			SS11	70	49
555	35						
					NR12	0	34
550	40						
		548.9 ft					
		POORLY GRADED SAND WITH SILT (SP-SM): fine grained; brown; wet; very dense. 43.5ft			SS13	60	71
545	45						
		543.9 ft					
		SILTY SAND (SM): fine grained; brown/gray; wet; very dense. 48.5ft			SS14	60	65
540	50						
		From 53.5-58.5' interbedded with 1" LEAN CLAY (CL) layers.			SS15	60	74
535	55						
		533.9 ft					
		SILTY LEAN CLAY (CL): brown; very stiff; interbedded with 1" SILT WITH SAND (ML) layers. 58.5ft			SS16	70	30
	60	532.4 ft 60.0ft					
		Bottom of Boring at 60.0 feet					

STANDARD PENETRATION TEST DATA N in blows/ft ◎
10 20 30 40
REC%
RQD % ◆
20 40 60 80
SHEAR STRENGTH, tsf
0 2.5 5

NATURAL DRY DENSITY (pcf) ★
80 100 120
WATER CONTENT (%) ×
PL LL
20 40 60

49
34
71 >>
65 >>
74 >>
30

Date Boring Started:	4/8/22	Water Levels (ft)	
Date Boring Completed:	4/8/22	After Install	6.3
Logged By:	AWB	At Time of Drilling	8.5
Drilling Contractor:	Stearns		
Drill Rig:	CME 55 LCX		

Remarks: Augers pulled up to 55' bgs to allow infill from 55-60'. Well installed and screend from 50-55'bgs.

Weather: 40°F, Overcast

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Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-14D

Project:	Pure Muskegon	Surface Elevation:	591.3 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon, 3TW
Coordinates:	N 630,956.9 ft E 12,606,571.8 ft	Completion Depth:	96.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	Surface Elev.: 591.3 ft					
590	0	FILL: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): fine to coarse grained; gray/brown; moist; medium dense. At 1.3', 3.5" layer of white lime.			SS1	80	20
		587.8 ft					
		From 3-5', rig chattering; driller reported concrete debris and hard drilling; little to no change in drilling rate. 3.5ft			SS2	40	9
585	5	FILL: SILTY SAND (SM): fine to coarse grained; dark gray/brown; moist; loose; frequent debris (concrete, lime, brick) and POORLY GRADED SAND (SP) layers.			SS3	60	7
		581.8 ft			SS4	73	7
580	10	FILL: POORLY GRADED SAND (SP): fine grained; brown; wet; loose; trace coarse sand and gravel. 9.5ft			SS5	53	9
		At 12', 6" layer of brown fibrous wood debris.					
		577.8 ft					
		13-55' driller added water to the borehole to combat heave. 13.5ft			SS6	47	8
575	15	POORLY GRADED SAND (SP): fine to medium grained; brown; wet; loose.					
		575.3 ft			SS7	53	16
		POORLY GRADED SAND (SP): fine to medium grained; brown/gray; wet; medium dense to very dense. 16.0ft					
		At 17', 3.5" layer of SILT WITH SAND (ML).			SS8	47	22
570	20						
					SS9	73	70
565	25						
					SS10	87	64
560	30	At 31', rig chattering slightly; driller reported fine gravel.					

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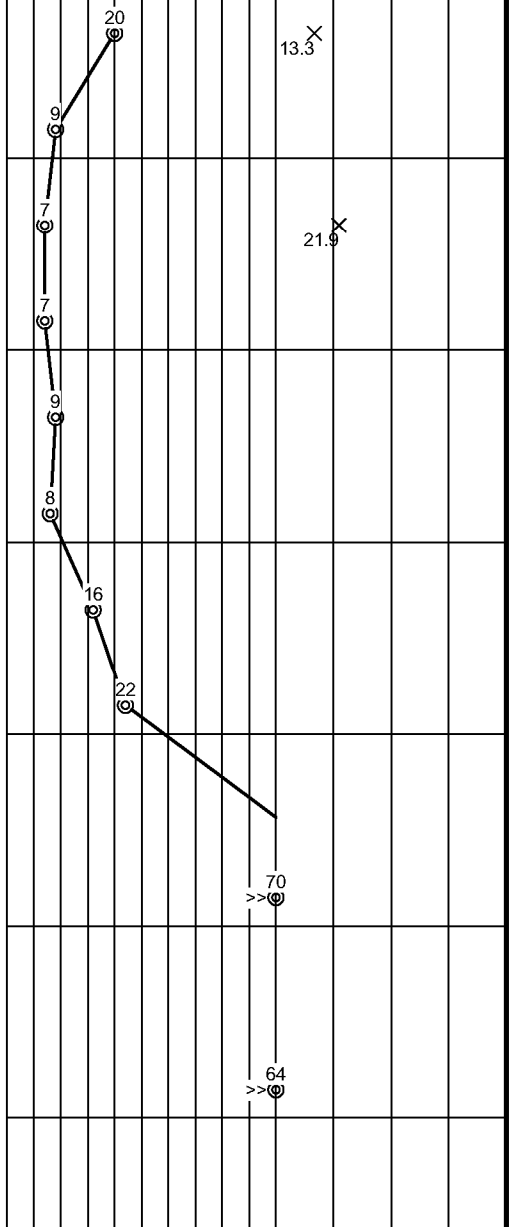
STANDARD PENETRATION TEST DATA N in blows/ft ◎ (10, 20, 30, 40)
REC% ▬
RQD % ◆ (20, 40, 60, 80)
SHEAR STRENGTH, tsf □ Qp/2 (0, 2.5, 5)
NATURAL DRY DENSITY (pcf) ★ (80, 100, 120)
WATER CONTENT (%) × (13.3, 21.9)
PL LL (20, 40, 60)



Date Boring Started:	4/13/22 8:00 am	Water Levels (ft)		Remarks: Offset 5' east from initial deep boring and blind drilled to 45' to install well. Well screened from 40-45'bgs. Initial deep boring backfilled with grout from 0-96' (~6 bags quick grout and 200 gal water). Data taken from deep boring. Weather: 60°F, Overcast
Date Boring Completed:	4/13/22 8:50 am	▼ After Install	5.8	
Logged By:	JKP3	▼ At Time of Drilling	8.0	
Drilling Contractor:	Stearns			
Drill Rig:	CME 55 LCX			

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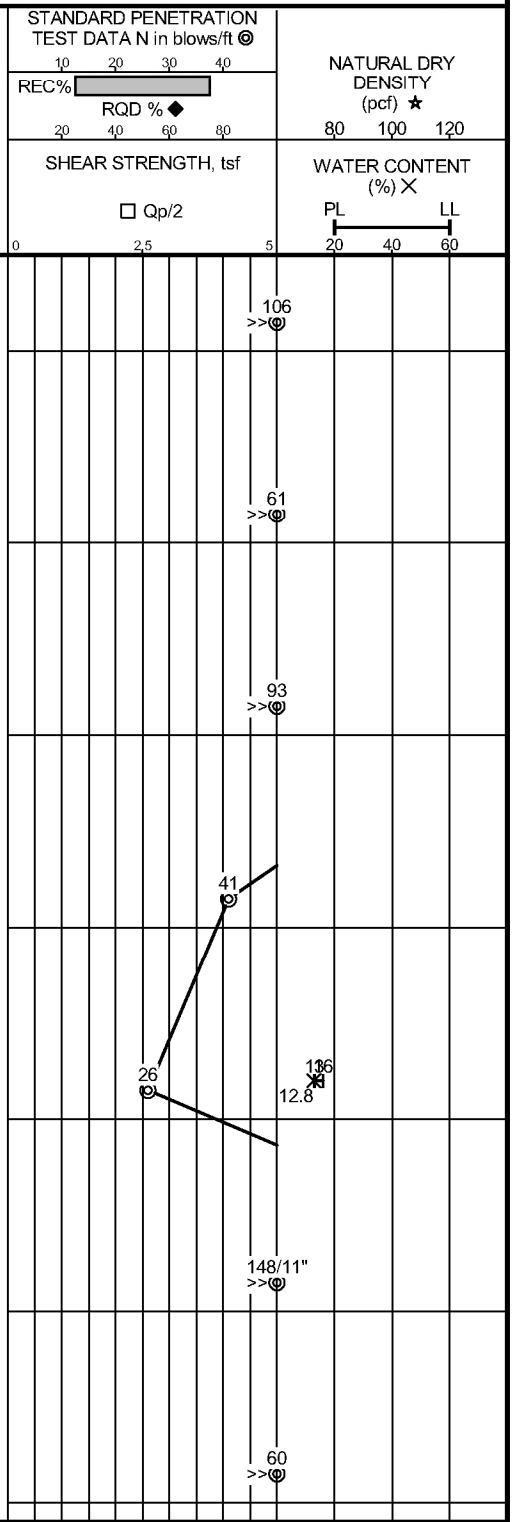
Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-14D

Project:	Pure Muskegon	Surface Elevation:	591.3 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon, 3TW
Coordinates:	N 630,956.9 ft E 12,606,571.8 ft	Completion Depth:	96.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	35	POORLY GRADED SAND (SP): fine to medium grained; brown/gray; wet; medium dense to very dense. *(Continued)*		SS	SS11	100	106
555							
	40			SS	SS12	100	61
550		547.8 ft					
	45	POORLY GRADED SAND WITH SILT (SP-SM): fine grained; gray; wet; very dense. 43.5ft		SS	SS13	80	93
545		542.3 ft					
	50	SILTY SAND (SM): fine grained; gray; wet; dense; interbedded with 1" LEAN CLAY (CL) layers. 49.0ft		SS	SS14	73	41
540		537.8 ft					
	55	SANDY SILT (ML): fine grained; gray; wet; medium dense; trace clay. 53.5ft		SS	SS15	100	26
535		534.3 ft					
		At 57', driller reported harder drilling resistance. 57.0ft					
	60	SILTY SAND (SM): fine grained; gray; wet; very dense; interbedded with LEAN CLAY (CL) layers.		SS	SS16	60	148/ 11"
530		527.8 ft					
	65	SANDY SILT (ML): fine grained; gray; wet; very dense; trace clay. 63.5ft		SS	SS17	100	60
		Continued Next Page					



Date Boring Started:	4/13/22 8:00 am
Date Boring Completed:	4/13/22 8:50 am
Logged By:	JKP3
Drilling Contractor:	Stearns
Drill Rig:	CME 55 LCX

Water Levels (ft)

After Install	5.8
At Time of Drilling	8.0

Remarks: Offset 5' east from initial deep boring and blind drilled to 45' to install well. Well screened from 40-45'bgs. Initial deep boring backfilled with grout from 0-96' (~6 bags quick grout and 200 gal water).
Data taken from deep boring.
Weather: 60°F, Overcast

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Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-14D

Project:	Pure Muskegon	Surface Elevation:	591.3 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon, 3TW
Coordinates:	N 630,956.9 ft E 12,606,571.8 ft	Completion Depth:	96.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
525	65	SANDY SILT (ML): fine grained; gray; wet; very dense; trace clay. *(Continued)* At 64', 3" layer of SILTY SAND (SM).					
		522.3 ft					
		SILTY LEAN CLAY (CL): brown; stiff; trace sand. 69.0ft			SS18	100	15
520	70						
	75				SS19	100	12
515							
	80				SS20	100	14
510		507.8 ft					
		SILTY LEAN CLAY (CL): gray/brown; stiff; trace sand and gravel. 83.5ft			SS21	100	11
505	85						
	90	From 90-92', driller attempted 3TW sample and had no recovery. Driller resampled with 3" split spoon barrel.			SS22	100	9
500					SS23	100	13
					TW1	79	
	95				SS25	100	15
		495.3 ft					
		Bottom of Boring at 96.0 feet 96.0ft					

STANDARD PENETRATION TEST DATA N in blows/ft ◎ (10, 20, 30, 40)
REC% ▬ RQD % ◆ (20, 40, 60, 80)
SHEAR STRENGTH, tsf □ Qp/2 (0, 2.5, 5)

Sample No.	Qp/2	N	Natural Dry Density (pcf) ★	Water Content (%) ×
SS18	1.25	15		15.5
SS19	0.5	12		13.7
SS20	0.625	14		18.1
SS21	0.375, 0.5	11		18.8
SS22	0.25	9		19.7
SS23	0.5	13		17.8
SS25	0.25	15		17.7

NATURAL DRY DENSITY (pcf) ★ (80, 100, 120)
WATER CONTENT (%) × PL LL (20, 40, 60)

Date Boring Started:	4/13/22 8:00 am
Date Boring Completed:	4/13/22 8:50 am
Logged By:	JKP3
Drilling Contractor:	Stearns
Drill Rig:	CME 55 LCX

Water Levels (ft)
After Install 5.8
At Time of Drilling 8.0

Remarks: Offset 5' east from initial deep boring and blind drilled to 45' to install well. Well screened from 40-45'bgs. Initial deep boring backfilled with grout from 0-96' (~6 bags quick grout and 200 gal water).
Data taken from deep boring.
Weather: 60°F, Overcast

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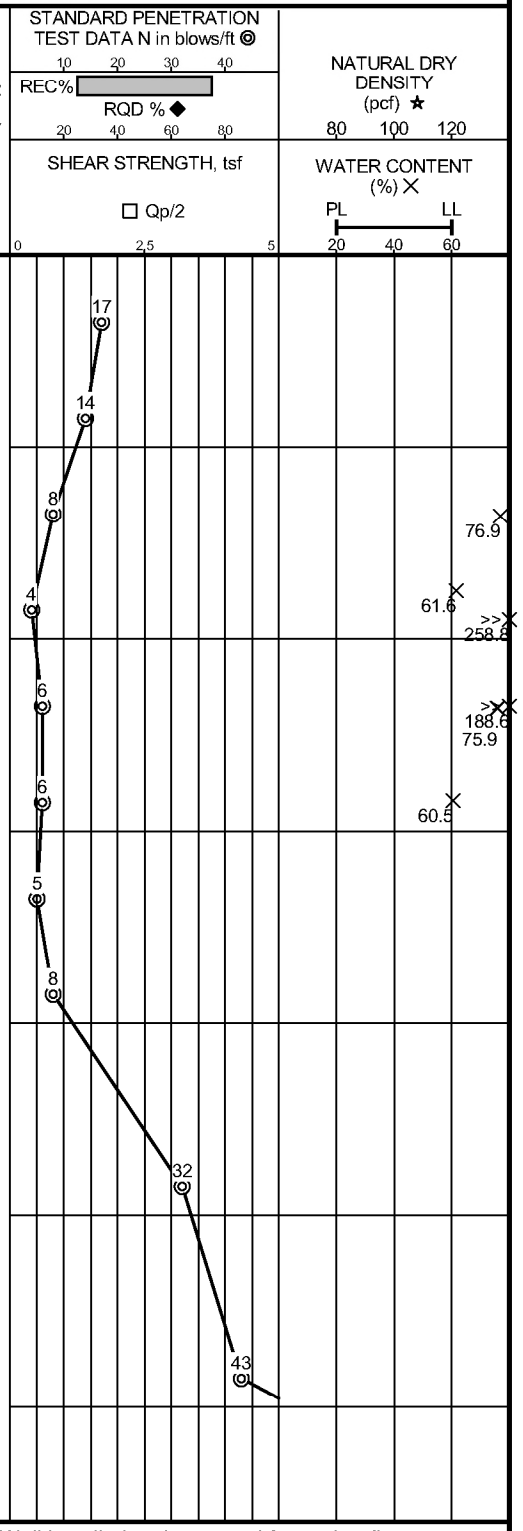
Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-15D

Project:	Pure Muskegon	Surface Elevation:	589.3 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 631,242.9 ft E 12,606,286.9 ft	Completion Depth:	60.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	0	Surface Elev.: 589.3 ft					
		FILL: AGGREGATE: fine gravel. 589.2 ft					
		0.1ft FILL: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): fine to medium grained; brown; moist; medium dense. At 1.5', 12" layer of gray lime with wood debris. 585.8 ft			SS1	100	17
585		3.5ft					
	5	4.0ft FILL: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM): fine to medium grained; brown; moist; frequent debris (concrete, brick). 585.3 ft			SS2	80	14
		6.5ft FILL: POORLY GRADED SAND (SP): fine to coarse grained; brown; moist; medium dense. 582.8 ft			SS3	60	8
580		FILL: FIBRIC PEAT (PT): brown/black; moist to wet; frequent 4-6" lime waste layers; lime waste and FIBRIC PEAT (PT) moisture content 76.9%; lime waste moisture content 61.6% FIBRIC PEAT (PT) moisture content 258%. 579.3 ft			SS4	100	4
	10	10.0ft FILL: FIBRIC PEAT (PT): brown/black; wet; frequent black slag and black sand layers; moisture content 188.6%, 75.9%, and 60.5%. 574.3 ft			SS5	20	6
575					SS6	13	6
	15	15.0ft POORLY GRADED SAND (SP): fine to medium grained; dark gray; wet; loose. 15-55' driller added water to borehole to combat heave.			SS7	53	5
570	20				SS8	87	8
		565.8 ft					
565		23.5ft POORLY GRADED SAND (SP): fine to medium grained; dark gray; wet; dense to very dense.			SS9	60	32
	25						
560					SS10	100	43
	30	Below 30', color change to gray/brown. 556.8 ft					

Continued Next Page



Date Boring Started:	4/13/22 2:45 pm	Water Levels (ft)		Remarks: Well installed and screened from 50-55'bgs.
Date Boring Completed:	4/14/22 9:30 am	After Install	5.2	
Logged By:	JKP3	At Time of Drilling	8.5	
Drilling Contractor:	Stearns			
Drill Rig:	CME 55 LCX			Weather: 50°F, Overcast

O:\GINT\PROJECTS\22611059 2400 LAKESHORE\22611059 LAKESHORE_MW_GEOTECH_NO ISTRUMENTATION.GPJ BARRLIBRARY.GLB BOREHOLE LOG REPORT BARR TEMPLATE.GDT

Barr Engineering Co.
4771 50th Street SE
Grand Rapids, MI 49512
Telephone: 616-554-3210

LOG OF BORING MW-15D

Project:	Pure Muskegon	Surface Elevation:	589.3 ft
Job No.:	22/61-1059	Drilling Method:	Hollow Stem Auger
Location:	Muskegon, MI	Sampling Method:	Split Spoon
Coordinates:	N 631,242.9 ft E 12,606,286.9 ft	Completion Depth:	60.0 ft
Datum:	MI State Plane, S. Zone, NAD83 (Intl. ft)		

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION		Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
555	35	POORLY GRADED SAND (SP): fine to medium grained; gray/brown; wet; dense to very dense.	32.5ft			SS11	73	111/11"
550	40					SS12	100	123/10"
545	45					SS13	100	95
		543.3 ft At 46', driller reported higher drilling resistance.	46.0ft					
540	50	POORLY GRADED SAND (SP): fine grained; gray; wet; very dense; occasional 1" LEAN CLAY (CL) layers.				SS14	100	68
		535.8 ft						
535	55	SILTY SAND (SM): fine grained; gray; wet; very dense; occasional 1" LEAN CLAY (CL) layers.	53.5ft			SS15	87	67
		530.8 ft						
530	60	SILT (ML): gray; moist to wet. 530.3 ft	58.5ft 59.0ft			SS16	100	24
		SILTY LEAN CLAY (CL): brown; moist; very stiff. 529.3 ft	60.0ft					
		Bottom of Boring at 60.0 feet						

STANDARD PENETRATION TEST DATA N in blows/ft ◎
10 20 30 40
REC%
RQD % ◆
20 40 60 80

NATURAL DRY DENSITY (pcf) ★
80 100 120

SHEAR STRENGTH, tsf
□ Qp/2
0 2.5 5

WATER CONTENT (%) ×
PL LL
20 40 60

111/11" >>
123/10" >>
95 >>
68 >>
67 >>
24
2.25
13.3

Date Boring Started:	4/13/22 2:45 pm	Water Levels (ft)	
Date Boring Completed:	4/14/22 9:30 am	After Install	5.2
Logged By:	JKP3	At Time of Drilling	8.5
Drilling Contractor:	Stearns		
Drill Rig:	CME 55 LCX		

Remarks: Well installed and screened from 50-55'bgs.

Weather: 50°F, Overcast

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SOILS & STRUCTURES

Borehole ID: TB-01

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066		
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard	**Reviewed By:**	S Synnestvedt
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	30.00
Date Started:	Jul 24 2017 **Completed:** Jul 24 2017	**Northing:**	631653.2 **Easting:** 12605107.4	**Elevation:**	591.71
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50	At Time of Drilling	2.00 on Jul 24 2017		
Hammer Type:	Automatic Hammer	End of Drilling	2.00 on Jul 24 2017		
Notes:					

Depth	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - dark brown sandy with a trace of gravel fill										
1	PEAT - dark brown (PT)										
2	ORGANIC SILT - soft light gray with occasional lenses of peat (OH)		SPT-A	100	3-3-2	5					OL
4			SPT-B	100	1-0-0	0					OL
7			SPT-C	100	0-0-0	0					OL
9			SPT-D	100	1-0-1	1					OL
14	ORGANIC SILT - firm light gray with lenses of peat and a trace of sand (OH)		SPT-E	100	3-3-3	6					OL
19			SPT-F	100	2-1-8	9					SP
23	SAND - extremely compact brown fine to medium (SP)		SPT-G	100	12-17-37	54					SP
29			SPT-H	100	14-28-41	69					SP

SOILS & STRUCTURES

Borehole ID: TB-02

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Hohmeyer
Reviewed By:	S Synnestvedt	**Client:**	Envirologic Technologies Inc.
Survey Datum:	NAD 1983 StatePlane Michigan South	**Hole Depth:**	30.00
Date Started:	Jul 24 2017	**Completed:**	Jul 24 2017
Northing:	631765.5	**Easting:**	12605404.5
Elevation:	587.10	**Drilling Method:**	3-1/4" Hollow Stem Auger
Ground Water Levels		**Equipment:**	Diedrich D-50
At Time of Drilling	1.50 on Jul 24 2017	**Hammer Type:**	Automatic Hammer
End of Drilling	1.50 on Jul 24 2017	**Notes:**	

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - black fine to coarse sandy with at race of gravel foundry fill												
2	PEAT - black sandy (PT)			SPT-A	100	2-2-2	4						
3													
4	PEAT - black sandy with wood and a trace of gravel (PT)			SPT-B	100	4-10-13	23						
5													
6													
7	PEAT - black sandy (PT)			GRAB-C	100								
8													
9													
10	PEAT - dark brown sandy with organic silt (PT)			GRAB-D	100	8-5-5							
11													
12													
13													
14				GRAB-E	100	2-1-1							
15													
16													
17													
18													
19				GRAB-F	100	1-1-1							
20													
21													
22	SAND - compact brown fine to medium with lenses of peat and a trace of organic silt (SP)												
23													
24				SPT-G	100	4-3-6	9						SP
25													
26													
27	SAND - very compact brown fine to medium with a trace of peat and trace of organic silt (SP)												
28													
29				SPT-H	100	4-10-12	22						SP
30													

SOILS & STRUCTURES

Borehole ID: TB-03

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 25 2017	**Completed:**	Jul 25 2017
Northing:	631499.8	**Easting:**	12605533.3
Elevation:	587.24		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	6.00 on Jul 25 2017
Hammer Type:	Automatic Hammer	End of Drilling	6.00 on Jul 25 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0	SAND - brown fine to medium (SP)												
1	SAND - brown fine to medium gravelly (SP)												
2	SILT - soft gray (ML)												
2	PEAT - black sandy with wood (PT)			SPT-A	80	1-1-3	4						
4				SPT-B	87	2-2-2	4						
6	ORGANIC SILT - soft gray with wood (OH)			SPT-C	100	1-1-1	2						OL
8				SPT-D	67	1-1-2	3						OL
12	SAND - extremely compact brown fine to medium with a trace of organic silt (SP)			SPT-E	100	14-15-37	52						SP
16	SAND - very compact brown fine to medium (SP)			SPT-F	87	5-12-19	31						SP
24				SPT-G	100	5-11-16	27						SP
26	SAND - extremely compact brown fine with a trace of silt (SP)												
29				SPT-H	100	7-21-35	56						SP
30													

SOILS & STRUCTURES

Borehole ID: TB-04

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066		
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard	**Reviewed By:**	S Synnestvedt
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	25.00
Date Started:	Jul 24 2017 **Completed:** Jul 24 2017	**Northing:**	631138.7 **Easting:** 12604994.2	**Elevation:**	588.46
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50	At Time of Drilling	1.50 on Jul 24 2017		
Hammer Type:	Automatic Hammer	End of Drilling	1.50 on Jul 24 2017		
Notes:					

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - dark brown fine to medium sandy with a trace of gravel												
2	White paper debris			SPT-A	87	3-3-2	5						
3	CLAY - firm brown with lenses of peat (CL)												
4	PEAT - black sandy with wood (PT)			SPT-B	87	2-1-1	2						
5													
6	ORGANIC SILT - soft gray (OH)												
7				SPT-C	100	1-1-1	2						OL
8													
9	ORGANIC SILT - soft gray with wood (OH)												
10				SPT-D	80	1-1-0	1						OL
11													
12													
13	SAND - extremely compact brown fine with a trace of gravel and a trace of organic silt (SP)												
14	Trace of metal scraps at 15.0'												
15				SPT-E	80	54	100						SP
16													
17													
18													
19													
20				SPT-F	80	5-18-32	50						SP
21													
22													
23													
24	SAND - extremely compact brown fine with a trace of organic silt (SP)			SPT-G	100	3-35-26	61						SP
25													
26													
27													
28													
29													
30													

SOILS & STRUCTURES

Borehole ID: TB-05

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 25 2017	**Completed:**	Jul 25 2017
Northing:	631204.5	**Easting:**	12605728.0
Elevation:	590.78		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	5.00 on Jul 25 2017
Hammer Type:	Automatic Hammer	End of Drilling	5.00 on Jul 25 2017
Notes:			

Depth	Graphic	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1		TOPSOIL - dark brown fine to medium sandy SAND - brown fine to medium (SP) ORGANIC SILT - soft light gray (OH)												
2					SPT-A	100	3-2-2	4						OL
3														
4					SPT-B	100	1-0-0	0						OL
5														
6					SPT-C	100	1-0-0	0						OL
7														
8					SPT-D	100	1-1-1	2	0.23	72.2				OL
9														
10														
11														
12														
13														
14					SPT-E	100	1-1-6	7						SP
15		SAND - slightly compact brown fine with organic silt and a trace of wood (SP)												
16														
17		SAND - extremely compact gray fine with a trace of organic silt (SP)												
18														
19					SPT-F	100	50	100						SP
20														
21														
22														
23														
24		SAND - extremely compact brown fine (SP)												
25					SPT-G	80	11-25-30	55						SP
26														
27														
28														
29					SPT-H	87	14-52	100						SP
30														

SOILS & STRUCTURES

Borehole ID: TB-06

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 25 2017	**Completed:**	Jul 25 2017
Northing:	631334.5	**Easting:**	12606482.4
Elevation:	587.09		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	2.50 on Jul 25 2017
Hammer Type:	Automatic Hammer	End of Drilling	2.50 on Jul 25 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	SAND - brown fine to medium (SP)												
1	SILT - sandy (ML)												
2	PEAT - black sandy with wood (PT)												
2				SPT-A	100	4-6-7	13						
3	SAND - compact brown fine with lenses of peat and a trace of gravel (SP)												
4													
4				SPT-B	100	4-5-6	11						SP
5													
6	SAND - loose brown fine to coarse with slag and lenses of peat and a trace of silt (SP)												
7				SPT-C	67	2-2-2	4						SP
8	SAND - slightly compact brown fine with lenses of peat and a trace of gravel (SP)												
9													
10				SPT-D	100	2-2-3	5						SP
11													
12													
13													
14													
15				SPT-E	67	2-2-3	5						SP
16													
17													
18	SAND - compact brown fine (SP)												
19													
20				SPT-F	87	5-7-9	16						SP
21													
22													
23													
24													
25				SPT-G	100	5-6-9	15						SP
26	SAND - compact brown fine to medium with a trace of wood (SP)												
27													
28													
29				SPT-H	93	3-5-6	11						SP
30													

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

SOILS & STRUCTURES

Borehole ID: TB-07

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066		
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard	**Reviewed By:**	S Synnestvedt
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	30.00
Date Started:	Jul 25 2017 **Completed:** Jul 25 2017	**Northing:**	632082.6 **Easting:** 12607021.7	**Elevation:**	585.66
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50	At Time of Drilling	5.00 on Jul 25 2017		
Hammer Type:	Automatic Hammer	End of Drilling	5.00 on Jul 25 2017		
Notes:					

Depth	Graphic	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1		TOPSOIL - brown sandy gravelly SAND - slightly compact brown fine with lenses of peat and a trace of gravel (SP)												
2					SPT-A	87	6-3-3	6						SP
3														
4														
5		SAND - slightly compact brown fine (SP)			SPT-B	100	4-4-3	7						SP
6														
7		SAND - loose brown fine with lenses of peat (SP)			SPT-C	100	1-1-3	4						SP
8														
9														
10		SAND - compact brown fine with wood and lenses of peat (SP)			SPT-D	93	7-4-4	8						SP
11														
12														
13		SAND - loose brown fine with lenses of peat (SP)												
14														
15					SPT-E	80	1-2-1	3						SP
16														
17														
18														
19		SAND - loose brown fine with peat and organic silt (SP)												
20					GRAB-F	100	1-1-0							SP
21														
22														
23														
24		SAND - loose brown fine with a trace of peat and trace of organic silt (SP)												
25					SPT-G	80	1-1-1	2						SP
26														
27														
28														
29					SPT-H	100	1-0-0	0						SP
30														

SOILS & STRUCTURES

Borehole ID: TB-08

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt	**Client:**	Envirologic Technologies Inc.
Survey Datum:	NAD 1983 StatePlane Michigan South	**Hole Depth:**	30.00
Date Started:	Jul 26 2017	**Completed:**	Jul 26 2017
Northing:	632081.3	**Easting:**	12607609.7
Elevation:	587.50	**Drilling Method:**	3-1/4" Hollow Stem Auger
Ground Water Levels		**Equipment:**	Diedrich D-50
At Time of Drilling	5.00 on Jul 26 2017	**Hammer Type:**	Automatic Hammer
End of Drilling	5.00 on Jul 26 2017	**Notes:**	

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - dark brown fine to medium sandy SAND - compact dark brown fine silty with lenses of peat and a trace of gravel (SM)												
2				SPT-A	67	5-6-6	12						SM
3													
4				SPT-B	100	4-4-5	9						SM
5													
6	SAND - loose dark brown fine silty with lenses of peat and a trace of gravel (SM)												
7				SPT-C	27	1-1-1	2						SM
8	ORGANIC SILT - soft gray with wood and lenses of peat (OH)												
9				SPT-D	67	1-1-0	1						OL
10													
11													
12													
13													
14				SPT-E	53	0-0-0	0						OL
15													
16													
17													
18													
19				SPT-F	53	2-1-1	2						OL
20													
21													
22													
23	SAND - loose brown fine with lenses of peat (SP)												
24				SPT-G	67	1-0-0	0						SP
25													
26													
27													
28													
29				SPT-H	80	1-0-0	0						SP
30													

SOILS & STRUCTURES

Borehole ID: TB-09

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 26 2017	**Completed:**	Jul 26 2017
Northing:	632171.0	**Easting:**	12608005.3
Elevation:	594.51		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	1.50 on Jul 26 2017
Hammer Type:	Automatic Hammer	End of Drilling	1.50 on Jul 26 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0	TOPSOIL - dark brown fine to medium sandy gravelly SAND - brown fine to medium (SP)												
2	PEAT - black sandy with a trace of gravel (PT)			SPT-A	93	3-2-3	5						
4				SPT-B	100	2-2-3	5						
6	SAND - loose brown fine with organic silt and lenses of peat and a trace of gravel (SP)			SPT-C	40	2-1-1	2						SP
8				SPT-D	73	1-0-0	0						SP
14				SPT-E	73	0-0-0	0						SP
15	SAND - loose brown fine with lenses of peat and a trace of gravel (SP)												
19				SPT-F	100	2-2-2	4						SP
24				SPT-G	100	1-1-1	2						SP
27	SAND - compact brown fine (SP)												
29				SPT-H	100	5-6-11	17						SP

SOILS & STRUCTURES

Borehole ID: TB-10

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 26 2017	**Completed:**	Jul 26 2017
Northing:	631993.3	**Easting:**	12607782.7
Elevation:	597.13		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	7.00 on Jul 26 2017
Hammer Type:	Automatic Hammer	End of Drilling	7.00 on Jul 26 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - dark brown fine to coarse gravelly sandy SAND - loose brown fine to coarse (SP)												
2	PEAT - black sandy with organic silt and a trace of gravel (PT)			SPT-A	100	2-2-2	4						
3													
4				SPT-B	100	1-1-1	2						
5													
6													
7				SPT-C	100	2-2-2	4						
8													
9	ORGANIC SILT - soft gray (OH)			SPT-D	100	1-1-2	3						OL
10													
11													
12													
13													
14	ORGANIC SILT - soft gray with lenses of peat (OH)			SPT-E	100	1-0-0	0						OL
15													
16													
17													
18													
19				SPT-F	100	1-0-1	1						OL
20													
21													
22													
23	ORGANIC SILT - stiff gray with peat (OH)												
24				SPT-G	73	12-6-8	14			173	87	86	OL
25													
26													
27													
28													
29				SPT-H	100	4-4-4	8						OL
30													

SOILS & STRUCTURES

Borehole ID: TB-11

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 27 2017	**Completed:**	Jul 27 2017
Northing:	631777.0	**Easting:**	12606986.6
Elevation:	587.43		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	6.50 on Jul 27 2017
Hammer Type:	Automatic Hammer	End of Drilling	6.50 on Jul 27 2017
Notes:			

Depth	Graphic	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1		TOPSOIL - brown fine to medium gravelly sandy PEAT - black sandy with a trace of gravel (PT)												
2					SPT-A	100	3-4-7	11						
3														
4					SPT-B	100	3-2-4	6						
5														
6		SAND - loose brown fine with lenses of peat (SP)												
7					SPT-C	40	2-1-1	2						SP
8														
9					SPT-D	67	1-1-0	1	0.05	121.7				OL
10		ORGANIC SILT - soft gray with lenses of peat (OH)												
11														
12														
13														
14					SPT-E	87	0-0-0	0						OL
15		ORGANIC SILT - soft gray sandy with lenses of peat (OH)												
16														
17														
18														
19		SAND - loose to slightly compact brown fine with a trace of peat (SP)			SPT-F	100	1-1-2	3						SP
20														
21														
22														
23														
24					SPT-G	100	4-4-3	7						SP
25														
26														
27		SAND - compact brown fine (SP)												
28														
29					SPT-H	100	4-6-8	14						SP
30														

SOILS & STRUCTURES

Borehole ID: TB-12

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 26 2017	**Completed:**	Jul 26 2017
Northing:	631933.0	**Easting:**	12608458.2
Elevation:	584.01		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	6.20 on Jul 26 2017
Hammer Type:	Automatic Hammer	End of Drilling	6.20 on Jul 26 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - dark brown fine to medium												
1	PEAT - gray (PT)												
2	PEAT - black sandy with wood and a trace of gravel (PT)												
2				SPT-A	13	2-1-1	2						
3													
4													
4				SPT-B	40	2-1-1	2						
5													
6													
6													
7				SPT-C	100	2-2-3	5						
7	SAND - loose brown fine with a trace of peat (SP)												
8													
9													
9				SPT-D	80	2-1-1	2						SP
10													
11													
12													
13													
13	SAND - slightly compact brown fine with lenses of organic silt and a trace of peat (SP)												
14													
14				SPT-E	87	1-3-4	7						SP
15													
16													
17													
17	SAND - very compact brown fine (SP)												
18													
19													
19				SPT-F	100	8-15-24	39						SP
20													
21													
21	SAND - extremely compact brown fine silty (SM)												
22													
23													
24													
24				SPT-G	100	18-38-25	63						SM
25													
26													
26	CLAY - very stiff brown silty sandy (CL-ML)												
27													
28													
29													
29				SPT-H	100	8-6-21	27	0.41	17.1				CL-ML
30													

SOILS & STRUCTURES

Borehole ID: TB-13

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 27 2017	**Completed:**	Jul 27 2017
Northing:	631554.4	**Easting:**	12606767.8
Elevation:	588.04		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	5.00 on Jul 27 2017
Hammer Type:	Automatic Hammer	End of Drilling	5.00 on Jul 27 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - brown fine to medium sandy with a trace of gravel												
2	SAND - slightly compact brown fine with lenses of organic silt (SP)			SPT-A	100	3-3-4	7						SP
3													
4	SAND - slightly compact brown fine (SP)			SPT-B	100	4-3-4	7						SP
5													
6													
7				SPT-C	73	2-3-4	7						SP
8													
9	SAND - very compact brown fine (SP)			SPT-D	67	5-9-14	23						SP
10													
11													
12													
13	SAND - loose brown fine with lenses of organic silt (SP)												
14				SPT-E	87	1-2-1	3						SP
15													
16													
17													
18													
19				SPT-F	100	1-0-0	0						SP
20													
21													
22													
23	SAND - very compact brown fine with lenses of organic silt (SP)												
24				SPT-G	100	6-9-16	25						SP
25													
26													
27													
28													
29	SAND - very compact brown fine (SP)			SPT-H	80	4-8-15	23						SP
30													

SOILS & STRUCTURES

Borehole ID: TB-14

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 26 2017	**Completed:**	Jul 26 2017
Northing:	631650.4	**Easting:**	12608145.0
Elevation:	585.33		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	6.50 on Jul 26 2017
Hammer Type:	Automatic Hammer	End of Drilling	6.50 on Jul 26 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - dark brown fine to medium sandy with a trace of concrete												
2	ORGANIC SILT - soft light gray with lenses of peat and a trace of gravel (OH)			SPT-A	100	2-2-2	4	0.12	58.8				OL
3													
4													
5				SPT-B	100	1-2-2	4			86	58	28	OL
6	PEAT - black with wood (PT)												
7				SPT-C	100	2-2-2	4						
8													
9													
10	SAND - loose brown fine with lenses or organic silt and a trace of peat (SP)			SPT-D	100	1-1-2	3						SP
11													
12													
13	SAND - compact to very compact brown fine with lenses of peat and a trace of gravel (SP)												
14													
15				SPT-E	100	3-4-7	11						SP
16													
17													
18													
19													
20				SPT-F	100	4-10-11	21						SP
21													
22													
23													
24													
25				SPT-G	100	5-7-13	20						SP
26													
27													
28													
29				SPT-H	100	5-10-15	25						SP
30													

SOILS & STRUCTURES

Borehole ID: TB-15

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 28 2017	**Completed:**	Jul 28 2017
Northing:	631289.8	**Easting:**	12607046.5
Elevation:	588.28		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	6.50 on Jul 28 2017
Hammer Type:	Automatic Hammer	End of Drilling	6.50 on Jul 28 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	TOPSOIL - brown sandy gravelly with a trace of cement												
2	SAND - compact dark brown fine to coarse gravelly with a trace of peat (SP)			SPT-A	100	9-10-9	19						SP
3													
4				SPT-B	100	4-4-5	9						SP
5													
6	SAND - slightly compact brown fine to coarse gravelly with lenses of organic silt (SP)												
7				SPT-C	40	1-3-3	6						SP
8													
9				SPT-D	40	3-3-4	7						SP
10													
11													
12													
13													
14				SPT-E	100	2-2-3	5						SP
15													
16													
17													
18	SAND - very compact brown fine with a trace of organic silt and a trace of gravel (SP)												
19				SPT-F	100	5-7-14	21						SP
20													
21													
22													
23													
24				SPT-G	100	12-24-30	54						SP
25	SAND - extremely compact brown fine (SP)												
26													
27													
28													
29				SPT-H	100	19-35-29	64						SP
30													

SOILS & STRUCTURES

Borehole ID: TB-16

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 28 2017	**Completed:**	Jul 28 2017
Northing:	631247.3	**Easting:**	12607965.8
Elevation:	587.72		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	5.00 on Jul 28 2017
Hammer Type:	Automatic Hammer	End of Drilling	5.00 on Jul 28 2017
Notes:			

Depth	Graphic	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1		TOPSOIL - dark brown medium sandy with a trace of gravel												
2		SAND - slightly compact brown fine (SP)			SPT-A	100	2-3-4	7						SP
3														
4		SAND - compact brown fine with a trace of organic			SPT-B	87	2-4-5	9						SP
5		silt and a trace of gravel (SP)												
6														
7					SPT-C	53	4-5-4	9						SP
8		SAND - slightly compact brown fine with lenses of												
9		peat (SP)			SPT-D	87	2-3-4	7						SP
10														
11														
12														
13		SAND - very compact brown fine with a trace of												
14		gravel (SP)			SPT-E	100	7-16-25	41						SP
15														
16														
17		SAND - extremely compact brown fine with a trace of												
18		silt (SP)												
19					SPT-F	100	9-30-25	55						SP
20														
21														
22														
23		SAND - very compact brown fine (SP)												
24					SPT-G	100	3-8-22	30						SP
25														
26														
27														
28														
29					SPT-H	100	5-11-20	31						SP
30														

SOILS & STRUCTURES

Borehole ID: TB-17

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt	**Client:**	Envirologic Technologies Inc.
Survey Datum:	NAD 1983 StatePlane Michigan South	**Hole Depth:**	25.00
Date Started:	Jul 27 2017	**Completed:**	Jul 27 2017
Northing:	631497.5	**Easting:**	12608602.7
Elevation:	584.67	**Drilling Method:**	3-1/4" Hollow Stem Auger
Ground Water Levels		**Equipment:**	Diedrich D-50
At Time of Drilling	6.50 on Jul 27 2017	**Hammer Type:**	Automatic Hammer
End of Drilling	6.50 on Jul 27 2017	**Notes:**	

Depth	Graphic	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1		TOPSOIL - brown fine to medium sandy gravelly with a trace of asphalt												
2		PEAT - dark brown with sand and wood and a trace of gravel (PT)			SPT-A	100	2-1-2	3						
3														
4					GRAB-B	100	2-1-1							
5														
6														
7		SAND - loose brown fine with lenses of organic silt (SP)			SPT-C	100	0-0-0	0						SP
8														
9					SPT-D	100	1-3-6	9						SP
10		SAND - compact brown fine with a trace of gravel (SP)												
11														
12														
13		SAND - very compact brown fine (SP)												
14					SPT-E	100	10-11-17	28						SP
15														
16														
17														
18														
19					SPT-F	100	7-12-15	27						SP
20														
21														
22														
23		SAND - compact brown fine with a trace of peat (SP)												
24					GRAB-G	100	8-9-15							SP
25														
26														
27														
28														
29														
30														

SOILS & STRUCTURES

Borehole ID: TB-18

Sheet 1 of 1

Project Name:	Sappi - Site Redevelopment	**Project Number:**	2017.1066
Project Location:	Muskegon, Michigan	**Logged By:**	S Howard
Reviewed By:	S Synnestvedt		
Client:	Envirologic Technologies Inc.	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	30.00		
Date Started:	Jul 28 2017	**Completed:**	Jul 28 2017
Northing:	630967.5	**Easting:**	12608619.7
Elevation:	587.53		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50	At Time of Drilling	5.20 on Jul 28 2017
Hammer Type:	Automatic Hammer	End of Drilling	5.20 on Jul 28 2017
Notes:			

Depth	Material Description	Cautionary Condition	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0	TOPSOIL - brown fine to medium sandy												
1	SAND - brown fine to coarse gravelly (SP)												
2	SAND - slightly compact dark brown fine with lenses of peat (SP)			SPT-A	100	5-3-4	7						SP
3													
4	PEAT - black sandy (PT)			SPT-B	100	2-1-1	2						
5													
6	SAND - compact brown fine with a trace of peat (SP)												
7				SPT-C	100	1-3-7	10						SP
8													
9				SPT-D	100	5-8-11	19						SP
10													
11													
12													
13													
14	SAND - very compact brown fine (SP)			SPT-E	100	8-11-20	31						SP
15													
16													
17													
18													
19				SPT-F	100	5-8-14	22						SP
20													
21													
22													
23													
24				SPT-G	100	8-13-24	37						SP
25													
26													
27	SAND - extremely compact brown fine silty (SM)												
28													
29				SPT-H	80	23-50	100						SM
30													

QC Documentation - Field Records
Environmental Division

Section 1

Project Name Windward Pointe

Project Number 181046

Project Manager DGG

Field Personnel LNL, CC2, DGG

Field Date(s) 1/12 - 1/13/21

Section 2

Check items included for review:

Field notes (narratives)	X	Air sample analysis tables	
Boring/well logs	X	Daily checklist	
Soil gas probe installation forms		Fungal assessment form	
SWL measurement forms		Fungal assessment form	
Equipment calibration forms		Flow measurement forms	
Sample location map	X	ISM soil description log	
Sample collection forms	X	ISM collection checklist	
QC sample collection forms		Other:	X Lat/long measurements
Chain-of-custody forms	X	Other:	X ISM Collection Sheets

Section 3

Compiled by:

Signature: Lauren Chrisp

Date: 1/15/21

Review comments:

Section 4

None

Section 5

Reviewed by:

Signature: Dennis Mahler

Date: 1/19/21

Action Taken:

Section 6

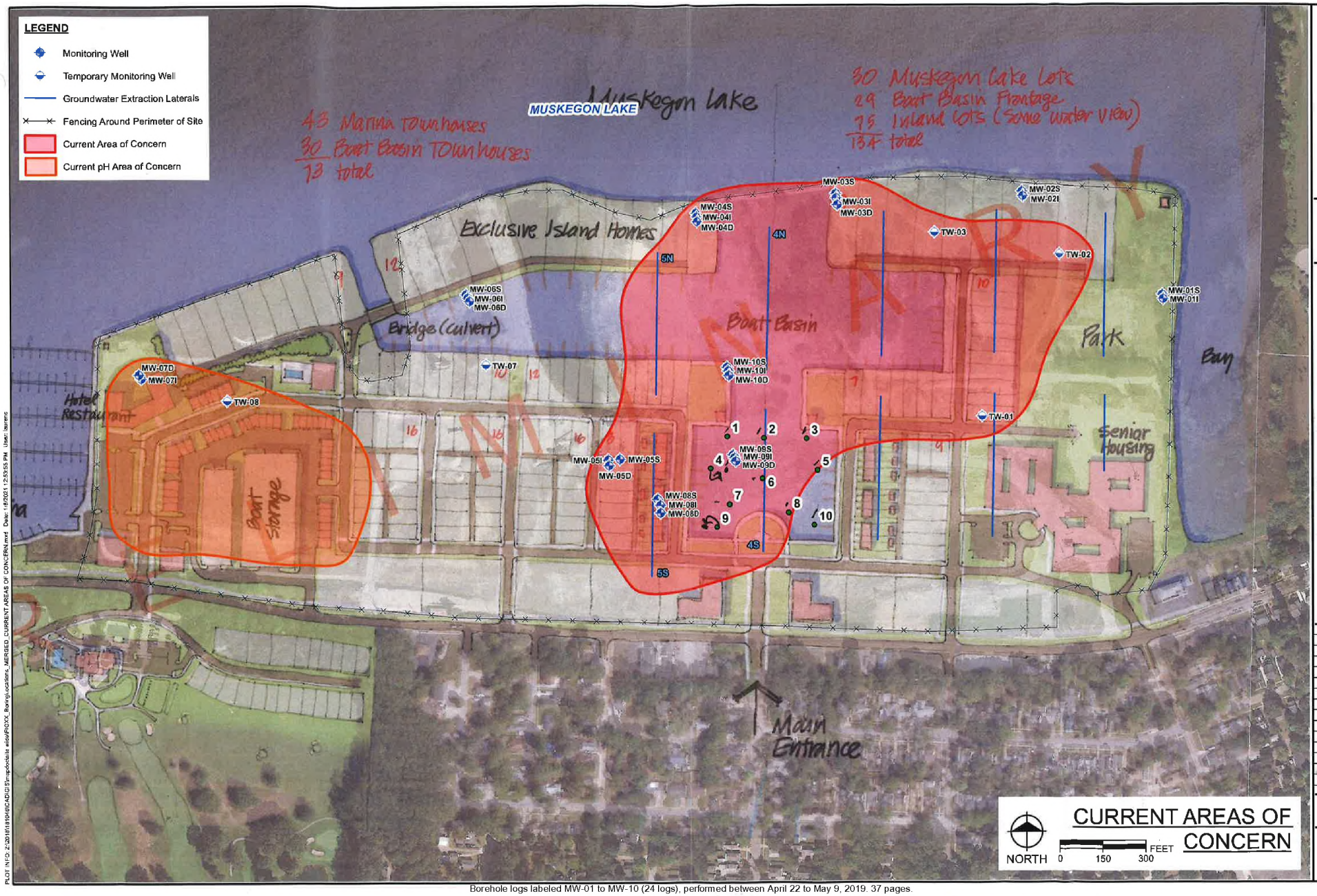
Section 7

Field Record Review Complete:

Signature: _____

Date: _____

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.



Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Pure Muskegon, LLC
2400 Lakeshore Dr., Muskegon, Michigan

PROJECT NO.
181046

FIGURE NO.
2

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PLOT INFO: Z:\2018\181046\CAD\GIS\mapdocs\arcmap\FIGXX_BoringLocations_MERGED_CURRENTAREAS OF CONCERN.mxd Date: 1/8/2021 1:25:55 PM User: laramc

FID	Id	Name		E. Lat	N Long
0	0		1	12607097	631296.9
1	0		2	12607224	631292
2	0		3	12607372	631289.6
3	0		4	12607038	631184.6
4	0		5	12607412	631179.7
5	0		6	12607219	631150.4
6	0		7	12607104	631060.1
7	0		8	12607309	631030.8
8	0		9	12607060	630979.5
9	0		10	12607399	630986.8

1) ~~12607149~~, 12607097, 631297

2) 12607224, 631292

3) 12607372, 631289

4) 12607143, 631184

5) 12601403, 631189

6) 12607219, 631060

7) 12607011, 631061

8) 12607319, 631032

9) 12607015, 630980

10) 12607412, 630987

BORING LOG

SB-01

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number: (SB)	~~SS-~~ 01 DUP-2
Project Number:	181046	Start/End Date:	1-12-21
Project Manager:	Roman Wilson	Logged By:	CLT
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosendall	Static Water Level :	~ 5.0
Driller/Helper:	Jason / Tyler	Abandonment Method:	Natural Collapse
Rig Type:	7822 DT	Development Method:	
Drilling Method:	Direct Push	Sampling Methods:	
Borehole Purpose:	ISM	PAGE 1 OF 1	

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
NA	4'	2.0	Sand, some gravel, brown, moist	
		3.0	2-4' Lime clay, gray, moist,	
			4-8' Fill, topsoil, SAND, moist,	
	4.5'	8	Fill, TOPSoil	
		10	SAND, brown, wet	
	6'		SAND, L. brown, Fine-med grain, WET	
	5'		SAND, L. brown, F-M grain, WET	
	5.0		Sand - fine grained, trace silt. Brownish gray, poorly graded, wet.	
		25	EOB @ 25.0' bgs	
		24		
		26		

Collected SS-01 through SS-05 for ISM. 10.0g = VOCs
20.0g = All others

Sampled @ 3.0'
9.0'
12.5'
18.0'
22.0'

PDM 1/19/21

Well Construction Details

Stick-up: NA
Casing
diameter:
interval:
material:
Screen
diameter:
interval:
material:
slot size:
Sand Pack
type:
interval:
Seal
type:
interval:
Grout
type:
interval:

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Comments:

BORING LOG

SB-02

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	~~SB~~
Project Number:	181046	Start/End Date:	1/12/21
Project Manager:	Roman Wilson	Logged By:	CCL
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosendall	Static Water Level :	~5.0
Driller/Helper:	Jason / Tyler	Abandonment Method:	Natural Collapse
Rig Type:	7822 DT	Development Method:	
Drilling Method:	Direct Push	Sampling Methods:	Geoprobe Macro-Core
Borehole Purpose:	ISM	PAGE	1 OF 1

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)	Well Construction Details
	4.0	2	Sand & gravel (fill), brick fragments at 2.0' Dark gray, dry	NM	Stick-up: NA
		4	3.0 - Silty Clay - trace gravel, slightly moist.		Casing diameter: interval: material:
	3.2	6	4.0 - Gravelly Sand - Sand fn to cs, fn Gravel (20%) Black, slightly moist		
		8	4.2 - Wood chips - organic material. Black		Screen diameter: interval: material: slot size:
		10	5.0 - Sandy Gravel - Gravel fine 80%; Sand fn to cs 20% Black, wet - coarsening w/ depth - fill		
	4.0	12	10.0 - Sand (native) - fine grained, poorly graded. Brownish gray, wet		Sand Pack type: interval:
		14			
		16	13.0 - SAA @ 10.0' - light brown		Seal type: interval:
	4.5	18			
		20	SAA - native, light brown		Grout type: interval:
	5.0	22			
		24	EOB @ 25.0' bgs		
		26			

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Sample Intervals:

2.0 ✓
6.0 ✓
14.0 ✓
17.0 ✓
23.0 ✓

Comments: Start at 1100

SS-06 to SS-10
RDW 1/19/21

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

BORING LOG

SB-03

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB-03
Project Number:	181046	Start/End Date:	1/19/21
Project Manager:	Roman Wilson	Logged By:	CCZ
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Geoprobe - Rosendall	Static Water Level :	~5.0
Driller/Helper:	Jason / Tyler	Abandonment Method:	Natural collapse
Rig Type:	7822 DT	Development Method:	
Drilling Method:	Direct Push	Sampling Methods:	
Borehole Purpose:	ISM	PAGE 1 OF 1	

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
	3	2	LIME, DRY, Gray/White,	
		4	SAND (40%) brown, Poorly sorted, DRY, Fine LIME (60%), Trace Fine gravel	
	4/3	6	SANDY Gravel, "Basement Fill" black/brown, WET	
		8	SAND, med. grain, brown, WET	
		10	SANDY Gravel, "Basement Fill"	
	4.5	12	Gravel "Basement Fill" wood chips GRAY SAND (80%) ~~COARSE~~ Fine grained, well sorted	
		14	WOOD CHIPS (20%) * Sulfur odor SAND, Gray, F. grain, well sorted	
	5	16	SAND, Fine grain (95%) Trace med grain.	
		18	Brownish gray, saturated	
		20	SAND, med. grain (95%) Trace coarse grain L. brown, moist	
	5	22	SAND, Fine grain (95%) Trace Silt, L. brown, moist	
		24	SAND, med. grain, L. brown, moist	
		26	EOB @ 25' bgs	

Well Construction Details

Stick-up: N/A

Casing
- diameter:
- interval:
- material:

Screen
- diameter:
- interval:
- material:
- slot size:

Sand Pack
- type:
- interval:

Seal
- type:
- interval:

Grout
- type:
- interval:

Sample Intervals

4.0 ✓
7.0 ✓
13.0 ✓
17.0 ✓
24.0 ✓

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Comments: Start : 920
End : 950

SS-11 to SS-15
POW 1/19/21

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

BORING LOG

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB-~~SS~~-04
Project Number:	181046	Start/End Date:	11/12/21
Project Manager:	Roman Wilson	Logged By:	ECL
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosendall	Static Water Level :	~5.0
Driller/Helper:	Jason / Tyler	Abandonment Method:	Natural Collapse
Rig Type:	7822 DT	Development Method:	
Drilling Method:	Direct Push	Sampling Methods:	
Borehole Purpose:	ISM	PAGE 1 OF 1	

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
	3.2	2	Lime. 1.5 - Sand - fine, fine, light brown, dry	
		4	4.5 - Lime - gray, friable, dry	
		6	5.0 - Sand - Fine	
	4.5	8	8.5 - Lime layer for 0.2' - 8.7 - Sand - Fine, trace brick fragments, wet	
		10	wood chips for 0.2 @ 10.0'	
	5.0	12	10.2 - Sand, fine, gray wet	
		14	..... SAND - dark gray, some coarse Sand + fine gravel, wet	
		16	15.0' - Sand, fine brown, wet	
	5.0	18	18.5' - Wood fragments for 0.3'	
		20	18.8 - Sand, brown, fine wet.	
	5.0	22	↓	
		24		
		26	EOB @ 25.0	

Sample Intervals:

3.0 -
8.0 -
13.0 -
18.0 -
23.0 -

SS-16 to SS-20

POM 1/19/21

Well Construction Details

Stick-up: NA

Casing
- diameter:
- interval:
- material:

Screen
- diameter:
- interval:
- material:
- slot size:

Sand Pack
- type:
- interval:

Seal
- type:
- interval:

Grout
- type:
- interval:

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Comments: Start at 1332

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

BORING LOG

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB ~~SB~~ 05
Project Number:	181046	Start/End Date:	1/12/21 1/13/21
Project Manager:	Roman Wilson	Logged By:	LNC
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosendall	Static Water Level :	~~NS~~.0
Driller/Helper:	Jason / Tyler	Abandonment Method:	Natural collapse
Rig Type:	7822 DT	Development Method:	
Drilling Method:	Direct Push	Sampling Methods:	
Borehole Purpose:	ISM	PAGE 1 OF 1	

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
	4	2	SAND, F.grain, well sorted, Brown, Slightly Saturated	
			LIME, clayey, cohesive, no plasticity, slightly moist, L.green	
		4	SAND, F.grain, well sorted, L.brown/Tan, DRY	
			LIME, clayey, Slightly cohesive, DRY, L.green	
	3	6	SAND (70+/-) fine-med grain, Poorly sorted, brown	
		8	Saturated. Gravel (30+/-) sub-Angular, coarse	
		10	SAND (90+/-) F.grain, gray/brown, saturated, moderately	
	5		sorted. Gravel (10+/-) Fine, Angular	
		12	SAND (70+/-) F.grain, black, Saturated	
			-Wood chips (30+/-)	
		14	SAND, F.grain, L.brown, moist "NATIVE"	
	5	16	SAA	
		18		
		20	SAND, Fine-med grain, L.brown, saturated,	
	5		Poorly sorted. Trace Gravel, Fine grain "NATIVE"	
		22	SAND (60+/-), F.grain, L.brown, moist, well sorted	
		24	-CLAY Lens, cohesive, med. plasticity, L.brown, moist	
			SAND, F.grain, moist, L.brown, well sorted	
		26	EOB @ 25' bgs	

SAMPLE INTERVALS

4.0 ✓
9.0 ✓
14.0 ✓
18.0 ✓
23.0 ✓

SS-21 to SS-25
Rcvd 1/19/21

Well Construction Details

Stick-up: NM
Casing
diameter:
interval:
material:
Screen
diameter:
interval:
material:
slot size:
Sand Pack
type:
interval:
Seal
type:
interval:
Grout
type:
interval:

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	>50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Comments: START: 954

BORING LOG

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB-06
Project Number:	181046	Start/End Date:	1/12/21
Project Manager:	Roman Wilson	Logged By:	CC2
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosendall	Static Water Level :	~5.0
Driller/Helper:	Jason Tyler	Abandonment Method:	Natural Collapse
Rig Type:	7822 DT	Development Method:	
Drilling Method:	Direct Push	Sampling Methods:	
Borehole Purpose:	ISM	PAGE	1 OF 1

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
	3.2	2	Sand, fine, dry 0.5'- Lime, gray, dry 1.0- Sand	NM
		4	3.8'- Lime	
	3.0	6	5.2- Sand - fine, brown dry	
		8	---- wet	
		10	--- 10.0 -- Sand, fine, brownish gray, wet	
	5.0	12	12.5 -- some wood chips for 0.1'	
		14	12.6- Sand SAA @ 10.0	
		16	---- 15.0 --- Sand - fine, medium brown, wet.	
	5.0	18	↓	
		20	---- 20.0 -- Sand, fine, medium brown, wet	
	5.0	22		
		24		
		26	EOB @ 25.0	

Well Construction Details

Stick-up: NM

Casing
- diameter:
- interval:
- material:

Screen
- diameter:
- interval:
- material:
- slot size:

Sand Pack
- type:
- interval:

Seal
- type:
- interval:

Grout
- type:
- interval:

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Sample Intervals:
3.0 4.0' ✓
7.0' ✓
12.0' ✓
18.0' ✓
22.0' ✓
SS-24 to SS-29 30
RDM 1/19/21

Comments: Start @ 1420

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

BORING LOG

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB ~~SS~~-07
Project Number:	181046	Start/End Date:	1/12/21
Project Manager:	Roman Wilson	Logged By:	CC2
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosendall	Static Water Level :	~5.0'
Driller/Helper:	Jason/Tyler	Abandonment Method:	Natural Collapse
Rig Type:	7822 DT	Development Method:	NM
Drilling Method:	Direct Push	Sampling Methods:	Macro Core
Borehole Purpose:	ISM	PAGE	1 OF 1

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
	3.8	2	Sand - fine, dark brown, dry, fill	
		4	3.0 - Lime - friable, clay-like feel, dry	
			4.0 - Sand, dry, brown	
		6	SAA -	
	3.5	8	wet - becoming black	
		10	Sandy Gravel ("basement fill"), black, wet, sulfur odor	
	3.0	12	11.0' - Wood chips - black - sulfur odor	
		14	12.5 - Sand - fine, some coarse grains. Gray, poorly graded wet	
	5.0	16	15.0 - SAA @ 12.5	
		18		
		20	20.0 - Sand - fine dark gray to black, wet	
	5.0	22		
		24	EOB @ 25.0' bgs	
		26		

Well Construction Details

Stick-up: NA

Casing
- diameter:
- interval:
- material:

Screen
- diameter:
- interval:
- material:
- slot size:

Sand Pack
- type:
- interval:

Seal
- type:
- interval:

Grout
- type:
- interval:

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Sample Interval:
- 1.5' ✓
- 7.0' ✓
- 11.0 ✓
- 17.0 ✓
- 22.0 ✓

Comments: Start @ 1140 SS-31 to SS-35 RDM 1/19/21

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

BORING LOG

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB ~~MS~~-08
Project Number:	181046	Start/End Date:	1/13/21
Project Manager:	Roman Wilson	Logged By:	LNC
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosenda 11	Static Water Level :	~~NS~~-0
Driller/Helper:	Jason / Tyler	Abandonment Method:	Natural Collapse
Rig Type:	7822 DT	Development Method:	
Drilling Method:	Direct Push	Sampling Methods:	
Borehole Purpose:	ISM	PAGE	1 OF 1

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
	3.4	2	SAND(85) F.grain, L.brown, dry. LIME(15) gray/blue,	
		4	LIME, clayey, slight consiveness, white/gray, DRY	
			SAND, F.grain, well sorted, dark brown, DRY	
			LIME, clayey, cohesive, slight plasticity, gray/green, moist	
	3.4	6	SAND, F.grain, well sorted, dark-Light brown,	
		8	moist, Trace Gravel, coarse, sub-rounded	
		10		
	5	12	SAND, F.grain, well sorted, brown, saturated	
			organics, wood chips, black	
		14	SAND, F.grain, well sorted, L.brown, saturated	
	5	16	SAND, F.grain, L.brown, saturated,	
		18	moderately sorted. Trace gravel, Fine gr	
		20		
	5	22	SAND, F.grain, well sorted, L.brown, saturated,	
			"NATIVE"	
		24	SAA, Trace coarse sand	
		26		

SAMPLE INTERVAL

3.0 ✓

7.0 ✓

13.0 ✓

18.0 ✓

23.0 ✓

SS-36 to SS-40

RDM 1/19/21

Well Construction Details

Stick-up: NM

Casing — diameter: / interval: / material:

Screen — diameter: / interval: / material: / slot size:

Sand Pack — type: / interval:

Seal — type: / interval:

Grout — type: / interval:

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Comments: Start: 1115

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

BORING LOG

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB ~~SG~~ 09
Project Number:	181046	Start/End Date:	1/12/21
Project Manager:	Roman Wilson	Logged By:	CCJ
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosenda H	Static Water Level :	
Driller/Helper:	Jason, Tyler	Abandonment Method:	Natural Collapse
Rig Type:	7822 DT	Development Method:	NA
Drilling Method:	Direct Push	Sampling Methods:	Macro Core
Borehole Purpose:	ISM	PAGE	1 OF 1

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)	Well Construction Details
NA	3.5	2	Sand - fine, brown, dry	NM	Stick-up: NA
		4	3.5' - Lime - friable, dry, light gray.		Casing diameter: interval: material:
	4.0	6	.... SAA - wet		Screen diameter: interval: material: slot size:
		8	7.5 - Sand - fine, fill, dark gray, wet, sulfer odor		
		10			
	5.0	12	12.5 - Wood chips & Sand - fine, Black, sulfer odor, wet		Sand Pack type: interval:
		14	12.9 - Sand, fine, Gray, wet - sulfer odor		Seal type: interval:
	5.0	16			
		18			Grout type: interval:
		20	--- SAA.		
	5.0	22	--- Black color for 1.0' - then back to gray		
		24	EOB @ 20 250'		
		26			

Sample Retrieval.

3.0 ✓
8.0 ✓
12.0 ✓
19.0 ✓
22.0 ✓

55-41-55-45

ROH 1/19/21

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Comments: Shovel @ 1247

BORING LOG

Project Name:	Pure Muskegon/Windward Pointe	Boring/Well Number:	SB SS-10
Project Number:	181046	Start/End Date:	1/13/21
Project Manager:	Roman Wilson	Logged By:	LNC
Site Location:	Muskegon, MI	Ground Elevation:	
Contractor:	Rosendall	Static Water Level :	
Driller/Helper:	Jason / Tyler	Abandonment Method:	
Rig Type:		Development Method:	
Drilling Method:		Sampling Methods:	
Borehole Purpose:		PAGE 1 OF 1	

Blows per 6"	Recovery (feet)	Depth (ft bgs)	Sample Description	PID (ppm)
	4	2	SAND, F. grain, well sorted, L. brown-orange, DRY	
		4	LIME, cohesive, clayey, gray/green, DRY	
			SAND (85±) cohesive, F. grain, Dark brown, Trace silt, Trace wood chips	
			LIME, clayey, cohesive, gray/green, DRY	
	3	6	SAND, F. grain, moderately sorted, gray/brown, moist, Trace wood chips (<5%)	
		8	LIME, cohesive, clayey, gray/green, slightly saturated	
		10	SAND, F. grain, moderately sorted, gray/dark brown, moist. Trace gravel, coarse	
	5	12	SAND, F. grain, well sorted, dark brown, saturated	
			SAND (70±) F. grain, brown, moist, poorly sorted	
		14	Gravel (30±) Rounded, coarse.	
			SAND, F. grain, well sorted, L. brown, saturated "NATIVE"	
	5	16	SAND, Fine ~~med~~ grain, ~~moderately~~ well sorted,	
		18	Trace med grain, L. brown, saturated	
			SAND, Fine grain, well sorted, L. brown,	
		20	Saturated	
	5	22	SAND, Fine grain, well sorted, Light brown,	
		24	Saturated	
		26		

SAMPLE INTERVALS

2.0 ✓
6.0 ✓
11.0 ✓
16.0 ✓
21.0 ✓

SS-46 to SS-50
RDM 1/19/21

Well Construction Details

Stick-up: NM

Casing
diameter:
interval:
material:

Screen
diameter:
interval:
material:
slot size:

Sand Pack
type:
interval:

Seal
type:
interval:

Grout
type:
interval:

Density - Sands (blow counts per foot)

very loose:	5 or less
loose:	6-11
med dense:	11-30
dense:	31-50
very dense:	> 50

Density - Clays/Silts (blow counts per foot)

very soft:	<2
soft:	2-4
medium stiff:	4-8
stiff:	8-15
very stiff:	15-30
hard:	>30

Comments: START: 1020

Borehole logs labeled MW-01 to MW-10 (24 logs), performed between April 22 to May 9, 2019. 37 pages.

BOREHOLE LOG

BORING/WELL ID: **SS-01**

TOTAL DEPTH (ft.): **15**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
GRAVEL: with Cobbles. White.	0.0		0					
FILL: Sand. Black, dry.	0.0		1					
	0.0		2					
	0.0		3		4.0'			
CLAY: with Lime. Gray to white, moist.	0.0		4					
	0.0		5					
FILL: Sand with Lime. Black, friable, dry.	0.0		6					
CLAY: with Lime. Gray to white, moist.	0.0		7					
	0.0		8		3.9'			
	0.0		9					
FILL: Wood debris. Red brown.	0.0		10					
CLAY: with Lime. Gray, saturated.	0.0		11					
FILL: Wood debris. Red brown.	0.0		12					
FILL: Same as above. Yellow.	0.0		13		3.8'			
FILL: Same as above. Red brown.	0.0		14					
CLAY: with Lime. Dark gray, high plasticity, soft, saturated.	0.0		15					

BOREHOLE LOG

BORING/WELL ID: **SS-02**

TOTAL DEPTH (ft.): **15**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand, fine grained. Black.	0.0		0					
FILL: Wood debris. Dark brown.	0.0		1					
	0.0		2		3.0'			
CLAY: with Lime. White, high plasticity, slightly moist.			3					
FILL: Wood debris. Dark brown.	0.0		4					
FILL: Sand, fine grained. Black.	0.0		5					
FILL: Wood debris. Dark brown.								
FILL: Same as above with coarse fragments. Red brown.	0.0		6					
	0.0		7		2.8'			
	0.0		8					
	0.0		9					
	0.0		10					
	0.0		11					
FILL: Sand, fine grained. Black, saturated.	2.5		12					
CLAY: with Lime. White gray, high plasticity, soft, very moist. Hydrocarbon odor.	13.3		13		3.5'			
	47.2		14					
	144		15					

BOREHOLE LOG

BORING/WELL ID: **SS-03**

TOTAL DEPTH (ft.): **15**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand, fine to coarse grained; some Lime; trace Gravel. Medium gray, dry.	0.0		0					
	0.0		1					
FILL: Same as above. Red brown.	0.0		2					
FILL: Sand, fine grained. Black, dry.	0.0		3		2.9'			
	0.0		4					
CLAY: with Lime. White gray, dry.	0.0		5					
FILL: Wood debris. Red brown.	0.0		6					
	0.0		7					
	0.0		8		3.5'			
	0.0		9					
	0.0		10					
	0.0		11					
FILL: Sand, fine grained. Black. FILL: Wood debris. Black.	0.0		12					
FILL: Lime and Wood debris.	0.0		13		2.9'			
	0.0		14					
FILL: Wood debris with coarse fragments.								
CLAY: with Lime. White gray, high plasticity, moist.	0.0		15					

BOREHOLE LOG

BORING/WELL ID: **SS-04**

TOTAL DEPTH (ft.): **15**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand, fine grained; trace Wood debris. Light brown.	0.0		0					
			1					
FILL: Sand (70%), fine to medium grained; Clayey Lime (30%). Dark brown and gray, dry.	0.0		2					
	0.0		3		2.0'			
FILL: Sand, fine grained with large Cobbles (0.15'x0.10'). Brown, dry.	0.0		4					
CLAY: with Lime. Gray white, high plasticity, slightly moist.	0.0		5					
	0.0		6					
FILL: Wood debris.								
CLAY: with Lime. High plasticity, slightly moist.	0.0		7					
	0.0		8		4.2'			
CLAY: Same as above with interbedded Wood debris layers (0.1-0.3' thick).	0.0		9					
	0.0		10					
CLAY: with Lime (80%); Wood debris (20%). High plasticity, moist.	0.0		11					
	0.0		12					
	0.0		13		3.7'			
	0.0		14					
	0.0		15					

BOREHOLE LOG

BORING/WELL ID: **SS-05**

TOTAL DEPTH (ft.): **15**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand, fine grained; trace Gravel, fine.	0.0		0					
	0.0		1					
	0.0		2					
FILL: Wood debris (possibly with glue).	0.0		3		3.4'			
CLAY: with Lime. Dark gray, dry.	0.0		4					
CLAY: Same as above. Light gray, dry to slightly moist.	0.0		5					
	0.0		6					
	0.0		7					
FILL: Wood debris. Dark brown.	0.0		8		3.5'			
	0.0		9					
	0.0		10					
FILL: Sand, fine grained. Black, poorly graded. FILL: Same as above. Saturated.	0.0		11					
CLAY: with Lime (70%); Wood debris (30%). Dark gray, moist.	0.0		12					
	0.0		13		3.7'			
CLAY: with Lime. Dark gray, moist.	0.0		14					
	0.0		15					

BOREHOLE LOG

BORING/WELL ID: **SS-06**

TOTAL DEPTH (ft.): **15**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand (90%), fine to coarse grained (80/10/10); trace Gravel (5%), fine; trace Slag fragments (5%). No plasticity.	0.0		0					
	0.0		1					
	0.0		2		3.1'			
	0.0		3					
	0.0		4					
FILL: Foundry Sand, fine grained. Black, poorly graded, dry.	0.0		5		—			
FILL: Sand, fine to coarse grained; trace Slag fragments. Black, dry.	0.0		6					
	0.0		7					
CLAY AND SAND: Clay (50%), with Lime; Sand (50%), fine grained; with trace animal hair and Wood debris. Black, moist.	0.0		8		2.5'			
	0.0		9					
	0.0		10		—			
	6.2		11					
CLAY AND SAND: Clay (34%), with Lime; Sand (33%), fine grained; Wood debris (33%). Black, saturated. Odor present.	9.2		12					
	43.0		13		3.9'			
	61.4		14					
	188		15					

BOREHOLE LOG

BORING/WELL ID: **SS-07**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand, fine to coarse grained (40/30/30); trace Asphalt fragments. Black, dry.	0.0		0					
	0.0		1					
CLAY: with Lime.			2					
FILL: Sand, fine to coarse grained (40/30/30); trace Asphalt fragments. Black, dry.	0.0		3		3.0'			
	0.1		4					
CLAY: with Lime. Gray, medium plasticity, dry to slightly moist.	0.1		5					
SILT WITH CLAY: Coal Ash (Silt) (85-90%); Clay (10-15%), with Lime. Black, dry.	0.0		6					
	0.0		7		4.4'			
	0.2		8					
	0.3		9					
	0.4		10					

fishbeck

BOREHOLE LOG

BORING/WELL ID: **SS-08**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SAND: Sand, fine to coarse grained (80/10/10); trace Gravel, fine; trace Wood debris.	0.0		0		3.8'			
	0.0		1					
	0.0		2					
CLAY: with Lime; trace Wood debris. Gray to dark gray, high plasticity, moist.	2.0		3					
FILL: Wood debris. Moist.			4					
SAND: Sand, fine grained. Poorly graded, dry.	0.0		5					

fishbeck

BOREHOLE LOG

BORING/WELL ID: **SS-09**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand (50%), fine grained; Silt (50%); trace Gravel, fine, with roots.			0					
			1					
SAND: Sand (50%), fine grained; Wood debris (50%). Red brown, dry.			2		3.0'			
			3					
SAND: Same as above. Saturated.			4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-10**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SILT: with trace Organics. Low plasticity, slightly moist.	0.0		0					
			1					
SILT: Silt (50%); Wood debris (50%). Black, dry.	0.0		2		2.1'			
	0.0		3					
	0.0		4					
	0.0		5					

BOREHOLE LOG

BORING/WELL ID: **SS-11**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SAND AND SILT: Sand (50%), fine to medium grained; Silt (50%); trace Gravel (Slag); trace Wood debris. Dark brown, moist.	0.0		0					
	0.0		1					
	2.5		2		2.9'			
	0.0		3					
			4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-12**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SANDY SILT: Silt (50%); Sand (40%), fine grained; little Wood debris (10%); trace Gravel. Dry.	10.0		0					
	124		1					
SANDY SILT: Silt (70%); Sand (30%), fine grained; trace Wood debris. No cohesiveness, dry.			2		3.6'			
			3					
			4					
FILL: Wood debris (70%); Silt (30%). Red black/black, dry.			5					
	0.5		6					
			7		2.9'			
CLAY: with Lime. Gray black, cohesive, moist.			8					
	23.3		9					
			10					

BOREHOLE LOG

BORING/WELL ID: **SS-13**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Wood debris (90%), Sand (10%), fine grained; trace Organics. Brown to black, dry.			0					
			1					
SAND: Fine to medium grained. Gray, dry.			2		1.4'			
			3					
FILL: Wood debris.			4					
			5		—			
FILL: Same as above. Moist.			6					
FILL: Same as above with fine grained Sand.			7		3.2'			
	15.5		8					
			9					
	3.4		10					

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BOREHOLE LOG

BORING/WELL ID: **SS-14**

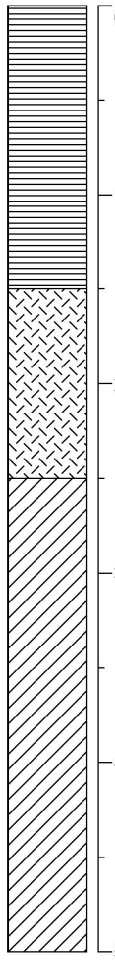
TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SILT: Coal Ash. Black, moist.	0.0							
FILL: Wood debris. Red, dry.	0.0							
CLAY: with Lime. Light tan/white, medium plasticity, dry.	0.0				3.1'			
	0.0							



BOREHOLE LOG

BORING/WELL ID: **SS-15**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/12/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/12/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SILTY SAND: Sand (70%); some Silt (20%); little coarse Sand/fine Gravel (10%). Gray to black.	0.0		0					
CONCRETE: Fragments. White.	0.0		1					
SANDY SILT: Silt (60%); Sand (30%); little Wood debris/Gravel (10%). Cohesive, slightly moist.	0.0		2		2.3'			
	0.0		3					
			4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-16**

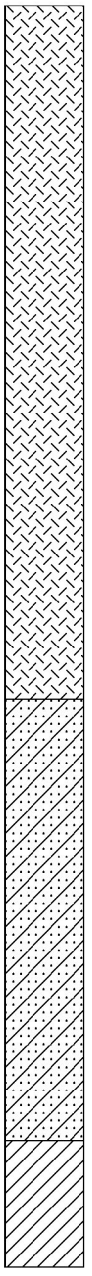
TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand (90%), fine to coarse grained (50/40/10); little Gravel (10%), fine. Dark brown, dry.	0.0							
FILL: Same as above. Medium brown.	0.0				3.2'			
CLAYEY SAND: Sand (60%), fine to medium grained; some Clay (20%), with Lime; some Wood debris (20%).	0.0				3.4'			
CLAY: with Lime. Dark gray, high plasticity, saturated.	0.0							



fishbeck

BOREHOLE LOG

BORING/WELL ID: **SS-17**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SILT: with Lime. Gray, low plasticity, cohesive, dry.	0.0		0		3.5'			
	0.0		1					
	0.0		2					
	0.0		3					
	0.0		4					
SILT: Same as above. Medium plasticity, moist.			5					

BOREHOLE LOG

BORING/WELL ID: **SS-18**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Coal Ash (Sand, very fine grained; Silt); trace Wood debris and root fragments. Black, cohesive, dry.	0.0		0					
	0.0		1					
	0.0		2		3.4'			
FILL: Coal Ash (Silt); Wood debris. Black, saturated.	0.0		3					
	0.0		4					
	0.0		5					
CLAY AND SILT: Clay (50%), with Lime; Silt (50%). Dark gray, low plasticity, cohesive.	0.0		6					
	0.0		7		3.5'			
	0.0		8					
	0.0		9					
CLAYEY SILT: Silt (70%); Clay (30%). Black, low plasticity, cohesive, saturated. Slight hydrocarbon odor.	20.8		10					

BOREHOLE LOG

BORING/WELL ID: **SS-19**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Coal Ash (Sand, very fine grained; Silt); trace root fragments. Black, no plasticity, cohesive, dry.	0.0		0					
	0.1		1					
	0.0		2		2.9'			
	0.1		3					
FILL: Same as above. Saturated.	0.0		4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-20**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
CLAY: with Lime. Gray, cohesive, friable, dry.	0.0 0.0 0.0 0.0 0.0		0 1 2 3 4 5		3.1'			

BOREHOLE LOG

BORING/WELL ID: **SS-21**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
CLAY: with Lime; trace root fragments. Gray, no plasticity, cohesive, friable, dry.	0.0		0		2.9'			
	0.0		1					
	0.0		2					
	0.0		3					
	0.0		4					
SILTY SAND: Sand (60%), fine grained; Silt (35%); trace Wood debris and root fragments (5%). Black, cohesive, dry.	0.0		5					
FILL: Wood debris. Red brown.								
SAND: Fine to medium grained. Brown, moist.	0.0		6					
SANDY CLAY: Clay (60%), with Lime; Sand (35%), fine grained; trace Wood debris (5%). Mottled black, gray, red.	0.0		7		3.0'			
FILL: Coal Ash (Silt). Saturated.	0.0		8					
FILL: Wood debris. Red brown, moist.	0.0		9					
CLAY: with Lime. Brown gray, high plasticity, cohesive, moist.	0.0		10					

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BOREHOLE LOG

BORING/WELL ID: **SS-22**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
CLAY: with Lime. Gray, cohesive, friable, dry.	0.0		0		3.5'			
	0.0		1					
	0.0		2					
	0.0		3					
	0.0		4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-23**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
CLAY: with Lime. Gray, cohesive, friable, dry.	0.0		0		3.3'			
	0.0		1					
	0.0		2					
	0.0		3					
CLAY: Same as above. High plasticity, moist.	0.0		4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-24**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
CLAY: with Lime; trace root fragments. Gray, cohesive, friable, dry.	0.0		0		3.0'			
	0.0		1					
	0.0		2					
	0.0		3					
	0.0		4					
	0.0		5					
SAND: Sand, fine to coarse grained. Brown, dry.	0.0		6					
	0.0		7		2.8'			
CLAY: with Lime. Gray, medium plasticity, moist.								
SILT WITH SAND: Coal Ash (Silt) (75%); little Sand (15%), fine to medium grained; little Wood debris (10%). Black, slightly moist.	0.0		8					
	0.0		9					
	0.0		10					

BOREHOLE LOG

BORING/WELL ID: **SS-25**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand (40%), fine grained; Silt (40%); Wood debris and root fragments (20%). Black, dry.	0.0		0		4.1'			
	0.0		1					
	0.0		2					
	0.0		3					
CLAY: with Lime; some Wood debris. Gray, cohesive, friable, slightly moist.	0.0		4					
	0.0		5					

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BOREHOLE LOG

BORING/WELL ID: **SS-26**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Coal Ash (Silt) (50%); Clay (40%), with Lime; Wood debris (10%). Black, slightly moist.	0.0		0		4.1'			
	0.0		1					
			2					
SILT: Coal Ash; trace Wood debris (5%). Saturated.	0.0		3					
	0.1		4					
	0.0		5					

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BOREHOLE LOG

BORING/WELL ID: **SS-27**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
CLAY: with Lime. Gray, cohesive, friable, saturated.	0.0		0		3.8'			
CLAY: Same as above. Dry.	0.0		1					
	0.0		2					
SAND: Fine grained. Brown, poorly graded, saturated.	0.0		3					
FILL: Wood debris (60%); some Clay (20%), with Lime; some Sand (20%). Saturated.	0.0		4					
			5					

BOREHOLE LOG

BORING/WELL ID: **SS-28**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: C. Carew	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
CLAY: with Lime. Gray, low plasticity, cohesive.	0.0		0		3.8'			
	0.0		1					
	0.0		2					
	0.1		3					
SAND: Fine to coarse grained; trace Gravel and Wood debris. Black, saturated.	0.1		4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-29**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SAND AND SILT: Sand (50%), fine grained; Silt (50%); trace root fragments. Low cohesiveness, dry.	0.0		0					
SANDY SILT: Silt (60%); Sand (40%), fine grained. Cohesive, slightly moist.	0.0		1					
SAND: Fine grained. Tan, well sorted, moist.	0.0		2		3.3'			
SAND: Same as above. Light gray, saturated.	0.0		3					
	0.0		4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-30**

TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
TOPSOIL: Sand (70%); Clay (30%); trace root fragments. Dark brown to black, slightly moist.	0.0		0					
SAND: Fine grained with trace medium to coarse grains. Brown, dry.	0.0		1					
SILT: Coal Ash. Black, dry.	0.0		2		3.0'			
SILT: Same as above. Saturated.	0.0		3					
	0.0		4					
			5					

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BOREHOLE LOG

BORING/WELL ID: **SS-31**

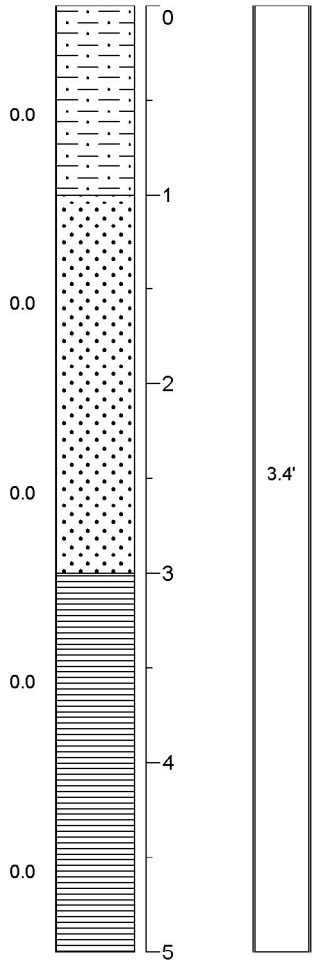
TOTAL DEPTH (ft.): **5.0**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/13/2020	**DRILLING CO.:** Rosendall Well Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/13/2020	**DRILLER:** Jeff
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** Geoprobe
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Direct Push
LOGGED BY: L. Chwojnicki	**STATIC WATER LVL.:** --	**SAMPLING METHODS:** Macrocore

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SILT WITH SAND: Silt (70%); some Sand (25%), fine grained; trace Gravel and root fragments (5%).	0.0							
SAND: Fine grained with trace coarse grains. Dark brown, dry.	0.0							
SILT: Coal Ash; trace Lime. Cohesive, moist.	0.0				3.4'			
SILT: Same as above. Saturated.	0.0							



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BOREHOLE LOG

BORING/WELL ID: **MW-1D**

TOTAL DEPTH (ft.): **71**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/22/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/22/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: A. Frye	**STATIC WATER LVL.:** ~7.0' bgs	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
FILL: Sand, fine grained. Brown, dry.			0					
FILL: Sand (60%), fine grained; Silt (40%). Black, dry.	17.9		1		1.5'		2/4/2/3	
			2					
FILL: Woody debris; Lime sludge. Black and gray, moist.	44.7		3		2.0'		2/3/2/3	
			4					
			5		2.0'		2/1/1/2	
	61.3		6					
			7	▼	2.0'		2/1/1/2	
	28.7		8					
FILL: Woody debris (80%); little Sand (10%), fine grained; little Silt (10%). Dark brown, saturated.			9		1.0'		1/1/1/2	
	50.9		10					
			11					
			12					
			13					
			14					
SAND: Fine to medium grained (70/30). Light brown, saturated.			15		1.5'		3/5/7/10	
	27.8		16					
			17					
			18					
			19					
SAND: Sand (60%), fine grained; Silt (40%). Light brown, saturated.			20		2.0'		2/6/8/11	
	44.3		21					
			22					
			23					
			24					
			25		1.5'		5/9/ 15/17	
	45.7		26					
			27					
			28					
			29					
			30		2.0'		16/27/ 39/53	
	63.2		31					
			32					
			33					
			34					
SAND: Silt (50%); Clay (40%); little Sand (10%), fine grained. Gray, low to medium plasticity, high cohesiveness, moist.			35		2.0'		4/7/6/11	
	59.6		36					

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BOREHOLE LOG

BORING/WELL ID: **MW-1D**

TOTAL DEPTH (ft.): **71**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/22/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/22/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: A. Frye	**STATIC WATER LVL.:** ~7.0' bgs	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	COMMENTS
SAND: Silt (50%); Clay (40%); little Sand (10%), fine grained. Gray, low to medium plasticity, high cohesiveness, moist.			37		2.0'		3/5/8/12	
	80.6		38					
CLAY: Clay (70%); Silt (30%). Gray, low to medium plasticity, high cohesiveness, saturated.			39		2.0'		4/5/7/11	
	60.6		40					
			41					
			42					
			43					
			44					
			45		2.0'		7/9/9/11	
	68.8		46					
			47					
			48					
			49					
			50		2.0'		3/5/7/10	
	64.4		51					
			52					
			53					
			54					
CLAY: Same as above with increasing Clay content. High plasticity.			55				4/5/7/9	
	49.3		56					
			57					
			58					
			59					
			60				4/4/6/10	
	41.7		61					
			62					
			63					
			64					
CLAY: Clay (95%); trace Gravel (5%). Gray/brown, moist.			65		2.0'		3/5/7/8	
	46.5		66					
			67					
			68					
			69					
			70		2.0'		4/5/6/9	
	43.3		71					

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BOREHOLE LOG

BORING/WELL ID: **MW-1I**

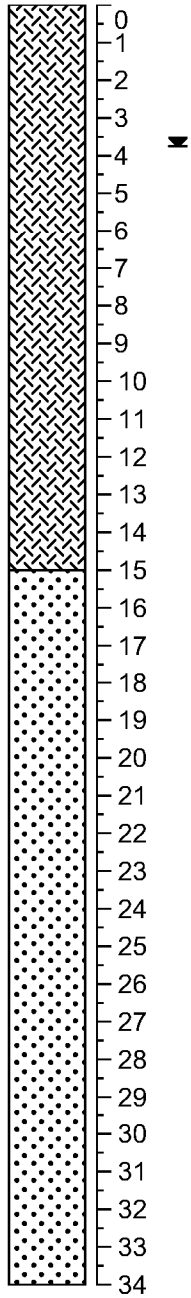
TOTAL DEPTH (ft.): **34**

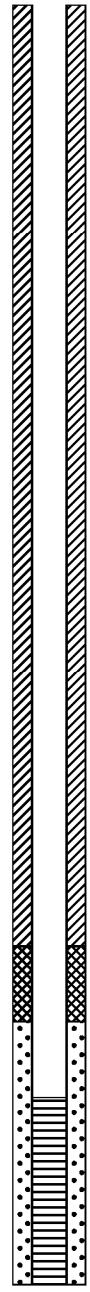
PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/23/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/23/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: A. Frye	**STATIC WATER LVL.:** ~6.95' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-1D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry. FILL: Sand (60%), fine grained; Silt (40%). Black, dry. FILL: Woody debris; Lime sludge. Black and gray, moist. FILL: Woody debris (80%); little Sand (10%), fine grained; little Silt (10%). Dark brown, saturated.			0–15					2" PVC Casing with 3.2' ags Stick-up Quick grout
SAND: Fine to medium grained (70/30). Light brown, saturated. SAND: Sand (60%), fine grained; Silt (40%). Light brown, saturated.			15–34					3/8 Bentonite Pellets #0 Well Gravel 2" PVC Screen (10 Slot)





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BOREHOLE LOG

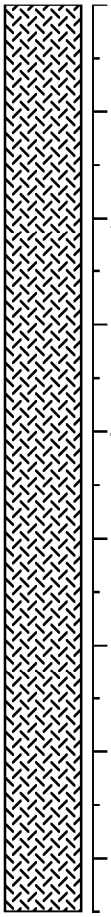
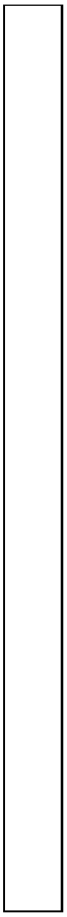
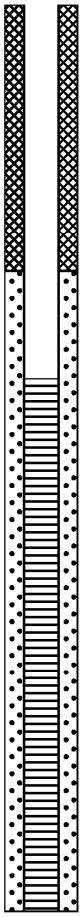
BORING/WELL ID: **MW-1S**

TOTAL DEPTH (ft.): **8.5**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/23/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/23/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: A. Frye	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-1D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry. FILL: Sand (60%), fine grained; Silt (40%). Black, dry. FILL: Woody debris; Lime sludge. Black and gray, moist. FILL: Woody debris (80%); little Sand (10%), fine grained; little Silt (10%). Dark brown, saturated.								

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BOREHOLE LOG

BORING/WELL ID: **MW-2I**

TOTAL DEPTH (ft.): **43**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/23/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/24/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~7.12' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained; with some Wood chips. Brown, dry.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (60%), fine to medium grained; Silt (40%). Black, dry.	0.5		1		2.0'		2/2/8/5	
			2		—			Quick Grout
FILL: Silt (60%); Sand (40%), fine grained. Black, moist	1.8		3		2.0'		5/3/3/4	
FILL: Same as above with Wood debris.			4	▼	—			
FILL: Woody debris; Lime sludge. Gray and black, moist.	3.0		5		1.5'		6/2/2/2	
			6		—			
FILL: Woody debris (70%); some Sand (20%), fine grained; little Silt (10%). Dark brown, saturated.	18.6		7		1.0'		4/2/1/1	
			8		—			
FILL: Same as above with Woody debris (90%).	2.6		9		1.0'		3/1/1/1	
			10		—			
			11					
			12					
			13					
			14		—			
FILL: Same as above with Woody debris (70%).			15		1.0'		2/2/2/2	
SAND: Fine to medium grained (70/30). Light brown/gray, saturated.	98.6		16		—			
			17					
			18					
			19		—			
SAND: Same as above with small shells and shell fragments. Light brown.	12.5		20		1.0'		2/1/2/1	
			21		—			
			22					

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BOREHOLE LOG

BORING/WELL ID: **MW-21**

TOTAL DEPTH (ft.): **43**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/23/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/24/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~7.12' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Fine to medium grained (70/30) with small shells and shell fragments. Light brown, moist.			23					2" PVC Casing with 3.0' ags Stick-up
SAND: Same as above. Moist.			24					Quick Grout
	51.2		25		1.0'		3/4/7/11	
			26					
			27					
			28					
SAND: Sand (90%), fine grained; little Silt (10%); trace Gravel with small shells and shell fragments. Light brown, moist.			29					
			30		2.0'		3/4/7/8	
	16.3		31					
			32					3/8 Bentonite Chips
			33					
			34					
SAND: Silt (60%); some Clay (20%); some Sand (20%), fine grained. Gray, low to medium plasticity, high cohesiveness, moist.			35		2.0'		12/14/ 29/21	#0 Well Gravel
	20.4		36					
			37					
			38					2" PVC Screen (10 Slot)
SAND: Same as above with Silt (70%); some Clay (20%); little Sand (10%), fine grained.			39					
			40		2.0'		8/9/ 14/16	
	23.5		41					
			42		1.5'		5/6/9/11	
CLAY: Clay (70%); Silt (30%). Gray, medium to high plasticity, high cohesiveness, moist.	3.3		43					

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BOREHOLE LOG

BORING/WELL ID: **MW-2S**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/24/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/24/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~7.61' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-2I.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained; with some Wood chips. Brown, dry.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (60%), fine to medium grained; Silt (40%). Black, dry.			1					Quick Grout
			2					3/8 Bentonite Chips
FILL: Silt (60%); Sand (40%), fine grained. Black, moist			3					
FILL: Same as above with Wood debris.			4					#0 Well Gravel
FILL: Woody debris; Lime sludge. Gray and black, moist.			5	▼				
			6					2" PVC Screen (10 Slot)
FILL: Woody debris (70%); some Sand (20%), fine grained; little Silt (10%). Dark brown, saturated.			7					
			8					
FILL: Same as above with Woody debris (90%).			9					
			10					

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BOREHOLE LOG

BORING/WELL ID: **MW-3D**

TOTAL DEPTH (ft.): **71**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/24/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/25/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~8.03' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Silt (70%); Sand (30%), fine grained. Black, dry.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (60%), fine grained; Silt (40%). Brown, dry.	13.0		1		2.0'		2/3/3/4	
FILL: Silt (60%); Sand (40%), fine grained; with trace Cinders. Dark brown/black, dry.			2					
FILL: Woody debris; Lime sludge; Sand (40%), fine grained; little Silt (10%). Brown/black, moist.	26.3		3		2.0'		3/3/3/4	Quick Grout
FILL: Same as above with Sand (20%), fine grained. Black, saturated.			4					
	22.3		5	▼	2.0'		2/2/1/1	
FILL: Woody debris; Lime Sludge; Sand (30%), fine grained; little Silt (10%); little Brick (10%). Black, saturated.			6					
	24.6		7		1.0'		2/2/1/1	
			8					
	51.0		9		1.0'		1/1/2/2	
SAND: Sand (70%), fine and coarse grained; some Gravel (20%), fine; little Silt (10%). Black, saturated.			10					
			11					
			12					
			13					
			14					
			15		1.0'		3/2/2/1	
	28.0		16					
			17					
			18					
			19					
SAND: Sand (80%), fine grained; some Silt (20%). Dark brown/gray, saturated.	26.1		20		2.0'		0.5/0.5	
			21					
			22					
			23					
			24					
SAND: Sand (70%), fine to medium grained; some Silt (20%); little shells and shell fragments (10%). Light brown, saturated.			25		1.0'		0.5/0.5	
	28.1		26					
			27					
			28					
			29					
			30		2.0'		1/0.5/0.5 /1	
	30.7		31					
			32					
			33					
			34					
SAND: Sand (80%), fine to medium grained; some Silt (20%). Light brown, saturated.			35		1.0'		1/1/1/1	
	23.3							

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BOREHOLE LOG

BORING/WELL ID: **MW-3D**

TOTAL DEPTH (ft.): **71**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/24/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/25/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~8.03' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Sand (80%), fine to medium grained; some Silt (20%). Light brown, saturated.			36–39					2" PVC Casing with 3.0' ags Stick-up Quick Grout
	38.5		40–44		1.0'		2/2/1/2	
	79.3		45–49		0.5'		5/7/9/12	
	90.0		50–54		0.5'		5/11/ 19/22	
SAND: Sand (70%), fine grained; Silt (30%). Brown, moist.	26.4		55–59		1.5'		4/5/4/4	3/8 Bentonite Chips #0 Well Gravel
SAND: Sand (70%), fine to medium grained; Silt (30%). Light brown, moist.	44.1		60–64		2.0'		3/5/3/4	2" PVC Screen (10 Slot)
SAND: Sand (50%), fine grained; Silt (50%). Light brown, saturated. SAND: Peat layer, 4" thick.			65				5/5/6/6	
CLAY: Clay (70%); Silt (30%). Medium to high plasticity, high cohesiveness.	81.2		66–69					
	140.7		70–71		1.0'		568/11	

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BOREHOLE LOG

BORING/WELL ID: **MW-3I**

TOTAL DEPTH (ft.): **35**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/25/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/25/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-3D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Silt (70%); Sand (30%), fine grained. Black, dry. FILL: Sand (60%), fine grained; Silt (40%). Brown, dry. FILL: Silt (60%); Sand (40%), fine grained; with trace Cinders. Dark brown/black, dry. FILL: Woody debris; Lime sludge; Sand (40%), fine grained; little Silt (10%). Brown/black, moist. FILL: Same as above with Sand (20%), fine grained. Black, saturated. FILL: Woody debris; Lime Sludge; Sand (30%), fine grained; little Silt (10%); little Brick (10%). Black, saturated.			0–10					2" PVC Casing with 3.0' ags Stick-up Quick Grout
SAND: Sand (70%), fine and coarse grained; some Gravel (20%), fine; little Silt (10%). Black, saturated. SAND: Sand (80%), fine grained; some Silt (20%). Dark brown/gray, saturated. SAND: Sand (70%), fine to medium grained; some Silt (20%); little shells and shell fragments (10%). Light brown, saturated. SAND: Sand (80%), fine to medium grained; some Silt (20%). Light brown, saturated.			10–35					3/8 Bentonite Chips #0 Well Gravel 2" PVC Screen (10 Slot)

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BOREHOLE LOG

BORING/WELL ID: **MW-3S**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/26/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/26/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~8.12' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-3D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Silt (70%); Sand (30%), fine grained. Black, dry.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (60%), fine grained; Silt (40%). Brown, dry.			1					Quick Grout
FILL: Silt (60%); Sand (40%), fine grained; with trace Cinders. Dark brown/black, dry.			2					3/8 Bentonite Chips
FILL: Woody debris; Lime sludge; Sand (40%), fine grained; little Silt (10%). Brown/black, moist.			3					
FILL: Same as above with Sand (20%), fine grained; little Silt (10%). Black, saturated.			4					#0 Well Gravel
			5	▼				
FILL: Woody debris; Lime Sludge; Sand (30%), fine grained; little Silt (10%); little Brick (10%). Black, saturated.			6					2" PVC Screen (10 Slot)
			7					
			8					
			9					
			10					

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BOREHOLE LOG

BORING/WELL ID: **MW-4D**

TOTAL DEPTH (ft.): **96**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/26/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/29/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~6.0' bgs	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry.			0		1.0'		2/1/1/2	2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (70%), fine grained; Silt (30%). Brown, moist.	1.4		2					
FILL: Sand (60%), fine grained; Silt (40%). Dark brown and gray, moist.					2.0'		0.5/0.5/ 0.5/0.5	Quick Grout
	1.7		4					
					4.0"		7/2/1/1	
	1.4		6	▼				
FILL: Woody debris; Lime sludge; Silt; little Gravel (10%); with metal piece. Black, saturated.					1.5'		0.5/0.5/ 0.5/0.5	
	4.5		8					
FILL: Woody debris; Lime sludge; Sand (30%), fine grained; some Silt (20%). Black, saturated.					1.0'		1 for 6"/ 1 for 18"	
	8.4		10					
			12					
FILL: Woody debris; Lime Sludge; some Sand (20%), fine grained; little Silt (10%). Gray, saturated.			14					
SAND: Sand (70%), fine grained; Silt (30%). Brown, saturated.					1.0'		1/1/1/1	
	3.1		16					
			18					
SAND: Sand (80%), fine grained; some Silt (20%). Light brown, saturated.			20		1.0'		1/1/1/1	
	4.8		22					
			24					
SAND: Sand (70%), fine to medium grained; Silt (30%); with trace shell fragments. Light brown, saturated.					1.0'		1/2/2/1	
	3.7		26					
			28					
SAND: Sand (90%), fine to medium grained; little Shells and Shell fragments (10%). Light brown, saturated.			30		1.0'		1/1/1/1	
	4.2		32					

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BOREHOLE LOG

BORING/WELL ID: **MW-4D**

TOTAL DEPTH (ft.): **96**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/26/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/29/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~6.0' bgs	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Sand (90%), fine to medium grained; little Shells and Shell fragments (10%). Light brown, saturated.	4.4		34		1.0'		1 for 24"	2" PVC Casing with 3.0' ags Stick-up
			36					Quick Grout
SAND: Fine to medium grained (60/40). Light brown, saturated.	4.8		38		0.5'		1 for 24"	
			40					
SAND: Sand (70%), fine to medium grained; Silt (30%). Light brown, moist.	4.8		42		1.0'		3/3/5/6	
			44					
SAND: Sand (70%), fine grained; Silt (30%). Light brown, saturated.	5.3		46		1.5'		3/2/3/8	
			48					
SAND: Silt (60%); Sand (40%), fine grained. Light brown, moist.			50					
SAND: Clay (70%); Silt (30%). Gray, low to medium plasticity, high cohesiveness.	1.6		52		2.0'		3/4/5/4	
			54					
SAND: Sand (90%), fine to medium grained; little Silt (10%). Light brown, moist.	0.4		56		1.0'		9/12/ 12/13	
			58					
SAND: Fine to coarse grained (30/50/20). Light brown, saturated.	0.1		60		0.5'		5/6/8/9	
			62					
			64					
			66					

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BOREHOLE LOG

BORING/WELL ID: **MW-4D**

TOTAL DEPTH (ft.): **96**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/26/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/29/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~6.0' bgs	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Fine to coarse grained (30/50/20). Light brown, saturated.	0.1		68					2" PVC Casing with 3.0' ags Stick-up
			70	0.5'			5/9/9/12	Quick Grout
			72					
	1.6		74	3.0"			5/8/ 14/17	
			76					
SAND: Sand (80%), fine to medium grained; some Gravel (20%), fine. Light brown, saturated.	0.7		78					#5 Well Gravel
			80	3.0"			4/8/ 12/13	
			82					
	0.5		84	0.5'			4/6/9/13	2" PVC Screen (10 Slot)
			86					
			88					
CLAY: Clay (90%); Silt (10%). High plasticity, high cohesiveness, moist.	2.6		90	2.0'			3/4/9/8	
			92					
CLAY: Same as above with some coarse Gravel.			94					
	2.8		96				3/4/7/8	

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BOREHOLE LOG

BORING/WELL ID: **MW-4I**

TOTAL DEPTH (ft.): **46**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/30/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/30/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-4D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (70%), fine grained; Silt (30%). Brown, moist.			2					Quick Grout
FILL: Sand (60%), fine grained; Silt (40%). Dark brown and gray, moist.			4					
FILL: Woody debris; Lime sludge; Silt; little Gravel (10%); with metal piece. Black, saturated.			6					
FILL: Woody debris; Lime sludge; Sand (30%), fine grained; some Silt (20%). Black, saturated.			8					
			10					
			12					
FILL: Woody debris; Lime Sludge; some Sand (20%), fine grained; little Silt (10%). Gray, saturated.			14					
SAND: Sand (70%), fine grained; Silt (30%). Brown, saturated.			16					
			18					
SAND: Sand (80%), fine grained; some Silt (20%). Light brown, saturated.			20					
			22					
SAND: Sand (70%), fine to medium grained; Silt (30%); with trace shell fragments. Light brown, saturated.			24					
			26					

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BOREHOLE LOG

BORING/WELL ID: **MW-4I**

TOTAL DEPTH (ft.): **46**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/30/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/30/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-4D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Sand (70%), fine to medium grained; Silt (30%); with trace shell fragments. Light brown, saturated.			28					2" PVC Casing with 3.0' ags Stick-up Quick Grout
SAND: Sand (90%), fine to medium grained; little Shells and Shell fragments (10%). Light brown, saturated.			30					
			32					
			34					
			36					
			38					
SAND: Fine to medium grained (60/40). Light brown, saturated.			40					3/8 Bentonite Pellets 2" PVC Screen (10 Slot)
			42					
			44					#5 Well Gravel
SAND: Sand (70%), fine to medium grained; Silt (30%). Light brown, moist.			46					

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BOREHOLE LOG

BORING/WELL ID: **MW-4S**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/30/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/30/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** ~4.3' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-4D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (70%), fine grained; Silt (30%). Brown, moist.			1					3/8 Bentonite Pellets
FILL: Sand (60%), fine grained; Silt (40%). Dark brown and gray, moist.			2					
			3					#5 Well Gravel
			4					
			5					2" PVC Screen (10 Slot)
FILL: Woody debris; Lime sludge; Silt; little Gravel (10%); with metal piece. Black, saturated.			6					
			7					
FILL: Woody debris; Lime sludge; Sand (30%), fine grained; some Silt (20%). Black, saturated.			8					
			9					
			10					

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BOREHOLE LOG

BORING/WELL ID: **MW-5D**

TOTAL DEPTH (ft.): **49.5**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/29/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/29/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** CME
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: D. Greene	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions to 10' bgs taken from boring log TW-06.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine to medium grained; trace Gravel. Brown, dry. FILL: Sand, coarse grained; Gravel. Black, dry. FILL: Silty Clay sludge, Black, low plasticity, saturated. FILL: Silty Clay sludge, White, low plasticity, saturated. FILL: Same as above. Light blue/green. FILL: Sand, coarse grained; Gravel. Black, saturated.			0–11					2" PVC Casing
SAND: Fine to medium grained. Gray, saturated. Slight sulfur odor.			11–14					
			14		—			
			15				3/3/4/6	
			16		—			
			17–18					
			19		—			
SAND: Fine to medium grained. Gray, saturated.			20				5/12/ 21/24	
			21		—			
			22–23					
			24		—			
SAND: Fine grained. Gray, saturated.			25				6/5/ 22/47	
			26		—			

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BOREHOLE LOG

BORING/WELL ID: **MW-5D**

TOTAL DEPTH (ft.): **49.5**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/29/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/29/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** CME
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: D. Greene	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions to 10' bgs taken from boring log TW-06.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Fine grained. Gray, saturated.			27					2" PVC Casing
			28					
			29	—				
SAND: Sand, fine grained; Silt. Gray, saturated.			30				21/38/ 50+	
			31	—				
			32					
			33					
			34	—				
			35				18/37/ 50+	
			36	—				
			37					
			38					
			39	—				
SAND: Fine grained. Gray, saturated.			40				24/50+	2" PVC Screen (10 Slot)
			41	—				
			42					
			43					
			44	—				
CLAY: Clay; Silt. Gray, varved, saturated.			45				6/5/ 25/50	
			46	—				
			47					
			48					
CLAY: Same as above. Stiff.			49				7/7/9/14	

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BOREHOLE LOG

BORING/WELL ID: **MW-5I**

TOTAL DEPTH (ft.): **25**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 04/29/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 04/29/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** CME
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: D. Greene	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-5D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine to medium grained; trace Gravel. Brown, dry. FILL: Sand, coarse grained; Gravel. Black, dry. FILL: Silty Clay sludge, Black, low plasticity, saturated. FILL: Silty Clay sludge, White, low plasticity, saturated. FILL: Same as above. Light blue/green. FILL: Sand, coarse grained; Gravel. Black, saturated.			0–11					2" PVC Casing
SAND: Fine to medium grained. Gray, saturated. Slight sulfur odor. SAND: Fine to medium grained. Gray, saturated. SAND: Fine grained. Gray, saturated.			11–25					2" PVC Screen (10 Slot)

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BOREHOLE LOG

BORING/WELL ID: **MW-6D**

TOTAL DEPTH (ft.): **56**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/01/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/02/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 3.7' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine to coarse grained; Gravel. Gray, moist.			0	▼	1.5'		10/9/ 6/12	2" PVC Casing with 3.0' ags Stick-up
FILL: Cinders and Coal. Black.			2					
FILL: Sand, fine grained. Orange.	5.9							
FILL: Material with high Coal content. Black, moist.					2.0'		28/43/48/ 50 for 5"	Quick Grout
FILL: Sand, fine grained. Orange with lenses of blue white, moist.			4					
FILL: Same as above with Cinders.	9.0				2.0'		9/7/6/10	
FILL: Sludge (40%); Sand (30%), fine grained; Gravel (30%), medium. Black with small orange lenses, saturated.			6					
FILL: Sand, fine grained. Gray/white.	12.6				1.5'		3/5/4/4	
FILL: Metallic material with Coal chunks. Black with sheen, saturated. Strong petroleum odor.			8					
	13.2				1.0'		3/2/2/3	
	16.0		10					
			12					
			14					
SAND: Sand (80%), fine to medium grained; some Silt (20%). Gray, moist.	13.8				1.0'		1/1/1/1	
			16					
			18					
SAND: Fine to medium grained (80/20). Black, saturated.								
			20		1.5'		1/1/1/2	
	11.2							
			22					
			24					
SAND: Fine to medium grained (60/40). Black/gray transitioning to brown gray, moist.	8.4				1.5'		8/8/ 10/12	
			26					
			28					

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BOREHOLE LOG

BORING/WELL ID: **MW-6D**

TOTAL DEPTH (ft.): **56**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/01/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/02/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 3.7' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Fine to medium grained (60/40). Brown gray, saturated.	14.9		30		1.5'		4/6/9/13	2" PVC Casing with 3.0' ags Stick-up Quick Grout
SAND: Sand (70%), fine grained; Silt (30%). Brown gray, moist.	15.6		32 34 36		1.5'		5/9/ 15/19	
	19.8		38 40 42		1.5'		12/18/ 22/29	3/8 Bentonite Pellets #5 Well Gravel
SAND: Same as above. Gray.	7.5		44 46 48		2.0'		4/5/7/9	2" PVC Screen (10 Slot)
CLAY: Clay (80%); Silt (20%). Medium to high plasticity, high cohesiveness, moist.	17.6		50 52		2.0'		3/5/6/9	
CLAY: Silt (70%); Clay (30%). Gray, low to medium plasticity, high cohesiveness, moist.	17.4		54 56				7/9/ 11/14	

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BOREHOLE LOG

BORING/WELL ID: **MW-6I**

TOTAL DEPTH (ft.): **30**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/02/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/02/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 5.25' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-6D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine to coarse grained; Gravel. Gray, moist. FILL: Cinders and Coal. Black. FILL: Sand, fine grained. Orange. FILL: Material with high Coal content. Black, moist. FILL: Sand, fine grained. Orange with lenses of blue white, moist. FILL: Same as above with Cinders. FILL: Sludge (40%); Sand (30%), fine grained; Gravel (30%), medium. Black with small orange lenses, saturated. FILL: Sand, fine grained. Gray/white. FILL: Metallic material with Coal chunks. Black with sheen, saturated. Strong petroleum odor.			0 2 4 6 8 10 12					2" PVC Casing with 3.0' ags Stick-up Quick Grout
SAND: Sand (80%), fine to medium grained; some Silt (20%). Gray, moist. SAND: Fine to medium grained (80/20). Black, saturated. SAND: Fine to medium grained (60/40). Black/gray transitioning to brown gray, moist. SAND: Fine to medium grained (60/40). Brown gray, saturated.			14 16 18 20 22 24 26 28 30					3/8 Bentonite Pellets #5 Well Gravel 2" PVC Screen (10 Slot)

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BOREHOLE LOG

BORING/WELL ID: **MW-6S**

TOTAL DEPTH (ft.): **10**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/02/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/02/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 5.01' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-6D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine to coarse grained; Gravel. Gray, moist.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Cinders and Coal. Black.			1					3/8 Bentonite Pellets
FILL: Sand, fine grained. Orange.								
FILL: Material with high Coal content. Black, moist.			2	▼				
FILL: Sand, fine grained. Orange with lenses of blue white, moist.			3					
FILL: Same as above with Cinders.								#5 Well Gravel
FILL: Sludge (40%); Sand (30%), fine grained; Gravel (30%), medium. Black with small orange lenses, saturated.			4					
			5					2" PVC Screen (10 Slot)
FILL: Sand, fine grained. Gray/white.			6					
FILL: Metallic material with Coal chunks. Black with sheen, saturated. Strong petroleum odor.			7					
			8					
			9					
			10					

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BOREHOLE LOG

BORING/WELL ID: **MW-7D**

TOTAL DEPTH (ft.): **66**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/03/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/06/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 13.97' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry. FILL: Lime sludge. Green white, moist.			0		2.0'		1/3/4/4	2" PVC Casing with 3.0' ags Stick-up
FILL: Sludge with Coal chunks. Black, moist.	16.2		2					
FILL: Sand, fine to medium grained (70/30). Brown, moist. FILL: Sand (70%), fine to medium grained; Woody debris (30%). Brown, moist.	5,184				2.0'		2/3/3/5	Quick Grout
FILL: Lime sludge. Green white, moist. FILL: Same as above. Saturated.			4		2.0'		1/1/1/1	
	27.2		6		2.0'		0/0/0/1	
			8		2.0'		0.5/0.5/ 1/1	
	47.2		10	▼				
			12					
FILL: Lime Sludge. Green/gray, saturated.			14		2.0'		1/1/1/1	
	38.0		16					
			18					
SAND: Fine to medium grained (70/30). Brown/gray, saturated.			20				1/1/2/37	
	52.0		22					
			24					
SAND: Fine to medium grained (80/20). Brown, moist.					2.0'		18/27/ 49/38	
	29.0		26					
			28					
			30		2.0'		12/18/ 20/29	
	52.2							
			32					

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BOREHOLE LOG

BORING/WELL ID: **MW-7D**

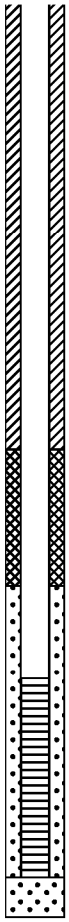
TOTAL DEPTH (ft.): **66**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/03/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/06/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 13.97' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Sand (70%), fine grained; Silt (30%). Light green/gray, saturated.	56.3		34		1.5'		34/67	2" PVC Casing with 3.0' ags Stick-up
			36					Quick Grout
	52.1		38		2.0'		24/45/47/ 50 for 4"	
			40					
			42					
	56.6		44		1.5'		4/7/ 13/20	3/8 Bentonite Pellets
			46					
			48					#5 Well Gravel
SAND: Sand (60%), fine grained; Silt (40%). Light brown, saturated.	22.5		50		1.5'		14/38/55	2" PVC Screen (10 Slot)
			52					
			54		1.5'		13/69	
	45.1		56					
			58					
CLAY: Clay (70%); Silt (30%). Dark gray/brown, medium to high plasticity, high cohesiveness, saturated.	30.1		60		2.0'		5/7/ 10/20	
			62					
CLAY: Clay (80%); some Silt (20%). Brown, high plasticity, high cohesiveness, moist.	1.6		64		1.5'		3/4/8/11	
			66					



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BOREHOLE LOG

BORING/WELL ID: **MW-7I**

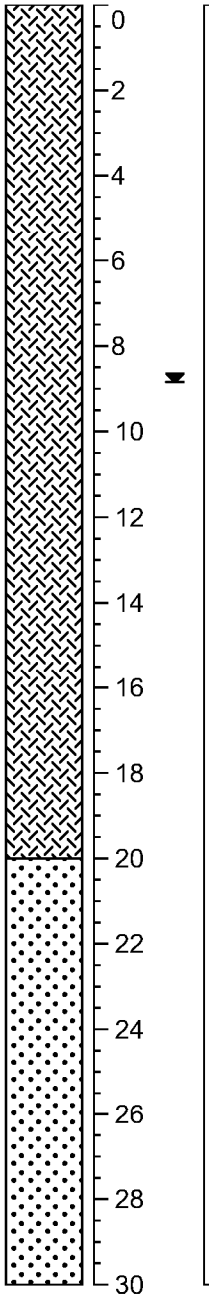
TOTAL DEPTH (ft.): **30**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/06/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/06/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 11.84' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-7D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry. FILL: Lime sludge. Green white, moist. FILL: Sludge with Coal chunks. Black, moist. FILL: Sand, fine to medium grained (70/30). Brown, moist. FILL: Sand (70%), fine to medium grained; Woody debris (30%). Brown, moist. FILL: Lime sludge. Green white, moist. FILL: Same as above. Saturated. FILL: Lime Sludge. Green/gray, saturated.			0–20					2" PVC Casing with 3.0' ags Stick-up Quick Grout 3/8 Bentonite Pellets
SAND: Fine to medium grained (70/30). Brown/gray, saturated. SAND: Fine to medium grained (80/20). Brown, moist.			20–30					#5 Well Gravel 2" PVC Screen (10 Slot)



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BOREHOLE LOG

BORING/WELL ID: **MW-8D**

TOTAL DEPTH (ft.): **61**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/07/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/07/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 8.09' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand (40%), fine grained; Silt (30%); Gravel (30%), medium. Brown, dry.			1		1.0'		1/2/5/10	
	3.7		2					Quick Grout
FILL: Sand, fine grained. Black. Petroleum odor.			3		2.0'		4/5/9/10	
FILL: Lime sludge. White/green.	480.7		4					
FILL: Sand (50%), fine grained; Silt (30%); some Lime sludge (20%). Black/green, dry.			5	▼	1.5'		5/7/ 10/11	
FILL: Sand (70%), fine grained; Silt (30%). Black/brown and orange, dry.	103.5		6					
FILL: Sand (50%), fine grained; Silt (50%). Black, moist. Petroleum odor.			7		2.0'		3/4/4/4	
FILL: Same as above. Saturated.	363.4		8					
			9		1.5'		1/2/2/2	
	172.0		10					
			11					
			12					
			13					
			14					
FILL: Woody debris.			15		1.5'		2/2/3/5	
FILL: Sand (80%), fine to medium grained; some Silt (20%). Gray, saturated. Strong hydrogen sulfide odor.	841.5		16					
SAND: Sand (90%), fine to medium grained; little Gravel (10%), medium. Black, saturated. Hydrogen sulfide odor.			17					
			18					
			19					
	72.6		20		2.0'		2/3/ 12/16	
SAND: Sand (60%), fine grained; Silt (40%). Gray/black, saturated. Hydrogen sulfide odor.			21					
			22					
			23					
			24					
			25		2.0'		5/19/ 33/36	
	117.1		26					
			27					
			28					
			29					
			30		2.0'		8/12/ 23/35	
SAND: Sand (50%), fine grained; Silt (50%). Black, saturated. Hydrogen sulfide odor.	93.0		31					

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BOREHOLE LOG

BORING/WELL ID: **MW-8D**

TOTAL DEPTH (ft.): **61**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/07/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/07/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 8.09' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Sand (50%), fine grained; Silt (50%). Black, saturated. Hydrogen sulfide odor.			32					2" PVC Casing with 3.0' ags Stick-up
			33					
			34					Quick Grout
SAND: Sand (70%), fine grained; Silt (30%). Gray, saturated. Slight hydrogen sulfide odor.			35		2.0'		11/27/ 39/44	
	89.6		36					
			37					
			38					
			39					
			40		1.5'		5/12/ 22/34	
	82.0		41					
			42					
			43					
			44					
SAND: Sand (50%), fine grained; Silt (50%). Light brown, saturated. Slight hydrogen sulfide odor.			45		2.0'		9/19/ 26/21	3/8 Bentonite Pellets
	76.3		46					
			47					
			48					#5 Well Gravel
			49					
SAND: Clay (60%); Silt (30%); little Sand (10%), fine grained. Light brown, low to medium plasticity, high cohesiveness, moist. SAND: Silt (50%); Clay (30%); some Sand (20%), fine grained. Light brown, saturated.			50		2.0'		3/10/ 15/25	2" PVC Screen (10 Slot)
	30.1		51					
			52					
			53					
			54					
			55				15/9/ 11/14	
	18.1		56					
			57					
			58					
			59					
CLAY: Brown, high plasticity, high cohesiveness, moist.	15.3		60		2.0'		2/3/6/8	
			61					

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BOREHOLE LOG

BORING/WELL ID: **MW-8I**

TOTAL DEPTH (ft.): **30**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/07/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/07/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 8.18' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-8D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand, fine grained. Brown, dry. FILL: Sand (40%), fine grained; Silt (30%); Gravel (30%), medium. Brown, dry. FILL: Sand, fine grained. Black. Petroleum odor. FILL: Lime sludge. White/green. FILL: Sand (50%), fine grained; Silt (30%); some Lime sludge (20%). Black/green, dry. FILL: Sand (70%), fine grained; Silt (30%). Black/brown and orange, dry. FILL: Sand (50%), fine grained; Silt (50%). Black, moist. Petroleum odor. FILL: Same as above. Saturated. FILL: Woody debris. FILL: Sand (80%), fine to medium grained; some Silt (20%). Gray, saturated. Strong hydrogen sulfide odor.			0 2 4 6 8 10 12 14					2" PVC Casing with 3.0' ags Stick-up Quick Grout
SAND: Sand (90%), fine to medium grained; little Gravel (10%), medium. Black, saturated. Hydrogen sulfide odor. SAND: Sand (60%), fine grained; Silt (40%). Gray/black, saturated. Hydrogen sulfide odor. SAND: Sand (50%), fine grained; Silt (50%). Black, saturated. Hydrogen sulfide odor.			16 18 20 22 24 26 28 30					3/8 Bentonite Pellets #5 Well Gravel 2" PVC Screen (10 Slot)

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BOREHOLE LOG

BORING/WELL ID: **MW-9D**

TOTAL DEPTH (ft.): **61**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/08/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/08/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 5.56' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand. Brown, dry. FILL: Lime sludge. Green/white.			0					2" PVC Casing with 3.0' ags Stick-up
FILL: Sand, fine to medium grained (70/30). Light brown, dry.	3.8		1		2.0'		4/4/5/7	
			2					Quick Grout
FILL: Lime sludge. Green/white and gray, dry	1.7		3	▼	2.0'		6/6/7/11	
			4					
FILL: Sand (50%), fine to medium grained; Gravel (50%), medium, with granular material. Black, dry. FILL: Brick lense, 3" thick.	2.1		5		2.0'		12/10/ 10/8	
			6					
			7		1.5'		2/2/3/4	
			8					
FILL: Sand (70%), fine grained; Silt (30%); with Woody debris lenses. Brown, saturated.	1.3		9		2.0'		2/2/3/5	
			10					
SAND: Sand (80%), fine grained; some Silt (20%). Light brown, saturated.			11					
			12					
			13					
			14					
	0.3		15		1.5'		4/5/7/9	
			16					
			17					
			18					
			19					
SAND: Sand (80%), fine to coarse grained; some Gravel (20%), medium. Light brown, saturated.	0.4		20		1.0'		2/3/7/10	
			21					
			22					
			23					
			24					
SAND: Sand (70%), fine grained; Silt (30%). Light brown, saturated.	1.1		25		1.5'		3/4/6/10	
			26					
			27					
			28					
			29					
			30		1.5'		5/11/ 17/22	
	1.6		31					

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BOREHOLE LOG

BORING/WELL ID: **MW-9D**

TOTAL DEPTH (ft.): **61**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/08/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/08/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 5.56' btoc	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Sand (70%), fine grained; Silt (30%). Light brown, saturated.			32					2" PVC Casing with 3.0' ags Stick-up
			33					
			34					Quick Grout
SAND: Sand (60%), fine grained; Silt (40%). Light brown, moist.			35		1.5'		22/46/75	
	1.8		36					
			37					
			38					
			39					
SAND: Silt (60%); Sand (40%), fine grained. Light brown, moist.			40		1.5'		24/31/63	
	0.9		41					3/8 Bentonite Pellets
			42					
			43					#5 Well Gravel
			44					
	2.8		45		1.5'		10/29/53	2" PVC Screen (10 Slot)
			46					
			47					
			48					
			49					
SAND: Silt (70%); Sand (30%), fine grained. Light brown, moist.	2.9		50		2.0'		11/19/ 34/48	
			51					
			52					
			53					
	0.6		54					
SAND: Silt (50%); Clay (40%); little Sand (10%), fine grained. Light brown, medium plasticity, high cohesiveness, moist.			55		2.0'		5/10/ 12/15	
			56					
			57					
			58					
			59					
CLAY: Clay (70%); some Silt (20%); little Sand (10%), fine grained. Brown, medium to high plasticity, high cohesiveness, moist.	1.7		60		2.0'		5/7/ 10/12	
			61					

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BOREHOLE LOG

BORING/WELL ID: **MW-9I**

TOTAL DEPTH (ft.): **30**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/08/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/08/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:** 6.86' btoc	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-9D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand. Brown, dry. FILL: Lime sludge. Green/white. FILL: Sand, fine to medium grained (70/30). Light brown, dry. FILL: Lime sludge. Green/white and gray, dry FILL: Sand (50%), fine to medium grained; Gravel (50%), medium, with granular material. Black, dry. FILL: Brick lense, 3" thick. FILL: Sand (70%), fine grained; Silt (30%); with Woody debris lenses. Brown, saturated.			0 2 4 6 8 10					2" PVC Casing with 3.0' ags Stick-up Quick Grout
SAND: Sand (80%), fine grained; some Silt (20%). Light brown, saturated. SAND: Sand (80%), fine to coarse grained; some Gravel (20%), medium. Light brown, saturated. SAND: Sand (70%), fine grained; Silt (30%). Light brown, saturated.			12 14 16 18 20 22 24 26 28 30					3/8 Bentonite Pellets #5 Well Gravel 2" PVC Screen (10 Slot)

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BOREHOLE LOG

BORING/WELL ID: **MW-9S**

TOTAL DEPTH (ft.): **18**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/08/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/08/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-9D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand. Brown, dry. FILL: Lime sludge. Green/white. FILL: Sand, fine to medium grained (70/30). Light brown, dry. FILL: Lime sludge. Green/white and gray, dry FILL: Sand (50%), fine to medium grained; Gravel (50%), medium, with granular material. Black, dry. FILL: Brick lense, 3" thick. FILL: Sand (70%), fine grained; Silt (30%); with Woody debris lenses. Brown, saturated.			0 2 4 6 8 10					2" PVC Casing with 3.0' ags Stick-up Quick Grout 3/8 Bentonite Pellets
SAND: Sand (80%), fine grained; some Silt (20%). Light brown, saturated.			12 14 16 18					#5 Well Gravel 2" PVC Screen (10 Slot)

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BOREHOLE LOG

BORING/WELL ID: **MW-10D**

TOTAL DEPTH (ft.): **56**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/09/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/09/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Recovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand (70%), fine to coarse grained; Gravel (30%), fine to medium; with various fill material. Brown/gray, moist.	226.7		0		1.5'		5/7/ 12/20	2" PVC Casing with 3.0' ags Stick-up
			2		2.0'		16/14/ 13/22	Quick Grout
FILL: Sand (70%), fine grained; Silt (30%); trace Gravel. Black, moist.	271.0		4		1.5'		6/6/3/2	
FILL: Gravel with granular material. Black, moist. Petroleum odor.								
FILL: Lime sludge. White/gray, moist. Petroleum odor.	303.0		6		2.0'		0.5/0.5/ 1/1	
FILL: Sand, fine grained; Silt; with Lime sludge and Woody debris. Gray/green with oily sheen, saturated. Petroleum odor.	380.1		8		2.0'		0.5/0.5/ 0.5/0.5	
	10.0		10					
SAND: Sand (40%), fine grained; Gravel (30%), medium; some Silt (20%). Gray/black with oily sheen, saturated.			12					
	5.0		14		1.0'		1/1/2/2	
			16					
			18					
SAND: Sand (80%), fine to medium grained; some Silt (20%). Light brown/gray, saturated.	4.2		20		1.0'		2/2/2/5	
			22					
			24					
	4.8		26		0.5'		2/5/7/8	
			28					

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BOREHOLE LOG

BORING/WELL ID: **MW-10D**

TOTAL DEPTH (ft.): **56**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/09/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/09/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES:

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
SAND: Sand (80%), fine grained; some Silt (20%). Light brown, saturated.	5.1		30		1.5'		10/17/48/ 50 for 3"	2" PVC Casing with 3.0' ags Stick-up
			32					Quick Grout
			34		2.0'		7/21/57	
	5.3		36					3/8 Bentonite Pellets
			38					#5 Well Gravel
SAND: Sand (60%), fine grained; Silt (40%). Light brown, saturated.	5.4		40		1.0'		15/44/ 50 for 3"	2" PVC Screen (10 Slot)
			42					
			44		2.0'		5/8/ 17/36	
SAND: Silt (40%); Sand (30%), fine grained; Clay (30%). Gray brown, saturated. Burnt odor.	3.1		46					
			48					
SAND: Silt (50%); Clay (40%); Sand (10%), fine grained. Brown, low to medium plasticity, high cohesiveness, moist.	4.4		50		2.0'		6/9/ 14/20	
			52					
			54					
CLAY: Clay (70%); some Silt (20%); little Sand (10%), fine grained. Brown, medium to high plasticity, high cohesiveness, moist.	6.2		56		2.0'		6/9/ 10/11	

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BOREHOLE LOG

BORING/WELL ID: **MW-10I**

TOTAL DEPTH (ft.): **30**

PROJECT: Pure Muskegon/Windward Pointe	**START DATE:** 05/09/19	**DRILLING CO.:** Stearns Drilling
SITE LOCATION: Muskegon, MI	**END DATE:** 05/09/19	**DRILLER:** Daryl / Gary
PROJECT NO.: 181046	**TOC ELEV.:**	**RIG TYPE:** LCX55
PROJECT MANAGER: R. Wilson	**GROUND ELEV.:**	**METHOD OF DRILLING:** Hollow Stem
LOGGED BY: M. Hunter	**STATIC WATER LVL.:**	**SAMPLING METHODS:** Split Spoon

NOTES: Soil descriptions taken from boring log MW-10D.

Static Water Level

DESCRIPTION	PID ppm	GRAPHIC LOG	DEPTH (ft. bgl)	Static Water Level	Sample/ Revovery	Sample ID	Blow Counts	WELL CONSTRUCTION DETAIL
FILL: Sand (70%), fine to coarse grained; Gravel (30%), fine to medium; with fill material. Brown/gray, moist. FILL: Sand (70%), fine grained; Silt (30%); trace Gravel. Black, moist. FILL: Gravel with granular material. Black, moist. Petroleum odor. FILL: Lime sludge. White/gray, moist. Petroleum odor. FILL: Sand, fine grained; Silt; with Lime sludge and Woody debris. Gray/green with oily sheen, saturated. Petroleum odor.			0 2 4 6 8					2" PVC Casing with 3.0' ags Stick-up Quick Grout
SAND: Sand (40%), fine grained; Gravel (30%), medium; some Silt (20%). Gray/black with oily sheen, saturated.			10 12 14 16 18					
SAND: Sand (80%), fine to medium grained; some Silt (20%). Light brown/gray, saturated.			20 22 24 26 28					3/8 Bentonite Pellets #5 Well Gravel 2" PVC Screen (10 Slot)
SAND: Sand (80%), fine grained; some Silt (20%). Light brown, saturated.			30					

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG:	–
OPERATOR:	–
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 1
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		Dark SAND with wood chips				
2'		White LIME				
3'		E.O.B. at 2'				

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG:	–
OPERATOR:	–
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 2
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Light SAND with wood chips				
1'		Gray LIME				
2'		E.O.B. at 2'				
3'						

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG:	–
OPERATOR:	–
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 3
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		Large wood chips, some SAND				
2'		WOOD CHIPS				
3'		E.O.B. at 3'				

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG:	–
OPERATOR:	–
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 4
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		Large WOOD CHIPS, some SAND				
2'		WOOD CHIPS				
3'		E.O.B. at 3'				

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: –	OPERATOR: –
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 5
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		WOOD CHIPS, SAND, and LIME				
2'		White LIME				
3'		E.O.B. at 3'				

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: –	OPERATOR: –
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 6
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		WOOD CHIPS and dark fine SAND				
2'		WOOD CHIPS				
3'		E.O.B. at 3'				

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: –	OPERATOR: –
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 7
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Light SAND, TOPSOIL and WOOD CHIPS				
1'		White LIME				
2'		E.O.B. at 2'				
3'						

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: –	OPERATOR: –
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 8
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		Large WOOD CHIPS and light brown SAND				
2'		White LIME				
3'		E.O.B. at 3'				

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: –	OPERATOR: –
DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS
SURFACE CONDITIONS:	TOPSOIL BLEND
WATER LEVEL DURING DRILLING:	–
STATIC GROUNDWATER LEVEL:	–
BORING NO.	SB – 9
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	05–14–17
DRILLING FINISH DATE	05–14–17
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	KCK
GROUND ELEVATION:	–
T.O.C. ELEVATION:	–
GROUNDWATER ELEVATION:	–

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		Fine degraded WOOD and dark brown SAND				
2'		Gray LIME				
		E.O.B. at 2'				
3'						

SOIL BORING LOG

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SITE NAME: MELCHING DEMOLITION	DRILLING METHOD: HAND AUGER	BORING NO. SB – 10
LOCATION: MUSKEGON, MICHIGAN	SAMPLING METHOD: CONTINUOUS	SHEET 1 OF 1
	SURFACE CONDITIONS: TOPSOIL BLEND	DRILLING START TIME / FINISH TIME
	WATER LEVEL DURING DRILLING: –	DRILLING START DATE: 05–14–17 / FINISH DATE: 05–14–17
DRILL RIG: – / OPERATOR: –	STATIC GROUNDWATER LEVEL: –	
DRILLING CONTRACTOR: LEI		GROUND ELEVATION: –
LEI PROJECT #: 17–100		T.O.C. ELEVATION: –
SUPERVISED BY: KCK		GROUNDWATER ELEVATION: –

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		Fine degraded WOOD and dark brown SAND				
2'		Green LIME				
3'		E.O.B. at 3'				

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH – GEOPROBE	BORING NO. LW–1
SAMPLING METHOD: CONTINUOUS CORES	SHEET 1 OF 1
SURFACE CONDITIONS: HARD LIME	DRILLING START TIME 8:12 DATE JUNE 6, 2014 / FINISH TIME 11:38 DATE JUNE 6, 2014
SITE NAME: MELCHING INC. LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	WATER LEVEL DURING DRILLING 10.48'
DRILL RIG: GP 5400 OPERATOR: KCK	STATIC GROUNDWATER LEVEL 13.93' FROM GRADE
DRILLING CONTRACTOR: LEI	GROUND ELEVATION: 595.35
LEI PROJECT #: 10–339	T.O.C. ELEVATION 598.42
SUPERVISED BY: KCK	GROUNDWATER ELEVATION 581.42

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		Gray white LIME with wood chips. Hard, dry, wood odor.					
5'		White LIME. Dry to 10.0' then wet, chalk odor.					BENTONITE SEAL FROM 13' TO SURFACE.
10'							INSTALLED 1.0" DIAMETER P.V.C. WELL TO 17.0', SCREENED INTERVAL 14.0'–17.0'
15'		Green LIME. Soft, wet. Septic odor.					SCREEN FILTER PACKED WITH SAND ALTHOUGH INSTALLED IN LIME.
		White LIME. Very soft, wet. No odor.					HOLE PLUG 18.0' TO 20.0'
20'		E.O.B. at 20' in soft LIME					
25'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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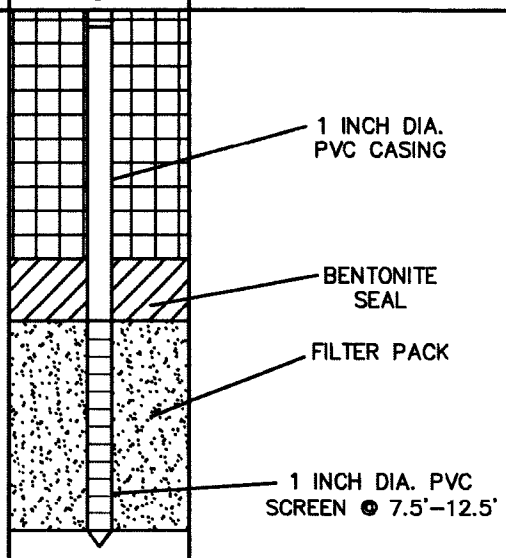
SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: AUGER	OPERATOR: REK

DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CUTTINGS
SURFACE CONDITIONS:	SAND/WOOD MATERIAL (COVER)
WATER LEVEL DURING DRILLING:	8.0'
STATIC GROUNDWATER LEVEL:	–

BORING NO.	LW–1R	
SHEET	1 OF 1	
DRILLING		
START	TIME 11:00	DATE 06–30–17
FINISH	TIME 11:45	DATE 06–30–17

DRILLING CONTRACTOR: LEI	GROUND ELEVATION: 592.86
LEI PROJECT #: 17–100	T.O.C. ELEVATION: 595.14
SUPERVISED BY: JRC	GROUNDWATER ELEVATION: 587.14

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		WOOD CHIPS with fine sand, loose, dry, no odor (cover).				
		White LIME, stiff, moist to 8.0' then soft, wet.				
5'						
		Water ⊙ 8.0'				
10'						
		Green LIME, soft, wet, no odor.				
15'		E.O.B. ⊙ 15.0' in green LIME.				
20'						
25'						



SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

DRILLING METHOD: DIRECT PUSH – GEOPROBE	BORING NO. LW–2
SAMPLING METHOD: CONTINUOUS CORES	SHEET 1 OF 1
SURFACE CONDITIONS: HARD LIME/WOOD CHIPS	DRILLING START TIME 9:00 DATE DEC 12, 2014 / FINISH TIME 12:28 DATE DEC 12, 2014
WATER LEVEL DURING DRILLING 26.42'	
STATIC GROUNDWATER LEVEL 27.30'	

SITE NAME: MELCHING INC.
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: GP 5400 | OPERATOR: AWG

DRILLING CONTRACTOR: LEI

LEI PROJECT #: 10–339

SUPERVISED BY: KCK

GROUND ELEVATION: 609.09
T.O.C. ELEVATION 612.49
GROUNDWATER ELEVATION 585.19

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Gray white LIME with wood chips. Hard, dry, wood odor.					
5'		Brown/white LIME. Trace wood chips, dry, wood odor.					
10'		White LIME. Soft, dry, chalk odor.					BENTONITE SEAL FROM 28' TO SURFACE.
15'							
20'							INSTALLED 1.0" DIAMETER P.V.C. WELL TO 34.0', SCREENED INTERVAL 29.0'–34.0'
25'		Green LIME. Loose, wet, septic odor.					
30'		White LIME. Very soft, wet, sulfer odor.					
35'		E.O.B. at 34' in soft white LIME					
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING INC.
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
DRILL RIG:	G 5400
OPERATOR:	AWG
DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	10-339
SUPERVISED BY:	RVG

DRILLING METHOD:	DIRECT PUSH – GEOPROBE
SAMPLING METHOD:	CONTINUOUS SAMPLE TUBES
SURFACE CONDITIONS:	SPARSE GRASS IN GRAVEL
WATER LEVEL DURING DRILLING	5.0'
STATIC GROUNDWATER LEVEL	4.85'
GROUND ELEVATION:	587.44
T.O.C. ELEVATION	591.93
GROUNDWATER ELEVATION	582.59

BORING NO.	LMW-10
SHEET 1 OF 1	
DRILLING	
START TIME	0822
FINISH TIME	0907
START DATE	MARCH 27, 2014
FINISH DATE	MARCH 27, 2014

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Light gray CRUSHED CONCRETE & GRAVEL (fill); Trace of fine sand. Stiff, dry, no odor.			ALL FID READINGS NON-DETECTABLE		INSTALLED 2" DIAMETER PVC WELL TO 13.5 FEET
5'		Light brown fine SAND; Trace of gravel (fill). Stiff, dry to 5.0 feet, then wet. No odor.					BENTONITE SEAL FROM 7.0' TO SURFACE
10'		Gray fine–medium SAND with wood. Loose, wet. Wood odor.					SCREENED INTERVAL @ 8.5'–13.5' BELOW GRADE
15'		Gray fine–medium SAND. Some shell fragments. Stiff, wet. No odor.					
20'							
25'							
30'							
35'							
40'							
45'		Gray CLAY. Stiff, moist. No odor.					
50'							EOB @ 48' IN GRAY CLAY

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH – GEOPROBE	BORING NO. LMW–11s
SAMPLING METHOD: NO SAMPLING	SHEET 1 OF 1
SURFACE CONDITIONS: GRASS	DRILLING START TIME 1130 / FINISH TIME 1210
WATER LEVEL DURING DRILLING 8.0'	DRILLING START DATE MARCH 27, 2014 / FINISH DATE MARCH 27, 2014
STATIC GROUNDWATER LEVEL 7.78'	

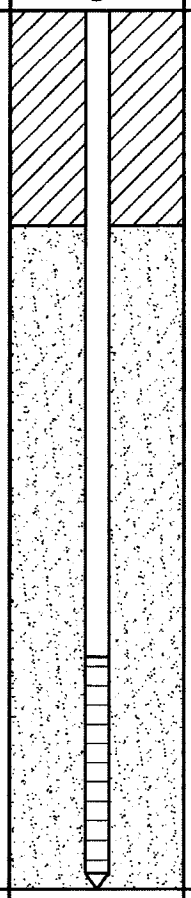
SITE NAME: MELCHING INC.
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: G 5400 | OPERATOR: RVG

DRILLING CONTRACTOR: LEI | GROUND ELEVATION: 587.31

LEI PROJECT #: 10–339 | T.O.C. ELEVATION 590.34

SUPERVISED BY: AWG | GROUNDWATER ELEVATION 579.53

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
5'		NO SAMPLING SEE LOG OF LMW–11d			ALL FID READINGS NON–DETECTABLE		BENTONITE SEAL FROM 5' TO SURFACE. REFUSAL @ 10' (SEVERAL TIMES) DUE TO WOOD (LOGS). REDUCED SIZE OF TOOLING AND PROBED THROUGH WOOD. INSTALLED 1.0" DIAMETER P.V.C. WELL TO 20.0', SCREENED INTERVAL 15.0'–20.0'
10'							
15'							
20'							
25'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH – GEOPROBE	BORING NO. LMW–11d
SAMPLING METHOD: CONTINUOUS SAMPLE TUBES	SHEET 1 OF 1
SURFACE CONDITIONS: GRASS	DRILLING START TIME 0945 / FINISH TIME 1110
WATER LEVEL DURING DRILLING 9.5'	DRILLING START DATE MARCH 27, 2014 / FINISH DATE MARCH 27, 2014
STATIC GROUNDWATER LEVEL 8.77'	

SITE NAME: MELCHING INC.
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: G 5400 | OPERATOR: AWG

DRILLING CONTRACTOR: LEI | GROUND ELEVATION: 588.35

LEI PROJECT #: 10–339 | T.O.C. ELEVATION 592.69

SUPERVISED BY: RVG | GROUNDWATER ELEVATION 579.58

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
5'		Dark brown fine SAND; Trace of coal. Loose, dry. No odor.			ALL FID READINGS NON–DETECTABLE		
10'		WOOD; some coarse sand. Stiff, dry to 9.5', then wet. Wood odor.					INSTALLED 2.0" DIAMETER P.V.C. WELL TO 40.0', SCREENED INTERVAL 35.0'–40.0'
15'		White LIME, trace wood. Soft, wet. No odor.					BENTONITE SEAL FROM 25' TO 5'.
20'		WOOD; some peat. Loose, wet. Muck odor.					
25'		Gray fine SAND. Loose, wet. No odor.					
30'							
35'							
40'							EOB @ 40' IN SAND
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: CME 450	OPERATOR: JD

DRILLING METHOD:	8 3/4" HSH
SAMPLING METHOD:	CUTTINGS
SURFACE CONDITIONS:	FINE SAND
WATER LEVEL DURING DRILLING:	9.0'
STATIC GROUNDWATER LEVEL:	8.8'

BORING NO.	LMW-11D (REPLACEMENT)	
SHEET	1 OF 1	
DRILLING		
START	9:00	FINISH 10:00
DATE	02-03-17	DATE 02-03-17

DRILLING CONTRACTOR:	DEWIND DRILLING
LEI PROJECT #:	17-100
SUPERVISED BY:	JRC
GROUND ELEVATION:	587.94
T.O.C. ELEVATION:	592.51
GROUNDWATER ELEVATION:	579.58

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Dark Brown fine SAND with trace wood, loose, moist, no odor.				
5'						
		Water @ 9.0'				
10'						
15'						1 INCH DIA. PVC CASING
20'		Gray fine SAND, compact, very hard (cemented), wet, no odor.				
25'		Gray, very fine SAND, loose, wet, no odor.				BENTONITE
30'		Dark brown fine SAND, wet, loose, no odor.				
35'						1 INCH DIA. PVC SCREEN @ 35'-40'
40'						
45'						
50'		E.O.B. at 50' in SAND.				
55'						

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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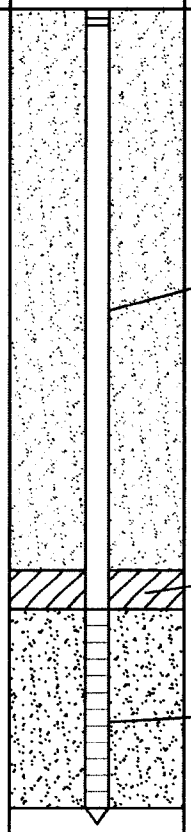
SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: G5400	OPERATOR: AWG

DRILLING METHOD:	DIRECT PUSH – GEOPROBE
SAMPLING METHOD:	CONTINUOUS ACETATE LINERS
SURFACE CONDITIONS:	FINE SAND
WATER LEVEL DURING DRILLING:	10.0'
STATIC GROUNDWATER LEVEL:	8.42

BORING NO.	LMW–12S	
SHEET	1 OF 1	
DRILLING		
START		FINISH
TIME	14:00	TIME 15:00
DATE	07–20–16	DATE 07–20–16

DRILLING CONTRACTOR: LEI	GROUND ELEVATION: 587.93
LEI PROJECT #: 17–100	T.O.C. ELEVATION: 588.44
SUPERVISED BY:	GROUNDWATER ELEVATION: 580.01

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
5'		Light brown fine SAND, loose, moist, no odor.				
10'		Water @ 10.0'				
15'						
20'		Gray fine SAND, compact, very hard (cemented), wet, no odor.				
25'		E.O.B. @ 24.0' in hard cemented SAND.				

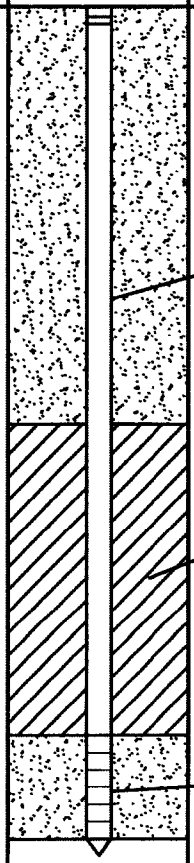


SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: DT-66	OPERATOR: RL
DRILLING METHOD:	DIRECT PUSH - GEOPROBE
SAMPLING METHOD:	CONTINUOUS LINERS
SURFACE CONDITIONS:	FINE SAND
WATER LEVEL DURING DRILLING:	9.0'
STATIC GROUNDWATER LEVEL:	12.84'
BORING NO.	LMW-12D
SHEET	1 OF 1
DRILLING	START 11:00 DATE 07-20-16 / FINISH TIME 12:00 DATE 07-20-16
DRILLING CONTRACTOR:	ALLUVIAL EARTH
LEI PROJECT #:	17-100
SUPERVISED BY:	
GROUND ELEVATION:	588.28
T.O.C. ELEVATION:	592.84
GROUNDWATER ELEVATION:	580.04

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Dark Brown fine SAND with trace wood, loose, moist, no odor.				
5'						
		Water @ 9.0'				
10'						
15'						
20'		Gray fine SAND, compact, very hard (cemented), wet, no odor.				
25'		Gray, very fine SAND, loose, wet, no odor.				
30'		Dark brown fine SAND, wet, loose, no odor.				
35'						
40'		E.O.B. at 40' in SAND.				
45'						
50'						
55'						



SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

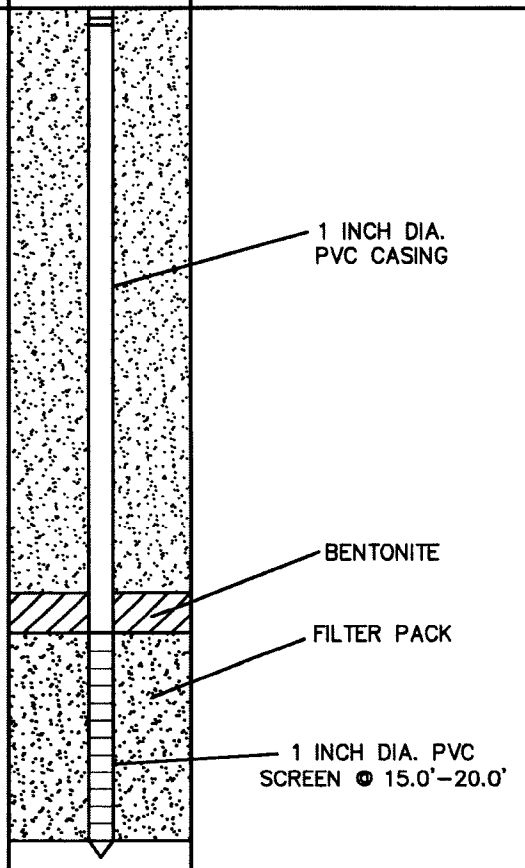
SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: G5400	OPERATOR: AWG

DRILLING METHOD:	DIRECT PUSH – GEOPROBE
SAMPLING METHOD:	NO SAMPLING
SURFACE CONDITIONS:	FILL SAND
WATER LEVEL DURING DRILLING:	8.0'
STATIC GROUNDWATER LEVEL:	12.63'

BORING NO.	LMW–13S	
SHEET	1 OF 1	
DRILLING		
START	TIME 11:00	DATE 07–20–16
FINISH	TIME 12:00	DATE 07–20–16

DRILLING CONTRACTOR:	LEI
LEI PROJECT #:	17–100
SUPERVISED BY:	
GROUND ELEVATION:	588.92
T.O.C. ELEVATION:	592.58
GROUNDWATER ELEVATION:	579.95

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Light brown fine SAND, loose, moist, no odor.				
20'		E.O.B. @ 20.0' in hard cemented SAND.				



SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: DT-66	OPERATOR: RL
DRILLING METHOD:	DIRECT PUSH – GEOPROBE
SAMPLING METHOD:	CONTINUOUS LINERS
SURFACE CONDITIONS:	FINE SAND
WATER LEVEL DURING DRILLING:	8.0'
STATIC GROUNDWATER LEVEL:	9.87'
BORING NO.	LMW-13D
SHEET	1 OF 1
DRILLING	START / FINISH
TIME	15:00 / 16:00
DATE	07-20-16 / 07-20-16
DRILLING CONTRACTOR:	ALLUVIAL EARTH
LEI PROJECT #:	17-100
SUPERVISED BY:	
GROUND ELEVATION:	588.97
T.O.C. ELEVATION:	589.73
GROUNDWATER ELEVATION:	579.86

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
5'		Light brown fine SAND, loose, moist, no odor.				
		Wet @ 8.0'				
10'						
15'						2 INCH DIA. PVC CASING
20'		Dark brown, very fine SAND with trace gravel, compact, very hard (cemented), wet, no odor.				
25'						BENTONITE
30'		Dark brown, very fine SAND, loose, wet, no odor.				
35'						FILTER PACK
40'						2 INCH DIA. PVC SCREEN @ 35.0'-40.0'
45'		E.O.B. @ 40.0' in SAND.				
50'						
55'						

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: AUGER	OPERATOR: REK

DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS GRAB
SURFACE CONDITIONS:	FINE COAL
WATER LEVEL DURING DRILLING:	5.0'
STATIC GROUNDWATER LEVEL:	8.13'

BORING NO.	LMW-14	
SHEET	1 OF 1	
DRILLING		
START	FINISH	
TIME	10:30	TIME 11:00
DATE	06-08-17	DATE 06-08-17

DRILLING CONTRACTOR: LEI	GROUND ELEVATION: 586.21
LEI PROJECT #: 17-100	T.O.C. ELEVATION: 589.28
SUPERVISED BY: KCK	GROUNDWATER ELEVATION: 581.15

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
2'		Black fine to coarse COAL, stiff, dry, no odor.				1 INCH DIA. PVC CASING
4'						BENTONITE
6'		Light brown coarse WOOD AND SAWDUST, moist, loose, no odor. Wet @ 5.0'				SANDY BACKFILL
8'		Brown find SAND, trace coal and wood, loose, wet, no odor.				FILTER PACK
10'						1 INCH DIA. PVC SCREEN @ 7.5'-12.5'
12'		E.O.B. @ 13.0' in SAND.				

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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SITE NAME:	MELCHING DEMOLITION
LOCATION:	MUSKEGON, MICHIGAN
DRILL RIG: AUGER	OPERATOR: REK

DRILLING METHOD:	HAND AUGER
SAMPLING METHOD:	CONTINUOUS GRAB
SURFACE CONDITIONS:	COVER
WATER LEVEL DURING DRILLING:	6.0'
STATIC GROUNDWATER LEVEL:	8.78'

BORING NO.	MW-15	
SHEET	1 OF 1	
DRILLING		
START	FINISH	
TIME	12:30	13:00
DATE	06-08-17	06-08-17

DRILLING CONTRACTOR: LEI	GROUND ELEVATION: 588.64
LEI PROJECT #: 17-100	T.O.C. ELEVATION: 591.19
SUPERVISED BY: KCK	GROUNDWATER ELEVATION: 582.41

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	SAMPLE INTERVAL	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		WOOD CHIPS with fine sand, loose, dry, no odor (cover).				BENTONITE
2'		WOOD CHIPS, hard, dry, no odor.				
4'		White LIME, stiff, moist to 6.0' then soft, wet.				1 INCH DIA. PVC CASING
6'		Wet @ 6.0'				
8'						
10'						1 INCH DIA. PVC SCREEN @ 7.5'-12.5'
12'		Green LIME, very soft, wet, no odor.				
14'		E.O.B. @ 14.0' in green LIME.				

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

DRILLING METHOD: DIRECT PUSH – GEOPROBE	BORING NO. LW–1
SAMPLING METHOD: CONTINUOUS CORES	SHEET 1 OF 1
SURFACE CONDITIONS: HARD LIME	DRILLING START TIME 8:12 / FINISH TIME 11:38
WATER LEVEL DURING DRILLING 10.48'	
STATIC GROUNDWATER LEVEL 13.93' FROM GRADE	DATE JUNE 6, 2014 / DATE JUNE 6, 2014
SITE NAME: MELCHING INC. LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	
DRILL RIG: GP 5400 OPERATOR: KCK	
DRILLING CONTRACTOR: LEI	GROUND ELEVATION: 595.35
LEI PROJECT #: 10–339	T.O.C. ELEVATION 598.42
SUPERVISED BY: KCK	GROUNDWATER ELEVATION 581.42

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		Gray white LIME with wood chips. Hard, dry, wood odor.					
5'		White LIME. Dry to 10.0' then wet, chalk odor.					BENTONITE SEAL FROM 13' TO SURFACE.
10'							INSTALLED 1.0" DIAMETER P.V.C. WELL TO 17.0', SCREENED INTERVAL 14.0'–17.0'
15'		Green LIME Soft, wet. Septic odor.					SCREEN FILTER PACKED WITH SAND ALTHOUGH INSTALLED IN LIME.
		White LIME. Very soft, wet. No odor					HOLE PLUG 18.0' TO 20.0'
20'		E.O.B. at 20' in soft LIME					
25'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH – GEOPROBE	BORING NO.: LS–S
SAMPLING METHOD: CONTINUOUS CORES	SHEET 1 OF 1
SURFACE CONDITIONS: GRAVEL	DRILLING START TIME: 13:12 DATE: JUNE 12, 2014
WATER LEVEL DURING DRILLING: 4.0'	DRILLING FINISH TIME: 13:58 DATE: JUNE 12, 2014
STATIC GROUNDWATER LEVEL: 3.62 FROM GRADE	

SITE NAME: MELCHING INC.
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: G 5400 | OPERATOR: NCK

DRILLING CONTRACTOR: LEI

LEI PROJECT #: 10–339

SUPERVISED BY: KCK

GROUND ELEVATION: 589.02
T.O.C. ELEVATION: 590.38
GROUNDWATER ELEVATION: 585.40

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		White GRAVEL and crushed concrete Stiff, dry. No odor.					
		Brown fine to coarse SAND. Some stones, (fill) Moist to 4.0' then wet, loose, no odor.					BENTONITE SEAL FROM WATER TABLE TO SURFACE.
5'							
10'							INSTALLED 1.0" DIAMETER P.V.C. WELL TO 13.6', SCREENED INTERVAL 8.6'–13.6'
15'		Light brown fine SAND, some wood to 17', some shells, Mod stiff, wet. No odor.					
20'		E.O.B. at 20' in LAKE SAND					
25'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

DRILLING METHOD: DIRECT PUSH – GEOPROBE	BORING NO. LS–N
SAMPLING METHOD: CONTINUOUS CORES	SHEET 1 OF 1
SURFACE CONDITIONS: GRAVEL	DRILLING START TIME 10:20 DATE JUNE 12, 2014 / FINISH TIME 11:05 DATE JUNE 12, 2014
WATER LEVEL DURING DRILLING 4.5'	
STATIC GROUNDWATER LEVEL 4.69' FROM GRADE	

SITE NAME: MELCHING INC.
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: G 5400 | OPERATOR: NCK

DRILLING CONTRACTOR: LEI | GROUND ELEVATION: 589.68

LEI PROJECT #: 10–339 | T.O.C. ELEVATION 590.88

SUPERVISED BY: KCK | GROUNDWATER ELEVATION 584.99

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		Gray GRAVEL and crushed concrete Stiff, dry. No odor.					
		White LIME Wet, very soft. Chalk odor.					BENTONITE SEAL FROM WATER TABLE TO SURFACE.
5'							
							INSTALLED 1.0" DIAMETER P.V.C. WELL TO 13.6', SCREENED INTERVAL 8.6'–13.6'
10'							
15'		Dark brown spongy WOOD, Dry in center, loose. Wood odor.					
		Lt brown fine SAND, Stiff, wet. No odor.					
20'		E.O.B. at 20' in LAKE SAND					
25'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. GB-1
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL	9.65'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DRILLING START DATE: APRIL 4, 2012 / FINISH DATE: APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	

DRILLING CONTRACTOR: ALLUVIAL EARTH
SURFACE CONDITIONS:
ELEVATION: 588.05 / DATUM: USGS
GROUT:
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC
LEI PROJECT #: 10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	DESCRIPTION OF OPERATION AND REMARKS
		GRAY SAND, COARSE GRAINED.			
5'		DARK BROWN SAND, FINE GRAINED; TRACES CRUSHED COAL AND BRICK.			
		WOOD			
10'		LIME			
15'					
		WOOD AND PEAT			
20'		GRAY SAND, FINE TO MEDIUM GRAINED.			
25'					
30'					
35'					
40'					
45'					
50'					
		GRAY CLAY, MEDIUM STIFF.			EOB @ 55' IN CLAY

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD:	GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER
SAMPLING METHOD:	5' ACETATE LINERS
BORING NO.	GB-2
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
SITE NAME:	MELCHING INC.
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	9.85'
TIME	
DATE	
DRILLING START DATE	APRIL 4, 2012
DRILLING FINISH DATE	APRIL 4, 2012
DRILL RIG:	GEOPROBE
OPERATOR:	R. LUBERDA
CASING DEPTH	
DRILLING CONTRACTOR:	ALLUVIAL EARTH
SURFACE CONDITIONS:	
ELEVATION:	587.52
DATUM:	USGS
GROUT:	
SUPERVISED BY:	KWP-LAKESHORE ENVIRONMENTAL, INC
LEI PROJECT #:	10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	DESCRIPTION OF OPERATION AND REMARKS
		TOPSOIL AND CRUSHED COAL			
5'		DARK BROWN SAND, FINE GRAINED; WITH TRACE CONCRETE			
		WOOD CHIPS			
10'		LIME			
		WOOD AND PEAT			
15'					
20'					
25'		GRAY SAND, FINE TO MEDIUM GRAINED.			
30'					
35'					
40'					
45'					
50'		GRAY CLAY, MEDIUM STIFF.			EOB @ 53' IN CLAY

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER	BORING NO. GB-3	
	SHEET 1 OF 1	
SAMPLING METHOD: 5' ACETATE LINERS	DRILLING START TIME	FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL 8.85'	
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DATE APRIL 4, 2012 / DATE APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:	
ELEVATION: 586.35 / DATUM: USGS	GROUT:	
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED; WITH GRAVEL.			
5'		DARK BROWN SAND, FINE GRAINED WITH TRACE COAL			
10'					
		GRAY SAND & SILT; W. TRACE BRICK			
15'		WOOD AND PEAT			
		GRAY SAND, FINE TO MEDIUM GRAINED.			
20'					
25'					
30'					
35'					
40'					
45'		GRAY CLAY, MEDIUM STIFF.			EOB @ 45' IN CLAY
50'					

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. GB-4
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL	8.50'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DRILLING START DATE: APRIL 4, 2012 / FINISH DATE: APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	
DRILLING CONTRACTOR: ALLUVIAL EARTH		SURFACE CONDITIONS:
ELEVATION: 586.45 / DATUM: USGS		GROUT:
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC		LEI PROJECT #: 10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED; TRACE COAL			
5'		DARK BROWN SAND, FINE GRAINED WITH TRACES COAL AND CONCRETE			
10'					
15'		WOOD AND PEAT			
20'		GRAY SAND, FINE TO MEDIUM GRAINED.			
25'					
30'		GRAY CLAY, MEDIUM STIFF.			
35'					
40'					EOB @ 40' IN CLAY
45'					
50'					

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. LMW-1s
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL	7.35'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DATE: APRIL 4, 2012 / DATE: APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:	
ELEVATION: 591.10 / DATUM: USGS	GROUT:	
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
5'		WOOD CHIPS					
		LT GRAY SAND; WELL SORTED					
10'		FILL SAND; TRACES BRICK, COAL, WOOD					SCREENED INTERVAL @ 10-15' BGS
		WOOD AND PEAT					
		GRAY SAND, FINE TO MEDIUM GRAINED.					
15'							EOB @ 15'
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2–1/4" OUTSIDE DIAMETER	BORING NO. LMW–1d
	SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS	DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL 6.98'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME / DATE
DRILL RIG: GEOPROBE OPERATOR: R. LUBERDA	CASING DEPTH
	DATE: APRIL 4, 2012 / APRIL 4, 2012
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:
ELEVATION: 590.79 DATUM: USGS	GROUT:
SUPERVISED BY: KWP–LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10–339–01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
5'		WOOD CHIPS					
		LT GRAY SAND; WELL SORTED.					
10'		FILL SAND; TRACES BRICK, COAL, WOOD					
		WOOD AND PEAT					
15'		GRAY SAND, FINE TO MEDIUM GRAINED.					
20'							
25'							
30'							
35'							
40'							SCREENED INTERVAL @ 40–45' BGS
45'							
50'		GRAY CLAY					EOB @ 54' IN CLAY

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER	BORING NO. LMW-2	
	SHEET 1 OF 1	
SAMPLING METHOD: 5' ACETATE LINERS	DRILLING START TIME	FINISH TIME
SITE NAME: MELCHING INC. LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	WATER LEVEL 10.29' / TIME / DATE	DATE APRIL 4, 2012 / DATE APRIL 4, 2012
DRILL RIG: GEOPROBE OPERATOR: R. LUBERDA	CASING DEPTH	
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:	
ELEVATION: 592.61 DATUM: USGS	GROUT:	
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		DARK BROWN SAND, FINE GRAINED.					
		FILL SAND; TRACES BRICK, COAL AND WOOD					
5'		CRUSHED COAL					
		FILL SAND; TRACES BRICK, COAL AND WOOD ▼					
10'							SCREENED INTERVAL @ 10–15' BGS
		WOOD AND PEAT					
15'		GRAY SAND, FINE TO MEDIUM GRAINED.					EOB @ 16'
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. LMW-3s
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL	9.09'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DATE: APRIL 4, 2012 / APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	

DRILLING CONTRACTOR: ALLUVIAL EARTH
SURFACE CONDITIONS:
ELEVATION: 587.54 DATUM: USGS
GROUT:
SUPERVISED BY: KWP–LAKESHORE ENVIRONMENTAL, INC
LEI PROJECT #: 10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		DARK BROWN SAND, FINE GRAINED.					
5'		FILL SAND; TRACES BRICK, COAL, WOOD					
10'							SCREENED INTERVAL @ 10–15' BGS
15'							EOB @ 15'
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD:	GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER
SAMPLING METHOD:	5' ACETATE LINERS
BORING NO.	LMW-3i
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	APRIL 4, 2012
DRILLING FINISH DATE	APRIL 4, 2012
SITE NAME:	MELCHING INC.
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	8.80'
TIME	
DATE	
DRILL RIG:	GEOPROBE
OPERATOR:	R. LUBERDA
CASING DEPTH	
DRILLING CONTRACTOR:	ALLUVIAL EARTH
SURFACE CONDITIONS:	
ELEVATION:	587.62
DATUM:	USGS
GROUT:	
SUPERVISED BY:	KWP-LAKESHORE ENVIRONMENTAL, INC
LEI PROJECT #:	10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED.					
5'		FILL SAND; TRACES BRICK, COAL, WOOD					
10'							
15'							
		WOOD AND PEAT					
20'							
25'		GRAY SAND, FINE TO MEDIUM GRAINED.					SCREENED INTERVAL @ 27-31' BGS
30'							EOB @ 31' IN SAND
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER	BORING NO. LMW-3d
	SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS	DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL 8.05'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME / DATE
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH / DATE APRIL 4, 2012 / DATE APRIL 4, 2012
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:
ELEVATION: 586.91 / DATUM: USGS	GROUT:
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED.					
5'		FILL SAND: TRACE BRICK, COAL, WOOD.					
10'							
15'							
		WOOD AND PEAT					
20'							
25'		GRAY SAND, FINE TO MEDIUM GRAINED.					
30'							
35'							
40'							
45'							SCREENED INTERVAL @ 42-47' BGS
50'							
		GRAY CLAY.					EOB @ 60' IN CLAY

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD:	GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER
SAMPLING METHOD:	5' ACETATE LINERS
BORING NO.	LMW-4
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
SITE NAME:	MELCHING INC.
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	8.31'
TIME	
DATE	
CASING DEPTH	
DRILLING START DATE	APRIL 4, 2012
DRILLING FINISH DATE	APRIL 4, 2012
DRILL RIG:	GEOPROBE
OPERATOR:	R. LUBERDA
DRILLING CONTRACTOR:	ALLUVIAL EARTH
SURFACE CONDITIONS:	
ELEVATION:	586.92
DATUM:	USGS
GROUT:	
SUPERVISED BY:	KWP-LAKESHORE ENVIRONMENTAL, INC
LEI PROJECT #:	10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED.					
5'		FILL SAND; TRACES BRICK, COAL, WOOD.					
10'		LT GRAY SAND; WELL SORTED.					SCREENED INTERVAL @ 7-12' BGS
							EOB @ 12'
15'							
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2–1/4" OUTSIDE DIAMETER		BORING NO. LMW–4s
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL	11.93' BTOC
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DRILLING START DATE: APRIL 4, 2012 / FINISH DATE: APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	
DRILLING CONTRACTOR: ALLUVIAL EARTH		SURFACE CONDITIONS:
ELEVATION: 586.92 / DATUM: USGS		GROUT:
SUPERVISED BY: KWP–LAKESHORE ENVIRONMENTAL, INC		LEI PROJECT #: 10–339–01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED.					
5'		FILL SAND; TRACES BRICK, COAL, WOOD.					
10'		LT GRAY SAND; WELL SORTED.					SCREENED INTERVAL @ 7–12' BGS
							EOB @ 12'
15'							
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH (GEOPROBE)		BORING NO. LMW-4i1
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START / FINISH
		TIME 1230 / TIME 1330
SITE NAME: MELCHING INC.	WATER LEVEL: 12.78' BTOC	DATE SEPT. 5, 2012 / DATE SEPT 5, 2012
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME: 1330	
	DATE: 9/5/12	
DRILL RIG: GEOPROBE / OPERATOR: R. VdG.	CASING DEPTH:	
DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC	SURFACE CONDITIONS: GRASS AND WEEDS	
ELEVATION: 587.09 / DATUM: USGS	GROUT:	
SUPERVISED BY: AWG-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		LIGHT GRAY SILTY SAND WITH STONES AND ROOTS. LOOSE, DRY, NO ODOR. (FILL)					T.O.C. =590.79
5'		DARK BROWN FINE SILTY SAND SOME WOOD CHIPS, BRICKS, AND STONES. LOOSE, DRY TO 11', THEN WET. NO ODOR. (FILL)					
10'							1" DIAMETER PVC CASING AND SCREEN
15'		DARK BROWN SILT & WOOD WITH GLASS. LOOSE, WET. BURNT WOOD ODOR. (FILL)					
20'		LIGHT GRAY FINE SAND. LOOSE, WET. NO ODOR. (LACUSTRINE SEDIMENT)					SCREENED INTERVAL @ 20.1-25.1' BGS
25'		EOB @ 25' IN SAME					EOB @ 25'

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH (GEOPROBE)		BORING NO. LMW-4i2
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START: TIME 925, DATE JULY 25, 2012 / FINISH: TIME 1405, DATE JULY 25, 2012
SITE NAME: MELCHING DEMOLITION LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	WATER LEVEL: 13.58' BTOC TIME: DATE:	
DRILL RIG: GEOPROBE / OPERATOR: –	CASING DEPTH: 47'	
DRILLING CONTRACTOR: –	SURFACE CONDITIONS:	
ELEVATION: 587.19 / DATUM: USGS	GROUT:	
SUPERVISED BY: KWP	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		LIGHT GRAY SILTY SAND W. STONES AND ROOTS. LOOSE, DRY, NO ODOR. (FILL)					T.O.C. =591.56
10'		DARK BROWN SILTY FINE SAND SOME WOOD CHIPS, BRICKS, AND STONES. LOOSE, DRY TO 11', THEN WET. NO ODOR. (FILL)					
		DARK BROWN SILT & WOOD WITH GLASS. LOOSE, WET. BURNT WOOD ODOR. (FILL)					1" DIAMETER PVC CASING AND SCREEN
20'		LIGHT GRAY FINE SAND. LOOSE, WET. NO ODOR. (LACUSTRINE SEDIMENT)					
30'		LIGHT GRAY MEDIUM SAND, WITH SOME SHELLS. LOOSE, WET. NO ODOR. (LACUSTRINE SEDIMENT)					SCREENED INTERVAL @ 29.9–34.9' BGS
40'							
50'		GRAY SILTY CLAY, HARD, DRY. NO ODOR.					
60'		EOB @ 60' IN SAME					EOB @ 60'

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH (GEOPROBE)		BORING NO. LMW-4d
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING
		START: TIME 925, DATE JULY 25, 2012
		FINISH: TIME 1405, DATE JULY 25, 2012
SITE NAME: MELCHING DEMOLITION	WATER LEVEL	12.35' BTOC
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	
DRILL RIG: GEOPROBE / OPERATOR: –	CASING DEPTH	47'
DRILLING CONTRACTOR: –	SURFACE CONDITIONS:	
ELEVATION: 587.07 / DATUM: USGS	GROUT:	
SUPERVISED BY: KWP	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		LIGHT GRAY SILTY SAND W. STONES AND ROOTS. LOOSE, DRY, NO ODOR. (FILL)					T.O.C. =590.44
10'		DARK BROWN FINE SILTY SAND SOME WOOD CHIPS, BRICKS, AND STONES. LOOSE, DRY TO 11', THEN WET. NO ODOR. (FILL)					
		DARK BROWN SILT & WOOD WITH GLASS. LOOSE, WET. BURNT WOOD ODOR. (FILL)					
20'		LIGHT GRAY FINE SAND. LOOSE, WET. NO ODOR. (LACUSTRINE SEDIMENT)					1" DIAMETER PVC CASING AND SCREEN
30'		LIGHT GRAY MEDIUM SAND, WITH SOME SHELLS. LOOSE, WET. NO ODOR. (LACUSTRINE SEDIMENT)					
40'							SCREENED INTERVAL @ 41.6–46.6' BGS
50'		GRAY SILTY CLAY, HARD, DRY. NO ODOR.					
60'		EOB @ 60' IN SAME					EOB @ 60'

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE 2-1/4" DPR	BORING NO. LMW-5
	SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS	DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING DEMOLITION	WATER LEVEL 10.45'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME / DATE
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH / DATE START: APRIL 4, 2012 / DATE FINISH: APRIL 4, 2012
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:
ELEVATION: 589.08 / DATUM: USGS	GROUT:
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED.					
5'		FILL SAND; TRACES BRICK, COAL, WOOD.					
10'		LT GRAY SAND; WELL SORTED.					SCREENED INTERVAL @ 7-12' BGS
							EOB @ 12'
15'							
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE 2-1/4" DPR		BORING NO. LMW-5s
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING DEMOLITION	WATER LEVEL	13.54' BTOC
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DRILLING START DATE: APRIL 4, 2012 / FINISH DATE: APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	
DRILLING CONTRACTOR: ALLUVIAL EARTH		SURFACE CONDITIONS:
ELEVATION: 589.08 / DATUM: USGS		GROUT:
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC		LEI PROJECT #: 10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SAND, FINE GRAINED.					
5'		FILL SAND; TRACES BRICK, COAL, WOOD.					
10'		LT GRAY SAND; WELL SORTED. ▼					SCREENED INTERVAL @ 7-12' BGS
							EOB @ 12'
15'							
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

DRILLING METHOD: DIRECT PUSH (GEOPROBE)		BORING NO. LMW-5d
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME / FINISH TIME
SITE NAME: MELCHING DEMOLITION LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	WATER LEVEL: 13.43' BTOC TIME: DATE:	DATE: JULY 25, 2012 / DATE: JULY 25, 2012
DRILL RIG: GEOPROBE OPERATOR: –	CASING DEPTH	
DRILLING CONTRACTOR: –	SURFACE CONDITIONS:	
ELEVATION: 588.42 DATUM: –	GROUT:	
SUPERVISED BY: –	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0'		LT. BROWN FINE SAND, W. GRAVEL & STONE. HARD, DRY; NO ODOR. (FILL)					T.O.C. =592.00
10'		LIGHT BROWN SILTY FINE SAND, WITH TRACE GRAVEL AND BRICKS. LOOSE, DRY TO 10.5', THEN WET. NO ODOR. (FILL)					
		BROWN WOOD, WITH SILT. VERY HARD, DRY ON INSIDE; WET WOOD ODOR. (FILL)					
20'							
		GRAY SAND, COARSE WITH SOME SHELLS. LOOSE, WET. NO ODOR. (LACUSTRINE SEDIMENT)					1" DIAMETER PVC CASING
30'							
40'							
50'							SCREENED INTERVAL @ 50.1–55.1' BGS
60'		GRAY CLAY.					
70'		EOB @ 70' IN SAME					EOB @ 70'

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. LMW-6
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING
		START TIME / FINISH TIME
SITE NAME: MELCHING INC.	WATER LEVEL	3.87'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	
	DATE	DATE: APRIL 4, 2012 / DATE: APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH	
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:	
ELEVATION: 586.02 / DATUM: USGS	GROUT:	
SUPERVISED BY: KWP–LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		CONCRETE					
5'		FILL SAND; TRACES BRICK, CONCRETE, PEBBLES.					
		DARK BROWN SAND, FINE GRAINED; WITH WOOD.					SCREENED INTERVAL @ 5–10' BGS
10'							EOB @ 10'
15'							
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. LMW-7
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME: / FINISH TIME:
SITE NAME: MELCHING INC. LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	WATER LEVEL: 4.20'	
	TIME:	
	DATE:	DRILLING START DATE: APRIL 4, 2012 / FINISH DATE: APRIL 4, 2012
DRILL RIG: GEOPROBE / OPERATOR: R. LUBERDA	CASING DEPTH:	
DRILLING CONTRACTOR: ALLUVIAL EARTH	SURFACE CONDITIONS:	
ELEVATION: 587.43 / DATUM: USGS	GROUT:	
SUPERVISED BY: KWP-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		FILL SAND; TRACES BRICK, CONCRETE, PEBBLES.					
5'							SCREENED INTERVAL @ 2-7' BGS
10'		DARK BROWN SAND, FINE GRAINED; WITH WOOD.					
15'							EOB @ 15'
20'							
25'							
30'							
35'							
40'							
45'							
50'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD:	GEOPROBE – DIRECT PUSH 2–1/4" OUTSIDE DIAMETER
SAMPLING METHOD:	5' ACETATE LINERS
BORING NO.	LMW–8s
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
SITE NAME:	MELCHING INC.
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	12.40' BTOC
TIME	–
DATE	–
DRILLING START DATE	JULY 25, 2012
DRILLING FINISH DATE	JULY 25, 2012
DRILL RIG:	GEOPROBE
OPERATOR:	–
CASING DEPTH	–
DRILLING CONTRACTOR:	LAKESHORE ENVIRONMENTAL, INC.
SURFACE CONDITIONS:	GRASS & WEEDS
ELEVATION:	587.21
DATUM:	USGS
GROUT:	
SUPERVISED BY:	KWP–LAKESHORE ENVIRONMENTAL, INC
LEI PROJECT #:	10–339–01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		LIGHT GRAY SILTY SAND WITH STONES. LOOSE, DRY. NO ODOR. (FILL)					T.O.C. =590.21
5'		DARK BROWN FINE SILTY SAND SOME WOOD CHIPS BRICKS AND STONES. LOOSE, DRY. NO ODOR. (FILL)					1" DIAMETER PVC CASING AND SCREEN
10'							SCREENED INTERVAL @ 104–15.4' BGS
15'		EOB @ 15' ON WOOD					

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD:	DIRECT PUSH (GEOPROBE)
SAMPLING METHOD:	5' ACETATE LINERS
BORING NO.	LMW-8d
SHEET	1 OF 1
DRILLING START TIME	
DRILLING FINISH TIME	
DRILLING START DATE	JULY 27, 2012
DRILLING FINISH DATE	JULY 27, 2012
SITE NAME:	MELCHING DEMOLITION
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	11.43' BTOC
TIME	--
DATE	--
CASING DEPTH	--
DRILL RIG:	DT-66
OPERATOR:	JOHN
DRILLING CONTRACTOR:	PEARSON
SURFACE CONDITIONS:	GRASS AND WEEDS
ELEVATION:	587.01
DATUM:	USGS
GROUT:	BENSEAL 2' ABOVE SCREEN TO SURFACE
SUPERVISED BY:	KWP
LEI PROJECT #:	10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		LIGHT GRAY SILTY SAND WITH STONES. LOOSE, DRY. NO ODOR. (FILL)					T.O.C. =592.39
10'		DARK BROWN FINE SILTY SAND SOME WOOD CHIPS BRICKS AND STONES. LOOSE, DRY. NO ODOR. (FILL)					
		DARK BROWN SILT AND WOOD WITH GLASS; LOOSE, WET. BURNT WOOD ODOR. (FILL)					
20'		LIGHT GRAY COARSE SAND. LOOSE, WET. NO ODOR. (LACUSTRINE SEDIMENT)					1" DIAMETER PVC CASING AND SCREEN
30'		GRAY SAND W. SHELLS LOOSE, WET. NO ODOR.					
40'							SCREENED INTERVAL @ 43.1-48.1' BGS
50'		GRAY SILT W. SHELLS LOOSE, WET. NO ODOR.					
		GRAY CLAY.					
60'		EOB @ 67' IN SAME					EOB @ 55'
70'							

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. LMW-9s
		SHEET 1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START TIME 1145 / FINISH TIME 1330
SITE NAME: MELCHING INC.	WATER LEVEL	14.31' BTOC
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	1602
	DATE	7/31/12
DRILL RIG: GEOPROBE / OPERATOR: R. VdG.	CASING DEPTH	15'
		DATE START: JULY 25, 2012 / DATE FINISH: JULY 25, 2012

DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC. | SURFACE CONDITIONS: GRASS & WEEDS

ELEVATION: 588.78 | DATUM: USGS | GROUT:

SUPERVISED BY: AWG-LAKESHORE ENVIRONMENTAL, INC | LEI PROJECT #: 10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		LIGHT BROWN FINE SAND WITH GRAVEL AND STONES HARD AND DRY, NO ODOR. (FILL)					T.O.C. =592.38
5'		LIGHT GRAY FINE SILTY SAND WITH BRICKS AND CONCRETE. LOOSE, DRY. NO ODOR. (FILL)					
		RED CRUSHED BRICK WITH TRACE OF WOOD, LOOSE, DRY. NO ODOR. (FILL)					1" DIAMETER PVC CASING AND SCREEN
10'		LIGHT BROWN FINE SILTY SAND, TRACE GRAVEL AND LIME. MOIST TO 10.5' THEN WET. LOOSE. SLIGHT BLACK LIQUOR (SULFATE) ODOR. (FILL)					SCREENED INTERVAL @ 10-15' BGS
15'		BROWN WOOD, VERY HARD. DRY ON INSIDE W. PEAT. WET. BURNT WOOD ODOR. (FILL)					
		LIGHT GRAY FINE SAND W. SHELLS LOOSE, WET. SLIGHT FISH ODOR. (LACUSTRINE SEDIMENT)					
20'							EOB @ 20'

SOIL BORING / WELL CONSTRUCTION LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: DIRECT PUSH (GEOPROBE)		BORING NO.	LMW-9d
		SHEET	1 OF 1
SAMPLING METHOD: 5' ACETATE LINERS		DRILLING START	DRILLING FINISH
		TIME	TIME
SITE NAME: MELCHING DEMOLITION	WATER LEVEL	13.77' BTOC	0945 / 1400
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	1020	
	DATE	7/31/12	DATE: JULY 27, 2012 / JULY 27, 2012
DRILL RIG: DT-66 / OPERATOR: JOHN	CASING DEPTH	60'	
DRILLING CONTRACTOR: PEARSON	SURFACE CONDITIONS: GRASS AND WEEDS		
ELEVATION: 588.72 / DATUM: USGS	GROUT: BENSEAL 2' ABOVE SCREEN TO SURFACE		
SUPERVISED BY: KWP	LEI PROJECT #: 10-339-01		

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
10'		SEE SB-1/(9s) FOR DETAILED SOILS DESCRIPTIONS					T.O.C. =592.04
20'		LIGHT GRAY FINE SAND W. SHELLS LOOSE, WET. SLIGHT FISH ODOR. (LACUSTRINE SEDIMENT)					1" DIAMETER PVC CASING AND SCREEN
30'							
40'							
50'							
60'		GRAY CLAY.					SCREENED INTERVAL @ 55.3-60.3' BGS
70'		EOB @ 67' IN SAME					EOB @ 67'

Originally logged by Horizon and developed into a soil boring log by LEI

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: HAND AUGER		BORING NO. MW–1
		SHEET 1 OF 1
SAMPLING METHOD: –		DRILLING START TIME – / FINISH TIME –
SITE NAME: MELCHING INC.	WATER LEVEL –	DRILLING START DATE FEB. 18, 2004 / FINISH DATE FEB. 18, 2004
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME –	
	DATE –	
DRILL RIG: – / OPERATOR: MC	CASING DEPTH 10.0'	
DRILLING CONTRACTOR: HORIZON ENVIRONMENTAL		SURFACE CONDITIONS: –
ELEVATION: – / DATUM: –		GROUT: CUTTINGS, 5' TO SURFACE
SUPERVISED BY: MP–HORIZON ENVIRONMENTAL		LEI PROJECT #: 10–339–01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
2'		BROWN FINE TO MEDIUM SAND, MOIST, WET AT 7.5' WHILE AUGERING, DIESEL ODOR AT 7.5'			N.D.		CASING 3' ABOVE GROUND SURFACE W/ J–PLUG
4'					N.D.		2" DIAMETER PVC CASING AND SCREEN
6'					N.D.		
8'					N.D.		FILTER SAND @ 5.0' – 10.0' BGS
10'		EOB @ 10'			N.D.		SCREENED INTERVAL @ 7.0' – 9.5' BGS
12'					N.D.		
14'							

Originally logged by Horizon and developed into a soil boring log by LEI

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: HAND AUGER		BORING NO. MW–2
		SHEET 1 OF 1
SAMPLING METHOD: –		DRILLING START TIME – / FINISH TIME –
SITE NAME: MELCHING INC.	WATER LEVEL –	DATE FEB. 18, 2004 / DATE FEB. 18, 2004
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME –	
	DATE –	
DRILL RIG: – / OPERATOR: MC	CASING DEPTH 10.0'	
DRILLING CONTRACTOR: HORIZON ENVIRONMENTAL	SURFACE CONDITIONS: –	
ELEVATION: – / DATUM: –	GROUT: NATURAL BACKFILL, 10' TO SURFACE	
SUPERVISED BY: MP–HORIZON ENVIRONMENTAL	LEI PROJECT #: 10–339–01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		BROWN SAND, MOIST, TRACE GRAVEL					CASING 4' ABOVE GROUND SURFACE W/ GAVLANIZED, THREADED CAP
2'		BROWN SAND, FINE TO MEDIUM, MOIST, WET AT 7.5'			N.D.		2" DIAMETER GALVANIZED CASING AND STAINLESS STEEL SCREEN
4'					N.D.		
6'					N.D.		NATURAL BACKFILL 10.0' BGS TO GROUND SURFACE
8'					N.D.		SCREENED INTERVAL @ 6.0' – 10.0' BGS
10'		EOB @ 10'			N.D.		
12'					N.D.		
14'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD:	GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER
SAMPLING METHOD:	4' ACETATE LINERS (CORES)
BORING NO.	MW-3
SHEET	1 OF 1
DRILLING	START TIME 0910 / FINISH TIME 0940
DATE	START JULY 12, 2012 / FINISH JULY 12, 2012
SITE NAME:	MELCHING INC.
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	8.30'
TIME	1010
DATE	7/13/12
DRILL RIG:	DT-66
OPERATOR:	AWG
CASING DEPTH	12.4'
DRILLING CONTRACTOR:	LEI
SURFACE CONDITIONS:	LOOSE SAND
ELEVATION:	588.15
DATUM:	USGS
GROUT:	BENSEAL
SUPERVISED BY:	AWG-LAKESHORE ENVIRONMENTAL, INC
LEI PROJECT #:	10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		DARK BROWN SILTY FINE SAND, LOOSE, SOME WOOD. MOIST, NO ODOR (FILL)					FLUSH PROTECTIVE COVER T.O.C. 588.15
2'		LIGHT BROWN FINE TO MEDIUM SAND, LOOSE. DRY TO 7.5', THEN WET. NO ODOR. (FILL FOR TANKS)			N.D.		1" DIAMETER PVC CASING AND SCREEN
4'					N.D.		
6'					N.D.		
8'		▼			N.D.		
10'					N.D.		SCREENED INTERVAL @ 7.4' – 12.4' BGS
12'		EOB @ 12' IN MEDIUM SAND			N.D.		
14'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: GEOPROBE – DIRECT PUSH 2-1/4" OUTSIDE DIAMETER		BORING NO. MW-4
		SHEET 1 OF 1
SAMPLING METHOD: 4' ACETATE LINERS (CORES)		DRILLING START TIME 1020 DATE JULY 12, 2012 / FINISH TIME 1055 DATE JULY 12, 2012
SITE NAME: MELCHING INC.	WATER LEVEL	8.31'
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	1320
	DATE	7/13/12
DRILL RIG: DT-66 / OPERATOR: AWG	CASING DEPTH	12.2'
DRILLING CONTRACTOR: LEI	SURFACE CONDITIONS: LOOSE SAND FILL	
ELEVATION: 587.26 / DATUM: USGS	GROUT: BENSEAL	
SUPERVISED BY: AWG-LAKESHORE ENVIRONMENTAL, INC	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	PID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
2'		LIGHT BROWN FINE TO MEDIUM SAND, LOOSE. DRY TO 7.7', THEN WET. NO ODOR. (FILL FOR TANKS)			N.D.		FLUSH PROTECTIVE COVER T.O.C. 587.26
4'					N.D.		1" DIAMETER PVC CASING AND SCREEN
6'					N.D.		
8'					N.D.		
10'					N.D.		SCREENED INTERVAL @ 7.2' – 12.2' BGS
12'		EOB @ 12' IN MEDIUM SAND			N.D.		
14'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: STAINLESS STEEL HAND AUGER		BORING NO. HB-1
		SHEET 1 OF 1
SAMPLING METHOD: CONTINUOUS		DRILLING START TIME: 1110 / FINISH TIME: 1135
SITE NAME: MELCHING INC.	WATER LEVEL: –	
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME:	DATE: OCT 2, 2012 / DATE: OCT 2, 2012
DRILL RIG: – OPERATOR: RVG	DATE:	
	CASING DEPTH:	
DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC	SURFACE CONDITIONS: WEEDS / BARE	
ELEVATION: – DATUM: –	GROUT:	
SUPERVISED BY:	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	SAMPLES	DESCRIPTION OF OPERATION AND REMARKS
0'		BROWN FINE SAND WITH STONES AND ROOTS (FILL). LOOSE, DRY, NO ODOR.			0.0		NO STAINED SOILS OBSERVED. SAMPLES COLLECTED AT 1-1.5' AND 5-5.5'
1'		LIGHT BROWN FINE SAND WITH GRAVEL AND TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY; NO ODOR.			0.4	1 to 1.5'	
2'					0.0		
3'					0.0		
4'					0.0		
5'					0.9	5 to 5.5'	
6'		LIGHT BROWN FINE SAND WITH TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY TO 7.5', THEN WET. FAINT FUEL OIL ODOR.			4.9		
7'					4.5		
8'					4.3		
		END OF BORING @ 8' IN SAND					EOB @ 8'
9'							
10'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: STAINLESS STEEL HAND AUGER		BORING NO. HB-2
		SHEET 1 OF 1
SAMPLING METHOD: CONTINUOUS		DRILLING START TIME 1220 / FINISH TIME 1300
SITE NAME: MELCHING INC	WATER LEVEL –	
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	TIME	DATE START OCT 2, 2012 / DATE FINISH OCT 2, 2012
	DATE	
DRILL RIG: – / OPERATOR: RVG	CASING DEPTH	
DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC	SURFACE CONDITIONS: WEEDS / BARE	
ELEVATION: – / DATUM: –	GROUT:	
SUPERVISED BY:	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	SAMPLES	DESCRIPTION OF OPERATION AND REMARKS
		BROWN FINE SAND WITH STONES AND ROOTS (FILL). LOOSE, DRY, NO ODOR.			0.0		NO STAINED SOILS OBSERVED. SAMPLES COLLECTED AT 1-1.5' AND 5-5.5'
1'					0.0	1 to 1.5'	
		LIGHT BROWN FINE SAND WITH GRAVEL AND TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY; NO ODOR.					
2'					0.0		
3'					0.0		
4'					0.0		
5'					0.0	5 to 5.5'	
6'		LIGHT BROWN FINE SAND WITH TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY TO 7.5', THEN WET. FAINT FUEL OIL ODOR.			2.6		
7'					4.2		
8'					4.5		
		END OF BORING @ 8' IN SAND					EOB @ 8'
9'							
10'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
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SITE NAME: MELCHING INC LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	DRILLING METHOD: STAINLESS STEEL HAND AUGER	BORING NO. HB–2 Resample
	SAMPLING METHOD: CONTINUOUS	SHEET 1 OF 1
	SURFACE CONDITIONS: FILL SAND	DRILLING START TIME 10:50 / FINISH TIME 11:20
	WATER LEVEL DURING DRILLING	
	STATIC GROUNDWATER LEVEL 6.8	DATE AUG 9, 2013 / DATE AUG 9, 2013
DRILL RIG: – / OPERATOR: NCK		
DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC	GROUND ELEVATION: 587.3	
LEI PROJECT #: 10–339 / –	T.O.C. ELEVATION	
SUPERVISED BY:	GROUNDWATER ELEVATION	

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
0		LIGHT BROWN FINE SAND (FILL). LOOSE, DRY; NO ODOR.			0.0		RECENT FILL MATERIAL
1'					0.0		
					0.0		
2'		BROWN FINE SAND WITH STONES AND BROKEN CONCRETE (FILL). LOOSE, DRY; NO ODOR.			0.0		
					0.0		
3'					0.0		
					0.0		
4'					0.0		
					0.0		
5'				X	0.0		SOIL SAMPLE FROM 5.0'–5..5' SUBMITTED FOR LABORATORY ANLYSIS.
				X	0.0		
6'		SAME, MOIST.			0.0		
		▽			0.0		
7'		END OF BORING @ 7' IN SAME, WET.			0.0		
8'							
9'							
10'							

SOIL BORING LOG

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DRILLING METHOD: STAINLESS STEEL HAND AUGER	BORING NO. HB-3	
	SHEET 1 OF 1	
SAMPLING METHOD: CONTINUOUS	DRILLING START TIME 1325 DATE OCT 2, 2012	DRILLING FINISH TIME 1350 DATE OCT 2, 2012
SITE NAME: MELCHING INC LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI	WATER LEVEL –	
	TIME	
	DATE	
DRILL RIG: – OPERATOR: RVG	CASING DEPTH	
DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC	SURFACE CONDITIONS: WEEDS / BARE	
ELEVATION: – DATUM: –	GROUT:	
SUPERVISED BY:	LEI PROJECT #: 10-339-01	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	SAMPLES	DESCRIPTION OF OPERATION AND REMARKS
1'		BROWN FINE SAND, WITH STONES AND ROOTS (FILL). LOOSE, DRY, NO ODOR.			0.0	1 to 1.5'	NO STAINED SOILS OBSERVED. SAMPLES COLLECTED AT 1-1.5' AND 5-5..5'
2'		LIGHT BROWN FINE SAND WITH GRAVEL AND TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY; NO ODOR.			0.0		
3'					0.0		
4'					0.0		
5'					0.0	5 to 5.5'	
6'		LIGHT BROWN FINE SAND WITH TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY TO 7.5', THEN WET. FAINT FUEL OIL ODOR.			2.0		
7'					3.8		
8'					4.9		
9'		END OF BORING @ 8' IN SAND					EOB @ 8'
10'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

DRILLING METHOD:	STAINLESS STEEL HAND AUGER
SAMPLING METHOD:	CONTINUOUS
BORING NO.	HB-4
SHEET	1 OF 1
DRILLING START TIME	1155
DRILLING FINISH TIME	1210
DRILLING START DATE	OCT 3, 2012
DRILLING FINISH DATE	OCT 3, 2012
SITE NAME:	MELCHING INC
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	-
TIME	
DATE	
CASING DEPTH	
DRILL RIG:	-
OPERATOR:	RVG
DRILLING CONTRACTOR:	LAKESHORE ENVIRONMENTAL, INC
SURFACE CONDITIONS:	WEEDS / BARE
ELEVATION:	-
DATUM:	-
GROUT:	
SUPERVISED BY:	
LEI PROJECT #:	10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	SAMPLES	DESCRIPTION OF OPERATION AND REMARKS
1'		BROWN FINE SAND WITH STONES AND ROOTS (FILL). LOOSE, DRY, NO ODOR.			2.9		OIL STAIN AT SURFACE. NO STAINED SOILS BELOW.
2'		LIGHT BROWN FINE SAND WITH GRAVEL AND TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY; NO ODOR.			1.7		
3'					2.4		
4'					3.2		
5'					4.8		
6'					4.1		
7'		LIGHT BROWN FINE SAND WITH TRACE CRUSHED CONCRETE (FILL). LOOSE, DRY TO 7.5', THEN WET. FAINT FUEL OIL ODOR.			3.9		
8'					4.2		
9'		END OF BORING @ 8' IN SAND					EOB @ 8'
10'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD:	STAINLESS STEEL HAND AUGER
SAMPLING METHOD:	CONTINUOUS
BORING NO.	HB-5
SHEET	1 OF 1
DRILLING START TIME	1110
DRILLING FINISH TIME	1135
DRILLING START DATE	OCT 17, 2012
DRILLING FINISH DATE	OCT 17, 2012
SITE NAME:	MELCHING INC
LOCATION:	2400 LAKESHORE DRIVE, MUSKEGON, MI
WATER LEVEL	–
WATER LEVEL TIME	
WATER LEVEL DATE	
CASING DEPTH	
DRILL RIG:	–
OPERATOR:	RVG
DRILLING CONTRACTOR:	LAKESHORE ENVIRONMENTAL, INC
SURFACE CONDITIONS:	WEEDS / BARE
ELEVATION:	–
DATUM	–
GROUT:	
SUPERVISED BY:	
LEI PROJECT #:	10-339-01

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	SAMPLES	DESCRIPTION OF OPERATION AND REMARKS
		CONCRETE					
		BROWN FINE SAND WITH STONES (FILL). LOOSE, DRY, NO ODOR.					
1'		LIGHT BROWN FINE SAND WITH GRAVEL AND CRUSHED CONCRETE (FILL). LOOSE, DRY TO 7.0', THEN WET; NO ODOR.			0.0		
2'					0.0		
3'					0.0		
4'					0.0		FOOTING OF BUILDING EXTENDS TO 48" B.G.S.
5'					0.0		
6'					0.0		
7'					0.0		
8'		END OF BORING @ 7.5' IN WET SAND UNDER BUILDING					
9'							
10'							

SOIL BORING LOG

Lakeshore Environmental, Inc.
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DRILLING METHOD: STAINLESS STEEL HAND AUGER	BORING NO. HB–6
SAMPLING METHOD: CONTINUOUS GRAB	SHEET 1 OF 1
SURFACE CONDITIONS:	DRILLING START TIME 11:25 DATE AUG 9, 2013 / FINISH TIME 11:40 DATE AUG 9, 2013
WATER LEVEL DURING DRILLING	
STATIC GROUNDWATER LEVEL	

SITE NAME: MELCHING INC
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: – | OPERATOR: NCK

DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC | GROUND ELEVATION: 587.3

LEI PROJECT #: 10–339 | – | T.O.C. ELEVATION

SUPERVISED BY: | GROUNDWATER ELEVATION

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER		FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
1'		LIGHT BROWN MEDIUM SAND MIXED WITH DARK BROWN SILTY FINE SAND (FILL). STIFF, DRY; NO ODOR.				0.0		
						0.0		
						0.0		
2'						0.0		
						0.0		
3'						0.0		
						0.0		
4'						0.0		
						0.6		SOIL SAMPLE FROM 4.5'–5.0' (at FID reading) SUBMITTED FOR LABORATORY ANALYSIS
5'						0.0		
						0.0		
6'		EOB @ 6' IN SAME, MOIST.				0.0		
						0.0		
7'						0.0		
8'								
9'								
10'								

SOIL BORING LOG

Lakeshore Environmental, Inc.
Scientists | Engineers | Planners

DRILLING METHOD: STAINLESS STEEL HAND AUGER		BORING NO. HB–7
SAMPLING METHOD: CONTINUOUS GRAB		SHEET 1 OF 1
SURFACE CONDITIONS: CONCRETE FLOOR		DRILLING START TIME 11:45 / FINISH TIME 12:20
WATER LEVEL DURING DRILLING		DRILLING START DATE AUG 9, 2013 / FINISH DATE AUG 9, 2013
STATIC GROUNDWATER LEVEL 7.0		

SITE NAME: MELCHING INC
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: – | OPERATOR: NCK

DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC | GROUND ELEVATION: 587.3

LEI PROJECT #: 10–339 | – | T.O.C. ELEVATION

SUPERVISED BY: | GROUNDWATER ELEVATION

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER	FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		CONCRETE WITH WIRE MESH			0.0		JACK HAMMER
1'		LIGHT BROWN FINE SAND (FILL). LOOSE, DRY; NO ODOR.			0.0		HAND AUGER
					0.0		
2'					0.0		
		LIGHT BROWN FINE SAND WITH GRAVEL AND CRUSHED CONCRETE (FILL). LOOSE, DRY; NO ODOR.			0.0		
3'					0.0		
					0.0		
4'					0.0		
					0.0		
5'				X	0.3		SOIL SAMPLE FROM 5.0'–5.5' (at FID reading) SUBMITTED FOR LABORATORY ANALYSIS
				X	0.0		
6'		SAME; MOIST AT 6.0'			0.0		
					0.0		
7'		▽			0.0		
		EOB @ 7.0' IN SAME.					
8'							
9'							
10'							

SOIL BORING LOG

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DRILLING METHOD: STAINLESS STEEL SHOVEL, STAINLESS STEEL HAND AUGER	BORING NO. SE-1 Shovel Excavation #1
SAMPLING METHOD: CONTINUOUS GRAB	SHEET 1 OF 1
SURFACE CONDITIONS: SAND	DRILLING START TIME 10:00 DATE AUG 9, 2013 / FINISH TIME 10:15 DATE AUG 9, 2013
WATER LEVEL DURING DRILLING	
STATIC GROUNDWATER LEVEL	

SITE NAME: MELCHING INC
LOCATION: 2400 LAKESHORE DRIVE, MUSKEGON, MI

DRILL RIG: – | OPERATOR: NCK

DRILLING CONTRACTOR: LAKESHORE ENVIRONMENTAL, INC | GROUND ELEVATION: 587.3

LEI PROJECT #: 10-339 | – | T.O.C. ELEVATION

SUPERVISED BY: | GROUNDWATER ELEVATION

DEPTH IN FEET	SOIL GRAPH	DESCRIPTION OF MATERIAL	RECOVERY	SAMPLER		FID (ppm)	WELL CONSTRUCTION SUMMARY	DESCRIPTION OF OPERATION AND REMARKS
		LIGHT BROWN FINE SAND (FILL) SOME STONES. LOOSE, DRY; NO ODOR.				0.0		EXCAVATED TO 4.0' USING A SHOVEL. BUILDING FOOTING ENDED AT 4.0 FEET.
1'						0.0		
						0.0		
2'						0.0		
						0.0		
3'						0.0		
						0.0		
4'						0.0		
						0.0		
5'						0.0		
						0.0		
6'		SAME; MOIST @ 6.0'.				0.0		HAND AUGER TO 6.0'
		END OF BORING IN LIGHT BROWN FINE SAND.						
7'								
8'								
9'								
10'								

SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	TRUCK-MOUNTED GEO PROBE
SAMPLING METHOD:	CLOSED SAMPLER (with 1.5" x 4' Liners)
BORING NO.	SB-1
SHEET	1 OF 1
DRILLING START TIME	1040
DRILLING FINISH TIME	1115
DRILLING START DATE	11/14/11
DRILLING FINISH DATE	11/14/11
SITE NAME:	SAPPI
LOCATION:	MUSKEGON, MI
WATER LEVEL	6' WATER DEPTH
TIME	
DATE	
CASING DEPTH	
DATUM:	ELEVATION:
DRILL RIG:	LEI GEOPROBE
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	BWG
LEI PROJECT#:	11-4107
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2	~	0-6' Water						[Concrete Rubble & Sediment Surface]
4	~							All Sediment 6-14' Below Water Level Very Loose - Very Little Vibration/Hammering Necessary to Advance Samplers.
6		6-7' Brown, FINE SAND, Loose						
8		7-12' Black, ORGANIC-RICH FINE SAND, Loose			6	10		
10								
12		12-22' Gray, Slightly ORGANIC-RICH FINE SAND, Loose			10	14		
14								
16					14	18		
18								
20					18	22		
22		End of Probing @ 22' BWL						

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	Truck-Mounted GEO PROBE
SAMPLING METHOD:	CLOSED SAMPLER (with 1.5" X 4' Liners)
BORING NO.	SB-2
SHEET	1 OF 1
DRILLING START TIME	1130
DRILLING FINISH TIME	1300
SITE NAME:	SAPPI
LOCATION:	MUSKEGON, MI
WATER LEVEL	6' WATER DEPTH
TIME	
DATE	
CASING DEPTH	
DRILLING START DATE	11/14/11
DRILLING FINISH DATE	11/14/11
DATUM:	ELEVATION:
DRILL RIG:	LEI GEOPROBE
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	BWG
LEI PROJECT#:	11-407
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
0		0-6' Water						Concrete Rubble or Sediment Surface
4								
6		6-9' Turquoise & Gray, "Lime-Like" SILT, SOFT			6	10		All Sediment 6-16' Below Water Level very Loose or Soft - Very Little Vibration/Hammering Necessary to Advance Samplers.
8								
10		9-11.5' Black, Fine Rubbly/Gravelly ORGANIC-RICH SAND, Loose			10	14		
12		11.5-24' Gray, Slightly ORGANIC-RICH FINE SAND						
14					14	16		
16								
18					16	20		
20								
22					20	24		
24		End of Probing 24' BGS						

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LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	Truck-Mounted GEO PROBE
SAMPLING METHOD:	CLOSED SAMPLER (With 1.5" X 4' Liners)
BORING NO.	SB-3
SHEET	1 OF 1
DRILLING START TIME	1330
DRILLING FINISH TIME	1415
SITE NAME:	SAPPI
LOCATION:	MUSKEGON, MI
WATER LEVEL	3.5' WATER DEPTH
TIME	
DATE	
CASING DEPTH	
DATE (START)	11/14/11
DATE (FINISH)	11/14/11
DATUM:	ELEVATION:
DRILL RIG:	LEI GEOPROBE
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	BWG
LEI PROJECT#:	11-407
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2	~	0-3.5' Water						[Concrete Rubble at Sediment Surface]
4	~	3.5-13' Mixture of Turquoise-Gray "Lime-Like" SILT and Black Fine Rubbly/Gravelly SAND, w/ Shells & Organics			3.5	7.5		All Sediment 3.5'-11.5' " " " " " " " " " "
6								
8								
10					7.5	11.5		
12		Increase Thickness of "Lime-Like" Silt with Depth (Pasty Texture)						
14		13-23.5' Grayish-Brown Slightly Organic-Rich			11.5	15.5		
16								
18					15.5	19.5		
20								
22					19.5	23.5		
24		End of Probing @ 23.5' BGL						

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	Truck-Mounted GeoProbe
SAMPLING METHOD:	CLOSED SAMPLER (with 1.5" x 4' Liners)
BORING NO.	SB-4
SHEET	1 OF 1
DRILLING START TIME	1430
DRILLING FINISH TIME	1620
SITE NAME:	SAPPI
LOCATION:	MUSKEGON, MI
WATER LEVEL	6' WATER DEPTH
TIME	
DATE	
CASING DEPTH	
DRILLING START DATE	11/14/11
DRILLING FINISH DATE	11/14/11
DATUM:	ELEVATION:
DRILL RIG:	LEI GeoProbe
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	AMG
LEI PROJECT#:	11-407
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2		0-6' Water						
4								
6		6-12'						[Concrete Rubble at Sediment Surface]
8		Black, ORGANIC-RICH and very WOODY Mixture with SAND/GRAVEL/RUBBLE						Majority of Sediments Between 6' and 22' BWL Too Loose/Dispersed to Allow Recovery
10								
12		Black, ORGANIC-RICH FINE SAND, Loose			10	14		[10-14' ≤1' Recovery]
14								
16								
18								
20		Gray, Slightly ORGANIC-RICH FINE SAND			18	22		[18-22' ≤2' Recovery]
22		End of Probing @ 22' BWL						

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD: Truck-Mounted Geo Probe	BORING NO. SB-5
	SHEET 1 OF 1
SAMPLING METHOD: Closed Sampler (with 1.5" x 4' Liners)	DRILLING START TIME 1630 DATE 11/14/11
	FINISH TIME 1710 DATE 11/14/11
SITE NAME: SAPPI	WATER LEVEL 5.5' WATER DEPTH
LOCATION: MUSKEGON, MI	TIME
	DATE
DATUM: ELEVATION:	CASING DEPTH
DRILL RIG: LEI Geoprobe	SURFACE CONDITIONS: WATER
DRILLING CONTRACTOR: LEI	GROUT:
SUPERVISED BY: BWS LEI PROJECT#: 11-407	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2		0-5.5' Water						
4								
6								
8		Black, Gravelly and Slightly ORGANIC-RICH FINE SAND, w/ Shells, Loose			5.5	9.5		[5.5-9.5' 4' Recovery]
10								
12	?							Majority of Sediments 5.5-17.5' BWL To. Loose/Dispersed to All Recovery
14								
16	?							
18		Gray, Slightly ORGANIC-RICH FINE SAND, Loose			17.5	21.5		[17.5-21.5' Near-Full Recovery]
20								
22		End of Probing @ 21.5' BWL						

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	TRUCK-MOUNTED GEO PROBE
SAMPLING METHOD:	CLOSED SAMPLER (with 1.5" X 4' Liners)
BORING NO.	SB-6
SHEET	1 OF 1
DRILLING START TIME	0915
DRILLING FINISH TIME	1030
DRILLING START DATE	11/15/11
DRILLING FINISH DATE	11/15/11
SITE NAME:	SAPPI
LOCATION:	MUSKEGAN, MI
WATER LEVEL	4.5 WATER DEPTH
TIME	
DATE	
CASING DEPTH	
DATUM:	ELEVATION:
DRILL RIG:	LEI GEOPROBE
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	BWS
LEI PROJECT#:	11-407
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2	~							
4	~	0-4.5' Water						
		4.5-8.5'						
6	+ + +	Black, mixture of VERY ORGANIC-RICH and WOODY/FIBROUS MATERIAL & SAND, Loose			4.5	8.5		All Sediment 4.5-12.5' Below water level very loose - Little or No Vibration/Hammering Necessary to Advance Sampler
8	+ + +	8.5-20.5'						
10	+	Greyish-Black, moderately ORGANIC-RICH FINE SAND, Loose			8.5	12.5		
12	+							
14	+				12.5	16.5		
16	+							
18	+				16.5	20.5		
20		End of Probing @ 20.5' BWL						
22								

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD: TRUCK-MOUNTED GEO PROBE

SAMPLING METHOD: CLOSED SAMPLER (with 1.5" X 4' Liners)

BORING NO. SB-7

SHEET 1 OF 1

DRILLING	START	FINISH
TIME	1055	1130
DATE	11/15/11	11/15/11

SITE NAME: SAPPI

LOCATION: MUSKEGAN, MI

DATUM: ELEVATION:

WATER LEVEL	4' WATER DEPTH
TIME	
DATE	
CASING DEPTH	

DRILL RIG: LEI GEOPROBE

DRILLING CONTRACTOR: LEI

SUPERVISED BY: BWS LEI PROJECT#: 11-407

SURFACE CONDITIONS: WATER

GROUT:

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2	~	0-4' Water						All Sediment 4-12' Below Water Level Very Loose - No Vibration/Hammering Necessary to Advance Sampler
4	+	Blackish-Brown, Slightly ORGANIC-RICH FINE SAND, Loose			4	8		
6	+							
8	+				8	12		
10	+							
12	+				12	16		
14	+							
16	+				16	20		
18	+							
20	+				20	24		
22	+							
24	+	End of Probing @ 24' BWL						

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	TRUCK-MOUNTED GEO PROBE
SAMPLING METHOD:	CLOSED SAMPLER (with 1.5" x 4' Liners)
BORING NO.	SB-8
SHEET	1 OF 1
DRILLING START TIME	1145
DRILLING FINISH TIME	1240
DRILLING START DATE	11/15/11
DRILLING FINISH DATE	11/15/11
SITE NAME:	SAPPI
LOCATION:	MUSKEGON, MI
WATER LEVEL	4' WATER DEPTH
TIME	
DATE	
CASING DEPTH	
DATUM:	ELEVATION:
DRILL RIG:	LEI GEOPROBE
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	BWS
LEI PROJECT#:	11-407
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2		0-4' water						
4		4-7' Grayish-Brown, Slightly Organic-Rich Fine Sand, Loose			4	8		
6								
8		7-8' Black, Fine Rubbly/Slightly Organic-Rich Sand, Loose						
		8-10', Grayish-Brown, Fine to Medium Sand with Woody Material, Loose						
10		3" Brown Fine Sand			8	12		Notable Woody Material Present 8-11.5' BWL
		10.25-11.5' Dark Blackish Brown, Mixture of Wood Debris, Organics, Sand, Loose						
12		11.5-16' Grayish-Brown, Slightly Organic-Rich Fine Sand, Loose						
14					12	16		
16								
18					16	20		
20		End of Probing @ 20' BWL						
22								
24								

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	TRUCK MOUNTED GEO PROBE
SAMPLING METHOD:	CLOSED SAMPLE (" " ")
BORING NO.	SB-9
SHEET	1 OF 1
DRILLING START TIME	1300
DRILLING FINISH TIME	1445
DATE	11/15/11
DATE	11/15/11
SITE NAME:	SAPPI
LOCATION:	MUSKEGON, MI
WATER LEVEL	6' WATER DEPTH
TIME	
DATE	
DATUM:	ELEVATION:
CASING DEPTH	
DRILL RIG:	LEI GEOPROBE
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	BWS
LEI PROJECT#:	11-407
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2	~	0-6' WATER						
4	~							
6	~							
		6-8.5' Dark Brown SAND w/ WOODY MATERIAL MIX, LOOSE			6	10		
8								
		8.5-14' Brown FINE SAND, LOOSE						
10								
12					10	14		
14								
16					14	18		
18								
20					18	22		
22		End of Probing @ 22' BWL						

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SOIL BORING LOG

LAKESHORE ENVIRONMENTAL INC.

DRILLING METHOD:	TRUCK-MOUNTED GEO PROBE
SAMPLING METHOD:	CLOSED SAMPLE (with 1.5" x 4' Liners)
BORING NO.	SB-10
SHEET	1 OF 1
DRILLING START TIME	1420
DRILLING FINISH TIME	1510
DRILLING START DATE	11/15/11
DRILLING FINISH DATE	11/15/11
SITE NAME:	SAPPI
LOCATION:	MUSKEGON, MI
WATER LEVEL	5.5' WATER DEPTH
TIME	
DATE	
CASING DEPTH	
DATUM:	ELEVATION:
DRILL RIG:	LEI GEOPROBE
DRILLING CONTRACTOR:	LEI
SUPERVISED BY:	BWS
LEI PROJECT#:	11-407
SURFACE CONDITIONS:	WATER
GROUT:	

DEPTH IN FEET (ELEVATION)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	BLOW COUNTS	SAMPLER	DEPTH IN FEET FROM	DEPTH IN FEET TO	WELL PLACEMENT	DESCRIPTION OF OPERATION AND REMARKS
2		0-5.5' Water						
4								
6		Grayish-Blackish Brown, Slightly organic-rich FINE SAND, Loose						
8					5.5	9.5		
10								
12								Sediment 9.5-13.5' BWL. Too Loose For Recovery
14		Slightly Grayish Brown, FINE SAND, Trace Organics, Loose						
16					13.5	17.5		
18								
20		End of Probing @ 21.5'			17.5	21.5		
22								
24								

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Permit Consolidation Unit

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: GLC-1
Completed Well No.: N/A
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/3/04 Finished: 8/3/04
Time: Started: 7:30 Finished: 10:30

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Hand Auger	2.0'
Geoprobe	29.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
0.0-5.0	Bentonite
5.0-29.0	Collapse

Notes: See Table 1 for field screening results

Construction: [ ] Abandonment: [X] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.3	0.3		Concrete									
4.7	5.0		Gravel, sand & wood, black, dry									
13.0	18.0		Sand, fine, wet									
11.0	29.0		Silt, wet									
			EOB @ 29'									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: GLC-2
Completed Well No.: N/A
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/3/04 Finished: 8/3/04
Time: Started: 11:00 Finished: 1:00

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Geoprobe	25.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
0.0-5.0	Bentonite
5.0-25.0	Collapse

Notes: See Table 1 for field screening results

Construction: [ ] Abandonment: [X] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.3	0.3		Concrete									
4.7	5.0		Sand, medium, black, dry									
14.0	19.0		Sand, medium to fine, wet									
6.0	25.0		Silt, wet									
			EOB @ 25'									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: TW-41
Completed Well No.: N/A
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/2/04 Finished: 8/2/04
Time: Started: 10:30 Finished: 1:30

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Hand Auger	5.0'
Geoprobe	46.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
0.0-5.0	Bentonite
5.0-46.0	Collapse

Notes: See Table 1 for field screening results

Construction: [ ] Abandonment: [X] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.2	0.2		Asphalt									
4.8	5.0		Sand, fine, black, dry									
			Drive large bore sampler to interval 44-46'									
			Clay/sand contact at 45.5'									
40.5	45.5		Sand, fine, brown, wet									
0.5	46.0		Clay, some silt, some sand, brown, wet									
			EOB @ 46.0'									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: TW-42
Completed Well No.: TW-42
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/2/04 Finished: 8/2/04
Time: Started: 1:30 Finished: 5:00

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Hand Auger	4.5'
Geoprobe	46.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
	See log of well installation

Notes: See Table 1 for field screening results

Construction: [X] Abandonment: [ ] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.2	0.2		Asphalt									
4.3	4.5		Sand, fine, black, trace brick, dry									
			See lithologic description from TW-41									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

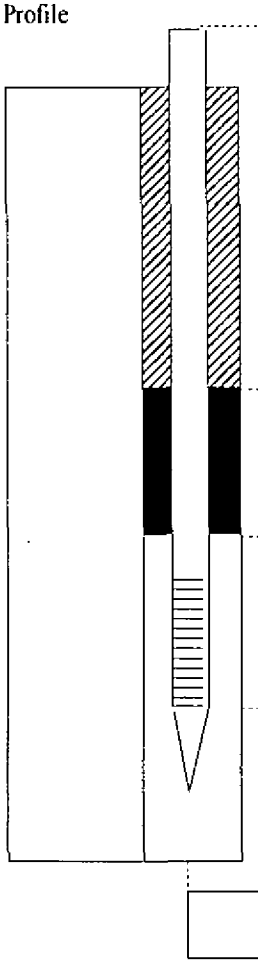
HORIZON ENVIRONMENTAL

Project Name: Sappi
Project Number: SDW-0104

Log of Well Installation

Well Number: TW-42

Generalized Subsurface Profile



-0.4' Length of Casing Below Ground Surface

Concrete Cap

0.0' Depth to Top of Grout or Backfill

Material (Backfill): Concrete

1.0' Depth to Top of Bentonite Pellets

2.5' Depth to Top of Filter Pack

Type: _____

9.5' Depth to Bottom of Well Screen

Borehole Backfill Material

Total Depth of Borehole

Top of Casing Elevation (feet): _____

Water Level Data

Date	Time	Water Level	Elevation

Development: _____

Survey Reference: _____

Well Casing

Diameter: 1"
Total Length: 4.1'
Material: PVC
Cap Type: Compression Plug

Well Screen

Diameter: 1"
Length: 5.0'
Slot/Type: 10 slot
Material: PVC

Protective Well Casing

Material: Steel Dia. 6"
Height Above Ground: Flush
Lock Type: _____

General Notes:

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: TW-43
Completed Well No.: N/A
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/3/04 Finished: 8/3/04
Time: Started: 1:00 Finished: 2:45

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Geoprobe	45.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
0.0-5.0	Bentonite
5.0-45.0	Collapse

Notes: See Table 1 for field screening results

Construction: [ ] Abandonment: [X] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.5	0.5		Gravel									
44.5	45.0		Sand, fine									
			EOB @ 45'									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: TW-44
Completed Well No.: TW-44
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/3/04 Finished: 8/3/04
Time: Started: 2:45 Finished: 5:00

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Geoprobe	45.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
	See log of well installation

Notes: See Table 1 for field screening results

Construction: [X] Abandonment: [ ] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts: Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.3	0.3		Asphalt									
44.7	45.0		Sand, fine									
			EOB @ 45'									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

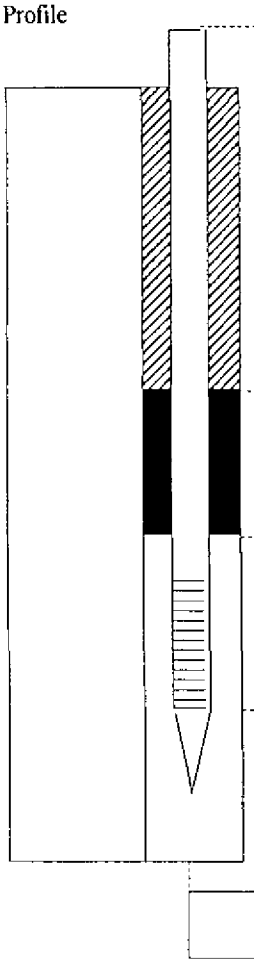
HORIZON ENVIRONMENTAL

Project Name: Sappi
Project Number: SDW-0104

Log of Well Installation

Well Number: TW-44

Generalized Subsurface Profile



-0.4' Length of Casing Below Ground Surface

Concrete Cap

0.0' Depth to Top of Grout or Backfill Material (Backfill) Cement

1.0' Depth to Top of Bentonite Pellets

3.0' Depth to Top of Filter Pack Type:

12.0' Depth to Bottom of Well Screen

Borehole Backfill Material

Total Depth of Borehole

Top of Casing Elevation (feet)

Water Level Data

Date	Time	Water Level	Elevation

Development:

Survey Reference:

Well Casing

Diameter: 1"
Total Length: 6.6'
Material: PVC
Cap Type: Compression Plug

Well Screen

Diameter: 1"
Length: 5.0'
Slot/Type: 10 slot
Material: PVC

Protective Well Casing

Material: Steel Dia. 9"
Height Above Ground: Flush
Lock Type:

General Notes:

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: TW-45
Completed Well No.: TW-45
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/4/04 Finished: 8/4/04
Time: Started: 8:00 Finished: 10:30

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Geoprobe	45.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
See log of well installation	

Notes: See Table 1 for field screening results

Construction: [X] Abandonment: [ ] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.3	0.3		Gravel									
44.7	45.0		Sand, fine									
			EOB @ 45'									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

HORIZON ENVIRONMENTAL

Project Name: Sappi
Project Number: SDW-0104

Log of Well Installation

Well Number: TW-45

Generalized Subsurface Profile

-0.4' Length of Casing Below Ground Surface

Concrete Cap

0.0' Depth to Top of Grout or Backfill

Material (Backfill)
Cement

1.0' Depth to Top of Bentonite Pellets

3.0' Depth to Top of Filter Pack
Type:

12.0' Depth to Bottom of Well Screen

Borehole Backfill Material

Total Depth of Borehole

Top of Casing Elevation (feet)

Water Level Data

Date	Time	Water Level	Elevation

Development:

Survey Reference:

Well Casing

Diameter: 1"
Total Length: 6.6'
Material: PVC
Cap Type: Compression Plug

Well Screen

Diameter: 1"
Length: 5.0'
Slot/Type: 10 slot
Material: PVC

Protective Well Casing

Material: Steel Dia. 9"
Height Above Ground: Flush
Lock Type:

General Notes:

HORIZON ENVIRONMENTAL

Page: 1 of 1
Boring No.: TW-46
Completed Well No.: N/A
Client : SAPPI
Project No.: SDW-0104
Date: Started: 8/4/04 Finished: 8/4/04
Time: Started: 10:30 Finished: 12:00

Well/Boring Log Sheet

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Muskegon		34	10N	17W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Geoprobe
Crew Chief: Tom
Horizon Supervisor: Dan Greene

Drilling Method(s)	Depth
Geoprobe	45.0'

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level:

Grout/Seal Depth/to	Material/Method
0.0-5.0	Bentonite
5.0-45.0	Collapse

Notes: See Table 1 for field screening results

Construction: [ ] Abandonment: [X] Additional Field Notes: Log Books: [ ] Computer File: [ ]

Thickness (feet)	Depth to Base (feet)	USCS*	Lithologic Description	Sample Depth	Blow Counts Time	6"	12"	18"	24"	Headspace	Background	Recovery
0.3	0.3		Asphalt									
44.7	45.0		Sand, fine									
			EOB @ 45'									

*= The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

Appendix E

Groundwater Elevations from 2022 Supplemental Environmental Investigation

- Semi-Permanent Monitoring Well
- Temporary Monitoring Well
- TW-VP Well
- Staff Gauge
- Surface Water Monitoring Location
- Groundwater Elevation Contour (ft, msl)
  - *-Dashed where inferred*
  - *-Values in parentheses not used for contouring*
  - *-NM = Not Measured*

0 300
Feet

GROUNDWATER ELEVATION CONTOURS (APRIL 2022)
Pure Muskegon, LLC
Muskegon County, MI

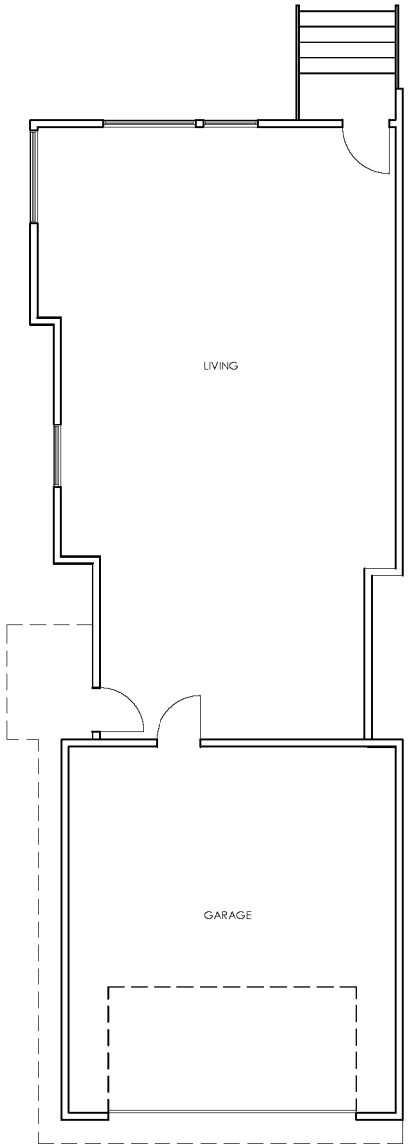
FIGURE 2

BARR

Barr Footer: ArcGIS 10.8.1, 2022-08-25 18:59 File: \\Projects\24\6511\059\Maps\Reports\PFAS Investigation Summary Report\Fig02 Groundwater Contours April 2022.mxd User: bal

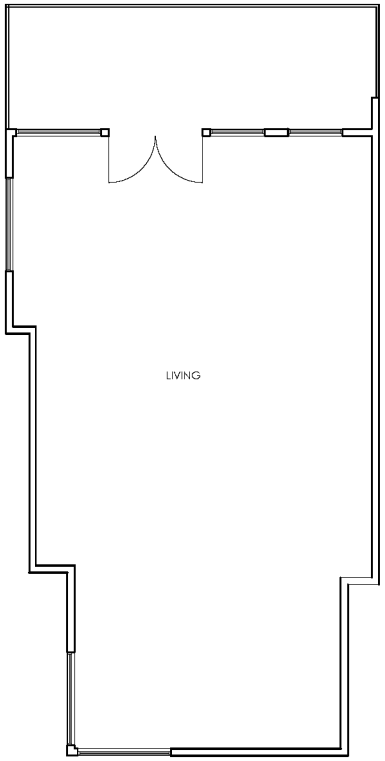
Appendix F

Windward Pointe Conceptual Plan
Views and Cross Sections



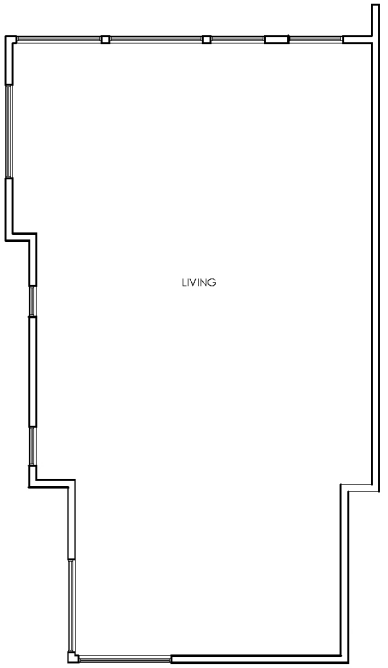
FIRST FLOOR PLAN

SCALE: 1/8" = 1'-0"



SECOND FLOOR PLAN

SCALE: 1/8" = 1'-0"



THIRD FLOOR PLAN

SCALE: 1/8" = 1'-0"

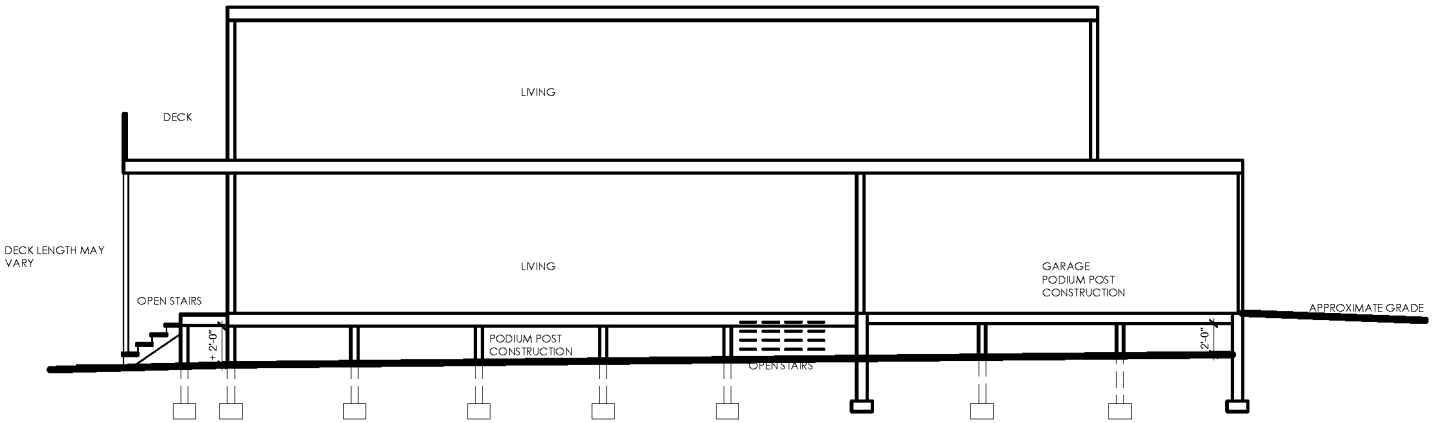
NOTE:
SCREEN AT THE PODIUM WILL HAVE OPENINGS ON TWO OPPOSITE SIDES -THE SCREEN WILL HAVE 1% OPENINGS (OR 1.5 SF FOR EACH 25 FT OF EXT WALL) TO PROVIDE CROSS VENTILATION.

Winward Pointe

MUSKEGON, MICHIGAN

DATE: 07-12-2025

Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546



BUILDING SECTION -OPTION 1

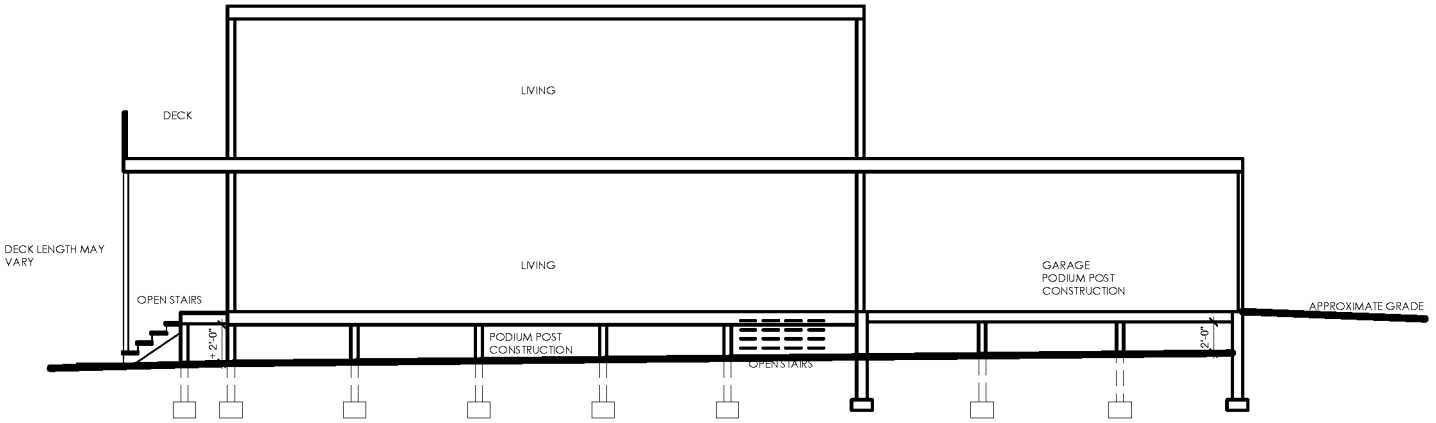
SCALE: 1/8" = 1'-0"

Winward Pointe

MUSKEGON, MICHIGAN

DATE: 07-12-2025

Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546



BUILDING SECTION -OPTION 2

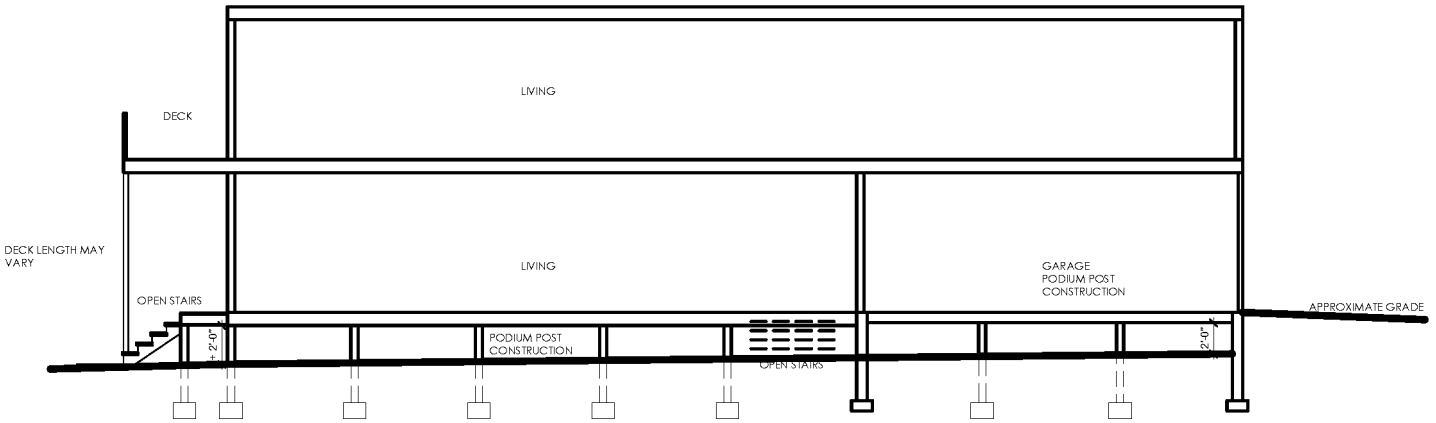
SCALE: 1/8" = 1'-0"

Winward Pointe

MUSKEGON, MICHIGAN

DATE: 07-12-2025

Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546



BUILDING SECTION -OPTION 3

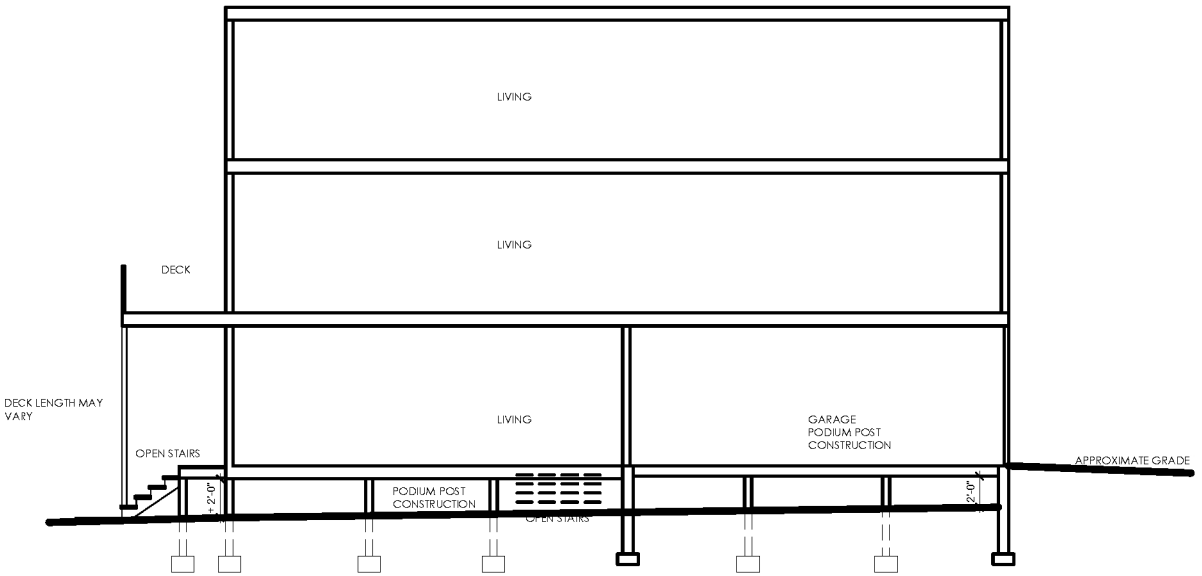
SCALE: 1/8" = 1'-0"

Winward Pointe

MUSKEGON, MICHIGAN

DATE: 07-12-2025

Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546



BUILDING SECTION -OPTION 4

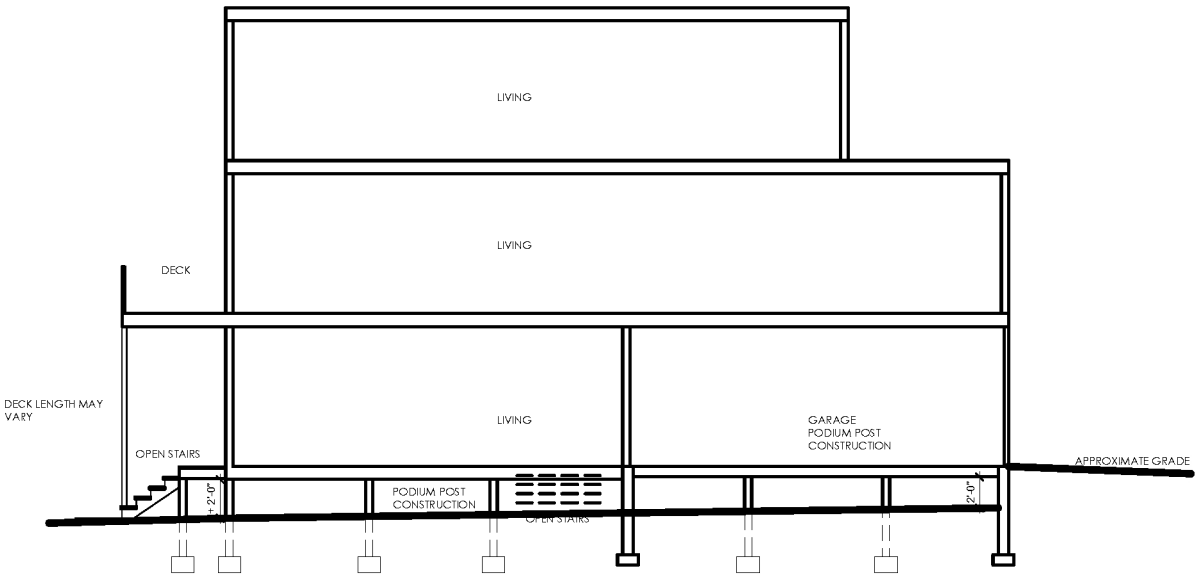
SCALE: 1/8" = 1'-0"

Winward Pointe

MUSKEGON, MICHIGAN

DATE: 07-12-2025

Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546



BUILDING SECTION -OPTION 5

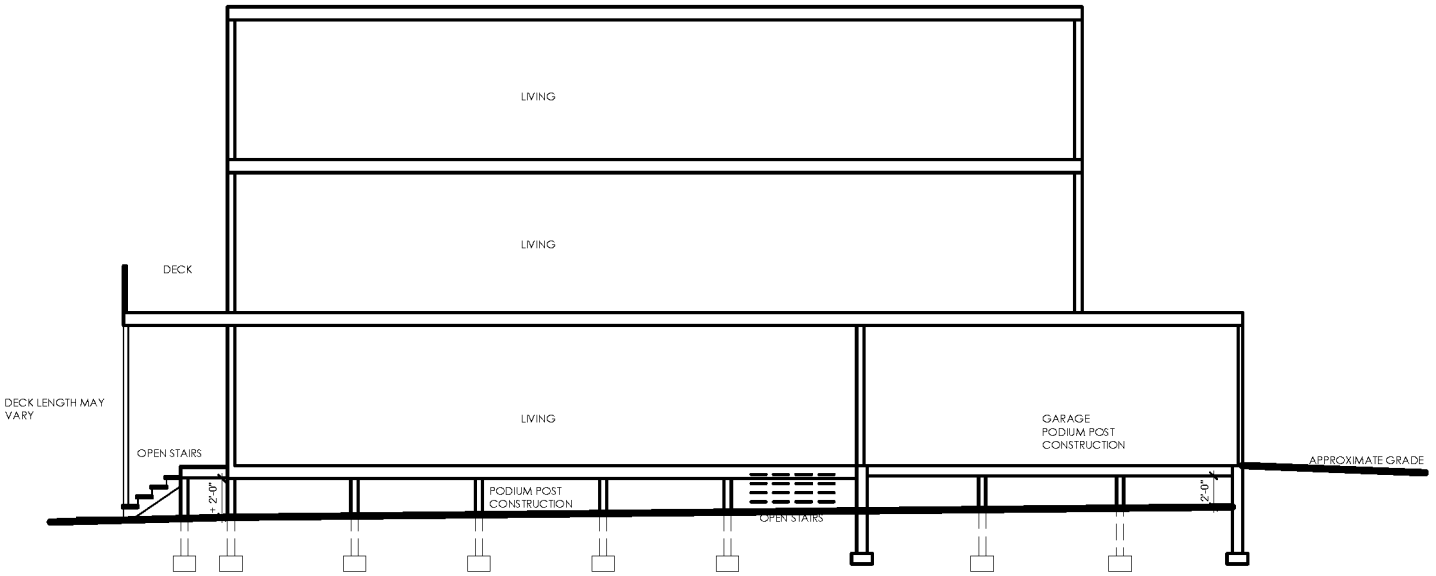
SCALE: 1/8" = 1'-0"

Winward Pointe

MUSKEGON, MICHIGAN

DATE: 07-12-2025

Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546



BUILDING SECTION -OPTION 6

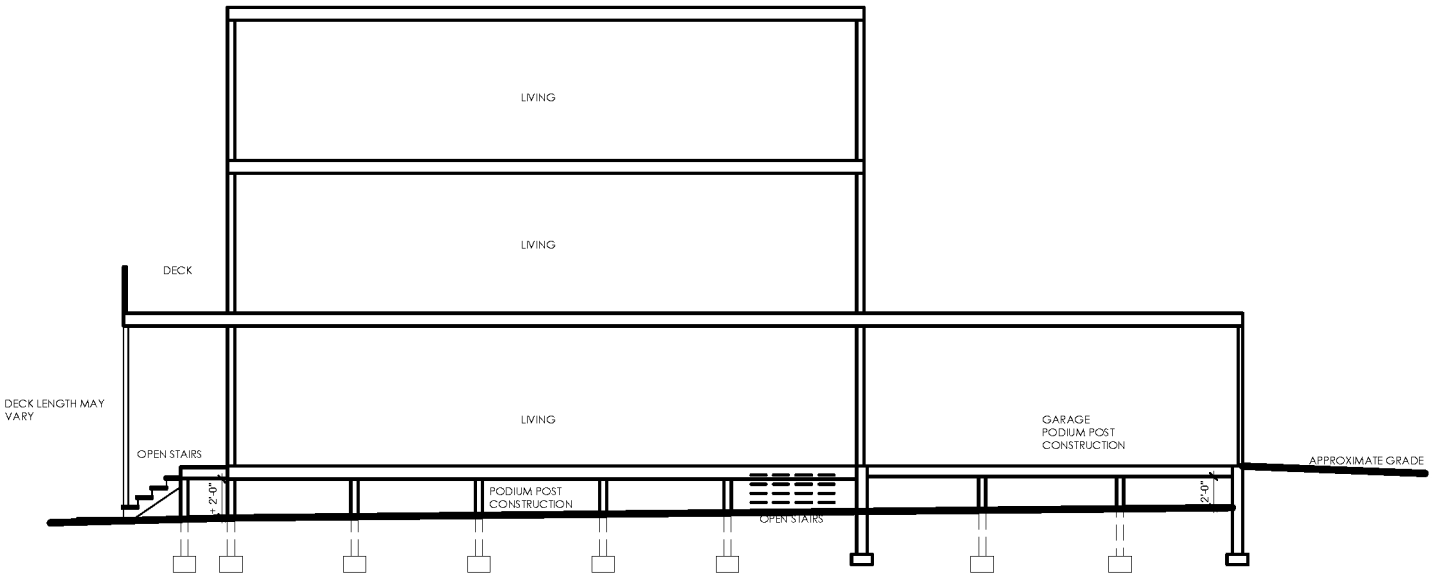
SCALE: 1/8" = 1'-0"

Winward Pointe

MUSKEGON, MICHIGAN

DATE: 07-12-2025

Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546



BUILDING SECTION -OPTION 7

SCALE: 1/8" = 1'-0"

Winward Pointe

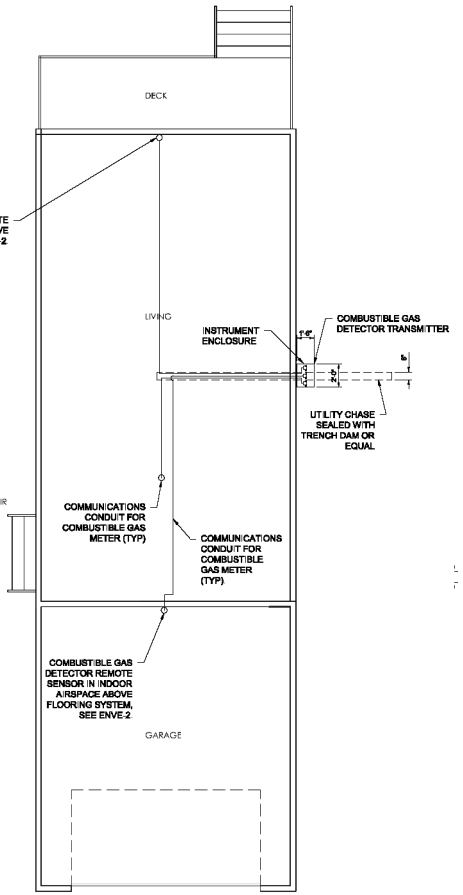
MUSKEGON, MICHIGAN

DATE: 07-12-2025

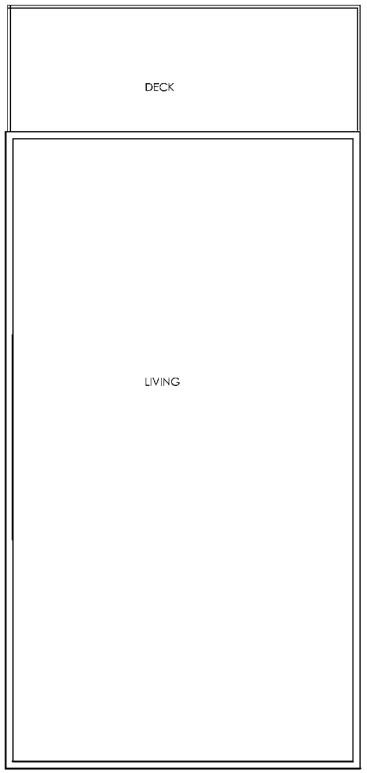
Eckert Design Co.
2416 Thornapple River Dr SE
Grand Rapids, Michigan 49546

Appendix G

Podium Style Construction Conceptual Design Plans



1 FIRST FLOOR PLAN
0 1 5 10
SCALE: 3/16"=1'-0"



2 SECOND FLOOR PLAN
0 1 5
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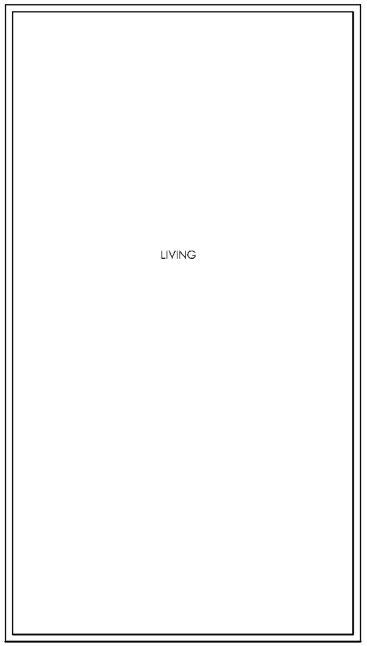

3 THIRD FLOOR PLAN
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NOTES:
1. DRAWING ADAPTED FROM "2025-0724 EGLE DRAWINGS" BY ECKERT DESIGN CO. DATED JULY 24, 2025.
2. THE SPECIFIC LOCATIONS OF THE COMBUSTIBLE GAS METER SENSORS THE LOCATION OF THE INSTRUMENT ENCLOSURE MAY VARY AS DETAILED DESIGN IS COMPLETED.
3. BUILDING PODIUM WILL BE PROVIDED WITH A SCREEN WITH OPENINGS ON AT LEAST TWO OPPOSITE SIDES. THE AREA OF THE OPENINGS WILL BE EQUAL TO 1% OF THE UNDER FLOOR AREA OR 1 S F FOR EACH 25 FEET OF EXTERIOR WALL TO PROVIDE CROSS VENTILATION.
4. THE STRUCTURE DEPICTED HERE IS AN EXAMPLE OF RESIDENCES THAT ARE PROPOSED TO BE CONSTRUCTED ON THE PROPERTY AND IS PROVIDED PRIMARILY FOR THE PURPOSE OF DEMONSTRATING THE "PODIUM" NATURE OF CONSTRUCTION AND APPURTENANT FEATURES TO MITIGATE VAPOR INTRUSION AND METHANE FIRE/EXPLOSIVITY HAZARDS. VARIATIONS OF ARCHITECTURAL DESIGN OF RESIDENCES IS ANTICIPATED INCLUDING, BUT NOT LIMITED TO, OVERALL BUILDING AREA, BUILDING HEIGHT, CONFIGURATION OF GARAGES RELATIVE TO THE RESIDENCES, POTENTIALLY INCLUDING DETACHED GARAGES OR LIVING SPACE OVERLYING THE GARAGE, AND STAIR/DECK QUANTITY AND LOCATIONS. PODIUM-STYLE CONSTRUCTION, VENTILATION OF THE PODIUM SPACE, MONITORING, AND SEALING OF UTILITY CHASES WILL NOT CHANGE, REGARDLESS OF OTHER ARCHITECTURAL CHANGES.

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NOT FOR CONSTRUCTION

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BARR ENGINEERING CO.
3333 ORCHARD VISTA DR SE
SUITE 200
GRAND RAPIDS, MI 49546
PH: 1-616-512-7000
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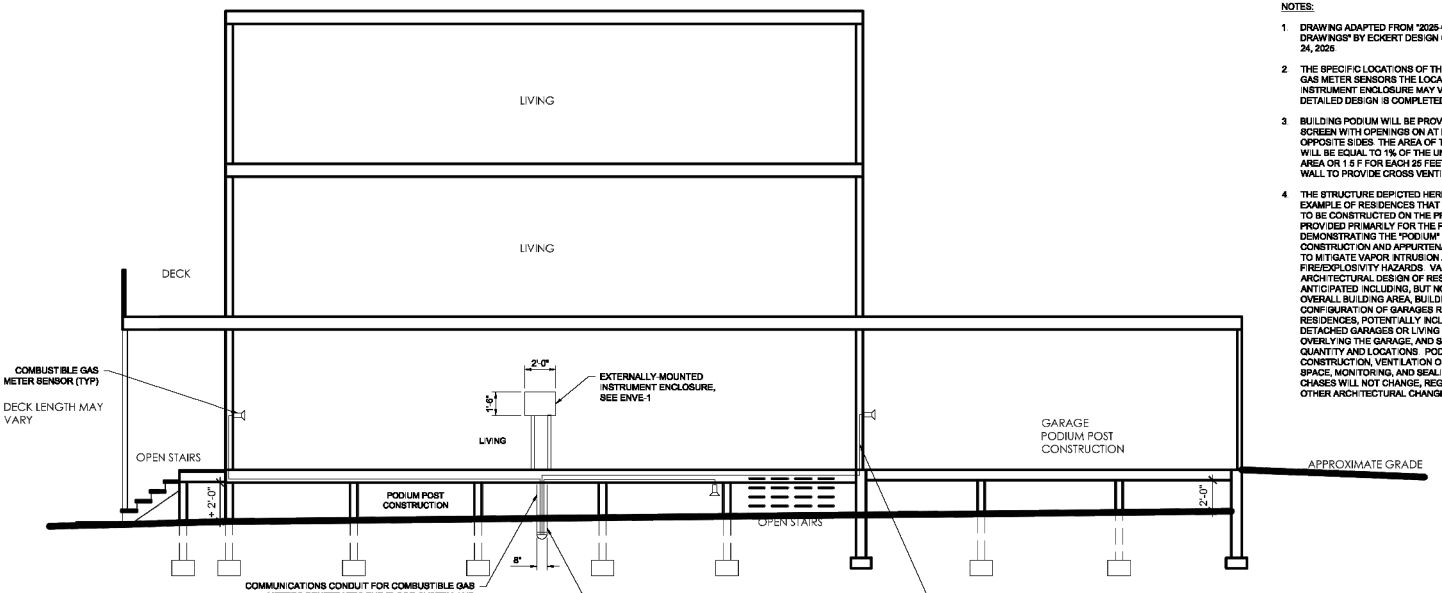
MINNESOTA ENGINEERING FIRM
NUMBER 10104111545

PARKLAND ACQUISITION SIX, LLC

WINDWARD POINTE PHASE 1 REDVELOPMENT
2400 LAKESHORE DRIVE, MUSKEGON, MI
RESIDENTIAL
BUILDING PLAN VIEW

BARR PROJECT #: 22611068
DWG #: ENVE-1
REV #: A



1 BUILDING SECTION - OPTION 7

0 1 5

SCALE: 1/4"=1'-0"

NOTES:

1. DRAWING ADAPTED FROM "2025-0724 EGLE DRAWINGS" BY ECKERT DESIGN CO. DATED JULY 24, 2025
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SIGNATURE: _____

DATE: _____ LICENSE #: _____

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BARR
BARR ENGINEERING CO.
3333 ORCHARD VISTA DR SE
SUITE 200
GRAND RAPIDS, MI 49546
PH: 1-616-512-7000
WWW.BARR.COM
MINNESOTA ENGINEERING FIRM
NUMBER 10104111545

PARKLAND ACQUISITION SIX, LLC

WINDWARD POINTE PHASE 1 REDVELOPMENT
2400 LAKESHORE DRIVE, MUSKEGON, MI
RESIDENTIAL
BUILDING SECTION

BARR PROJECT # 22611068
DWG # ENVE-2
REV # A

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M2A-XL STAND ALONE TRANSMITTER

- Operates with or without a controller
- Direct digital readout with OLED cold temperature display
- Available gases include
  - LEL, O2, H2S, CO, CO2, and 100% Vol CH4
  - Toxic gases include NH3, AsH3, Cl2, ClO2, HCN, NO2 & SO2
- Infrared sensor for combustibles and CO2
- 4-20 mA & digital Modbus outputs standard
- 2 fully programmable alarm relays & fail relay
- Non-intrusive calibration via magnetic wand
- Explosion proof construction
- Patented water repellent sensor cover
- User friendly setup, push buttons & OLED menus
- Long-life sensors (2 + years typical)

The RKI M2A-XL ™ is a state-of-the-art transmitter that can operate as an independent, stand-alone monitor or as part of an integrated system. The M2A-XL connects with an analog or digital signal to virtually any controller, PLC, or DCS. Setup procedures are simplified with user friendly push buttons and OLED menus. It utilizes a magnetic wand technique for performing non-intrusive calibration. The M2A-XL provides an automatic zero drift correction feature, which results in more stable readings and reduces the need for adjustments due to sensor aging.

The housing of the M2A-XL does not need to be opened for zeroing or calibration, making it unnecessary to declassify the area for routine maintenance. It is designed so that a complete field calibration can be performed by one person. Sensor construction is rated Class I, Div. 1 Groups B, C, D for flammables, CO, H2S, O2, and CO2, and Class I, Div. 2 for all other toxics.

The transmitter provides a 4-20 mA output in addition to a Modbus digital output. It also has two levels of alarms with relays, plus a fail alarm with relay. A digital display of the gas concentration, as well as alarm and status lights, can be viewed through the front window.

The toxic sensors are electrochemical type plug-in sensors, which provide high specificity, fast response, and long life. The plug-in design allows quick replacement in the field with no tools required. Toxic sensors are designed for use in Class I, Div. 2 hazardous locations. Sensors available for NH3, AsH3, Cl2, ClO2, HCN, PH3, NO2 and SO2.

The M2A-XL represents the latest leading edge technology in sensor / transmitters today.

World Leader In Gas Detection & Sensor Technology

RKI Instruments, Inc. | 33248 Central Ave. Union City, CA 94587 | Phone (800) 754-5165 | (510) 441-5656 | Fax (510) 441-5650

www.rkiinstruments.com

Explosion Proof

Class I, Div. 1 , Groups B, C, D

		Combustibles		LEL	O2	H2S	CO	CH4	HC	CO2
		LEL	PPM	H2 Specific	Oxygen	Hydrogen Sulfide	Carbon Monoxide	Methane	Hydrocarbons	Carbon Dioxide
Part #	UL	65-2640XL	65-2647XL	65-2641XL	65-2643XL-05	65-2645XL-05	65-2646XL-05	65-2649XL-CH4 65-2658XL-CH4	65-2649XL-HC	65-2660XL-02 65-2660XL-03 65-2660XL-05 65-2660XL-10
	CSA	65-2640XL-05	65-2647XL-05	65-2641XL-05						

Sensors	Catalytic			Galvanic cell	Electrochemical		Infrared				
Measuring Ranges	0 - 100% LEL	0 - 9000 ppm CH4	0 - 100% LEL	0 - 25.0% Vol.	0 - 100 ppm	0 - 300 ppm	0 - 100% LEL 0 - 100% Vol.	0 - 100% LEL	-02	0 - 5000 ppm	
									-03 -05	0 - 5% Vol. 0 - 50% Vol.	
									-10	0 - 100% Vol.	
Resolution	1% LEL	20 ppm	1% LEL	0.1% Vol.	1 ppm		1% LEL / 1% Vol.		20 ppm / 0.01% Vol / 0.1% Vol. / 1% Vol.		
Lower Detectable Limit (LDL)	2% of full scale			0.1% Vol.	2% of full scale						
Max Current Draw (24VDC)	160 mA with alarm 1 and alarm 2 active and all relays energized			125 mA with alarm 1 and alarm 2 active and all relays energized			160 mA with alarm 1 and alarm 2 active and all relays energized				
Response Time (T-90)	35 Seconds or less			90 Seconds or less	60 Seconds or less	90 Seconds or less	30 Seconds or less				
Life Expectancy	2 to 3 years with normal service		3 to 5 years with normal service	2 to 3 years with normal service			5 years plus with normal service				
Accuracy (which ever is greater)	± 5% of reading or ± 2% LEL			± 0.5% Vol. O2	± 5% of reading or ± 2 ppm H2S	± 5% of reading or ± 5 ppm CO	± 5% of reading or ± 2 % of full scale				
Weather Resistant	Patented water repellent sensor coating										

Alarms	
Alarm Settings	Two fully programmable alarm set points, increasing / decreasing, latching / self-resetting, on delays, off delays, normally energized or de-energized
Alarm Indication	Visual LEDs. Alarm 1, Amber; Alarm 2, Red; Fail, Red
Relays	5 amp form 'C' contacts for alarm 1, alarm 2, and fail
Physical	
Dimensions	Height: 6.2" (158 mm), Width: 5.66" (144 mm), Depth: 4.86" (124 mm) (Height measurement does not include sensor)
Display	Alphanumeric OLED display. 8 characters per line; 2 lines for gas concentration readout, plus user-friendly calibration and setup
Enclosure	Explosion proof for Class I, Div 1, Groups B, C, D.
Enclosure Rating	NEMA 4X, explosion proof, watertight, cast aluminum with o-ring seal and epoxy powder coating
Controls	Magnet used for calibration functions. Calibrates without opening the housing. Internal push-button controls also available for calibration and setup
Operating Environment	

Operating Temperature	-40°F to 167°F -40°C to 75°C	-4°F to 122°F -20°C to 50°C	-40°F to 122°F -40°C to 50°C	-4°F to 122°F -20°C to 50°C	-40°F to 122°F -40°C to 50°C
Relative Humidity	5 - 95% RH non-condensing				
Location	Indoor or outdoor. Explosion proof for Class I, Div. 1, Groups B, C, D.				
Operating Voltage	10 VDC - 30 VDC				
Outputs					
Analog	Linear 4-20 mA signal, into 1000 ohms impedance max (24DC), 0 - 500 ohms max (12VDC) corresponding to 0 - full scale				
Digital	Modbus RTU output standard, fully configurable, 2-wire RS-485, 1200 to 19.2k baud				

Approvals	65-2640XL UL	65-2641XL UL	C CSA US	C UL US
	65-2640XL-05 C CSA US	65-2641XL-05 C CSA US		
Controllers	Beacon 110, Beacon 200, Beacon 410A, Beacon 800, Beacon 3200 as well as most DCS / PLC systems			
Warranty	One year material and workmanship			

*Partial pressure sensor for helium (He) applications. Consult factory for details.

Toxic Gas Transmitters

Class I, Div. 2

		O2 Oxygen	H2S Hydrogen Sulfide	CO Carbon Monoxide	Toxics See Chart Below	CO2 Carbon Dioxide
	Part#	65-2666XL *65-2644XL	65-2662XL	65-2663XL	See Chart Below	65-2661XL-02 65-2661XL-03 65-2661XL-05 65-2661XL-10
Sensors		Galvanic cell	Electrochemical			Infrared
Measuring Ranges		0-25% Vol.	0-100 ppm	0-300 ppm	See Chart Below	-02 0 - 5000 ppm -03 0 - 5% Vol. -05 0 - 50% Vol. -10 0 - 100% Vol.
Resolution		0.1% Vol.	1 ppm		See Chart Below	20 ppm / 0.01% / 0.1% / 1% Vol.
Lower Detectable Limit (LDL)		0.1% Vol.	2% of full scale			
Response Time (T-90)		35 Seconds or less			60 Seconds or less	30 Seconds or less
Max Current Draw (24VDC)		125 mA with alarm 1 and alarm 2 active and all relays energized				160 mA with alarm 1 and alarm 2 active and all relays energized
Life Expectancy		2 to 3 years with normal service				5 years plus
Accuracy (which ever is greater)		± 0.5% Vol. O2	± 5% of reading or ± 2 ppm H2S	± 5% of reading or ± 5 ppm CO	± 10% of reading or ± 5% of full scale	± 5% of reading or ± 2% of full scale
Alarms	**Alarm Settings**	Two fully programmable alarm set points, increasing / decreasing, latching / self-resetting, on delays, off delays, normally energized or de-energized,				
	Indication	Visual LEDs. Alarm 1=Amber; Alarm 2=Red; Fail=Red				
	Relays	5 Amp form 'C' contacts for alarm 1, alarm 2, and fail				
Physical	**Dimensions**	Height: 6.2" (158 mm)*, Width: 5.66" (144 mm), Depth: 4.86" (124 mm) (Height measurement does not include sensor)				
	Display	Alphanumeric OLED display. 8 characters per line; 2 lines for gas concentration readout, plus user-friendly calibration and setup				
	Sensor Rating	Non explosion proof construction, designed for Class I, Div. 2, Groups B, C, D (no certification)				
	Housing J-Box	NEMA 4X, explosion proof, watertight, cast aluminum with o-ring seal and epoxy powder coating				
	Controls	Magnet used for calibration functions. Calibrates without opening the housing. Internal push-button controls also available for calibration and setup				
	Sensor	Aluminum / Plastic (non explosion proof)				
Operating Environment						
Operating Temperature		-4°F to 113°F -20°C to 45°C	-40°F to 104°F -40°C to 40°C	23°F to 104°F -5°C to 40°C	14°F to 104°F -10°C to 40°C	-40°F to 122°F -40°C to 50°C
Relative Humidity		5 - 95% RH non-condensing				
Location		Indoor or outdoor				
Operating Voltage		10 VDC - 30 VDC				
Outputs	**Analog**	Linear 4-20 mA signal, into 1000 ohms impedance max (24DC), 0 - 500 ohms max (12VDC) corresponding to 0 - full scale				
	Digital	Modbus RTU output standard, fully configurable, 2-wire RS-485, 1200 to 19.2k baud				
Controllers		Beacon 110, Beacon 200, Beacon 410A, Beacon 800, Beacon 3200 as well as most DCS / PLC systems				
Warranty		One year materials and workmanship				

Toxic Transmitter Sensor Ordering Information

ESM-01 Sensor

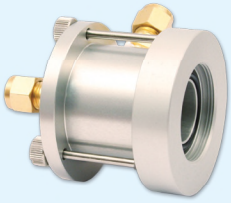
CT-7 Sensor

* **Sensor being phased out, use CT-7 type when possible.**

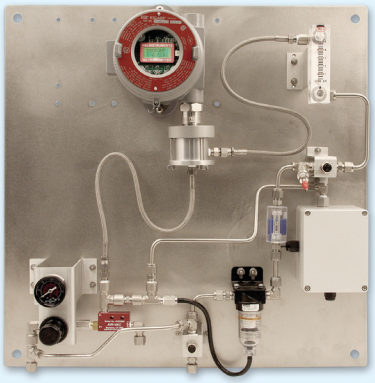
Part Number With J-Box	Gas	Range	Resolution	Sensor Type
65-2670XL-NH3-75	Ammonia (NH3)	0 - 75.0 ppm	0.1 ppm	CT-7
65-2670XL-NH3-1	Ammonia (NH3)	0 - 100 ppm	1 ppm	CT-7
65-2670XL-NH3-2	Ammonia (NH3)	0 - 200 ppm	1 ppm	CT-7
65-2670XL-NH3-5	Ammonia (NH3)	0 - 500 ppm	1 ppm	CT-7
65-2648XL-AsH3	Arsine (AsH3)	0 - 1.50 ppm	0.1 ppm	ESM -01
65-2670XL-CL2-3	Chlorine (Cl2)	0 - 3.00 ppm	0.01 ppm	CT-7
65-2670XL-CL2-5	Chlorine (Cl2)	0 - 5.00 ppm	0.01 ppm	CT-7
65-2670XL-CL2-10	Chlorine (Cl2)	0 - 10.0 ppm	0.1 ppm	CT-7
65-2670XL-CLO21	Chlorine Dioxide (ClO2)	0 - 1.00 ppm	0.01 ppm	CT-7
65-2670XL-CLO21	Chlorine Dioxide (ClO2)	0 - 1.00 ppm	0.01 ppm	CT-7
65-2670XL-CLO23	Chlorine Dioxide (ClO2)	0 - 3.00 ppm	0.01 ppm	CT-7
65-2670XL-CLO25	Chlorine Dioxide (ClO2)	0 - 5.00 ppm	0.01 ppm	CT-7
65-2670XL-HCN15	Hydrogen Cyanide (HCN)	0 - 15.0 ppm	0.1 ppm	CT-7
65-2670XL-NO2	Nitrogen Dioxide (NO2)	0 - 15.0 ppm	0.1 ppm	CT-7
65-2648XL-PH3	Phosphine (PH3)	0 - 1.00 ppm	0.01 ppm	ESM -01
65-2670XL-SO210	Sulfur Dioxide (SO2)	0 - 6.00 ppm	0.01 ppm	CT-7

AVAILABLE ACCESSORIES

Remote Mount Calibration Adaptor
(only recommended for LEL, O2, CO, H2S, and CO2 sensors)



Flow through adaptors



Air aspirator adaptors / panels

Remote horns & lights

Calibration adaptors

Calibration kits

Direct Interface with Beacon 110 / 200 / 410A / 800 / 3200 Controllers

M2A-XL Wiring Matrix				
	Number of Wires to Controller	Maximum Distance to Controller		
		18 AWG wire	16 AWG wire	14 AWG wire
M2A-XL Transmitter	3	2500 ft.	5,000 ft.	8,000 ft.

Made in the USA

Authorized Distributor:

INSTRUMENTS

65-2640XL-04
M2A Transmitter
Operator's Manual

Part Number: 71-0611

Revision: 0

Released: 1/18/24

RKI Instruments, Inc.
www.rkiinstruments.com

WARNING

Read and understand this instruction manual before operating instrument. Improper use of the gas monitor could result in bodily harm or death.

Periodic calibration and maintenance of the gas monitor is essential for proper operation and correct readings. Please calibrate and maintain this instrument regularly! Frequency of calibration depends upon the type of use you have and the sensor types. For most applications, typical calibration frequencies are between 3 and 6 months but can be more often or less often based on your usage.

Product Warranty

RKI Instruments, Inc. warrants gas alarm equipment sold by us to be free from defects in materials, workmanship, and performance for a period of one year from the date of shipment from RKI Instruments, Inc. Any parts found defective within that period will be repaired or replaced, at our option, free of charge. Parts must be returned to RKI Instruments, Inc. for repair or replacement. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired or replaced on a routine basis. Examples of such items are:

- Absorbent cartridges
- Fuses
- Pump diaphragms and valves
- Batteries
- Filter elements

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repair procedures not in accordance with instruction manual. This warranty indicates the full extend of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

> THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RKI INSTRUMENTS, INC. INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RKI INSTRUMENTS, INC. BE LIABLE FOR INDIRECT, INCIDENTAL, OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.

This warranty covers instruments and parts sold to users only by authorized distributors, dealers and representatives as appointed by RKI Instruments, Inc.

We do not assume indemnification for any accident or damage caused by the operation of this gas monitor and our warranty is limited to the replacement of parts or our complete goods. Warranty covers parts and labor performed at RKI Instruments, Inc. only, and does not cover field labor or shipment of parts back to RKI.

Table of Contents

Chapter 1: Introduction 6

Overview 6

About the M2A Transmitter 6

About this Manual 6

Specifications 7

Chapter 2: Description 8

Overview 8

External Description 8

Internal Description 10

Chapter 3: Installation & Startup 15

Overview 15

Mounting the M2A Transmitter 15

Wiring the M2A Transmitter 17

Start Up 21

Chapter 4: Operation 23

Overview 23

Normal Operation 23

Information Screen 23

4 - 20 mA Signal Output Operation 24

Alarm Indications 24

Chapter 5: Configuration Mode 28

Overview 28

Viewing & Changing M2A Parameters 28

Chapter 6: Gas Type Mode 32

Overview 32

Selecting the Gas Type 32

Chapter 7: Maintenance 35
Overview 35
Preventive Maintenance 35
Troubleshooting 35
Calibration Frequency 37
Calibration 39
Replacing the Combustible Gas Detector 42

Chapter 8: RS-485 Modbus Output 43
Overview 43
Wiring the M2A in a Modbus System 43
Using the M2A in a 4-wire Modbus System 47
Modbus Mode 47
Supported Modbus Functions 49

Chapter 9: Parts List 55

Appendix A: Control Button Quick Reference Guide 56

Appendix B: PLC and DCS Device Wiring 57

Appendix C: Function Code 16 Registers 58

Chapter 1: Introduction

Overview

This chapter briefly describes the 65-2640XL-04 M2A Transmitter. This chapter also describes the *65-2640XL-04 M2A Transmitter Operator's Manual* (this document). Table 1 at the end of this chapter lists the specifications for the M2A.

About the M2A Transmitter

The M2A transmitter is a fixed mount, continuous-monitoring detector head. All user adjustable parameters may be accessed using push button switches. In addition, calibration may be performed non-intrusively by use of a magnetic wand accessory which activates magnetic switches through a window at the front face of the detector head.

The M2A displays the current gas reading on an OLED display which is visible through the window in the cover (front face) and provides a 4 - 20 mA signal which indicates the target gas reading for use by a gas monitoring controller, recording device, or programmable controller. The M2A also provides an RS-485 Modbus output. Three sets of relay contacts, two controlled by the gas alarms and one by the fail alarm, rated at 115 VAC 5 amps are available for controlling devices such as lights or horns or for controlling higher rated relays.

Four operating modes allow you to display and change setup and calibration settings and change the gas type. They are Calibration Mode, Configuration Mode, Gas Type Mode, and Modbus Mode.

About this Manual

The *M2A Transmitter Operator's Manual* uses the following conventions for notes, cautions, and warnings.

NOTE: Describes additional or critical information.

CAUTION: *Describes potential damage to equipment.*

WARNING: Describes potential danger that can result in injury or death.

Specifications

Table 1 lists specifications for the M2A.

Table 1: M2A Specifications

Target Gas/Detection Range	Combustible Gas (methane calibration standard): 0 - 100% LEL, 1% LEL increments
Alarm Settings (Alarm 1/Alarm 2)*	10% LEL/50% LEL
Construction (housing)	Explosion-proof Junction Box, NEMA 4X
Area Classification	Explosion-proof for Class I, Groups B, C, and D
Sampling Method	Diffusion
Input Power	10 - 30 VDC
Controls	• Three push button switches • Three magnetic switches for non-intrusive calibration
Weight	5.5 lbs.
Signal Output	4 to 20 mA with impedance maximums listed below: • -12 VDC input: 500 ohms impedance max • -24 VDC input: 1000 ohms impedance max
	RS-485 Modbus
Operating Temperature	-40°C to 50°C
Accuracy	± 5% of reading or ± 2% LEL (whichever is greater)
* *These are the RKI factory settings. You can change the alarm settings in Configuration Mode. See "Viewing & Changing M2A Parameters" on page 28.*	

WARNING: ***When using the M2A, you must follow the instructions and warnings in this manual to assure proper and safe operation of the M2A and to minimize the risk of personal injury. Be sure to maintain and periodically calibrate the M2A as described in this manual.***

Chapter 2: Description

Overview

This chapter describes the components of the M2A transmitter. The transmitter is a 4 - 20 mA type detector head. It consists of the combustible gas detector, calibration adapter/splash guard, terminal PCB, the M2A junction box, and the detector junction box. The two junction box configuration is intended for situations where the detector needs to be installed at an inaccessible location. The detector junction box can be installed at the inaccessible location and the M2A junction box can be installed in a more readily accessible area.

External Description

This section describes the junction boxes and all external components of the M2A transmitter.

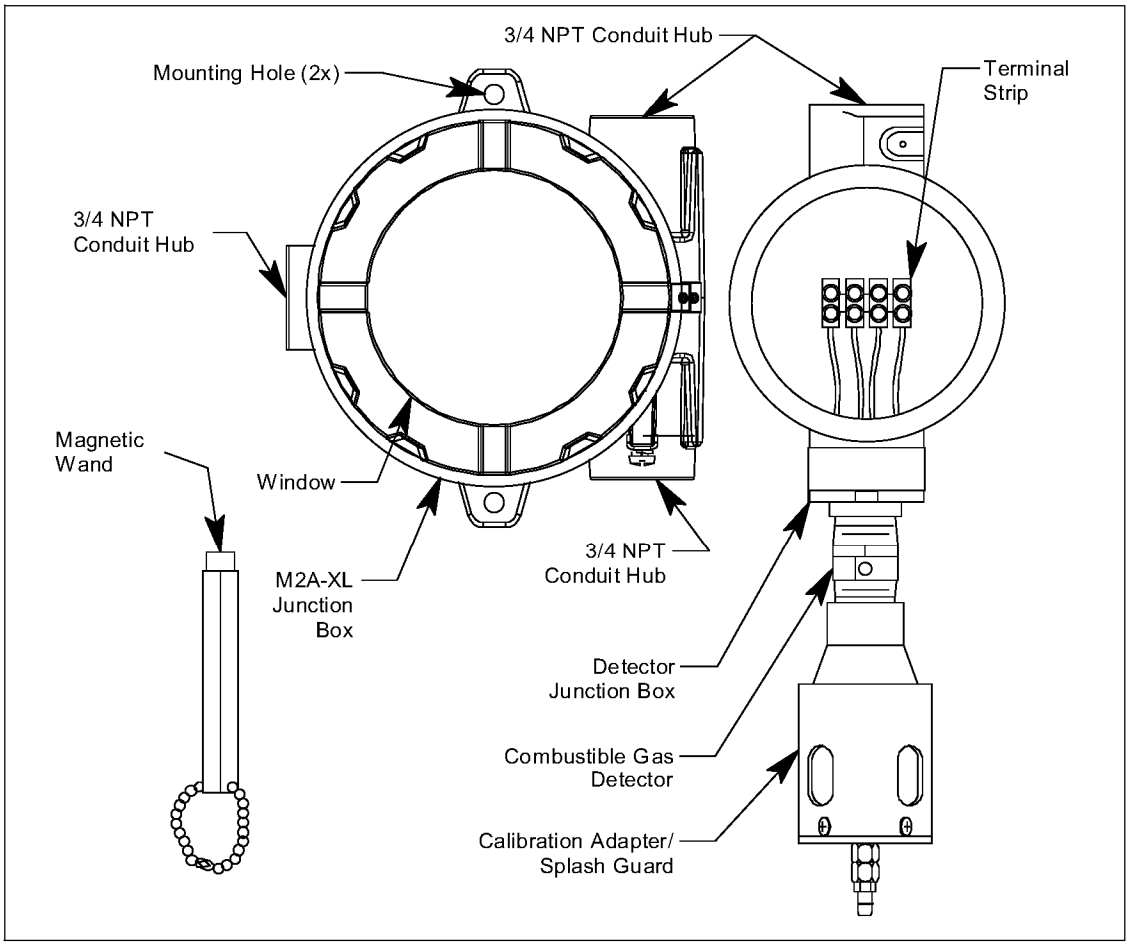


Figure 1: M2A External Components

M2A Junction Box

The M2A's cast aluminum junction box protects the terminal PCB and wiring connections made to the terminal PCB. Use the three 3/4 NPT conduit hubs to wire the remotely installed combustible gas detector and connect wiring from an external device, typically an RKI controller. The top hub is shipped with a factory installed and sealed conduit plug to avoid leaks into the junction box. If necessary, the conduit plug can be removed and the top hub can be used for wiring.

WARNING: ***If the top conduit hub is used for wiring, be sure to seal the threads to ensure water does not enter the junction box. See "Wiring the M2A Transmitter" on page 17 for complete wiring instructions.***

Use the junction box's two mounting slots to mount the M2A to a vertical surface at the monitoring site. The window in the cover on the front of the junction box allows you to view the OLED display and use the magnetic wand to actuate the magnetic control switches so you can perform non-intrusive calibration. Removing the cover allows you to access the interior of the junction box.

Detector Junction Box

The detector junction box is intended to be installed remotely from the M2A junction box. The combustible gas detector is factory installed in the bottom 3/4 NPT conduit hub using a 3/4 x 1/2 NPT reducer. A terminal strip is provided for wiring connections and the detector is factory wired to one side of this terminal strip. The other side of the terminal strip is for user-supplied wiring to the detector terminal strip located in the M2A junction box. This wiring should go through the top 3/4 NPT conduit hub. Three spacers installed on the back of the junction box controls the distance of the junction box from a mounting surface.

Combustible Gas Detector

The combustible gas detector is a catalytic type detector that produces an electrical output that corresponds to the detection range. It is packaged in a 1/2 NPT nipple with a sintered metal flame arrestor on one end allowing ambient air to diffuse into the detector. The flame arrestor also contains any sparks which may occur within the detector. The 1/2 NPT mounting threads at the top of the detector allow you to mount it into the bottom conduit hub of the junction box. The junction box conduit hub is 3/4 NPT, so a 3/4 x 1/2 NPT reducer is used to install the combustible gas detector. A rainshield screws onto the bottom of the detector (flame arrestor end). The rainshield helps protect the detector from rain and debris in the monitoring environment. Four color-coded leads extend from the top of the detector. The leads allow you to connect the detector to the terminal strip.

Calibration Adapter/Splash Guard

A calibration adapter/splash guard is installed on the combustible gas detector. A fitting at the bottom of the calibration adapter/splash guard allows a length of tubing to be connected for calibration and routed to a more easily accessible location (near the M2A junction box is optimal for ease of calibration). The calibration adapter/splash guard also protects the detector from splashing water or direct water spray.

Magnetic Wand

The magnetic wand is a short plastic rod with a magnet in one end. It is used to actuate the magnetic control switches on the control PCB while the junction box cover is still installed so that non-intrusive calibration can be performed.

Internal Description

This section describes the internal components of the M2A. The internal components of the M2A include the terminal PCB which provides for all the wiring connections to the M2A and the control PCB which displays the gas reading and has the control buttons.

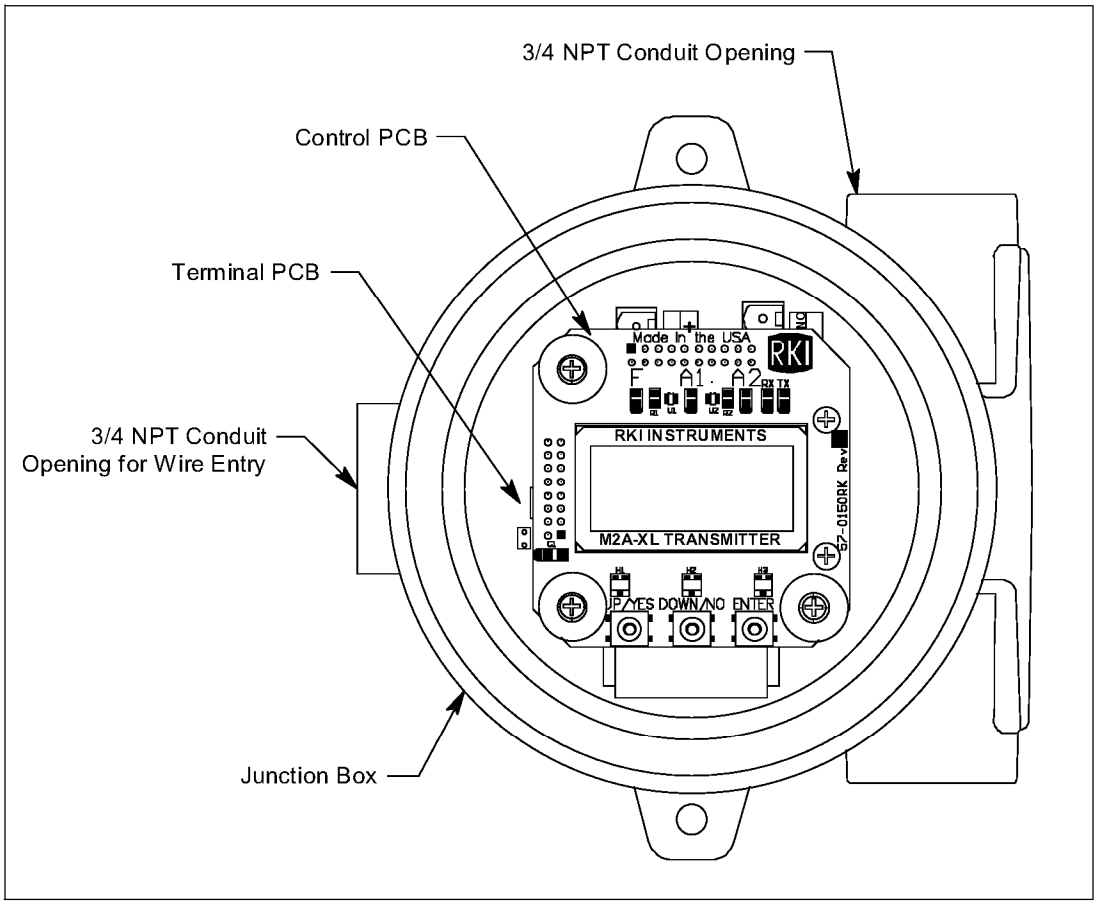


Figure 2: M2A Internal Components

Terminal PCB

The terminal PCB is encapsulated in epoxy for protection against moisture and physical damage. It is mounted into the rear of the junction box with three standoffs and rests on a thin layer of foam. A banana jack is screwed into each of the standoffs and used for mounting the control PCB. The terminal PCB converts the electrical output from the detector to a signal which can be displayed by the OLED display, a 4 - 20 mA signal (that is proportional to the detection range), and an RS-485 Modbus output signal. The 4 - 20 mA signal may be used by a recording device, gas monitor controller, or programmable controller. The Modbus output may be used to connect the M2A to a Modbus network. The terminal PCB also controls three relays, one fail and two gas alarm relays.

Two columns of plug-in style terminal strips are used to make all wiring connections to the M2A. The column on the left consists of the power/signal, detector, and Modbus terminal strips. The column on the right consists of the relay terminal strips. A 20 position connector at the bottom of the terminal PCB is used to connect the terminal PCB to the control PCB with a ribbon cable. A 5 position connector on the left side of the terminal PCB is used by factory or field service personnel to program the M2A. A factory adjust pot just above the programming connector is used to set the detector current.

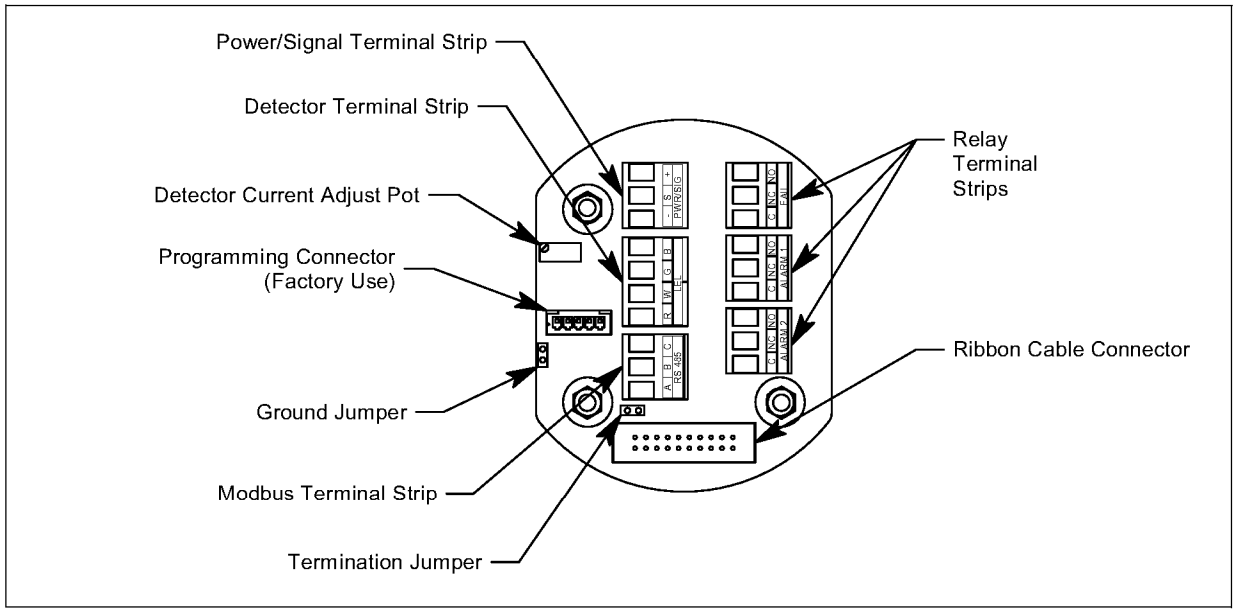


Figure 3: Terminal PCB Component Location

Power/Signal Terminal Strip

The power/signal terminal strip is a three position plug-in style terminal strip located at the top of the left terminal column. It is used to connect 24 VDC power to the M2A and to connect the 4 - 20 mA output signal to a device.

The signal output, the S terminal, does not have to be connected for the M2A to function. The S terminal is used if you want to connect the 4 - 20 mA output signal to another device such as a gas monitoring controller, chart recorder, or programmable controller (PLC).

Detector Terminal Strip

The detector terminal strip is a four position plug-in style terminal strip and is the middle terminal strip in the left terminal column. All four terminals are used to connect the detector to the M2A.

NOTE: The detector is factory-wired to the M2A. See "Wiring the M2A Transmitter" on page 17 for all wiring procedures related to M2A.

Modbus Terminal Strip

The Modbus terminal strip is a three position plug-in style terminal strip and is the bottom terminal strip in the left terminal column. It allows connection of the M2A into a Modbus network.

Relay Terminal Strips

The right column of terminal strips consists of, from top to bottom, the fail, alarm 1, and alarm 2 relay terminal strips. They are three-position plug-in style terminal strips. The relay terminal strips are used to connect devices such as lights and horns that are controlled by the relay contacts. The relay contacts are rated at 115 VAC, 5 amps. The relay contacts may also be used to control higher rated relays.

Termination Jumper

A two pin header with a termination jumper installed is located below the Modbus terminal strip. Leave this jumper installed unless directed to remove it for a Modbus installation. See "Chapter 8: RS-485 Modbus Output" on page 43 for a description of using the M2A in a Modbus system.

Ground Jumper

A two pin header with a jumper installed is located along the left side of the terminal PCB. Leave this jumper installed unless directed to remove it for a Modbus installation. See "Chapter 8: RS-485 Modbus Output" on page 43 for a description of using the M2A in a Modbus system.

Control PCB

The OLED display and control switches are located on the control PCB. It is installed on top of the terminal PCB by lining up its three spacing standoffs with the banana jacks in the terminal PCB mounting standoffs and pushing it onto the banana jacks. The jacks retain the control PCB.

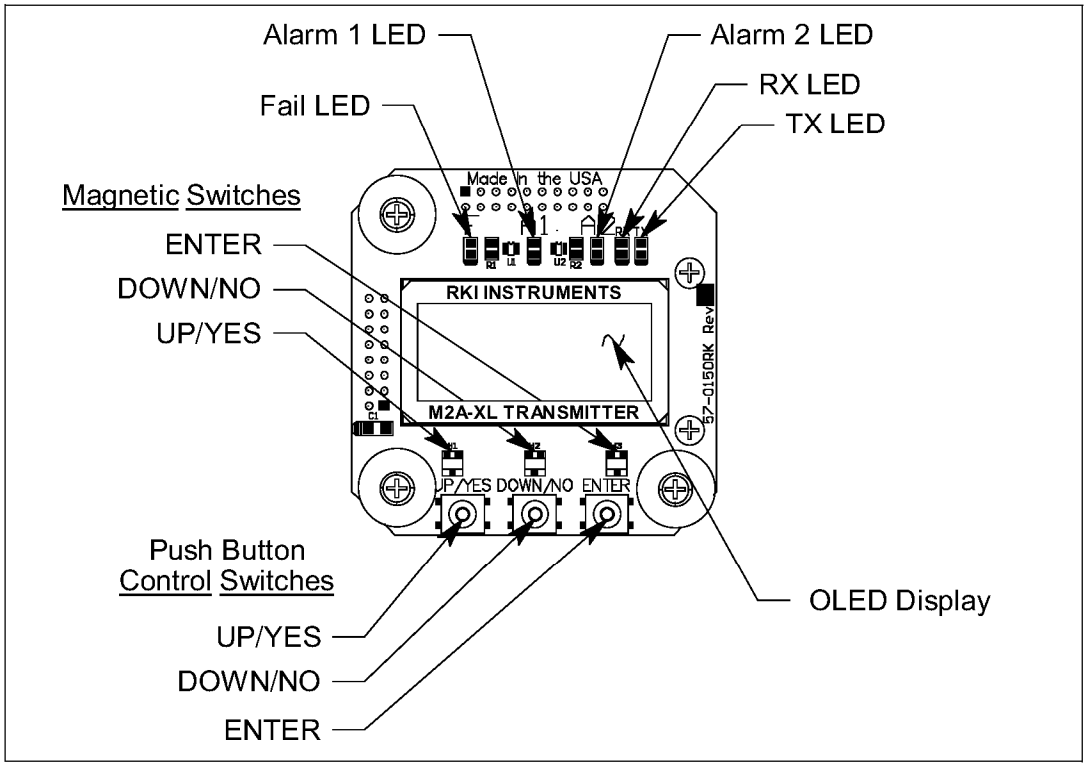


Figure 4: Control PCB Component Location

OLED Display

The OLED display is located at the top of the control PCB. It indicates the current gas reading and displays messages and parameters in the M2A's programs.

Control Buttons

The M2A includes three push button switches that allow you to enter the M2A's operating modes, navigate through the modes, update settings, and save changes to the settings. The push button switches are located along the bottom edge of the control PCB (see Figure 4). The UP/YES button is on the left, the DOWN/NO button is in the middle, and the ENTER button is on the right.

Table 2: M2A Control Button Functions

Switch	Function
UP (YES)	• Saves settings • Changes the displayed setting • Enters the Calibration Program • Enters Gas Type Mode (press with DOWN/NO button) • Enters Configuration Mode (press with ENTER button)

Table 2: M2A Control Button Functions

Switch	Function
DOWN (NO)	• Cancels setting changes • Changes the displayed setting • Enters Gas Type Mode (press with UP/YES button) • Enters Modbus Mode (press with ENTER button) • Displays the Information Screen
ENTER	• Initiates operations • Enters Configuration Mode (press with UP/YES button) • Enters Modbus Mode (press with DOWN/NO button) • Functions as an alarm reset switch

Just above each push button switch is a magnetic switch with the same function as the push button switch below it. The magnetic switches are for use in non-intrusive calibration. They are actuated by bringing the magnetic wand close enough to them to actuate them. Although the magnetic switches have the same functions as the push button switches, it is not practical to use them for operations other than calibration because it is not possible to actuate two magnetic switches at once with only one magnetic wand. Since displaying the Information Screen only requires the use of one switch, the wand may be used to show the Information Screen (see "Information Screen" on page 23).

Status LEDs

The M2A includes five status LEDs that are located above the display (see Figure 4).

- Fail LED

  The fail LED turns on when the M2A is experiencing a fail condition. A fail condition can be caused by a detector failure or low detector signal.
- Alarm 1 LED

  The alarm 1 LED is on when the M2A is experiencing an alarm 1 condition.
- Alarm 2 LED

  The alarm 2 LED is on when the M2A is experiencing an alarm 2 condition.
- RX & TX LED's

  These LED's indicate data being received (RX) and transmitted (TX) when the M2A's Modbus output is operating.

Chapter 3: Installation & Startup

Overview

This chapter describes procedures to mount the M2A Transmitter in the monitoring environment and wire it to input power and devices.

Mounting the M2A Transmitter

1. Select a mounting site that is representative of the monitoring environment. Consider the following when you select the mounting site.
   - For the M2A junction box, select a site where the junction box is not likely to be bumped or disturbed. Make sure there is sufficient room to perform start-up, maintenance, and calibration procedures. The site should be easily accessible.
   - For the detector junction box, select a site where the target gas is likely to be found first. For lighter gases, mount the detector near the ceiling; for heavier gases, mount the detector near the floor.
   - The junction boxes should be mounted no further than 200 feet from each other.
2. Use #10 screws through the M2A junction box's two mounting slots to secure the junction box to a vertical surface. Figure 5 shows the outline and mounting dimensions the M2A junction box. Figure 6 shows the outline and mounting dimensions for the detector junction box. Mount the detector junction box with the detector facing down as shown in Figure 6.

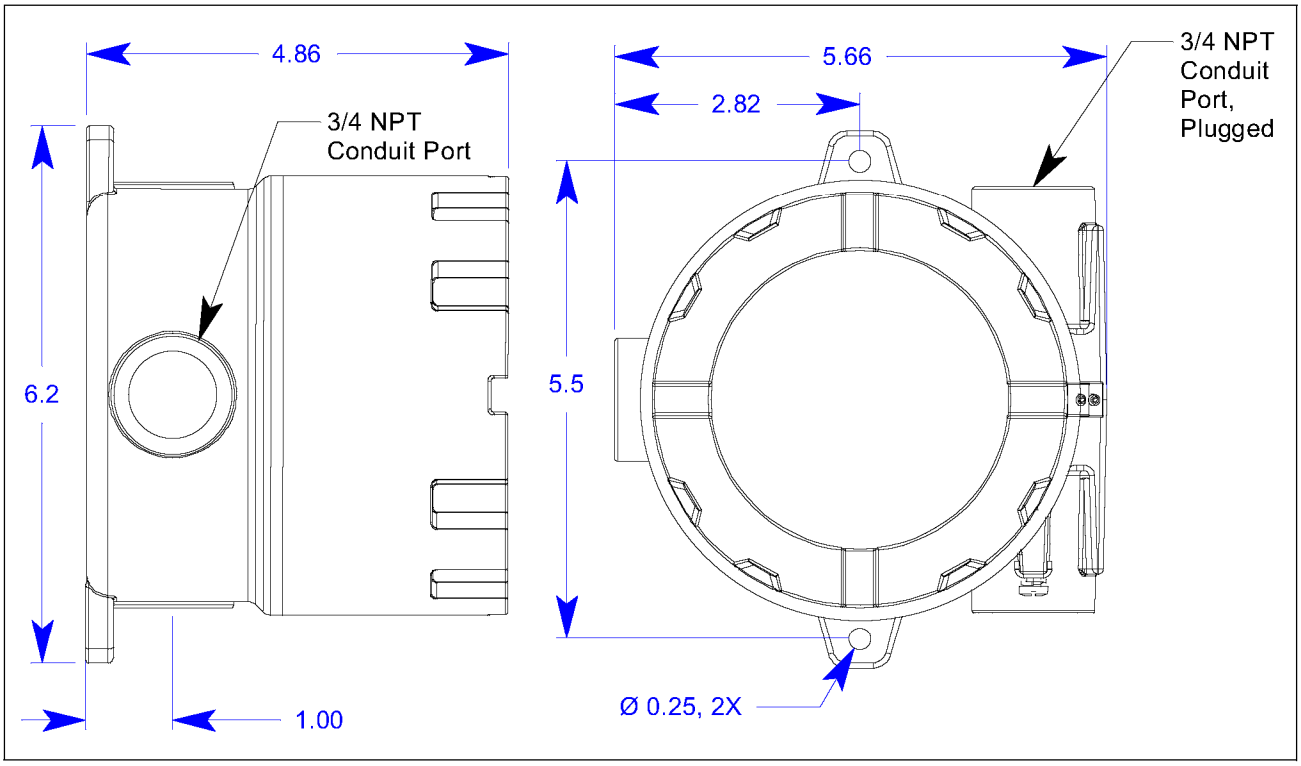


Figure 5: Outline & Mounting Dimensions, M2A Junction Box

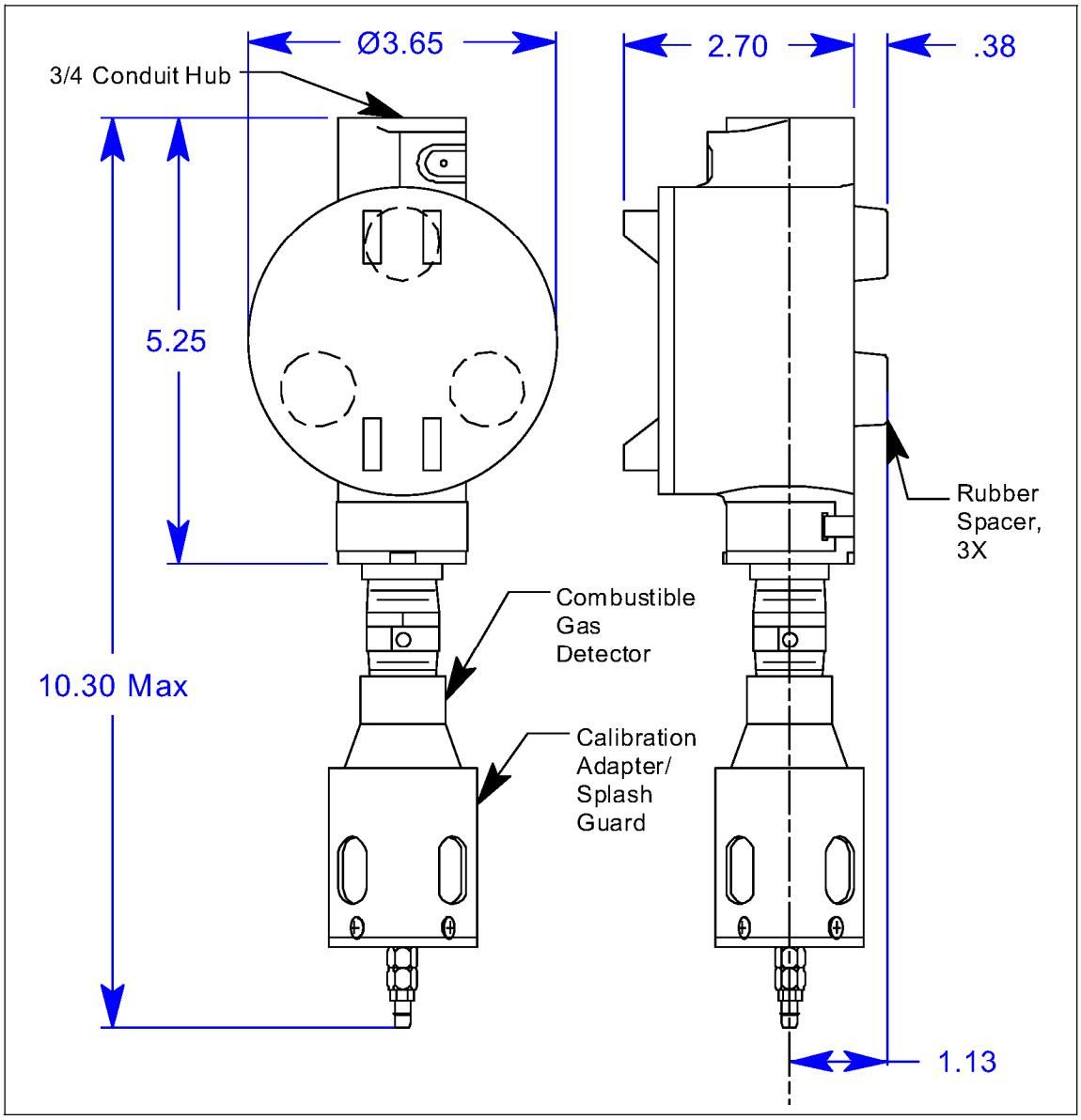


Figure 6: Outline & Mounting Dimensions, Detector Junction Box

3. Install 3/16 inch I.D. flexible polyurethane tubing to the fitting at the bottom of the calibration adapter/splash guard and route it to an accessible area that is close to the M2A junction box. See the "Chapter 9: Parts List" on page 55 for available tubing.

Wiring the M2A Transmitter

Wiring the Detector to the M2A

WARNING: Always verify that the power to the M2A is off before you make wiring connections.

1. Confirm that no power is being applied to the M2A.
2. Remove the detector junction box's cover from the junction box.
3. Remove the M2A junction box's cover from the junction box.
4. Grasp the control PCB by its edges.
5. Gently pull until the control PCB is pulled away from the banana jacks. Take care not to pull too hard and damage the cable which connects the control and terminal PCBs.
6. Let the control PCB hang by the cable. The terminal strips are now visible on the terminal PCB. The control PCB may be left hanging while wiring is done. If desired, the control PCB may be disconnected from the cable and set aside while wiring.
7. To maintain the explosion proof classification of the junction boxes, conduit seals must be installed as shown in Figure 7. Adhere to your local electrical code when installing the conduit seal.
8. Guide multi conductor shielded cable or cables or wires in conduit through the top conduit hub of the detector junction box. To make wiring more convenient, use wire colors that correspond to the detector wire colors: red, white, green, and black.

Max Distance to M2A w/18 Gauge Wire	Max Distance to M2A w/16 Gauge Wire	Max Distance to M2A w/14 Gauge Wire
500 ft.	1,000 ft.	2,000 ft.

9. Connect the wires to the terminal block in the detector junction box.
10. Secure the detector junction box's cover to the junction box.
11. Guide the other end of the four-conductor, shielded cable or four wires in conduit through the bottom conduit hub of the M2A junction box.

WARNING: If the top conduit hub is used for wiring, be sure to seal the threads to ensure water does not enter the junction box. A conduit seal, which is normally required to maintain the junction box's hazardous location rating, will also help to prevent water from entering through the top port.

12. To gain access to a plug-in terminal strip for wiring, pull it out of its socket by grasping the wall between two terminal positions with needle nose pliers and pulling. Be careful not to exert too much force on the wall to avoid damage to the terminal strip. The detector terminal strip and the alarm 1 relay terminal strip may be removed by grasping them with your fingers if the adjacent terminal strips have been removed.

13. Pull out the detector terminal strip and connect the four wires to the terminal strip as follows (see Figure 7).
    - Connect the wire corresponding to the detector's red wire to the **LEL "R"** terminal.
    - Connect the wire corresponding to the detector's white wire to the **LEL "W"** terminal.
    - Connect the wire corresponding to the detector's green wire to the **LEL "G"** terminal.
    - Connect the wire corresponding to the detector's black wire to the **LEL "B"** terminal.

CAUTION: *If shielded cable is used, leave the cable shield's drain wire disconnected and insulated at the detector junction box. You will connect the opposite end of the cable's drain wire to the M2A junction box's chassis (earth) ground.*

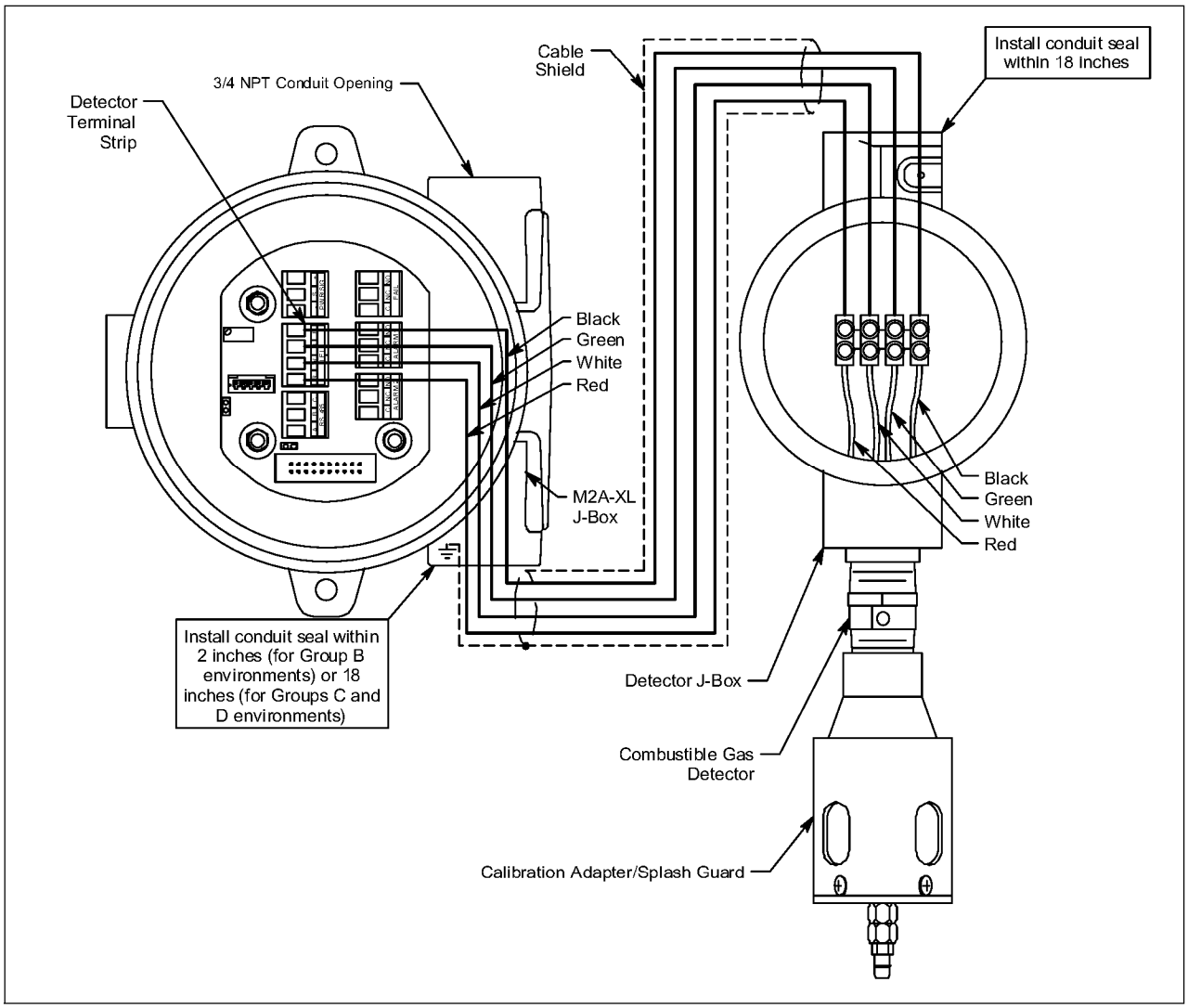


Figure 7: Wiring the Detector to the M2A

14. Reinstall the detector terminal strip into its socket.

15. If shielded cable is used between the detector junction box and the M2A junction box, connect the cable's drain wire to an available chassis (earth) ground at the M2A junction box. Do not connect the shield drain wire at the detector junction box.

Wiring the M2A to a Controller and Alarm Devices

WARNING: ***If the controller's construction is not explosion-proof, the controller must be installed in an ordinary location. Do non install a non-explosion-proof controller in a classified location.***

1. To maintain the explosion proof classification of the M2A junction box, a conduit seal must be installed within 2 inches (for Group B environments) or 18 inches (for Groups C and D environments) of the M2A's left conduit hub, in addition to the conduit seals shown in Figure 7. Adhere to your local electrical code when installing the conduit seal.

2. Guide multi conductor shielded cable or cables or wires in conduit through the left conduit hub of the M2A junction box. The number of cables or wires needed will depend on whether the M2A is wired to a gas monitoring controller or just to power, whether any relays are used, and whether the Modbus output is used.

WARNING: ***If the top conduit hub is used for wiring, be sure to seal the threads to ensure water does not enter the junction box. A conduit seal, which is normally required to maintain the junction box's hazardous location rating, will also help to prevent water from entering through the top port.***

NOTE: If the M2A is being wired to a PLC or DCS device, see "Appendix B: PLC and DCS Device Wiring" on page 57, then continue with step 8.

Use the following recommendations to determine how to wire the M2A:

- If Modbus connections will not be used and only the PWR/SIG connections will be used, use a two or three conductor shielded cable or two or three wires in conduit for connections to the power/signal terminal strip depending on whether or not the signal (S) terminal is used. The S terminal has a 4 - 20 mA output, but if you do not need to monitor this signal and do not connect to the S terminal to access this signal, the M2A will still function completely.

Table 3: Wire Size for PWR/SIG Connections

Max Distance to Controller w/18 Gauge Wire	Max Distance to Controller w/16 Gauge Wire	Max Distance to Controller w/14 Gauge Wire
2,500 ft.	5,000 ft.	8,000 ft.

- If the PWR/SIG connections and one or more relays are used, route the connections to the M2A in conduit. Use shielded cable in the conduit for the PWR/SIG connections and unshielded cable or individual wires for the relay connections. Make sure any wire or cable used for relay wiring is appropriately rated for the power that it will carry.

CAUTION: *If shielded cable is used for the PWR/SIG connections, leave the cable shield's drain wire insulated and disconnected at the M2A junction box. You will connect the opposite end of the cable's drain wire at the controller or device.*

- If the M2A will be wired into a Modbus network, see "Chapter 8: RS-485 Modbus Output" on page 43.

  See Figure 8 below for field wiring connections to the M2A.

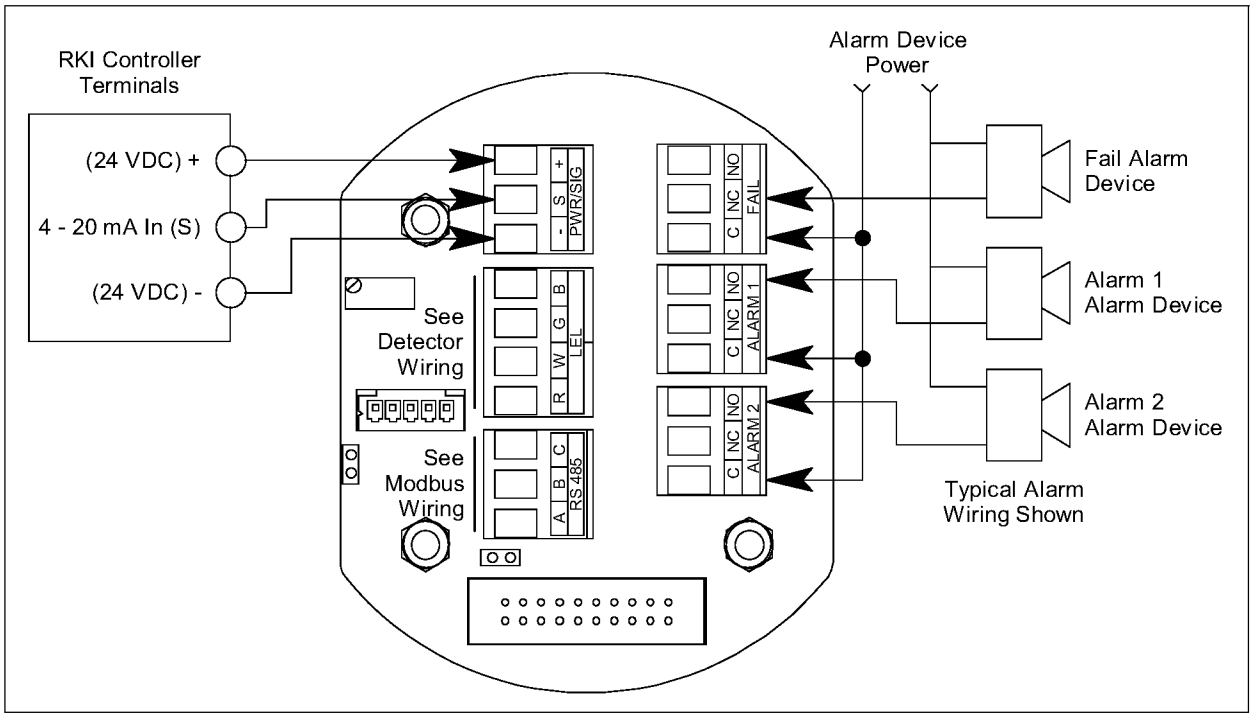


Figure 8: Wiring the M2A Junction Box to a Controller and Alarm Devices

3. Re-install the control PCB (and ribbon cable if necessary). Be sure the ribbon cable is routed down below the control PCB so it will not be damaged by the cover when it is screwed back on.
4. Secure the M2A junction box cover to the junction box.
5. Make controller, device, and relay connections as appropriate. If shielded cable is used for the PWR/SIG connections, connect the cable shield's drain wire to an available chassis ground at the gas monitoring controller, recording device, or programmable controller.

Start Up

Introducing Incoming Power

1. Complete the installation procedures described earlier in this manual.
2. Verify that all wiring connections are correct and secure.
3. Turn on the incoming power.
4. If necessary, turn on the controller or other monitoring device that is connected to the M2A.
5. The OLED display will indicate the firmware version when the M2A is first powered up and will then count down a one minute warm-up period before normal operation begins. During normal operation, the display will indicate the target gas and current gas reading. Verify that the display is indicating the target gas and current gas reading after the warm-up period is complete and normal operation begins.

NOTE: Allow the M2A's detector to warm up for 15 minutes before you continue with the next section, "Adjusting the Fresh Air Reading."

Adjusting the Fresh Air Reading

When the M2A is shipped from RKI Instruments, Inc., it is factory calibrated. If a full calibration is desired at startup, see "Calibration" on page 39.

Verify that the M2A is in a fresh air environment (environment known to be free of combustible or toxic gas vapors and of normal oxygen content, 20.9%).

CAUTION: *If you suspect the presence of combustible gas in the monitoring environment, use the calibration kit and the zero air calibration cylinder to introduce "fresh air" to the detector and verify an accurate fresh air setting. See the "Calibration" on page 39 for instructions on how to use a zero air cylinder when performing a fresh air adjustment.*

Non-Intrusive Fresh Air Signal Adjustment

If the M2A is installed in a classified area and non-intrusive zero adjustment is required, follow the instructions below, **but do not remove the junction box cover**. Use the magnetic wand accessory to actuate the magnetic switches instead of pushing the control switch buttons. To actuate a magnetic switch and perform the same operation as pressing a control switch button, touch the magnet in the end of the magnetic wand to the M2A's glass cover directly over the magnetic switch you wish to actuate. Touching the glass and removing the wand is the same as pressing and releasing a button. Touching the glass and keeping the wand in place is the same as pressing and holding a button.

WARNING: ***The M2A is not an active gas monitoring device during the fresh air adjustment procedure. The 4-20 mA output signal will "freeze" at 3.5 mA and all relays will remain in their non-alarm state while the M2A is in Calibration Mode. The output signal will not indicate current readings and the relays will not resume operating normally until the M2A is in normal operation again.***

NOTE: While in the calibration program, if there is no switch activity for the calibration time-out period the unit will return to normal operation. The factory set time-out is 15 minutes. If you want a different time-out period, see "Viewing & Changing M2A Parameters" on page 28 for instructions to change the calibration time-out.

1. While in normal operation, press and hold the UP/YES button for 5 seconds to enter Calibration Mode. Release the button when the following screen appears.

Calib? YES/NO

2. Press and release the UP/YES button to continue. The display will indicate the target gas and **CAL Mode** for a few seconds before showing **FreshAir Adjust?**.
3. Press and release the UP/YES button. **ENTER** will alternate with **FreshAir** on the top display line and the current gas reading will be on the bottom display line.
4. Press and release the ENTER button. The M2A will perform a zero operation and the display will indicate **SPAN w/Cal Gas?**.
5. Press and release the DOWN/NO button. The display will indicate **Leaving CAL Mode** and the M2A will return to normal operation.

Chapter 4: Operation

Overview

This chapter describes the M2A in normal operation. This chapter also describes the M2A in alarm 1, alarm 2, and fail conditions and suggests responses to these conditions.

Normal Operation

Normal operation is defined as follows:

- The start-up procedure is complete.
- The M2A is not indicating an alarm 1, alarm 2, or fail condition.
- The M2A is not in Calibration, Configuration, or Gas Type modes.

During normal operation, the M2A simultaneously displays the current gas reading, unit of measure, and target gas.

Information Screen

The Information Screen displays the M2A's operating voltage and firmware and hardware information. To display the Information Screen, do the following:

1. Press and hold the DOWN/NO button for 3 seconds. The Information Screen will appear.

2. Continue holding the DOWN/NO button to keep the Information Screen on the display. The top line indicates the operating voltage that is connected to the M2A. The second line indicates the firmware that is running, version 5.0 in this example, and the M2A's hardware version, version 2A in this example. This information may be useful if you need to contact the factory with questions about the M2A.
3. Release the DOWN/NO button when you are done viewing the Information Screen. The display will return to the normal operation screen within a couple of seconds.

4 - 20 mA Signal Output Operation

The output at the S terminal of the power/signal terminal strip is a 4 - 20 mA signal that corresponds to the detection range of the M2A. During normal operation, this signal tracks the gas concentration on the OLED display.

There are several circumstances where the signal output will not track the display reading but will behave as follows:

- When the M2A is in its warm-up period, the signal output will be fixed at 3.5 mA (zero).
- When the M2A's gas type is changed, the M2A will enter Configuration Mode for you to verify the parameter settings. When you exit Configuration Mode, the display will indicate **NEEDS CALIBRATION** and will continue to indicate this until Calibration Mode is entered and a calibration is performed. In this situation, the signal output will be fixed at 3.5 mA from the time Gas Type Mode is entered until the M2A is calibrated and returns to normal operation.
- If you enter Calibration Mode, Configuration Mode, Gas Type Mode, or Modbus Mode, the signal output will be fixed at 3.5 mA until the M2A returns to normal operation.
- If the M2A's input power decreases below 18.5 volts so that the M2A is in a low power alarm, the signal output is fixed below 2.4 mA until the low power alarm is cleared.
- If the M2A goes into a fail condition, after a 30 second delay, the signal output is fixed below 2.4 mA until the fail alarm is cleared. During the 30 second delay, the signal output follows the detector output. In the case of a downscale reading, the display and the signal output continue to track the reading down to -99% of full scale (1.15 mA).

Alarm Indications

NOTE: The M2A includes alarm on and alarm off delay settings for alarm 1 and alarm 2. The alarm indications described in this section operate according to the factory set alarm settings. See Table 5 on page 29 for all the factory settings.

Table 4: Visual and Audible Alarm Indications

Condition	Cause	Visual Indication(s)
Alarm 1*	Increasing gas reading at or above the alarm 1 setpoint	• A1 LED is on • Gas reading alternates with **ALARM-1** message
Alarm 2*	Increasing gas reading at or above the alarm 2 setpoint	• A2 LED is on • Gas reading alternates with **ALARM-2** message

Table 4: Visual and Audible Alarm Indications

Condition	Cause	Visual Indication(s)
Fail	• Disconnected or misconnected detector wiring • Display reading at -10% of full scale or lower • Defective components	• F LED is on • **FAIL** message replaces gas reading NOTE: There is a 30 second delay on the fail condition.
Low Power	DC power source less than 9.5 volts.	• F LED is on • **LowPower** message and actual voltage of incoming DC power
* *If the M2A is in both an alarm 1 and an alarm 2 condition, both alarm LEDs are on and the display alternates between the gas reading and the ALMS 1&2 message.*		

NOTE: You can select normally energized (N. EN) or normally de-energized (N. DE-EN) alarm 1 and alarm 2 relay settings in Configuration Mode. The following sections describe the standard factory setting for these relays which is N. DE-EN.

The fail relay is factory set as N. EN and is not user-adjustable.

Alarm 1 Condition

Alarm 1 Condition Indications

When the gas reading reaches the alarm 1 setpoint, the M2A senses an alarm 1 condition. The M2A alerts you to an alarm 1 condition as follows:

- The A1 LED turns on.
- The gas reading alternates with the **ALARM-1** message.
- The alarm 1 relay energizes.

Responding to an Alarm 1 Condition

1. Follow your established procedure for a low level combustible gas condition.
2. After the gas reading falls below the alarm 1 setpoint, press the ENTER button to reset the alarm 1 circuit. Resetting the alarm 1 circuit turns off the A1 LED, resets the OLED display, and de-energizes the alarm 1 relay.

NOTE: If the ENTER button is pressed while the M2A is in an alarm 1 condition, the A1 LED will flash but all other indications will remain unchanged.

You cannot de-energize the alarm 1 relay until the gas reading falls below the alarm 1 setpoint.

Alarm 2 Condition

Alarm 2 Condition Indications

When the gas reading reaches the alarm 2 setpoint, the M2A senses an alarm 2 condition. The M2A alerts you to an alarm 2 condition as follows:

- The A2 LED turns on.
- The gas reading alternates with the **ALARM-2** message.
- The alarm 2 relay energizes.

NOTE: If the M2A is in both an alarm 1 and alarm 2 condition, both the A1 and A2 LEDs will be on, the gas reading will alternate with the **ALMS 1&2** message, and both alarm relays will energize.

Responding to an Alarm 2 Condition

1. Follow your established procedure for a high level combustible gas condition.
2. After the gas reading falls below the alarm 2 setpoint, press the ENTER button to reset the alarm circuit. Resetting the alarm circuit turns off the A2 light, resets the OLED display, and de-energizes the alarm 2 relay.

NOTE: If the ENTER button is pressed while the M2A is in an alarm 2 condition, the A2 LED will flash but all other indications will remain unchanged.

You cannot de-energize the alarm 2 relay until the gas reading falls below the alarm 2 setpoint.

Fail Condition

Fail Condition Indications

The M2A indicates a fail condition for any of the following:

- The detector wiring is disconnected or incorrectly connected.
- The display reading is -10% of full scale or lower.

When the M2A senses a fail condition, it alerts you as follows:

- The F LED turns on.
- The gas reading is replaced by the **FAIL** message.
- The fail relay de-energizes.

NOTE: The fail alarm has a 30 second delay.

Responding to a Fail Condition

1. Verify that the detector wiring is correctly and securely connected.

Low Power Alarm

Low Power Alarm Indications

The M2A senses a low power condition when the DC power source is 9.5 volts or less.

WARNING: While in a low power condition, the M2A is not an active gas monitor.

When the M2A senses a low power condition, it alerts you as follows:

- The F LED turns on.
- The message **LowPower** is indicated on the top line of the OLED display and the input voltage is displayed on the bottom line of the OLED display.
- The fail relay de-energizes.

NOTE: The low power alarm cannot be cleared using the ENTER button.

When the voltage increases to 10.0 volts, the low power alarm is cleared and the M2A will begin its warm-up sequence.

Responding to a Low Power Condition

1. Determine and correct the cause of the low power condition.
2. When the input power increases above 10.0 volts, the M2A will begin its warm-up sequence.
3. Verify that the M2A enters normal operation after its warm-up sequence. If necessary, perform a fresh air adjustment. See “Adjusting the Fresh Air Reading” on page 21.

Chapter 5: Configuration Mode

Overview

This chapter describes how to view and change M2A parameters using Configuration Mode. It is accessed using the program buttons.

Configuration Mode includes a 5-minute time-out feature. If you do not press a control button for 5 minutes, the M2A automatically returns to normal operation.

NOTE: If the M2A returns to normal operation because of a time-out, it enters a warm-up period just as it does when it is first turned on.

If you are installing a new M2A, it has been setup at the factory. Use Configuration Mode only if you want to change the M2A's setup. If you want to change the detector type see "Chapter 6: Gas Type Mode" on page 32.

Viewing & Changing M2A Parameters

1. While in normal operation, simultaneously press and hold the UP/YES and ENTER buttons for 5 seconds to enter Configuration Mode. Release the buttons when the following screen appears.

Enter Config?

2. If you want to exit Configuration Mode, press and release the DOWN/NO button and the M2A will return to normal operation.

   If you want to continue in Configuration Mode, press and release the UP/YES button. The target gas and the full scale will be displayed for a few seconds before the first adjustable parameter, the alarm 1 setpoint, is displayed.

3. If you want to change the currently displayed parameter, use the UP/YES and DOWN/NO buttons to adjust it to the desired setting, then press ENTER to continue to the next parameter.

   If the currently displayed parameter is OK, press the ENTER button to proceed to the next parameter.

   Table 5 lists the M2A parameters you can set. Table 5 also lists the factory set value for each parameter.

Table 5: Configuration Parameters

Parameter (Factory Set Value)	Description
ALARM-1 (level) (10% LEL)	The gas reading at which the M2A initiates an alarm 1 condition.
ALARM-1 (activation) (Increase)	Indicates if the alarm 1 circuit is activated by gas readings increasing (**Increase**) or decreasing (**Decrease**) to the ALARM-1 Level.
ALARM-1 (relay action) (N. DE-EN)	If set as **N. DE-EN**, the alarm 1 relay is de-energized in normal operation and energizes when an alarm 1 condition is initiated. If set as **N. EN**, the alarm 1 relay is energized in normal operation and de-energizes when an alarm 1 condition is initiated.
ALARM-1 (relay reset) (LATCH)	If set as **LATCH**, you must press the ENTER button to reset the alarm 1 circuit after the alarm 1 condition passes. If set as **SELF-RST**, the M2A automatically resets the alarm 1 circuit after the alarm 1 condition passes.
A1 OnDy (alarm 1 on delay) (1 secs)	The amount of time the M2A delays activation of the alarm 1 circuit once an alarm 1 condition is initiated. It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
A1 OffDy (alarm 1 off delay) (0 sec.)	The amount of time the M2A delays turning off the alarm 1 circuit once an alarm 1 condition passes. This parameter appears only if the alarm 1 relay reset setting is set to **SELF-RST**. It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
ALARM-2 (level) (50% LEL)	The gas reading at which the M2A initiates an alarm 2 condition.
ALARM-2 (activation) (Increase)	Indicates if the alarm 2 circuit is activated by gas readings increasing (**Increase**) or decreasing (**Decrease**) to the ALARM-1 Level.
ALARM-2 (relay action) (N. DE-EN)	If set as **N. DE-EN**, the alarm 2 relay is de-energized in normal operation and energizes when an alarm 2 condition is initiated. If set as **N. EN**, the alarm 2 relay is energized in normal operation and de-energizes when an alarm 2 condition is initiated.
ALARM-2 (relay reset) (LATCH)	If set as **LATCH**, you must press the ENTER button to reset the alarm 2 circuit after the alarm 2 condition passes. If set as **SELF-RST**, the M2A automatically resets the alarm 2 circuit after the alarm 2 condition passes.

Table 5: Configuration Parameters (Continued)

Parameter (Factory Set Value)	Description
A2 OnDy (alarm 2 on delay) (1 secs)	The amount of time the M2A delays activation of the alarm 2 circuit once an alarm 2 condition is initiated. It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
A2 OffDy (alarm 2 off delay) (0 sec.)	The amount of time the M2A delays turning off the alarm 2 circuit once an alarm 2 condition passes. This parameter appears only if the alarm 2 relay reset setting is set to **SELF-RST**. It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
ZeroSupp (2% LEL)	The zero suppression feature helps prevent "jumpy" readings near the fresh air reading. For example, if the zero suppression is **2.0% LEL,** the M2A will display a reading of 0% LEL for gas readings from -2% LEL to 2% LEL. It is settable from 0 to 6% of the detection range.
FILTER (5 secs)	The filter feature helps "smooth out" jumpy or noisy signals from the detector. You can set the filter from 0 seconds to 60 seconds in 5 seconds increments. The displayed gas reading is the average reading over the previous time period defined by the filter setting. So if the filter is set to 5 seconds, the displayed gas reading is the average over the past 5 seconds.
CAL Time (15 mins)	The calibration time-out sets the amount of time after the last button push while in Calibration Mode that the M2A will wait before returning to normal operation. If the calibration time-out is set to **15 mins**, then M2A will return to normal operation automatically 15 minutes after the last button push.
Auto Zero (Enabled)	If set to **Enabled**, the M2A's firmware will monitor the zero (fresh air) reading and make automatic zero adjustments under precisely specified conditions if it determines that a reading change is due to normal sensor drift. If set to **Disabled**, the Auto Zero function is turned off.

4. When you have scrolled through all the adjustable parameters, **SAVE IT? YES/NO** appears on the display.

5. If you do not wish to save the adjustments and want to exit Configuration Mode, press and release the DOWN/NO button. The **DO OVER? YES/NO** message will display. Press and release the DOWN/NO button. The **ABORT? YES/NO** message will display. Press the UP/YES button to return to normal operation.

   If you wish to change some of the adjustments made, press and release the DOWN/NO button. The **DO OVER? YES/NO** message will display. Press and release the UP/YES button. The **Re-do Config** message will display and the M2A will return to the first adjustable parameter. Go back to step 3 and continue.

   If you wish to save the adjustments made, press and release the UP/YES button. **Config Saved** is indicated on the display for a few seconds and the M2A returns to normal operation.

Chapter 6: Gas Type Mode

Overview

This chapter describes how to use Gas Type Mode to select the M2A's gas type. The gas type determines the target gas and detection range.

CAUTION: *The target gas is factory set and does not normally need to be changed. The standard setting for the 65-2640XL-04 is methane, but it may be different depending on the calibration.*

Gas Type Mode includes a 5-minute time-out feature. If you do not press a button for 5 minutes, the M2A automatically returns to normal operation.

NOTE: If the M2A enters normal operation because of a program time-out, it enters a warm-up period just as it does when it is first turned on.

Selecting the Gas Type

1. While in normal operation or during the warm-up sequence, press and hold the UP/YES and DOWN/NO buttons for five seconds. Release them when the following screen appears.

Select GasType?

2. If you want to exit Gas Type Mode, press and release the DOWN/NO button. The display will indicate **NO CHANGE** and the M2A will return to normal operation.

   If you want to continue in Gas Type Mode, press and release the UP/YES button. The top display line will indicate **GasType?** and the bottom display line will indicate the target gas choice.

3. Use the UP/YES or DOWN/NO button to scroll through the choices of target gas. Table 6 below lists the choices of target gas for the M2A.

Table 6: Gas Types

Gas Type Choices	Detection Range
HC	0 - 100% LEL
iBUTANE	0 - 100% LEL
PROPANE	0 - 100% LEL
HEXANE	0 - 100% LEL
HYDROGEN	0 - 100% LEL

Table 6: Gas Types

Gas Type Choices	Detection Range
METHANE	0 - 100% Volume
METHANE	0 - 100% LEL
CO2	0 - 5,000 ppm
CO2	0 - 9,000 ppm
CO2	0 - 100% volume
CO2	0 - 50.0% volume
CO2	0 - 5.00% volume
METHANE	0 - 5.00% volume
METHANE	0 - 8980 ppm*
*Use this gas type for 0-9000 ppm CH_4. 8980 ppm is the highest displayed value. Anything higher is displayed as **OVER**.	

4. When the desired target gas is on the display, press and release the ENTER button. The display will ask **SAVE IT? YES/NO**.

5. To discard the gas type change, press and release the DOWN/NO button. The display will ask **DO OVER? YES/NO**. Press the DOWN/NO button. The display will ask **ABORT? YES/NO**. Press the UP/YES button. The M2A will return to normal operation without changing the gas type.

   To save the gas type, press and release the UP/YES button. The display will indicate **Gas Type Updated**, the display will indicate the target gas and the detection range for a few seconds, and then the M2A will enter Configuration Mode automatically so that the parameter settings in Configuration Mode can be verified or changed.

6. While in Configuration Mode press and release the ENTER button to accept the displayed parameter setting and move to the next one. Use the UP/YES and DOWN/NO buttons to adjust a setting. See “Chapter 5: Configuration Mode” on page 28 for a complete description of Configuration Mode.

7. When you have reviewed and accepted the last item in Configuration Mode by pressing the ENTER button, display will ask **SAVE IT? YES/NO**.

8. To save the configuration settings, press and release the UP/YES button.The display will indicate **Config Saved** and the M2A will begin its warm-up sequence.

   To discard the settings and review them again, press the DOWN/NO button. The display will ask **DO OVER? YES/NO**. Press the UP/YES button and the display will indicate **Re-do Config**, then display the target gas and the detection range for a few seconds before returning to Configuration Mode. Repeat steps 6 - 8 until the settings are as desired.

9. After the M2A completes its warm-up sequence, the display will indicate **CAL NEEDED**. Since the gas type has been changed, a successful calibration must be performed before the M2A can enter normal operation.
10. Press and release the UP/YES button to enter Calibration Mode. Normally, you must hold the UP/YES button for 5 seconds to enter Calibration Mode, but since a calibration is required, only a momentary push is needed to enter Calibration Mode after changing the gas type.
11. See "Calibration" on page 39 for calibration instructions.

NOTE: When calibrating an M2A after changing the gas type, the M2A will not ask if you want to calibrate, or whether you want to perform a fresh air adjustment, span adjustment or zero adjustment. Since a complete calibration is required, the calibration sequence will proceed without asking if you want to perform certain operations.

Chapter 7: Maintenance

Overview

This chapter describes procedures for performing preventive maintenance, troubleshooting, calibrating the M2A, and replacing field replaceable parts.

Preventive Maintenance

This section describes a recommended preventive maintenance schedule to ensure the optimum performance of the M2A. It includes daily and quarterly procedures.

Daily

Verify a display reading of 0% LEL. Investigate significant changes in the reading.

Quarterly

Calibrate the M2A as described in "Calibration" on page 39. See "Calibration Frequency" on page 37 for a discussion of calibration frequency guidelines.

Troubleshooting

The troubleshooting guide describes symptoms, probable causes, and recommended action for problems you may encounter with the M2A.

NOTE: This troubleshooting guide describes M2A problems only. If the M2A is connected to a controller, see the controller operator's manual for problems you may encounter with the controller.

Table 7: Troubleshooting the Combustible Gas Detector

Condition	Symptom(s)	Probable Causes	Recommended Action
No Power	The display back-light is off and the display screen is blank.	• The power wiring is disconnected or misconnected. • The display cable is disconnected or misconnected.	1. Verify that the wiring to the power source or controller is correct and secure. 2. Verify that the ribbon cable connecting the terminal PCB to the control PCB is securely installed. This ribbon cable plugs into a connector on the top edge of the control PCB and on the bottom of the terminal PCB. 3. If the power difficulties continue, contact RKI for further instruction.

Table 7: Troubleshooting the Combustible Gas Detector (Continued)

Condition	Symptom(s)	Probable Causes	Recommended Action
Frequent or Suspect Alarms	The M2A alerts you to frequent or suspect alarms while the fresh air readings remain on zero.	• The M2A is experiencing false readings due to RFI or EMI. • The detector wiring is disconnected, misconnected, or intermittent.	1. Verify that the M2A wiring is properly shielded. See "Wiring the M2A Transmitter" on page 17. 2. Verify that the detector wiring is correct and secure. 3. Increase the alarm on delay setting in Configuration Mode. 4. If the frequent or suspect alarm difficulties continue, contact RKI for further instruction.
Flickering Display	The display reading flickers often.	• The M2A is experiencing false readings due to RFI or EMI. • The noise filter setting is too low. • The zero suppression setting is too low. • The display screen is malfunctioning.	1. Verify that the M2A wiring is properly shielded. See "Wiring the M2A Transmitter" on page 17. 2. Verify that the detector wiring is correct and secure. 3. Increase the filter setting in Configuration Mode. 4. Increase the zero suppression setting in Configuration Mode. 5. If the display difficulties continue, contact RKI for further instruction.
Fail Condition	• M2A indicates a fail condition. • Controller indicates a fail condition	• The detector wiring to the terminal PCB is disconnected or misconnected. • The wiring from the M2A to the controller is disconnected or misconnected. • The detector fresh air signal is low enough to cause a fail condition. • The detector is malfunctioning. • The terminal or display PCB is malfunctioning.	1. Verify that the detector wiring is correct and secure. 2. Verify that the wiring between the M2A and the controller is correct and secure. 3. Calibrate the M2A. 4. If the fail condition continues, replace the detector. 5. If the fail condition continues, contact RKI for further instruction.

Table 7: Troubleshooting the Combustible Gas Detector (Continued)

Condition	Symptom(s)	Probable Causes	Recommended Action
Slow or No Response/ Difficult or Unable to Calibrate	• Unable to successfully set the fresh air or span reading during calibration. • M2A requires frequent calibration. ***NOTE:*** *See "Calibration Frequency" on page 37 for calibration frequency guidelines.*	• The calibration cylinder is low, out-dated, or defective. • The calibration gas flow rate is too low. • The calibration gas is not an appropriate concentration. • The detector is malfunctioning. • The terminal PCB is malfunctioning. • The flexible tubing to the calibration adapter/splash guard has become kinked, blocked, or disconnected.	1. Verify that the calibration cylinder contains an adequate supply of a fresh test sample. 2. Verify that the regulator used for calibration is a 0.5 LPM regulator. 3. Verify that the calibration gas concentration is appropriate for the transmitter. The concentration should be in the detection range, preferably about half of the detection range. 4. Verify that the flexible tubing to the calibration adapter/splash guard is clear and connected to the calibration adapter/splash guard. 5. If the calibration/response difficulties continue, replace the detector. 6. If the calibration/response difficulties continue, contact RKI for further instruction.

Calibration Frequency

Although there is no particular calibration frequency that is correct for all applications, a calibration frequency of every 3 to 6 months is adequate for most combustible gas transmitter applications. Unless experience in a particular application dictates otherwise, RKI Instruments, Inc. recommends a calibration frequency of every 3 months.

If an application is not very demanding, for example detection in a clean, temperature controlled environment where combustible gas is not normally present and calibration adjustments are minimal at calibration, then a calibration frequency of every 6 months is adequate.

If an application is very demanding, for example if combustible gas is present often and in significant concentrations or the environment is not well controlled, then more frequent calibration than every 3 months may be necessary. If potential catalyst poisons are known or likely to be present, more frequent calibration than every 3 months will be necessary.

Determining Response Time

Since the detector junction box is installed remotely from the M2A, the response time of the detector will depend on the length of flexible tubing that is attached to the calibration adapter/splash guard. To determine the response time based on the length of tubing connected:

1. Place the M2A into its calibration mode or disable external alarms.
2. Note the current gas reading displayed at the M2A.
3. Screw the regulator into the calibration cylinder. Do not use a zero air cylinder for this operation.
4. Use the flexible tubing coming from the calibration adapter/splash guard to connect the regulator to the calibration adapter/splash guard.
5. Turn the regulator's on/off knob counterclockwise to open the regulator. Gas will begin to flow. Take note of the time or start a stopwatch.
6. When you first start to notice an increase in the gas reading, note how much time passed between starting the gas flow and noticing a reading response.
7. Turn the regulator's on/off knob clockwise to close the regulator.
8. Unscrew the regulator from the calibration cylinder.
9. Disconnect the calibration adapter/splash guard's flexible tubing from the regulator.

NOTE: Do not disconnect the flexible tubing from the calibration adapter/splash guard.

10. Add 1 minute to the length of time determined in Step 6. This is the response time for the detector. When performing a zero adjustment or span adjustment, gas must be applied for this length of time.

Calibration

This section describes how to calibrate the M2A transmitter. It includes procedures to prepare for calibration, enter Calibration Mode, adjust the fresh air (zero) setting, adjust the span setting, and return to normal operation.

WARNING: ***The M2A is not an active gas monitoring device during the calibration procedure. The 4-20 mA output signal will "freeze" at 3.5 mA and all relays will remain in their non-alarm state while the M2A is in Calibration Mode. The output signal will not indicate current readings and the relays will not resume operating normally until the M2A is in normal operation again.***

NOTE: The following procedure assumes the use of a calibration kit which includes a calibration gas cylinder, a zero air cylinder and a fixed flow regulator with an on/off knob.

NOTE: The detector must be calibrated with a gas concentration between 10% and 100% of the channel's full scale value (ie. between 10% LEL and 100% LEL).

NOTE: While in the calibration program, if there is no switch activity for the calibration time-out period the unit will return to normal operation. See "Viewing & Changing M2A Parameters" on page 28 for instructions to set the calibration time-out.

NOTE: The following procedure assumes that the target gas is present in a high enough concentration to affect the fresh air (zero) reading. If a fresh air environment can be verified, applying zero air to the detector is not necessary when setting the zero (span for oxygen) reading.

Non-Intrusive Calibration

If the M2A is installed in a classified area and non-intrusive calibration is required, follow the instructions below, but do not remove the junction box cover. Use the magnetic wand accessory to actuate the magnetic switches instead of pushing the control switch buttons. To actuate a magnetic switch and perform the same operation as pressing a control switch button, touch the magnet in the end of the magnetic wand to the M2A's glass cover directly above the magnetic switch you wish to actuate. Touching the glass and removing the wand is the same as pressing and releasing a button. Touching the glass and keeping the wand in place is the same as pressing and holding a button.

Calibration Gas Response Memory Feature

The M2A has the capability to "remember" the detector's response to the calibration gas after the gas is removed from the detector during the fresh air and span adjustment procedure. This feature enables one person to perform calibration if the detector is mounted remotely from the M2A. When zero air is applied to the M2A during a fresh air adjustment, the M2A will freeze the display reading at the lowest response and the M2A will continue to display this reading and retain it in its memory until the fresh air adjustment procedure is completed. When calibration gas is applied to the M2A during a span adjustment, the M2A will freeze the display reading at the highest response to the calibration gas. The calibration gas can then be removed and the M2A will continue to display this reading and retain it in its memory until the span adjustment procedure is completed.

Adjusting the Fresh Air Reading

1. While in normal operation, press and hold the UP/YES button for 5 seconds to enter Calibration Mode. Release the button when the following screen appears.

Calib? YES/NO

2. If you want to continue with calibration, press and release the UP/YES button. The display will indicate the target gas and **CAL Mode** for a few seconds before showing **FreshAir Adjust?**.

   If you want to exit Calibration Mode, press and release the DOWN/NO button. The M2A will indicate **Leaving CAL Mode** and the M2A will return to normal operation.

3. To continue with adjusting the fresh air reading, press and release the UP/YES button. **ENTER** will alternate with **FreshAir** on the top display line and the current gas reading will be on the bottom display line.

   To skip adjusting the fresh air reading, press and release the DOWN/NO button. The display will indicate **SPAN w/Cal Gas?**. Skip to the next section, Adjusting the Span Setting.

4. Screw the zero air cylinder into the fixed flow regulator.

5. Use the flexible tubing coming from the calibration adapter/splash guard to connect the regulator to the calibration adapter.

6. Turn the regulator knob counterclockwise to open the regulator.

7. Allow zero air to flow for the length of time determined in "Determining Response Time" on page 38.

8. Turn the regulator knob clockwise to close the regulator.

9. Unscrew the zero air cylinder from the fixed flow regulator. Leave the calibration adapter/splash guard's flexible tubing connected to the regulator. The M2A will continue to display the minimum gas response on the display and retain the response level in its memory.

10. Press and release the ENTER button. The M2A will perform a fresh air adjustment and the display will indicate **SPAN w/Cal Gas?**.

NOTE: If the fresh air adjustment fails, see "Troubleshooting" on page 35 for recommended actions.

Adjusting the Span Setting

1. If you want to continue with adjusting the span setting, press and release the UP/YES button. **APPLY** will alternate with **SPAN Gas** on the top display line and the current gas reading will be on the bottom display line.

   If you want to skip adjusting the span reading, press and release the DOWN/NO button. The display will indicate **Leaving Cal Mode** and the M2A will return to normal operation.

2. Screw the calibration gas cylinder into the fixed flow regulator.

3. Turn the regulator knob counterclockwise to open the regulator.

4. Allow calibration gas to flow for the length of time determined in "Determining Response Time" on page 38.

5. Turn the regulator knob clockwise to close it.

6. Unscrew the calibration gas cylinder from the fixed flow regulator. The M2A will continue to display the maximum gas response on the display and retain the response level in its memory.

7. **Adjust the gas reading up or down to match the calibration gas cylinder concentration by using the UP/YES and DOWN/NO buttons, then press and release the ENTER button.**

NOTE: The detector must be calibrated with a gas concentration between 10% and 100% of the channel's full scale value (ie. between 10% LEL and 100% LEL).

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8. The M2A will perform a span operation. The display will indicate **SPAN Gas PASS** for a few seconds, then indicate **SPAN Gas SAVED** before indicating **Leaving CAL Mode** for a few seconds.

NOTE: If the span adjustment fails, see "Troubleshooting" on page 35 for recommended actions.

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9. The display will now alternate between the normal operation screen and the message **REMOVE CAL GAS** for 1 minute. If the calibration gas has not been removed from the detector, remove it now to avoid unwanted alarms.

   During this 1 minute period, the signal output will remain fixed at 3.5 mA and the relays will remain in their non-alarm state to avoid unwanted alarms while the calibration gas clears from the detector. At the end of the 1 minute period, the **REMOVE CAL GAS** message will stop appearing and the M2A will return to normal operation.

10. Disconnect the calibration adapter/splash guard's flexible tubing from the regulator.

NOTE: Do not disconnect the flexible tubing from the calibration adapter/splash guard.

11. Store the components of the calibration kit in a safe place.

Replacing the Combustible Gas Detector

1. Turn off or disconnect power to the M2A.
2. Remove the detector junction box cover.
3. Unscrew the calibration adapter/splash guard from the detector.
4. Disconnect the detector leads from the terminal block in the detector junction box. Note the position of the color-coded leads as you remove them.
5. Unscrew the detector from the detector junction box.
6. Guide the detector leads of the replacement detector through the bottom conduit hub of the detector junction box, then screw the mounting threads of the detector into the conduit hub. If necessary for environmental conditions, apply thread sealant or Teflon tape to the hub and/or detector threads to seal them.
7. Connect the detector leads to the terminal block the same way the old detector was wired (see Figure 7 on page 18).
8. Screw the calibration adapter/splash guard onto the new detector.
9. Reinstall the detector junction box cover.
10. Turn on or plug in power to the M2A.

NOTE: Allow the replacement detector to warm up for 15 minutes before you continue with the next step.

11. Calibrate the replacement detector as described in "Calibration" on page 39.

Chapter 8: RS-485 Modbus Output

Overview

This chapter describes the M2A's RS-485 Modbus output and how to configure the M2A to make use of it. It also discusses how to wire the M2A into a Modbus system.

The M2A provides an RS-485 serial communications interface. It is a Modbus Slave Device, supporting 2-wire RS-485 Modbus RTU serial communications.

Wiring the M2A in a Modbus System

The M2A is a 2-wire Modbus RTU device. When wiring the M2A into a Modbus system, adhere to standard Modbus wiring practices per the Modbus Over Serial Line Specification and Implementation Guide V1.0 or later. This document can be found online at www.modbus.org/specs.php.

The Modbus protocol supports a maximum of 247 unique slave addresses (1-247). The M2A's line driver provides for up to 128 M2As to be connected together without the need for a repeater. Figure 11 & Figure 12 below illustrate typical M2A wiring configurations. If more than 128 M2As need to be connected together, RS-485 repeater(s) should be used such that no more than 128 M2As reside on any given network segment.

CAUTION: *The network segment can only support 128 units if RKI M2As are being used. The use of any other instruments will lower the number of units that may reside on any given network segment.*

The MODBUS terminal strip is located on the terminal PCB (see Figure 3 on page 11). The following signals are available at the Modbus terminal strip:

Table 8: Modbus Terminal Strip Signals

Modbus Terminal Label (RS-485 Name)	Modbus Signal Name
A	D0
B	D1
C	Common

Ground Jumper

The M2A includes a 2-pin ground header (see Figure 3 on page 11) that is used when the M2A is used in a Modbus system. Every M2A is supplied with a ground jumper (a jumper block) installed onto this header. If the M2A isn't wired into a Modbus system or if it is wired into one as shown in Figure 10, the ground jumper should be installed. If the M2A is wired in a Modbus system as shown in Figure 9, the ground jumper should be removed.

Recommended Modbus Wiring

The recommended Modbus wiring for the M2A is illustrated in Figure 9 below. In this configuration, 5 wires are used for wiring the M2A into a Modbus system. Figure 9 also illustrates typical alarm device wiring. The ground jumper must be removed in this wiring configuration.

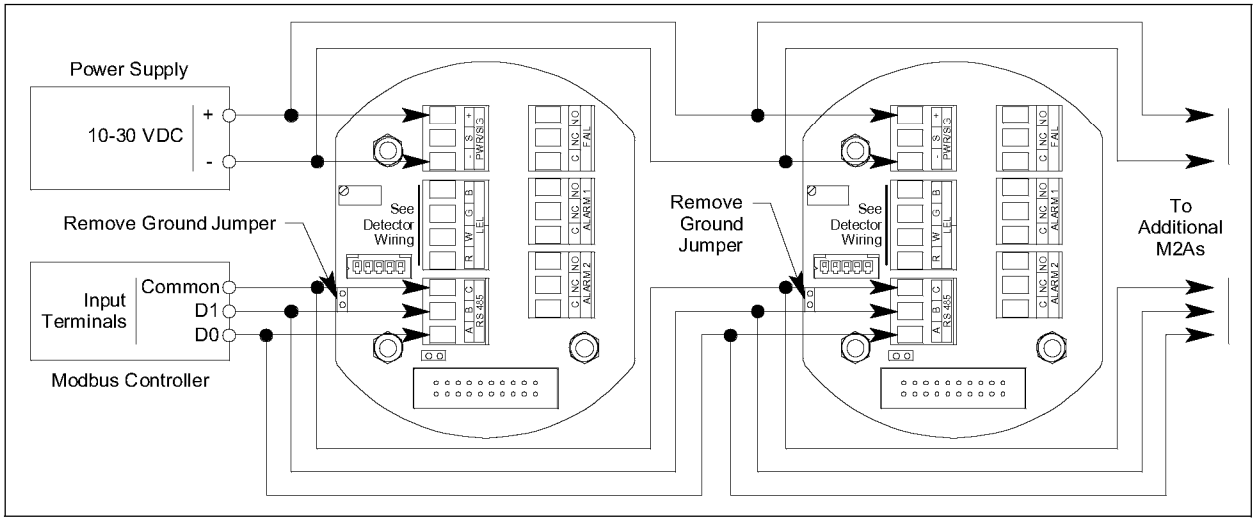


Figure 9: Recommended Modbus Wiring

Adding an M2A to an Existing M2 Modbus Installation with Recommended Wiring

An M2A can be wired into an existing M2 Modbus system. The shape of the terminal PCB will be different but the wiring connections are identical and the ground jumper on the M2A must still be removed.

Alternate Modbus Wiring For Existing Installations

Although the wiring shown in Figure 9 is recommended, it is possible to wire the M2A into a Modbus system with only 4 wires in situations where a pre-existing system is being replaced and wiring is already in place. This should only be done if wiring for a system that is being replaced is already installed and it is not practical to run another wire. See Figure 10 below for this wiring configuration. In this configuration, the wire between the "C" terminal on the M2A and the Common terminal on the Modbus controller is omitted. Instead, the Common terminal on the Modbus controller is connected to the "-" of the 24 VDC power supply. The ground jumper must be installed in this wiring configuration.

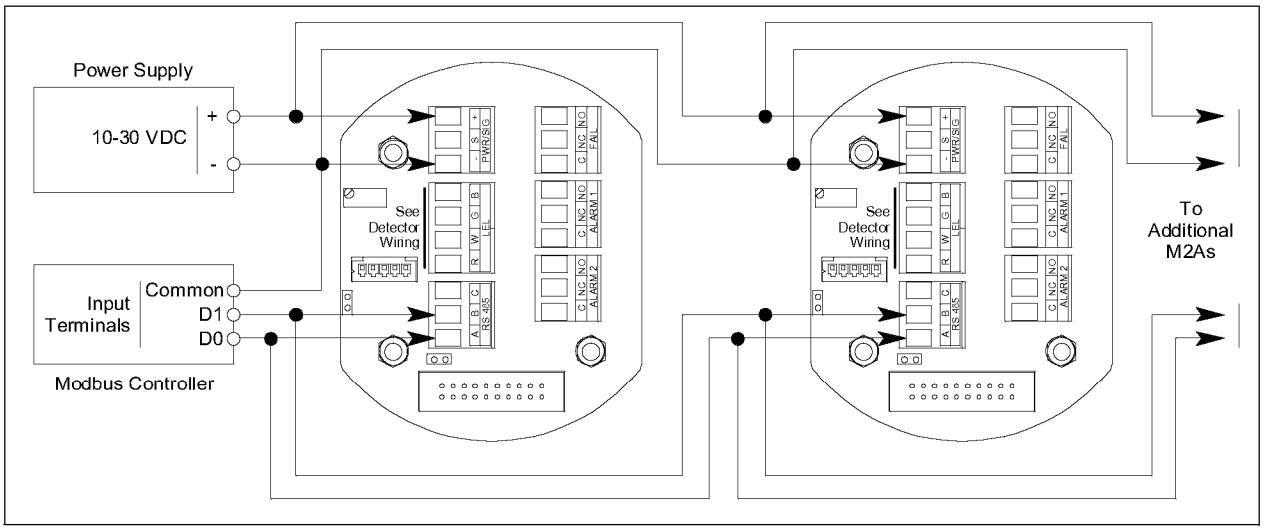


Figure 10: Alternate Modbus Wiring

Adding an M2A to an Existing M2 Modbus Installation with Alternate Wiring

An M2A can be wired into an existing M2 Modbus system. The shape of the terminal PCB will be different but the wiring connections are identical and the ground jumper on the M2A must still remain installed.

Termination Jumper

The M2A includes a 2-pin termination header (see Figure 3 on page 11) that is used when the M2A is used in a Modbus system. Every M2A is supplied with a termination jumper (a jumper block) installed onto this header. If the M2A is not used in a Modbus system, this jumper has no function. When the M2A is installed in a Modbus system, this jumper must be installed in an M2A that is at the end of a Modbus line. Any M2A in a Modbus system that is not at the end of a line must have the termination jumper removed (see Figure 11 & Figure 12 below).

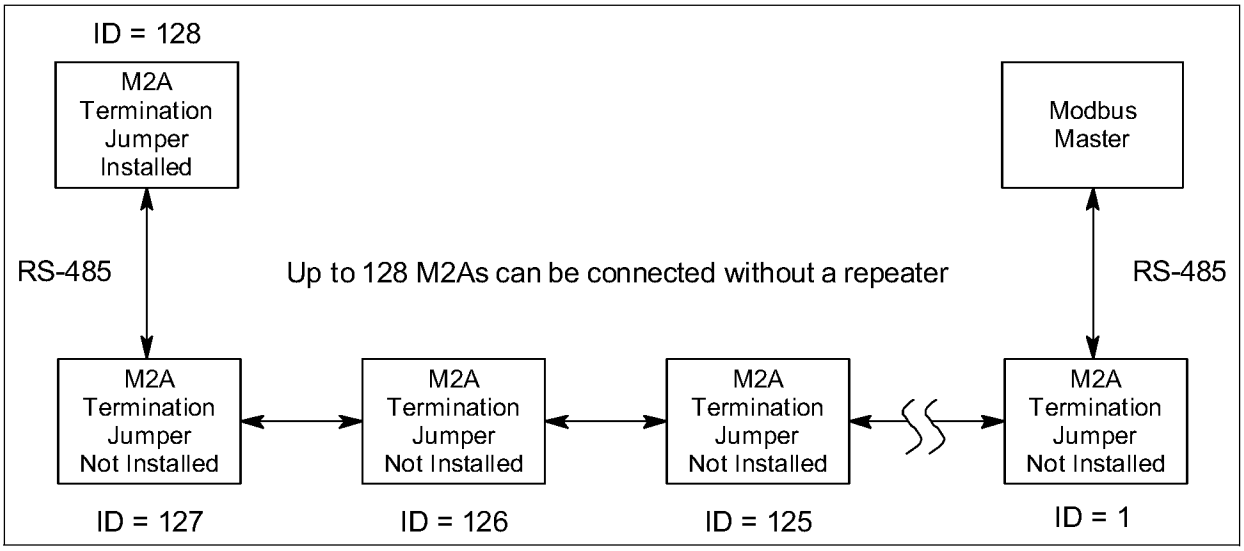


Figure 11: Multiple M2As in a Daisy Chain Configuration

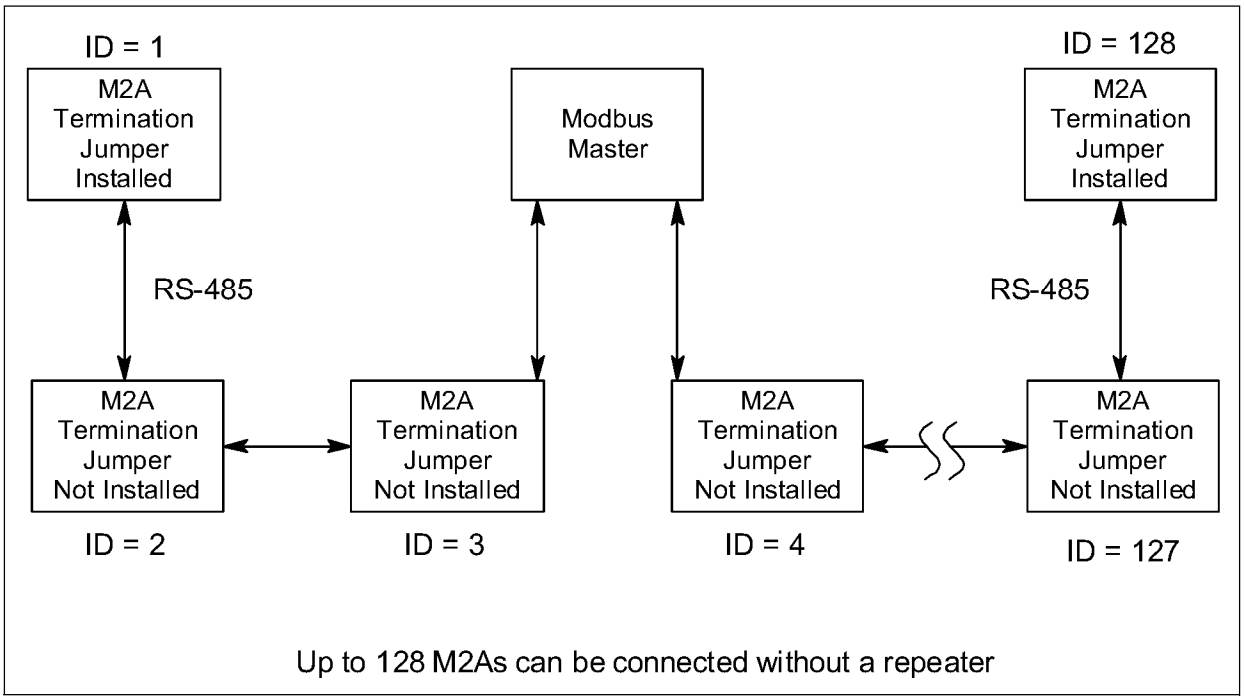


Figure 12: Multiple M2As in a Two Branch Configuration

Using the M2A in a 4-wire Modbus System

Although the M2A is a 2-wire Modbus RTU device, it can be used with a 4-wire Modbus controller if the system wiring is modified as follows:

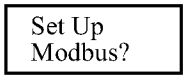
- Connect the controller's TxD0 and RxD0 wires together and use this connection as the 2-wire Modbus D0 signal.
- Connect the controller's TxD1 and RxD1 wires together and use this connection as the 2-wire Modbus D1 signal.
- Connect these D0 and D1 signals and the common wire from the controller to the 2-wire Modbus Network of M2As.

Modbus Mode

Modbus Mode allows you to configure various parameters relating to the Modbus setup of the M2A. Modbus Mode includes a 5-minute time-out feature. If you do not press a control button for 5 minutes, the M2A automatically returns to normal operation.

NOTE: If the M2A returns to normal operation because of a time-out, it enters a warm-up period just as it does when it is first turned on.

1. While in normal operation, simultaneously press and hold the DOWN/NO and ENTER buttons for 5 seconds to enter Modbus Mode. Release the buttons when the following screen appears.

2. To exit Modbus Mode, press and release the DOWN/NO button. The M2A will return to normal operation.

   To continue in Modbus Mode, press and release the UP/YES button. The current ENABLED/DISABLED setting will appear.

3. If you want to change the currently displayed parameter, use the UP/YES and DOWN/NO buttons to adjust it to the desired setting, then press ENTER to continue to the next parameter.

   If the currently displayed parameter setting is OK, press the ENTER button to proceed to the next parameter.

   Table 9 lists the M2A Modbus Mode parameters you can set. Table 9 also lists the factory set value for each parameter.

Table 9: Configuration Parameters

Modbus Mode Parameter	Available Settings & Description
Enabled/Disabled	Can be set to ENABLED or DISABLED (factory setting). Enables or disables the Modbus output.
Slave ID	The Slave ID can be set to values from 1 (factory setting) to 247. The M2A will only receive messages from the Master which are addressed to this Slave ID (except for broadcast messages which are received by all slaves).
Baud Rate	Can be set to 1200, 2400, 4800, 9600 (factory setting), 14440, & 19200.
Parity	EVEN (factory setting), ODD, NONE
Response Delay	The response delay can be set from 0 (factory setting) to 20 mS. This is an optional additional delay inserted by the M2A prior to returning a response message to the Master. It may be helpful in some installations where the Master's preparedness to receive responses might be delayed.

4. When you have scrolled through all the adjustable parameters, **SAVE IT? YES/NO** appears on the display.

5. If you do not wish to save the adjustments, press and release the DOWN/NO button. The **DO OVER? YES/NO** message will display. Press and release the DOWN/NO button. The **ABORT? YES/NO** message will display. Press the UP/YES button to return to normal operation.

   If you wish to change some of the adjustments made, press and release the DOWN/NO button. The **DO OVER? YES/NO** message will display. Press and release the UP/YES button. The **Re-do MB Setup** message will display and the M2A will return to the first adjustable parameter. Go back to step 3 and continue.

   If you want to save the adjustments made, press and release the UP/YES button. **Modbus Saved** is indicated on the display for a few seconds and the M2A returns to normal operation.

NOTE: All M2As on a Modbus network must be configured with the same baud rate and parity, and each M2A must have a unique slave ID. For an M2A to participate on a network, the ENABLED/DISABLED setting must be set to ENABLE.

Supported Modbus Functions

The M2A supports Function Code 03: Read Holding Registers and Function Code 16: Write Registers.

Function Code 03: Read Holding Registers

There are a total of 40 registers available to be read via this Function Code.

Registers 1 - 2

The format (bit & field assignments) for registers 1 - 2 is shown below in Table 10 - Table 11.

Table 10: Register 1, Numerical Reading with Sign & Decimal Point Bit & Field Assignments

Bit(s)	Value & Field
[15]	Sign of Reading 0 = Positive 1 = Negative
[14:13]	Format of Reading 0 = XXX (no decimal point) 1 = XX.X 2 = X.XX 3 = .XXX
[12:0]	Numerical value of display reading (8000 max)

Table 11: Register 2, Operating State, Alarms & Relays Bit & Field Assignments

Bit(s)	Value
[15:12]	Operating State 0 = Undefined 1 = Initialization 2 = Normal 3 = Warm-up 4 = Fail 5 = Calibration 6 = Post-Calibration 7 = Low Power 8 = Setup
[11]	Gas Type Change 0=Not Changed 1=Changed

Table 11: Register 2, Operating State, Alarms & Relays Bit & Field Assignments

Bit(s)	Value
[10]	Configuration Change 0=Not Changed 1=Changed
[9]	Calibration Activity Flag 0=No Calibration Activity 1=Calibration Activity Has Occurred
[8]	Fail Status 0 = Fail Not Asserted 1 = Fail Asserted
[7:6]	Alarm 2 Status 0 = No Alarm 1 = Unacknowledged Alarm 2 = Acknowledged Alarm 3 = Unused Code
[5:4]	Alarm 1 Status 0 = No Alarm 1 = Unacknowledged Alarm 2 = Acknowledged Alarm 3 = Unused Code
[3]	Overscale Status 0 = Not Overscale 1 = Overscale
[2]	Fail Relay Status 0 = Not Energized 1 = Energized
[1]	Alarm 2 Relay Status 0 = Not Energized 1 = Energized
[0]	Alarm 1 Relay Status 0 = Not Energized 1 = Energized

Register 3

Register 3 is the supply voltage (0.1 volt per count).

Registers 4 - 11

The 16 bytes in these registers contain the same ASCII text information that is displayed on the M2A's OLED (not NULL Terminated).

Register 12

Register 12 is the range (full scale readout).

Register 13

Register 13 is the alarm 1 set point.
The decimal point location is the same as specified in Register 1.

Register 14

Register 14 is the alarm 2 set point.
The decimal point location is the same as specified in Register 1.

Registers 15 - 19

Registers 15 - 19 are the Gas Name ASCII String (NULL Terminated).

Registers 20 - 22

Registers 20 - 22 are the Gas Units String (NULL Terminated).

Register 23

Register 23 is the alarm 1 trigger.
0=Decreasing
1=Increasing

Register 24

Register 24 is the alarm 1 normal relay state.
0=Normally De-Energized
1=Normally Energized

Register 25

Register 25 is the alarm 1 relay reset.
0=Latching
1=Self-Resetting

Register 26

Register 26 is the alarm 1 ON delay.
Integer values are in seconds.

Register 27

Register 27 is the alarm 1 OFF delay.
Integer values are in seconds.

Register 28

Register 28 is the alarm 2 trigger.
0=Decreasing
1=Increasing

Register 29

Register 29 is the alarm 2 normal relay state.
0=Normally De-Energized
1=Normally Energized

Register 30

Register 30 is the alarm 2 relay reset.
0=Latching
1=Self-Resetting

Register 31

Register 31 is the alarm 2 ON delay.
Integer values are in seconds.

Register 32

Register 32 is the alarm 2 OFF delay.
Integer values are in seconds.

Register 33

Register 33 is zero suppression.
Toxics and LEL: 0%-6% of full scale
Oxygen: 0%-0.7% Oxygen
The decimal point location is the same as specified in Register 1.

Register 34

Register 34 is noise filter.
Integer values in seconds.
0-60 in 5 second increments.

Register 35

Register 35 is calibration timeout in minutes (5, 10, 15, 20, 25, or 30).

Register 36

Register 36 is calibration month (upper byte) and day (lower byte).
This is zero based (e.g. January=0 and the 1st=0).

Register 37

Register 37 is the calibration year.

Register 38

Register 38 is the calibration outcome.
Upper=Gas Operation
Lower=Air Operation

Calibration Outcome Codes:

1=Sensor Missing
2=Sensor Too Weak
3=Signal Too Strong
4=Not Enough Span
5=Negative Reading
6=Span Gas Value Is Not OK
7=Calculated Zero Is Too Low
8=Calculated Zero Is Too High
9=Zero Failure
10=Span Failure
11=Calibration Is Overscale
12=LEL Sensor Offset Is Too High
13=LEL Null Operation Failed
14=Operation Not Performed

Register 39

Register 39 is the auto-zero disable.
0=AutoZero Enabled
1=AutoZero Disabled

Register 40

Register 40 is the remote configuration register access level
0=None
1=Alarm Reset
2=All

NOTE: The default factory setting of Function Code 03, Register 40 is 1. If a value is written to Function Code 16, Register 21, that value is automatically copied to Function Code 03, Register 40. The M2A firmware looks to Function Code 03, Register 40 for the remote configuration setting.

Function Code 16: Write Registers

There are 21 registers in Function Code 16 that can be used to write to the M2A. This section only describes Registers 16 and 21 that can be used to reset an alarm condition. For a complete description of Function Code 16, see "Appendix C: Function Code 16 Registers" on page 58.

Register 16

Register 16 performs the same function as the ENTER button on the M2A. It is useful for remotely silencing alarms. With the M2A in an alarm condition, bit [0] can be used to silence it.

NOTE: Register 40 in Function Code 03, the remote configuration register, must be set to 1 or 2 in order for Register 16 to work.

Table 12: Register 16, Button Function

Bit	Value & Field
[0]	ENTER (used for "Alarm Reset") 0=Not Pressed 1=Pressed
[1]	DOWN/NO 0=Not Pressed 1=Pressed
[2]	UP/YES 0=Not Pressed 1=Pressed
[3]	HOLD STATUS 0=Buttons pressed and released 1=Buttons pressed and held

Register 21

Register 21 is the Remote Configuration Register.
0=No Remote Configuration
1=Reset Alarm
2=All

NOTE: The default factory setting of Function Code 03, Register 40 is 1. If a value is written to Function Code 16, Register 21, that value is automatically copied to Function Code 03, Register 40. The M2A firmware looks to Function Code 03, Register 40 for the remote configuration setting.

Chapter 9: Parts List

Table 13 lists replacement parts and accessories for the M2A Transmitter.

Table 13: Parts List

Part Number	Description
06-1248RK	Calibration kit sample tubing (3/16 in. x 5/16 in.; specify length when ordering)
07-0203RK	Rubber retaining boot for charcoal filter
18-0400RK-01	Detector junction box, with spacers
18-0440-01-01	M2A junction box
45-6132RK	Termination jumper
61-0140RK	LEL detector, catalytic type
71-0611	65-2640XL-04 M2A Transmitter Operator's Manual (this document)
81-0002RK-01	Calibration cylinder, 50% LEL hydrogen in air, 34 liter steel
81-0002RK-03	Calibration cylinder, 50% LEL hydrogen in air, 103 liter
81-0004RK-01	Calibration cylinder, 50% LEL propane in air, 34 liter steel
81-0004RK-03	Calibration cylinder, 50% LEL propane in air, 103 liter
81-0007RK-01	Calibration cylinder, 15% LEL hexane in air, 34 liter steel
81-0012RK-01	Calibration cylinder, 50% LEL methane in air, 34 liter steel
81-0012RK-03	Calibration cylinder, 50% LEL methane in air, 103 liter
81-0076RK-01	Zero air calibration cylinder, 34 liter steel
81-0076RK-03	Zero air calibration cylinder, 103 liter
81-1050RK	Regulator, with gauge and knob, 0.5 liter/minute continuous flow, for 17 liter and 34 liter steel calibration cylinders (cylinders with external threads)
81-1051RK	Regulator, with gauge and knob, 0.5 liter/minute continuous flow, for 34 liter aluminum/58 liter/103 liter calibration cylinders (cylinders with internal threads)
81-1116RK	Calibration adapter/splash guard

Appendix A: Control Button Quick Reference Guide

The M2A's control buttons allow access to operational modes, resetting of alarms, and display of the Information Screen. Table 14 shows which button combinations perform these functions and which parameters are available for adjustment while in the operational modes. While in these modes, display prompts showing a "?" require you to respond by pressing either the UP/YES (for yes) or DOWN/NO (for no) button. To change parameter settings, use the UP/YES and DOWN/NO buttons to get the desired setting, then press and release the ENTER button to accept the setting.

Table 14: Control Button Quick Reference Chart

Mode Entered or Function Performed	Button Combination	Adjustable or Viewable Parameters
Alarm Reset	Press and Release ENTER	n/a
Show Information Screen	Press and Hold DOWN/NO	• Input Voltage • M2A Version/Revision Information
Calibration Mode	Press and Hold UP/YES for 5 seconds	• Fresh Air Adjust • Span (or Zero for Oxygen) Adjust with Calibration Gas
Configuration Mode	Press and Hold UP/YES & ENTER for 5 seconds	• Alarm Levels • Increasing or Decreasing Alarms • Normally Energized or Normally De-energized Relays • Latching or Self-resetting Alarms • Alarm On Delay • Alarm Off Delay (if self-resetting) • Zero Suppression • Noise Filter • Calibration Time-out Period
Gas Type Mode	Press and Hold UP/YES and DOWN/NO for 5 seconds	Gas Type
Modbus Mode	Press and Hold DOWN/NO and ENTER for 5 seconds	• Enable or Disable Modbus • Slave ID • Baud Rate • Parity • Response Delay

Appendix B: PLC and DCS Device Wiring

The M2A can be wired to a PLC or DCS device if desired.

1. Guide multi conductor shielded cable or cables or wires in conduit through the top conduit hub of the junction box. The number of cables or wires needed will depend on whether any relays are used and whether the Modbus output is used. Use the following recommendations to determine how to wire the M2A:
   - If Modbus connections will not be used and only the PWR/SIG terminal strip connections will be used, use four conductor shielded cable or four wires in conduit for connections to the power/signal terminal strip.

Table 15: Wire Size for PWR/SIG Connections

Max Distance to Controller w/18 Gauge Wire	Max Distance to Controller w/16 Gauge Wire	Max Distance to Controller w/14 Gauge Wire
2,500 ft.	5,000 ft.	8,000 ft.

   - If the PWR/SIG terminal strip connections and one or more relays are used, route the connections to the M2A in conduit. Use shielded cable in the conduit for the PWR/SIG connections and unshielded cable or individual wires for the relay connections. Make sure any wire or cable used for relay wiring is appropriately rated for the power that it will carry.

NOTE: If shielded cable is used for the PWR/SIG connections, leave the cable shield's drain wire insulated and disconnected at the M2A. You will connect the opposite end of the cable's drain wire at the controller or device.

   - If the M2A will be wired into a Modbus network, see "Chapter 8: RS-485 Modbus Output" on page 43.

   See Figure 13 below for field wiring connections to the M2A.

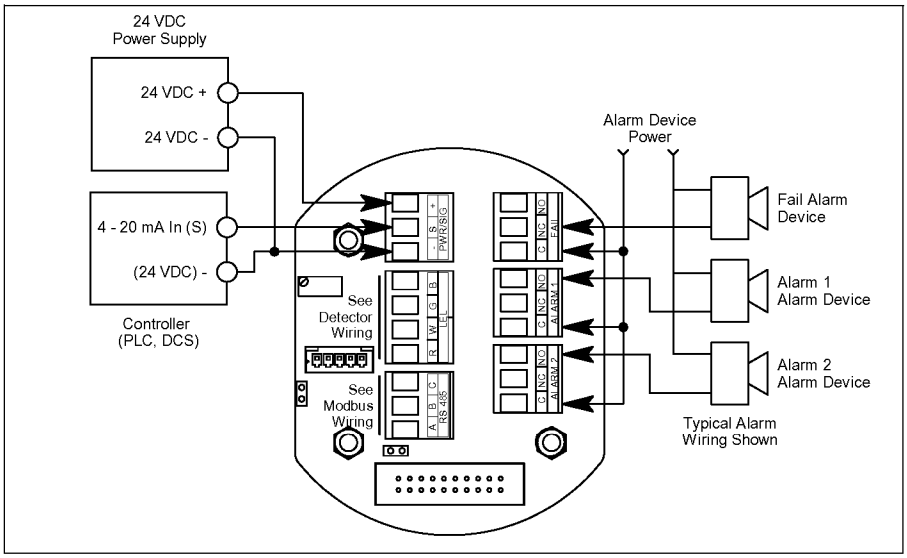


Figure 13: PLC and DCS Device Wiring

Appendix C: Function Code 16 Registers

The M2A supports Function Code 16 that allows writing to the M2A. There are 21 registers in this Function Code.

Register 1

Register 1 is the alarm 1 set point.
Value must be an integer. Any decimals are omitted.

Register 2

Register 2 is the alarm 1 trigger.
0=Decreasing
1=Increasing

Register 3

Register 3 is the alarm 1 relay state.
0=Normally De-Energized
1=Normally Energized

Register 4

Register 4 is the alarm 1 relay reset.
0=Latching
1=Self-Resetting

Register 5

Register 5 is the alarm 1 ON delay.
Integer value is in seconds.

Register 6

Register 6 is the alarm 1 OFF delay.
Integer value is in seconds.

Register 7

Register 7 is the alarm 2 set point.
Value must be an integer. Any decimals are omitted.
The decimal point location is the same as specified in Register 1 of Function Code 03.

Register 8

Register 8 is the alarm 2 trigger.
0=Decreasing
1=Increasing

Register 9

Register 9 is the alarm 2 relay state.
0=Normally De-Energized
1=Normally Energized

Register 10

Register 10 is the alarm 2 relay reset.
0=Latching
1=Self-Resetting

Register 11

Register 11 is the alarm 2 ON delay.
Integer value is in seconds.

Register 12

Register 12 is the alarm 2 OFF delay.
Integer value is in seconds.

Register 13

Register 13 is the zero suppression.
Toxics and LEL: 0%-6% Full Scale
Oxygen: 0%-0.7% Oxygen
Value must be an integer. Any decimals are omitted.

Register 14

Register 14 is the noise filter.
Integer value is in seconds (0-60 in 5 second increments).

Register 15

Register 15 is the calibration timeout.
Value is in minutes (5, 10, 15, 20, 25, or 30).

Register 16

Register 16 performs the same function as the ENTER button on the M2A. It is useful for remotely silencing alarms. With the M2A in an alarm condition, bit [0] can be used to silence it.

NOTE: Register 40 in Function Code 03, the remote configuration register, must be set to 1 or 2 in order for Register 16 to work.

Table 16: Register 16, Button Function

Bit	Value & Field
[0]	ENTER (used for "Alarm Reset") 0=Not Pressed 1=Pressed
[1]	DOWN/NO 0=Not Pressed 1=Pressed
[2]	UP/YES 0=Not Pressed 1=Pressed
[3]	HOLD STATUS 0=Button(s) pressed and released 1=Button(s) pressed and held

Register 17

Register 17 is the calibration month (MSB) and day (LSB).
This is zero-based (e.g. January=0 and the 1st=0).

Register 18

Register 18 is the calibration year.

Register 19

Register 19 is for clearing change flags. When parameters are changed at the M2A, a flag is raised at the controller. This register can be used to clear those flags.

Table 17: Register 19, Clear Change Flags

Bit(s)	Value & Field
[15:2]	Unused
[1]	Write "1" to this bit to clear "Gas Type Changed" flag

Table 17: Register 19, Clear Change Flags

Bit(s)	Value & Field
[0]	Write "1" to this bit to clear "Configuration Changed" flag

Register 20

Register 20 is the AutoZero Disable.
0=AutoZero Enabled
1=AutoZero Disabled

Register 21

Register 21 is the Remote Configuration Register.
0=No Remote Configuration
1=Reset Alarm
2=All

NOTE: The default factory setting of Function Code 03, Register 40 is 1. If a value is written to Function Code 16, Register 21, that value is automatically copied to Function Code 03, Register 40. The M2A firmware looks to Function Code 03, Register 40 for the remote configuration setting.

Appendix H

Draft Declaration of Restrictive Covenant

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DECLARATION OF RESTRICTIVE COVENANT

EGLE Reference No.: [ ]

This Declaration of Restrictive Covenant ("Restrictive Covenant") is made by Parkland Acquisition Six, LLC, a Michigan limited liability company, with offices at 75 W. Walton, Suite A, Muskegon, MI 49440, and has been recorded with the Muskegon County Register of Deeds for the purpose of protecting public health, safety, and welfare, and the environment by prohibiting or restricting activities that could result in unacceptable exposure to environmental contamination present at the property located at Muskegon, Michigan and legally described in Exhibit 1 attached hereto ("Property"). This Restrictive Covenant supplements the restrictive covenant recorded at Liber 4095, Page 639, Muskegon County Register of Deeds for the Property.

The Property contain hazardous substances in excess of the concentrations developed as the unrestricted residential criteria under Section 20120a(1)(a) of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.20101 et seq., therefore the provisions of Section 20107a of the NREPA apply to any future owner or operator of the Property.

The Property is associated with the former S.D. Warren Company Site [Site I.D. No. 61000066] (the "Site"), for which response activities have previously been conducted. Owner has implemented additional response activities to specifically address potential vapor intrusion risks on the Property. These activities are described in the Response Activity Plan, Vapor Intrusion Mitigation, 2400 Lakeshore Drive, Muskegon, Michigan, dated [July 2025] ("ResAp") filed with EGLE on [DATE]. The Michigan Department of Environment Great Lakes, and Energy (EGLE) approved the ResAp on [Date], pursuant to Part 201 of the NREPA. This Restrictive Covenant assures the vapor intrusion mitigation described in the ResAp is implemented and maintained in perpetuity on the Property.

Exhibit 1 provides a survey of the Property that is subject to this Restrictive Covenant. The Property does not include the entire Site.

Summary of Vapor Intrusion Response Activities

Residential structures on the Property will be constructed using podium style construction methods to mitigate potential intrusion of volatile organic constituents (VOCs), including methane, to indoor airspace of structures. The podium style construction will be in accordance with the

following requirements:

- Foundations for the residential buildings and attached garages shall be constructed such that the bottom of the flooring system of the building is a minimum of 2-feet above final grade;
- Openings to ventilate the podium:
    - Openings shall be located less than 6 inches below the bottom of the floor system
    - Openings shall be evenly distributed along the length of opposite sides of the building joists
    - Openings shall be the larger of 1.5 square feet for each 25 linear feet of wall or 1% of the underfloor area
    - Opening shall be covered with corrosion-resistant wire mesh screens with openings between ¼ inch and ½ inch in nominal dimension
- Sensors associated with operating combustible gas detectors shall be located in the podium area and in the indoor airspace above the floor; and
- Plumbing and other utilities placed in trenches shall be sealed with appropriately sized trench dams constructed using a bentonite cement slurry mixture or equivalent.

Externally mounted instrument enclosures will be provided to house combustible gas detectors. Remote sensing elements from the combustible gas detectors will be located in the podiums and the indoor airspace of the residential buildings and attached garages. Combustible gas detectors monitoring indoor airspace will communicate audio/visual alarms in the indoor airspace. All combustible gas detectors will communicate alarm information to the instrument enclosures with remote connection capabilities.

The instrument enclosures are intended to keep the instruments in operation by preventing access by unauthorized individuals, including individual homeowners. The instrument enclosures will provide a single access point for instrument maintenance. The instrument enclosures will also be provided with the ability to communicate alarm information externally to a third-party operation and maintenance (O&M) service provider.

Definitions

“EGLE” means the Michigan Department of Environment, Great Lakes, and Energy, its successor entities, and those persons or entities acting on its behalf.

"Owner" means at any given time the then current title holder of the Property or any portion thereof, and all incorporated or unincorporated associations or other entities created by or affiliated with the Owner in conjunction with the development of the Property or in which title holder(s) of the Property or any portion of the Property hold a membership or voting interest.

All other terms used in this document which are defined in Part 3, Definitions, of the NREPA and Part 201 of the NREPA.

NOW THEREFORE,

1. Declaration of Land Use or Resource Use Restrictions. Owner hereby declares and

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covenants that the Property shall be subject to the following restrictions and conditions:

a. Construction of enclosed residential structures on the Property is prohibited unless such construction incorporates the podium style construction method and appurtenant vapor monitoring systems as described in the ResAP, attached as Exhibit 2.

b. The Owner shall prohibit and not undertake any activities on the Property that may interfere with any element of the installed podium style construction and vapor monitoring systems described in the ResAP, or that deviate in any way from the operation and management plan for the systems attached as Exhibit 3. Except for the limited conditions outlined in Exhibit 3, and unless otherwise approved by EGLE, such prohibited activities shall include, but are not limited to: modifications to structures on the Property; modifications to vapor monitoring systems on the Property; and the turning off of vapor monitoring systems on the Property.

c. The Owner grants to EGLE and its designated representatives the right to enter the Property at reasonable times and after reasonable notice to the Master Association for the purpose of determining and evaluating implementation of vapor mitigation on the Property, including the right to take samples, inspect the operation of the response activities and any records relating thereto, and to perform any actions necessary to ensure the efficacy and safety of the vapor mitigation.

d. If all or part of the Property is developed under the Michigan Condominium Act, notice of the Owner restrictions and obligations of this covenant to future Owners shall be accomplished by recording these restrictions as part of the recorded master deed. So long as the Property continues to be used for those uses allowed for under the Michigan Condominium Act, EGLE will not require further notice for any transfer of an individual condominium unit or transfer of any other interest in the Property. Once any portion of the Property is dedicated to condominium ownership, the association of co-owners of the Condominium may communicate with EGLE on behalf of the co-owners of the Condominium and may consent to the modification of common element areas on behalf of all co-owners. However, should a change in the land use of the Property or portion thereof occur that terminates the use of the Property pursuant to the condominium form of ownership or that is otherwise not consistent with the Michigan Condominium Act, the Owner shall provide notice to the EGLE Chief of the Remediation and Redevelopment Division within 14 business days of such termination or change.

2. Term and Enforcement of Restrictive Covenant. This Restrictive Covenant runs with the Property and is binding on the Owner, future owners; and all current and future successors, lessees, easement holders, their assigns, and their authorized agents, employees, or persons acting under their direction and control. This Restrictive Covenant may only be modified or rescinded with the written approval of the EGLE.

3. Enforcement of Restrictive Covenant. The State of Michigan, through the EGLE, may enforce the restrictions set forth in this Restrictive Covenant by legal action in a court of competent jurisdiction.

4. Severability. If any provision of this Restrictive Covenant is held to be invalid by any court of competent jurisdiction, the invalidity of such provision shall not affect the validity of any

other provisions hereof, and all such other provisions shall continue unimpaired and in full force and effect.

5. Authority to Execute Restrictive Covenant. The undersigned person executing this Restrictive Covenant is the Owner, or has the express written permission of the Owner, and represents and certifies that he or she is duly authorized and has been empowered to execute and deliver this Restrictive Covenant.

IN WITNESS WHEREOF, the undersigned has caused this Restrictive Covenant, RC-RRD-201-10-14, to be executed on this _____day of_____, 20___.

PARKLAND ACQUISITION SIX, LLC, a
Michigan limited liability company

By: _____
Jonathan L. Rooks
Its: Manager

STATE OF MICHIGAN)
) SS
COUNTY OF MUSKEGON)

The foregoing instrument was acknowledged before me this ___ day of _____, 2025 by Jonathan L. Rooks, Manager of Parkland Acquisition Six, LLC, a Michigan limited liability company, on behalf of the company.

Notary Public

[*Print or type name*]
Acting in **[*Commissioned in*] County, [*State*]**

My Commission Expires:

[Doc. No.]

PREPARED BY AND RETURN TO:

Dennis J. Donohue
WARNER NORCROSS & JUDD LLP
150 Ottawa Ave NW,
Grand Rapids, Michigan 49503 (616) 752-200

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EXHIBIT 1

SURVEY AND LEGAL DESCRIPTION OF PROPERTY

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EXHIBITS 2

RESPONSE ACTIVITY PLAN, VAPOR INTRUSION MITIGATION, 2400 LAKESHORE DRIVE, MUSKEGON, MICHIGAN, DATED [JULY 2025]

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Exhibit 3

OPERATION AND MANAGEMENT PLAN

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