MEMO

To:

Christine Matlock, MDEQ

Joe Rogers, MDEQ

John McCabe, MDEQ

Copies:

Dave Favero, RACER

From:

Patrick Curry, Arcadis

Alex Villhauer, Arcadis

Date:

August 10, 2020

Arcadis Project No.:

30042872.04600

Subject:

RACER Lansing Biosparge System Installation Data Package, 2018-2020

The following memo provides a summary of data collected during the lower 1,4-dioxane biosparge system installation completed at the Revitalizing Auto Communities Environmental Response (RACER) Trust Plants 2 and 3 (Site) located in Lansing Township, Michigan. The biosparge system is designed to reduce the concentrations of the lower 1,4-dioxane plume extending from Plant 3 southeast to Plant 2 within the weathered bedrock and the lower 1,4-dioxane impacts in the weathered bedrock below the Plant 2 LNAPL area. Data, including soil boring logs, well construction logs and groundwater samples were all collected as part of the system installation. The following provides a brief overview of the work completed as a primer for the attached data package. Based on the new data, an updated lower 1,4-dioxane conceptual site model (CSM) and a biosparge system installation report are being prepared for submittal.

The weathered bedrock is generally observed to be ~70-90 feet below ground surface with variable thickness and a gradational vertical transition from the weathered to consolidated rock. The biosparge wells, updated area of 1,4-dioxane impacts, and portions of Plant 2 and 3 layout are shown on **Figure 1**. To guide placement of the biosparge system wells, vertical aquifer profile (VAP) samples were collected from the weathered bedrock prior to biosparge well installation. Follow-up performance monitoring wells have also been installed to monitor the future progress of the lower 1,4-dioxane remedy. Additional details regarding this scope of work were provided in the Interim Measures Workplan that was submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on October 19, 2018 (Arcadis 2018) and in the Plant 2 Annual Groundwater Monitoring Report (Arcadis, 2020).

BIOSPARGE SYSTEM DRILLING ACTIVITIES

The biosparge drilling activities were completed in a stepwise approach to allow informed drilling location determination. Biosparge installation included sonic drilling to weathered bedrock, collection of a VAP sample at select locations and, if suitable, installation of a 4-inch outer casing. If the 4-inch casing was installed, the point was finished by the installation of two sand lenses through the casing into the surrounding weathered bedrock, and then installation of a 2-inch well screen across the sand lenses and sealed with bentonite-cement within the 4-inch casing. Boreholes located outside the footprint of the lower 1,4-dioxane plume, as determined by VAP sample results, were abandoned with bentonite grout.

- A transect treatment approach was chosen based on the documented flow of groundwater onsite. The final system layout and surrounding wells are shown on **Figure 1**.
- At select biosparge locations, the initial drilling included VAP sampling with a rushed turn-around of analytical data from the laboratory to make informed decisions on where to complete the biosparge wells.
- A total of 48 biosparge wells were installed (41 on Plant 2 and 7 on Plant 3) and spaced roughly 30 feet apart. Placement of all biosparge locations was based on previous site investigation activities as well as the adaptive VAP sampling completed during the 2019 biosparge installation.
- An additional 20 borings were completed along the biosparge transects and were not converted to biosparge points based on VAP sample results. Of these locations, one was converted into a performance monitoring well (MW-19-115), and blank 4-inch casing was installed in six locations to facilitate future use if necessary. The remaining 13 locations were abandoned.
- Fifteen additional soil boring/VAP locations were completed in the area surrounding the transects to refine the conceptual site model (CSM) and seven were later converted to weathered bedrock performance monitoring wells (MW-19-109, MW-19-116, and MW-19-120 through MW-19-124).

Soil boring logs for each of the drilling locations are included as **Attachment 1**.

The sampling locations and analytical results are shown on **Figure 2A** for Plant 3 and **Figure 2B** for Plant 2. Samples were submitted to Merit Laboratories, Inc. in Lansing, Michigan and analyzed for 1,4-dioxane using USEPA Method 8260B-SIM. Analytical results for 1,4-dioxane are summarized on **Table 1**. The laboratory analytical reports, including the quality control samples are provided in **Attachment 2**.

If you have any questions, please contact Patrick Curry (Arcadis) at 810-225-1926 or Dave Favero (RACER Trust) at 734-879-9525.

Sincerely,

Arcadis of Michigan, LLC

Alex Villhauer
Staff Geologist

Patrick Curry, PG, CPG
Technical Expert (Geo)

Enclosures:

TABLES

Table 1 Biosparge Groundwater Analytical Data

FIGURES

Figure 1 Site Layout

Figure 2A 1,4-Dioxane Analytical Results – Plant 3

Figure 2B 1,4-Dioxane Analytical Results – Plant 2

ATTACHMENTS

Attachment 1 Soil Boring Logs

Attachment 2 Laboratory Analytical Reports

REFERENCES

Arcadis, 2018. Interim Measures Work Plan: Lower 1,4-Dioxane Biosparge. October 19, 2018.

Arcadis. 2019. Revised Interim Groundwater Monitoring Work Plan - 2019. RACER Trust, Lansing, Michigan, Plants 2, 3, and 6. October 28.

Arcadis. 2020. 2019 Annual Groundwater Monitoring Report. RACER Trust, Lansing, Michigan, Plant 3. May 4.

Tables

Table 1
Summary of Groundwater Analytical Results
2020 Biosparge Data Package
RACER Trust Plants 2 and 3 - Lansing, Michigan

Sample Location ID:	Screen Interval (ft bgs):	Date Collected:	1,4-Dioxane Result (µg/L)
AS-19-06	94-98	5/1/2019	5
AS-19-07	93-97	5/3/2019	**30**
AS-19-13	87-90	4/30/2019	**10**
ASP-B01	68-73	8/8/2019	**77**
ASP-B02	68-73	8/2/2019	**179**
ASP-B03	69-74	7/30/2019	**200 Y**
ASP-B04	70-75	7/31/2019	< 1
ASP-C02	72-77	8/22/2019	< 2
ASP-D01	62-67	9/25/2019	**42**
ASP-D04	56-61	9/30/2019	6
ASP-F01	71-75	7/15/2019	**99**
ASP-F02	67-71	7/24/2019	**64**
ASP-F03	71-75	7/26/2019	**350 Y**
ASP-G01	63-67	7/13/2019	3
ASP-G02	68-72	7/10/2019	**141**
ASP-G03	66-70	7/14/2019	**119**
CSP-B01	70-75	8/15/2019	< 1
CSP-D01	64-69	10/4/2019	**12**
PSP-B04	72-77	8/13/2019	**180**
PSP-B05	70-75	8/5/2019	< 1
PSP-C02	72-77	8/29/2019	< 1
PSP-C03	71-76	9/3/2019	< 2
PSP-C04	72-77	9/5/2019	< 2
PSP-C11	62-67	9/11/2019	< 1
PSP-D04	59-64	9/27/2019	7
PSP-E03	66-70	9/14/2019	**54**
PSP-E06	64-68	9/16/2019	< 1
PSP-E09	63-68	9/18/2019	< 1
PSP-E12	66-70	8/11/2019	**88**
PSP-F11	69-73	7/16/2019	**165**
PSP-F12	64-69	9/16/2019	**41**
PSP-G04	66-70	9/12/2019	**20**
MW-15-72	63-68	10/4/2019	**16**
MW-19-115 / PSP-C01	72.5-77.5	8/27/2019	**11**
MW-19-115 / PSP-C01	72.5-77.5	12/20/2019	< 1
MW-19-116 / VAP-P2-NF97	65-70	9/12/2019	**11**
MW-19-116 / VAP-P2-NF97	65-70	12/20/2019	**51**
MW-19-117 / VAP-P2-NI108	61-66	9/24/2019	< 2
MW-19-117 / VAP-P2-NI108	53-58	9/26/2019	**10**
MW-19-120 / VAP-P2-NU156	66-70	10/15/2019	**92**
MW-19-120 / VAP-P2-NU156	66-70	12/4/2019	**165**

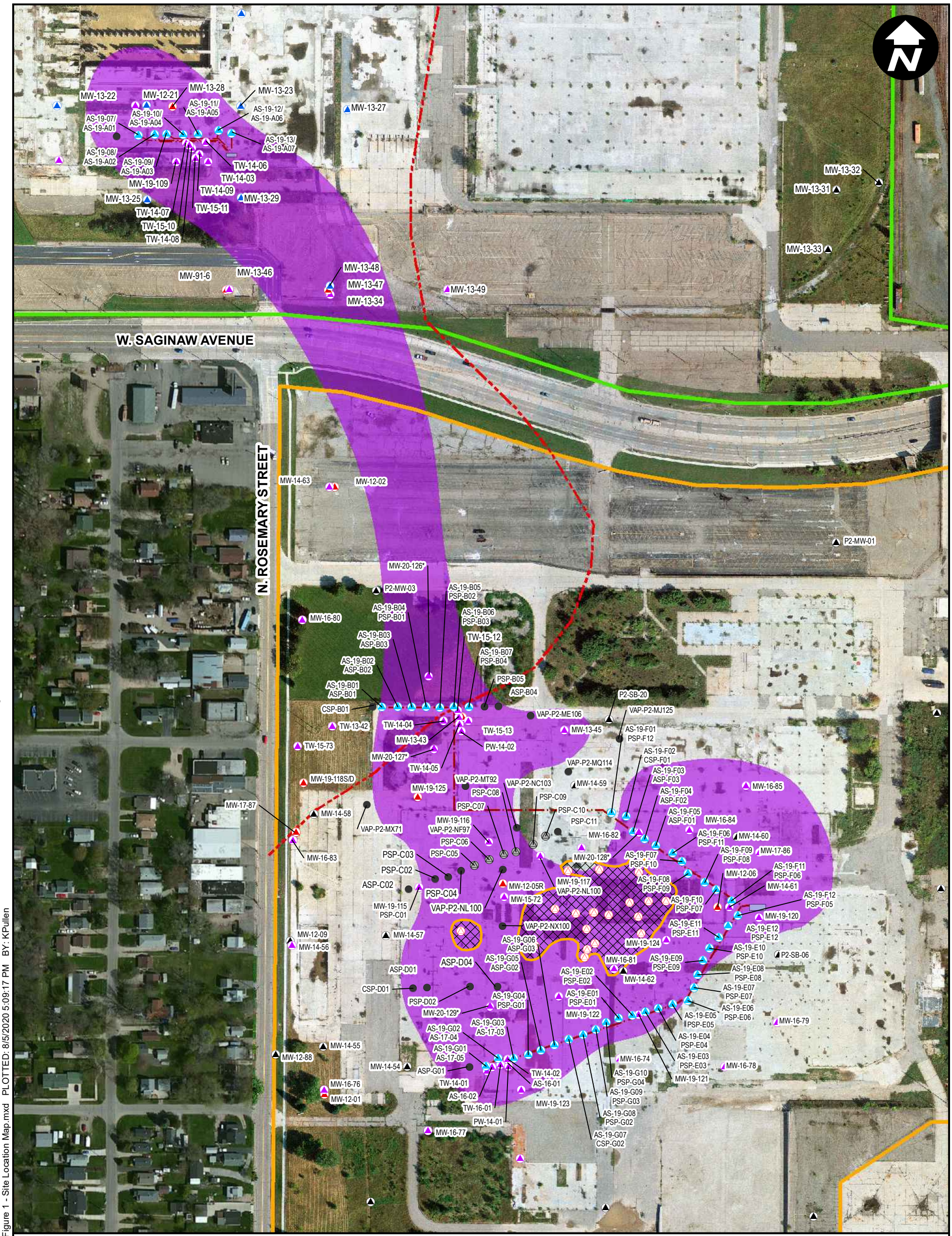
Table 1
Summary of Groundwater Analytical Results
2020 Biosparge Data Package
RACER Trust Plants 2 and 3 - Lansing, Michigan

Sample Location ID:	Screen Interval (ft bgs):	Date Collected:	1,4-Dioxane Result (µg/L)
MW-19-121 / VAP-P2-OQ129	66-70	10/16/2019	**110**
MW-19-121 / VAP-P2-OQ129	66-70	12/4/2019	**99**
MW-19-122 / VAP-P2-OM112	58-62	10/16/2019	**135**
MW-19-122 / VAP-P2-OM112	58-62	12/3/2019	**43**
MW-19-123 / VAP-P2-PG104	66-70	10/17/2019	5
MW-19-123 / VAP-P2-PG104	66-70	12/3/2019	**52**
MW-19-124 / VAP-P2-OA135	65-69	10/18/2019	**196**
MW-19-124 / VAP-P2-OA135	65-69	12/4/2019	**220 Y**
VAP-P2-ME106	71-76	10/14/2019	**12**
VAP-P2-MT92	71-76	10/14/2019	<1
VAP-P2-MJ125	65-70	10/11/2019	<1
VAP-P2-MQ114	66-71	10/11/2019	<1
VAP-P2-MX71	68-73	10/7/2019	**18**
VAP-P2-NC103	63-68	9/20/2019	3
VAP-P2-NC103	56-61	9/26/2019	7
VAP-P2-NL100	65-70	9/23/2019	< 1
VAP-P2-NX100	59-64	9/25/2019	6

Notes:
Bold font - indicates an exceedance of the Residential Drinking Water (DW) Criteria
ft bgs - feet below ground surface
µg/L - micrograms per liter
Samples were analyzed for 1,4-Dioxane via USEPA Method 8260B-SIM.
Part 201 Residential Drinking Water (DW) Criteria is 7.2 µg/L (DEQ2018).

Lab and Validation Data Qualifiers:
J - The compound/constituent was positively identified, but the associated numerical value is an estimated concentration only.
Y - Elevated reporting limit due to high target concentration.

Figures



CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: B0064479.2019 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
C:\GIS_RACER_Lansing\MXDs\2020_Biosparge\Data_Package\Figure 1 - Site Location Map.mxd PLOTTED: 8/5/2020 5:09:17 PM BY: KPullen

LEGEND

WELLS

- BIOSPARGE POINT
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- DEEP OVERBUDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- BLANK CASING
- SOIL BORING/VAP
- LNAPL EXTENT
- 1-INCH CONVEYANCE HOSE
- SYSTEM BUILDING
- SAGINAW / GRAND RIVER FORMATION BOUNDARY
- LOWER 1,4-DIOXANE IMPACTS > DW CRITERIA (7.2 µg/L)

PLANT BOUNDARIES

- PLANT 2
- PLANT 3

0 200 400
SCALE IN FEET

NOTES:
1. * - APPROXIMATE LOCATION IS SHOWN. WELL HAS NOT YET BEEN SURVEYED.

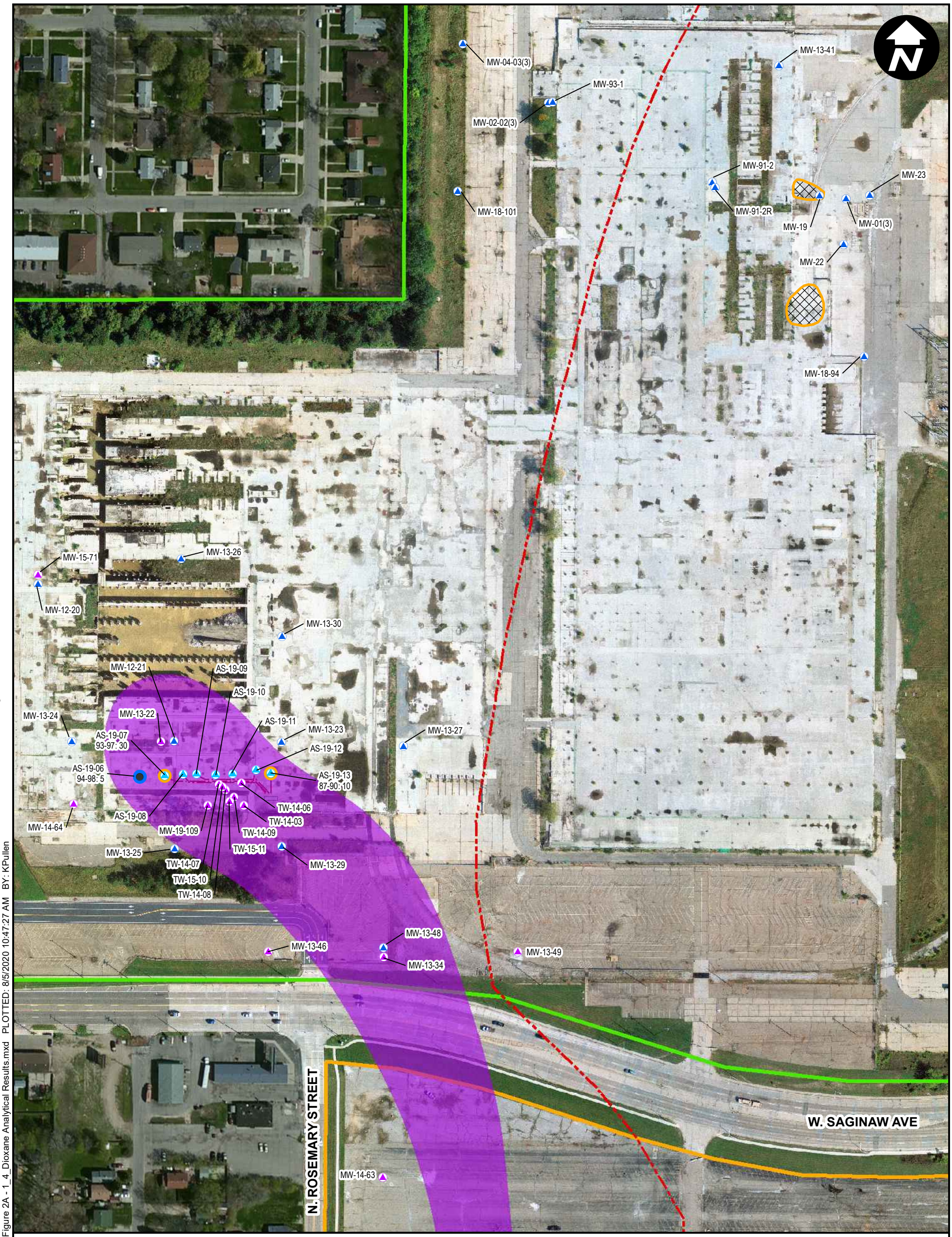
DRAFT

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

SITE LAYOUT

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1



CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: B0064479.2019 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
C:\GIS_RACER_Lansing\MXDs\2020_Biosparge\Data_Package\Figure 2A - 1_4_Dioxane Analytical Results.mxd PLOTTED: 8/5/2020 10:47:27 AM BY: KPullen

LEGEND

WELLS

- BIOSPARGE POINT
- DEEP OVERBUDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- LNAPL EXTENT
- SYSTEM BUILDING
- SAGINAW/ GRAND RIVER FORMATION BOUNDARY
- LOWER 1,4-DIOXANE IMPACTS > DW CRITERIA (7.2 µg/L)

PLANT BOUNDARIES

- PLANT 2
- PLANT 3

NOTES:
1. BIOSPARGE SAMPLES WERE COLLECTED FROM APRIL THROUGH SEPTEMBER 2019. VAP SAMPLES WERE COLLECTED FROM SEPTEMBER THROUGH OCTOBER 2019. MONITORING WELL SAMPLES WERE COLLECTED IN DECEMBER 2019.
2. ALL ANALYTICAL RESULTS ARE LISTED IN MICROGRAMS PER LITER (µg/L).
3. ALL SAMPLES WERE ANALYZED VIA EPA METHOD 8260B-SIM.

0 190 380
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

1,4-DIOXANE ANALYTICAL RESULTS - PLANT 3

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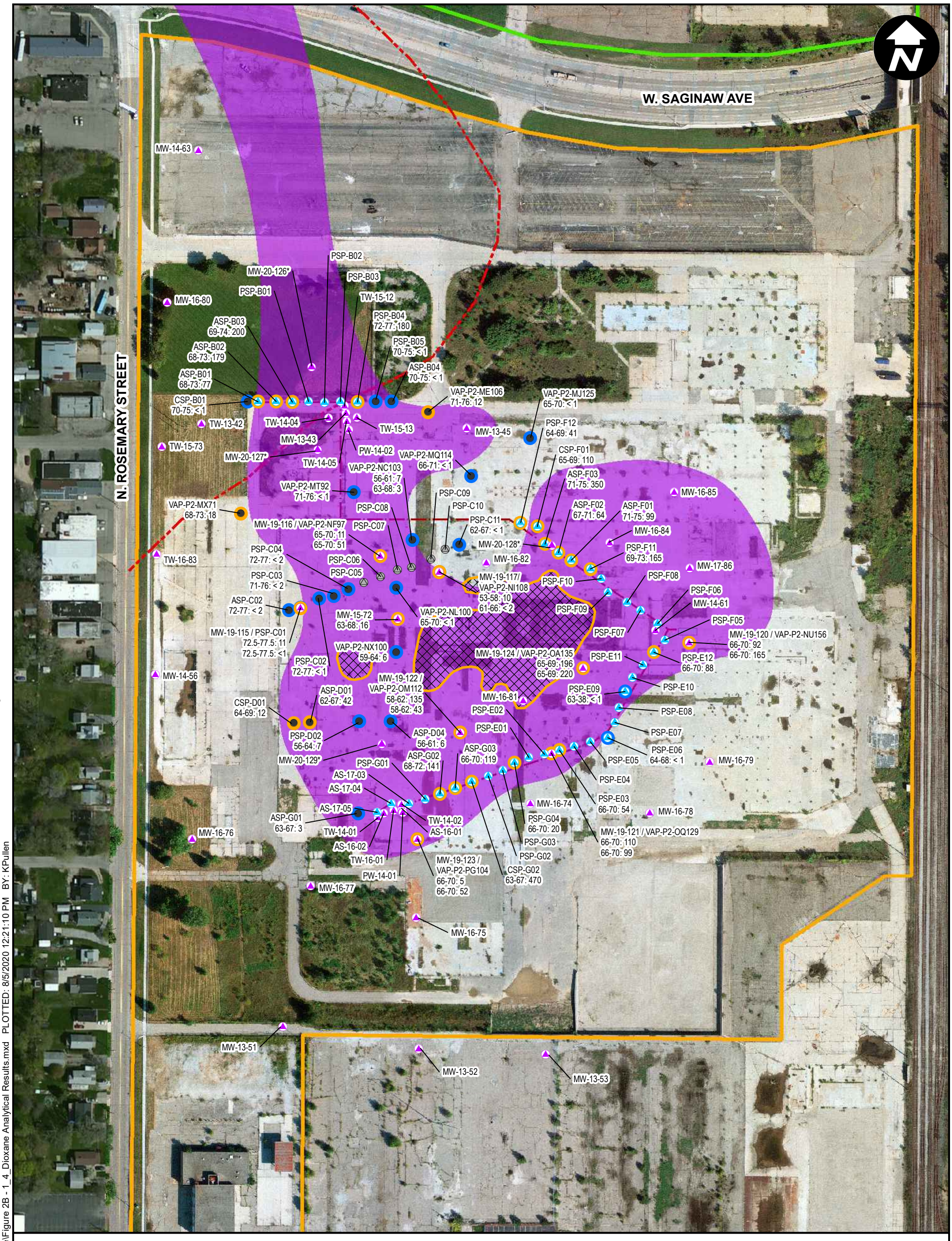
FIGURE
2A



CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: B0064479.2019 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
C:\GIS_RACER_Lansing\MXDs\2020_Biosparge\Data_Package\Figure 2B - 1_4_Dioxane Analytical Results.mxd PLOTTED: 8/5/2020 12:21:10 PM BY: KPullen

LEGEND

WELLS

- BIOSPARGE POINT
- WEATHERED BEDROCK MONITORING WELL
- BLANK CASING
- SOIL BORING/VAP
- LNAPL EXTENT
- 1-INCH CONVEYANCE HOSE
- SYSTEM BUILDING
- SAGINAW / GRAND RIVER FORMATION BOUNDARY
- LOWER 1,4-DIOXANE IMPACTS > DW CRITERIA (7.2 µg/L)
- EXCEEDS RESIDENTIAL DRINKING WATER CRITERIA VALUE OF 7.2 µg/L
- DOES NOT EXCEED RESIDENTIAL DRINKING WATER CRITERIA OF 7.2 µg/L

PLANT BOUNDARIES

- PLANT 2
- PLANT 3

0 190 380
SCALE IN FEET

NOTES:
1. BIOSPARGE SAMPLES WERE COLLECTED FROM APRIL THROUGH SEPTEMBER 2019. VAP SAMPLES WERE COLLECTED FROM SEPTEMBER THROUGH OCTOBER 2019. MONITORING WELL SAMPLES WERE COLLECTED IN DECEMBER 2019.
2. ALL ANALYTICAL RESULTS ARE LISTED IN MICROGRAMS PER LITER (µg/L).
3. ALL SAMPLES WERE ANALYZED VIA EPA METHOD 8260B-SIM.
4. * - APPROXIMATE LOCATION IS SHOWN. WELL HAS NOT YET BEEN SURVEYED.

DRAFT

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

1,4-DIOXANE ANALYTICAL RESULTS - PLANT 2

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FIGURE
2B

ATTACHMENT 1

Soil Boring Logs

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Soil Boring Log

Boring No.: PSP-G01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450815.5
East Coor: 13064586.5

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-51.0') SAND, fine, subrounded; little silt; well sorted; dry; brown (10YR 5/3).		
51					0.0		(51.0-56.5') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little to some fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; dark gray (10YR 4/1) to gray (10YR 5/1). Note: Little fragments of sandstone with finely interbedded shale.		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0		(56.5-57.0') Large sandstone cobble.		
58					0.0		(57.0-57.5') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little to some fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
59					0.0		(57.5-58.5') SAND, fine to medium, subrounded; trace coarse sand, subrounded; trace silt; well sorted; moist; brown (10YR 5/3).		
60					0.0		(58.5-61.0') WEATHERED SANDSTONE and SHALE, interbedded; very fine; loosely consolidated. Note: Little soft sand matrix.		
61					0.0				
62					0.0		(61.0-66.0') WEATHERED SHALE, trace interbedded sandstone; loosely consolidated; moist; dark gray (10YR 4/1). Note: Low competency.		
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-G01

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-66.0') WEATHERED SHALE, trace interbedded sandstone; loosely consolidated; moist; dark gray (10YR 4/1). Note: Low competency.		
65			120		0.0				
66					0.0				
67					0.0		(66.0-68.0') WEATHERED SHALE, some interbedded sandstone, moderately consolidated; gray (10YR 5/1) to light gray (10YR 7/1). Note: Low to medium competency.		
68					0.0				
69					0.0		(68.0-69.0') WEATHERED SHALE, trace interbedded sandstone, loosely consolidated; moist; dark gray (10YR 4/1). Note: Low competency.		
70					0.0		(69.0-70.0') SANDSTONE, very fine to fine, subrounded; well sorted; highly consolidated. Note: High competency with many large sandstone fragments in trace soft sand matrix.		
71					0.0		(70.0-75.0') SANDSTONE and SHALE, gray (10YR 5/1). Note: Medium competency.		
72					0.0				
73					0.0				
74					0.0				
75			120		0.0				
76					0.0		(75.0-77.5') SHALE, some interbedded sandstone, dark gray (10YR 4/1). Note: Medium competency.		
77					0.0				
78					0.0		(77.5-80.0') SANDSTONE, trace shale; light gray (10YR 7/1). Note: High competency.		
79					0.0				
80					0.0				
81							End of Boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/11/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-40.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450853.0
East Coor: 13064701.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-G02

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/11/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21			480				(0.0-40.0') Blind drilled.		
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41	◇				0.0	▨	(40.0-47.0') CLAY, medium to high plasticity, no dilatancy; some silt; little very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium sitff; gray (10YR 5/1).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-G02

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/11/2019
Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(40.0-47.0') CLAY, medium to high plasticity, no dilatancy; some silt; little very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium sitff; gray (10YR 5/1).		
43					0.0				
44					0.0				
45			108		0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-50.0') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; gray (10YR 6/1).		
49					0.0				
50					0.0				
51					0.0		(50.0-51.5') CLAY; and SILT, nonplastic, no dilatancy; little very fine to fine sand, subrounded; little to trace granules to small pebbles, subrounded; moist; stiff; light brownish gray (10YR 6/2).		
52					0.0		(51.5-55.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/2). Note: Some small to large fragments of brittle sandstone in a mostly soft sand matrix. Loose with no competency. Heavily weathered.		
53					0.0				
54					0.0				
55			120		0.0				
56					0.0		(55.0-57.0') WEATHERED SANDSTONE; some very fine interbedded shale laminations; very fine; well sorted; light gray (10YR 7/2) to gray (10YR 5/1). Note: Some small to large fragments with little to some soft sand matrix. Loose with little to no competency. Moderately weathered.		
57					0.0				
58					0.0		(57.0-58.0') WEATHERED SHALE; little finely interbedded sandstone, very fine; well sorted; dark grayish brown (10YR 4/2). Note: Moderate competency. Many large fragments.		
59					0.0		(58.0-63.0') WEATHERED SANDSTONE; some interbedded shale, very fine; well sorted; gray (10YR 6/1) to light gray (10YR 7/2). Note: Moderate to high competency with many large fragments.		
60					0.0				
61					0.0				
62					0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANAL YSIS\BORING LOGS\RACER LANSING MASTER DATABASE 041720.GPJ ARCADIS 2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/11/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-67.0') WEATHERED SHALE; and SANDSTONE; interbedded; very fine; well sorted; light gray (10YR 7/2) to gray (10YR 5/1). Note: Moderate to high competency. Many large fragments with little to no soft sand matrix.		
65			72		0.0				
66					0.0				
67					0.0				
68					0.0		(67.0-72.5') SHALE; trace very fine sandstone laminations; dark gray (10YR 4/1). Note: Highly competent.		
69					0.0				
70					0.0				
71					0.0				
72					0.0				
73					0.0		(72.5-73.5') SANDSTONE, very fine, well sorted; light gray (10YR 7/2). Note: Highly competent.		
74			84		0.0		(73.5-75.0') SHALE; trace very fine sandstone laminations; dark gray (10YR 4/1). Note: Highly compentent.		
75					0.0				
76					0.0		(75.0-77.0') SHALE; interbedded sandstone; dark gray (10YR 4/1) to light gray (10YR 7/2),		
77					0.0				
78							End of boring at 77.0' bgs.		
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G03

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/11/2019
Date Completed: 09/12/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 450862.8
East Coor: 13064731.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G03

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/11/2019
Date Completed: 09/12/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G03

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/11/2019
Date Completed: 09/12/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51			120		0.0		(50.0-51.0') CLAY; and SILT, low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff to stiff; light brownish gray (10YR 6/2).		
52					0.0		(51.0-57.0') WEATHERED SANDSTONE, very fine, well sorted; light gray (10YR 7/2). Note: Some small to large fragments of very brittle sandstone in a mostly soft sand matrix. Loosely consolidated with no competency.		
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-60.0') WEATHERED SANDSTONE; some very finely interbedded shale laminations; very fine; well sorted; light gray (10YR 7/2) to gray (10YR 5/1). Note: Some small to large fragments of brittle sandstone with little soft sand matrix. Loosely consolidated with slight increase in competency; slightly competent.		
59					0.0				
60					0.0				
61					0.0		(60.0-65.0') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. Little fragments in mostly a brittle, loose, soft clay matrix. No competency.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G03

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/11/2019
Date Completed: 09/12/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-65.0') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. Little fragments in mostly a brittle, loose, soft clay matrix. No competency.		
65			120		0.0				
66					0.0		(65.0-72.0') SHALE; trace very fine sandstone laminations; dark gray (10YR 4/1). Note: Moderate to high competency.		
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0				
72					0.0		(72.0-75.0') SANDSTONE, very fine, well sorted; light gray (10YR 7/2). Note: Highly competent.		
73					0.0				
74					0.0				
75			120		0.0		(75.0-76.5') SHALE; dark gray (10YR 4/1). Note: Highly competent.		
76					0.0				
77					0.0		(76.5-80.0') SANDSTONE; interbedded shale; dark gray (10YR 4/1) to light gray (10YR 7/2).		
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G04

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019
Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			60		0.0		(0.0-5.0') SAND, very fine; trace large pebbles; subrounded to subangular; poorly sorted; brown (10YR 5/3). Note: Fill.		
2					0.0				
3					0.0				
4					0.0				
5					0.0				
6			60		0.0		(5.0-9.0') SAND; fine; trace small pebbles; subrounded to subangular; poorly sorted; wet; brown (10YR 5/3). Note: Fill.		
7					0.0				
8					0.0				
9					0.0				
10					0.0		(9.0-11.0') PEBBLES, medium to large, subangular; dark grayish brown (10YR 4/2). Note: Fill.		
11			120		0.0		(11.0-12.0') CLAY, high plasticity, slow dilatancy; some sand; some pebbles, subrounded; poorly sorted; wet; soft; dark gray (10YR 4/1).		
12					0.0		(12.0-20.0') CLAY, medium plasticity, slow dilatancy; some sand; some large pebbles, subrounded; poorly sorted; dark gray (10YR 4/1).		
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 450872.5
East Coor: 13064757.7

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-G04

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-22.0') CLAY, high plasticity, slow dilatancy; trace pebbles, subangular to subrounded; gray (10YR 5/2).		
22					0.0				
23					0.0		(22.0-25.0') CLAY, medium plasticity, slow dilatancy; trace pebbles, subangular to subrounded; gray (10YR 5/2).		
24					0.0				
25			120		0.0				
26					0.0		(25.0-26.0') SAND, very fine to medium; trace pebbles, subrounded to subangular; poorly sorted.		
27					0.0		(26.0-30.0') CLAY, medium plasticity, slow dilatancy; trace pebbles, subangular to subrounded; gray (10YR 5/2).		
28					0.0				
29					0.0				
30					0.0				
31					0.0		(30.0-36.0') CLAY, medium plasticity, slow dilatancy; trace pebbles, subangular to subrounded; gray (10YR 5/2).		
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0		(36.0-40.0') CLAY, medium plasticity, slow dilatancy, trace sand, fine to medium; trace pebbles, subrounded to subangular; stiff; gray (10YR 5/2).		
38					0.0				
39					0.0				
40					0.0				
41					0.0		(40.0-46.0') CLAY, some silt, medium plasticity, no dilatancy; trace to little very fine sand; trace pebbles, small to very large, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-G04

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(40.0-46.0') CLAY, some silt, medium plasticity, no dilatancy; trace to little very fine sand; trace pebbles, small to very large, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
43					0.0				
44					0.0				
45			120		0.0				
46					0.0				
47					0.0		(46.0-50.0') SAND, very fine to fine, subrounded, little to some silt; poorly sorted; dry to moist; grayish brown (10YR 5/2).		
48					0.0				
49					0.0				
50					0.0				
51					0.0		(50.0-52.0') SANDSTONE; well sorted; light gray (10YR 7/1).		
52					0.0				
53					0.0		(52.0-52.5') CLAY, some silt, medium plasticity, no dilatancy; trace to little very fine sand; trace pebbles, small to very large, subrounded to subangular; moist; medium stiff; grayish brown (10YR 5/2).		
54					0.0		(52.5-60.0') WEATHERED SANDSTONE with little very finely interbedded shale laminations, very fine; well sorted; light gray (10YR 7/2) to gray (10YR 5/1).		
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-68.0') SHALE with little interbedded sandstone; dark gray (10YR 4/1). Note: Moderately competent.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-G04

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-68.0') SHALE with little interbedded sandstone; dark gray (10YR 4/1). Note: Moderately competent.		
65			120		0.0				
66					0.0				
67					0.0				
68				PSP-G04(66-70) (091219) @ 1425	0.0				
69					0.0		(68.0-73.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/2). Note: Highly competent.		
70					0.0				
71					0.0				
72					0.0				
73					0.0				
74					0.0		(73.0-74.0') SHALE; dark gray (10YR 4/1). Note: Moderately competent.		
75			120		0.0		(74.0-80.0') SANDSTONE with interbedded shale; dark gray (10YR 4/1) to light gray (10YR 7/2).		
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-ME106

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/11/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-0.8') CONCRETE.		
2					0.0		(0.8-3.5') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded; trace silt, poorly sorted; dry to moist; yellowish brown (10YR 5/6).		
3					0.0				
4			84		0.0		(3.5-8.0') CLAY, little silt, high plasticity, no dilatany; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff, grayish brown (10YR 5/2). Note: Mottled from 5.5-7.0' bgs.		
5					0.0				
6					0.0				
7					0.0				
8					0.0		(8.0-15.0') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles; subrounded; moist; stiff; pale brown (10YR 6/3).		
9					0.0				
10					0.0				
11					0.0				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0		(15.0-15.3') SAND, very fine to medium, subrounded; trace granules, subrounded; poorly sorted, moist to wet; yellowish brown (10YR 5/4).		
17					0.0		(15.3-29.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 861.1
North Coor: 45155.0
East Coor: 13064596.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-ME106

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/11/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(15.3-29.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0		(29.0-45.0') CLAY and SILT, medium to low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to vary large pebbles, subrounded; moist; medium stiff; gray (10YR 5/1).		
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-ME106

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/11/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(29.0-45.0') CLAY and SILT, medium to low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to vary large pebbles, subrounded; moist; medium stiff; gray (10YR 5/1).		
43					0.0				
44					0.0				
45					0.0				
46					0.0		(45.0-48.5') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/2).		
47					0.0				
48					0.0				
49					0.0		(48.5-58.5') CLAY and SILT, low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0		(58.5-63.0') SAND, fine, subrounded; trace silt; well sorted; moist to dry; light brownish gray (10YR 6/2).		
60					0.0				
61					0.0				
62			84		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-ME106

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/11/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-69.0') SILT, trace clay, nonplastic, no dilatancy to slow dilatancy; trace to little granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Trace small to large fragments of sandstone.		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69			48		0.0				
70					0.0		(69.0-71.0') WEATHERED SHALE; dark gray (10YR 4/1) with trace very fine sandstone laminations; light gray (10YR 7/1).		
71					0.0				
72					0.0		(71.0-77.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1) with trace very fine shale laminations; dark gray (10YR 4/1). Note: Highly competent with many large cores.		
73				VAP-P2-ME106(71-76) (101419) @ 0815	0.0				
74			48		0.0				
75					0.0				
76					0.0				
77					0.0				
78							End of boring at 77.0' bgs.		
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MJ125

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.0') CONCRETE.		
2					0.0		(1.0-9.0') SAND, fine, subrounded; trace granules to medium pebbles, subrounded; trace silt; well sorted; dry; light yellowish brown (10YR 6/4). Note: Fill.		
3					0.0				
4			84		0.0				
5					0.1				
6					0.0				
7					0.0				
8					1.1				
9					3.3		Note: Slight odor and dark gray (10YR 4/1) discoloration at 8.0' bgs.		
10					0.6		(9.0-19.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; gray (10YR 5/1).		
11					0.1				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 861.4
North Coor: 451476.1
East Coor: 13064777.4

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MJ125

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.0-26.5') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granuels to large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0		(26.5-30.0') SAND, very fine to fine, subrounded; little silt; well sorted; moist; light brownish gray (10YR 6/2).		
28					0.0				
29					0.0				
30					0.0		(30.0-35.0') SAND, fine to medium, subrounded; little silt; well sorted; moist to wet; light brownish gray (10YR 6/2).		
31					0.0				
32			84		0.0				
33					0.0				
34					0.0				
35					0.0				
36					NA		(35.0-54.0') No Recovery. Large cobble jammed in the core barrel caused no recovery.		
37					NA				
38					NA				
39					NA				
40					NA				
41					NA				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MJ125

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			0		NA		(35.0-54.0') No Recovery. Large cobble jammed in the core barrel caused no recovery.		
43					NA				
44					NA				
45					NA				
46					NA				
47					NA				
48					NA				
49					NA				
50					NA				
51					NA				
52			36		NA				
53					NA				
54					NA				
55					0.0		(54.0-57.0') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; gray (10YR 6/1).		
56					0.0				
57					0.0				
58					0.0		(57.0-65.5') CLAY and SILT, low plasticity to nonplastic, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; dry; stiff to very stiff; gray (10YR 5/1). Note: Some small to large fragments of sandstone and shale intermixed.		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MJ125

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(57.0-65.5') CLAY and SILT, low plasticity to nonplastic, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; dry; stiff to very stiff; gray (10YR 5/1). Note: Some small to large fragments of sandstone and shale intermixed.		
65					0.0				
66					0.0		(65.5-67.5') WEATHERED SHALE with little interbedded sandstone; well sorted; dark gray (10YR 4/1) to light gray (10YR 7/1). Note: Heavily weathered, no competency.		
67					0.0				
68				VAP-P2-MJ125(65-70) (101119) @ 1225	0.0		(67.5-68.5') WEATHERED SHALE and SANDSTONE; finely interbedded; well sorted; dark gray (10YR 4/1) to light gray (10YR 7/1). Note: Moderate weathering, low competency.		
69			36		0.0		(68.5-70.0') SANDSTONE with trace fine shale laminations, very fine; well sorted; light gray (10YR 7/1). Note: Moderate to high competency.		
70					0.0				
71							End of boring at 70.0' bgs.		
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-MQ114

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.0') CONCRETE.		
					0.0		(1.0-1.5') SAND, fine, subrounded; trace silt; well sorted; dry; yellowish brown (10YR 5/6).		
2					0.0		(1.5-5.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Fill. Trace fragments of plastic.		
3									
4			84		0.0				
5					0.0				
6					0.0		(5.0-10.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine sand, subrounded; trace granules subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
7					0.0				
8					0.0				
9					0.0				
10					0.0				
11					0.0		(10.0-13.0') SAND, very fine to fine, subrounded; and SILT, little clay, low plasticity, rapid dilatancy; wet; well sorted; soft; yellowish brown (10YR 5/6).		
12			120		0.0				
13					0.0		(13.0-17.0') CLAY, trace silt, high plasticity, no dilatancy; moist; medium stiff; gray (10YR 5/1).		
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-19.5') SAND, very fine to coarse, subangular; little silt; poorly sorted; wet; grayish brown (10YR 5/2).		
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 861.7
North Coor: 451408.7
East Coor: 13064680.9

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MQ114

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-26.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded, moist; medium stiff to soft; grayish brown (10YR 5/2).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0		(26.0-35.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0		(35.0-39.0') CLAY, little silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff to soft; grayish brown (10YR 5/2).		
37					0.0				
38					0.0				
39					0.0				
40					0.0		(39.0-47.0') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MQ114

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(39.0-47.0') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		
43					0.0				
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-52.0') CLAY and SILT, low plasticity to nonplastic; little fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; very stiff; gray (10YR 5/1).		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0		(52.0-64.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little to some fine sand, subrounded; trace granules to small pebbles, subrounded; dry; very stiff; gray (10YR 5/1). Note: Some small to very large fragments of sandstone intermixed.		
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61			102		0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MQ114

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/10/2019
Date Completed: 10/11/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0				
65					0.0		(64.0-65.5') WEATHERED SHALE; dark gray (10YR 4/1) with some finely interbedded sandstone, very fine, well sorted; light gray (10YR 7/1). Note: Heavily weathered with no competency.		
66			66	VAP-P2-MQ114(66-71)(101019) @ 0840	0.0		(65.5-69.5') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1) with little finely interbedded shale; dark gray (10YR 4/1). Note: Moderate weathering with low competency.		
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.5-71.5') SANDSTONE; light gray (10YR 7/1). Note: Highly competent.		
71					0.0				
72							End of boring at 71.5' bgs.		
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-MT92

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/14/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-2.0') CONCRETE.		
2					NA				
3			84		0.0		(2.0-5.5') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded; trace silt; poorly sorted; dry to moist; yellowish brown (10YR 5/6). Note: Fill.		
4					0.0				
5					0.0				
6					0.0		(5.5-7.5') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; moist; stiff; gray (10YR 5/1).		
7					0.0				
8					0.0		(7.5-15.0') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded; trace silt; poorly sorted; moist; yellowish brown (10YR 5/6).		
9					0.0				
10					0.0				
11					0.0				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0		(15.0-17.0') CLAY, little silt, high plasticty, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
17					0.0				
18					0.0		(17.0-19.5') SAND, very fine to fine, subrounded; trace silt; well sorted; wet; light brownish gray (10YR 6/2).		
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 863.1
North Coor: 451384.1
East Coor: 13064455.5

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MT92

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/14/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-28.5') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0		(28.5-44.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; dry; light brownish gray (10YR 6/2).		
30					0.0				
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MT92

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/14/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(28.5-44.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; dry; light brownish gray (10YR 6/2).		
43					0.0				
44					0.0				
45					0.0		(44.0-49.5') SAND, very fine to fine, subrounded; some silt; well sorted; dry to moist; light brownish gray (10YR 6/2).		
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0		(49.5-57.0') SAND, fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		
51					0.0				
52			96		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-71.0') CLAY and SILT, low plasticity to nonplastic; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff to very stiff; grayish brown (10YR 5/2). Note: Trace small to large fragments of sandstone and shale.		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-MT92

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/14/2019
Date Completed: 10/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(57.0-71.0') CLAY and SILT, low plasticity to nonplastic; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff to very stiff; grayish brown (10YR 5/2). Note: Trace small to large fragments of sandstone and shale.		
65					0.0				
66					0.0				
67					0.0				
68					0.0		Note: Increase in Sandstone and Shale fragments at 67.0' bgs.		
69					0.0				
70			72		0.0				
71					0.0				
72					0.0		(71.0-73.5') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/2) and SHALE; dark gray (10YR 4/1); finely interbedded. Note: Heavily weathered, no competency.		
73					0.0				
74				VAP-P2-MT92(71-76) (101419) @ 1430	0.0		(73.5-77.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/2) with trace to little very fine shale laminations; dark gray (10YR 4/1). Note: Highly competent.		
75			48		0.0				
76					0.0				
77					0.0				
78							End of boring at 77.0' bgs.		
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-MX71

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/04/2019
Date Completed: 10/04/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 48° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-0.3') CONCRETE.		
2					NA		(0.3-7.0') CLAY and SILT, high plasticity, no dilatancy; some small large pebbles, subangular to subrounded; wet to moist; stiff; gray (10YR 5/1).		
3					NA				
4			72		NA				
5					NA				
6					NA				
7					0.0				
8					0.0		(7.0-27.0') SAND, fine to coarse, subrounded; trace small pebbles; little clay; poorly sorted; wet; dark gray (10YR 4/1). Note: Poor recovery from 17.0-27.0' bgs due to a cobble jammed at the end of the core barrel.		
9					0.0				
10					0.0				
11					0.0				
12			48		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 860.7
North Coor: 451349.8
East Coor: 13064257.9

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MX71

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/04/2019
Date Completed: 10/04/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 48° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(7.0-27.0') SAND, fine to coarse, subrounded; trace small pebbles; little clay; poorly sorted; wet; dark gray (10YR 4/1). Note: Poor recovery from 17.0-27.0' bgs due to a cobble jammed at the end of the core barrel.		
22			24		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					NA		Note: Poor recovery from 27.0-47.0' bgs due to cobbles jammed at the end of the core barrel.		
29					NA				
30					NA				
31					NA				
32					NA				
33					NA				
34					NA				
35					NA				
36					NA				
37			0		NA				
38					NA				
39					NA				
40					NA				
41					NA				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MX71

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/04/2019
Date Completed: 10/04/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 48° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					NA		Note: Poor recovery from 27.0-47.0' bgs due to cobbles jammed at the end of the core barrel.		
43					NA				
44					NA				
45					NA				
46					NA				
47					NA				
48					NA		(47.0-48.5') SAND, fine to medium, subrounded; some small to large pebbles, subrounded; poorly sorted; moist; dark grayish brown (10YR 4/2).		
49					0.0		(48.5-52.0') CLAY, some silt, high plasticity, no dilatancy; little small to medium pebbles, subangular; moist; medium stiff; dark grayish brown (10YR 4/1).		
50					0.0				
51					0.0				
52			108		0.0				
53					0.0		(52.0-59.0') SAND, very fine, subrounded; some SILT; little small to large pebbles, subangular; poorly sorted; moist; dark grayish brown (10YR 4/1).		
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0		(59.0-62.5') SILT, some clay, medium plasticity, no dilatancy; little small to large pebbles, subangular; moist to dry; very stiff; dark gray (10YR 4/1).		
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-MX71

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/04/2019
Date Completed: 10/04/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 48° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.5-67.0') SILT, nonplastic, rapid dilatancy; some sand, very fine; little small to large pebbles, subangular; dry to moist; soft; light gray (10YR 7/1).		
65					0.0				
66					0.0				
67					0.0				
68					0.0		(67.0-68.0') WEATHERED SHALE with some fine sandstone laminations. Note: Heavily weathered with little competency.		
69					0.0		(68.0-75.5') SANDSTONE; light gray (10YR 7/1). Note: Highly competent, large cores.		
70					0.0				
71					0.0				
72			72		0.0				
73					0.0				
74					0.0				
75					0.0				
76					0.0		(75.5-76.0') SHALE.		
77					0.0		(76.0-77.0') SANDSTONE; light gray (10YR 7/1). Note: Highly competent, large cores.		
78							End of boring at 77.0' bgs.		
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANAL YSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NC103

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/19/2019
Date Completed: 09/20/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-1.5') CONCRETE.		
2			34		0.6		(1.5-4.0') SAND, very fine; trace granules, subangular to subrounded; poorly sorted; moist; loose; brown (10YR 4/3) to very dark grayish brown (10YR 3/2). Note: Fill. Some organics.		
3					0.4				
4					1.6		Note: Slight odor at 3.0' bgs.		
5					0.0		(4.0-8.5') CONCRETE.		
6			36		0.0				
7					0.0				
8					0.0				
9					0.0		(8.5-11.5') CLAY, high plasticity, no dilatancy; little very coarse sand to medium pebbles, subrounded; dry to moist; very stiff to hard; brown (10YR 5/3).		
10			60		0.0				
11					0.0				
12					0.0		(11.5-14.0') SAND, very fine; trace small pebbles, subrounded; poorly sorted; moist; very loose to loose; yellowish brown (10YR 5/6).		
13					0.0				
14					0.0				
15			60		0.0		(14.0-25.0') CLAY, medium plasticity, slow dilatancy; some silt; little sand, very fine to granules, subangular to subrounded; dry; very stiff; gray (10YR 5/1) to grayish brown (10YR 5/2).		
16					0.0				
17					0.1				
18					0.1				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451280.0
East Coor: 13064556.8

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NC103

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/19/2019
Date Completed: 09/20/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(14.0-25.0') CLAY, medium plasticity, slow dilatancy; some silt; little sand, very fine to granules, subangular to subrounded; dry; very stiff; gray (10YR 5/1) to grayish brown (10YR 5/2).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0		(25.0-28.5') CLAY, high plasticity, slow dilatancy; little to some silt; little sand, very fine to fine; trace granules, subrounded; moist, soft to medium stiff; gray (10YR 6/1).		
27					0.0				
28					0.0				
29					0.0		(28.5-29.5') SILT, little clay, low plasticity, rapid dilatancy; some sand, very fine to fine; well sorted; moist; medium dense; gray (10YR 5/1).		
30					0.0		(29.5-37.0') SAND, very fine to fine, trace graunules, subrounded; well sorted; moist; very loose; gray (10YR 6/1).		
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0		(37.0-45.0') SAND, fine to medium, subangular to subrounded; well sorted; moist; loose; gray (10YR 5/1).		
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NC103

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/19/2019
Date Completed: 09/20/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			77		0.0		(37.0-45.0') SAND, fine to medium, subangular to subrounded; well sorted; moist; loose; gray (10YR 5/1).		
43					0.0				
44					0.0				
45					0.0				
46					0.0		(45.0-47.0') CLAY, some silt, low plasticity, slow to rapid dilatancy; some sand, fine to medium, subangular to subrounded; wet; stiff to very stiff; gray (10YR 5/1).		
47					0.0				
48					0.3		(47.0-50.0') SAND, very fine to coarse, subangular to subrounded; little silt; poorly sorted; moist; medium dense; gray (10YR 5/1).		
49					0.0				
50					0.0				
51					0.0		(50.0-52.5') CLAY, little silt, medium to low plasticity, slow to rapid dilatancy; some sand, very fine to coarse, subangular to subrounded; wet; stiff; dark gray (10YR 4/1).		
52			80		0.3				
53					0.3		(52.5-61.0') WEATHERED SANDSTONE; few consolidated pieces; moist; light gray (10YR 7/1). Note: Heavily weathered.		
54					0.3				
55					0.4				
56					0.6				
57					0.4				
58					0.0				
59					0.0				
60			68		0.0				
61					0.0				
62					0.0		(61.0-63.0') WEATHERED SANDSTONE and SHALE; few consilidated pieces of sandstone and shale; very dark gray (10YR 3/1). Note: Heavily weathered.		
					0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 051420.GPJ ARCADIS 2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NC103

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/19/2019
Date Completed: 09/20/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64			60	VAP-P2-NC103(63-68)(092[illegible]19) @ 1115	0.0		(63.0-65.5') SANDSTONE with some shale laminations; some soft sand matrix; light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Highly competent.		
65					0.0				
66					0.0		(65.5-68.0') SHALE with some interbedded sandstone; some soft clay matrix; dark gray (10YR 4/1). Note: Highly competent.		
67					0.0				
68					0.0		End of boring at 68.0' bgs.		
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NI108

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/23/2019
Date Completed: 09/23/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 67° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1							(0.0-47.0') Blind drilled.	(0.0-1.0' bgs) Cement
2								
3								
4								
5								
6								
7								(-3.0-54.0' bgs) 2" Sch 40 PVC Well Casing
8								
9								
10								(1.0-50.0' bgs) Bentonite Quick Grout
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

3' Stick Up Stainless Steel Riser

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Converted into 2" monitoring well MW-19-117.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 451244.1
East Coor: 13064621.5

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NI108

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/23/2019
Date Completed: 09/23/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 67° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31								(1.0-50.0' bgs) Bentonite Quick Grout	
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-NI108

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/23/2019
Date Completed: 09/23/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 67° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.	(1.0-50.0' bgs) Bentonite Quick Grout	
43									
44									
45									
46									
47									
48					0.0		(47.0-50.0') SAND, very fine to medium, subrounded; trace granules, subrounded; some silt, little clay, low to no plasticity, rapid dilatancy; poorly sorted; dry to moist; medium dense; gray (10YR 6/1).		
49					0.2				
50					0.2				
51					1.2		(50.0-53.0') WEATHERED SHALE and SANDSTONE; few consolidated pieces; light gray (10YR 7/1) to very dark gray (10YR 3/1). Note: Heavily weathered.	(50.0-51.0') Bentonite Pellets.	
52			120		2.9			(51.0-52.0') Choker Sand	
53					1.0				
54					0.0		(53.0-57.0') WEATHERED SANDSTONE with some shale; few consolidated pieces of sandstone; light gray (10YR 7/1) to very dark gray (10YR 3/1). Note: Heavily weathered.		
55					0.0			(52.0-60.5' bgs) K&E 00 Filter Pack Sand	
56				VAP-P2-NI108(53-58) (092619) @ 1615	0.0				
57					0.0			(54.0-59.0') 2" Stainless Steel 10-Slot Well Screen	
58					0.0		(57.0-63.0') SANDSTONE; moderate to high competency; trace shale lenses; light gray (10YR 7/1).		
59					0.0				
60					0.0				
61					0.0				
62			67		0.0			(60.5-67.5') Bentonite Pellets.	

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NI108

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/23/2019
Date Completed: 09/23/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 67° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64				VAP-P2-NI108(61-66) (092419) @ 1040	0.0		(63.0-67.5') SANDSTONE with some interbedded shale; high competency; some soft clay matrix; light gray (10YR 7/1) to very dark gray (10YR 3/1).	(60.5-67.5') Bentonite Pellets.	
65					0.0				
66					0.0				
67					0.0				
68					0.0		End of boring at 67.5' bgs.		
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-NL100

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/20/2019
Date Completed: 09/20/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 82° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451228.2
East Coor: 13064558.8

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NL100

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/20/2019
Date Completed: 09/20/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 82° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NL100

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Date Started: 09/20/2019
Logger: E. Redner
Project Number: 30006870.04600
Date Completed: 09/20/2019
Editor: K. Donahue
Project Location: Lansing, MI
Weather Conditions: 82° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-50.0') CLAY, some silt, low plasticity, slow to rapid dilatancy; some sand, very fine to medium, subrangular to subrounded; trace granules, subrounded; wet; medium stiff; dark gray (10YR 3/1).		
49					0.0				
50			66		0.0				
51					0.0		(50.0-52.5') WEATHERED SHALE and SANDSTONE; few consolidated pieces; dry; light gray (10YR 7/1) to very dark gray (10YR 3/1). Note: Heavily weathered.		
52					0.0				
53					0.0		(52.5-56.0') WEATHERED SANDSTONE; few consolidated pieces; moist; light gray (10R 7/1) to very dark gray (10YR 3/1). Note: Heavily weathered.		
54					0.0				
55					0.0				
56					0.0				
57					0.0		(56.0-61.0') WEATHERED SANDSTONE with some interbedded shale; dry to moist; very dark gray (10YR 3/1). Note: Heavily weathered.		
58			120		0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0		(61.0-63.0') SANDSTONE with some interbedded shale; moderate competency; dry, light gray (10YR 7/1) to very dark gray (10YR 3/1).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-NL100

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/20/2019
Date Completed: 09/20/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 82° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-66.0') SANDSTONE with trace shale; high competency; some soft sand and clay matrix; light gray (10YR 7/1) to very dark gray (10YR 3/1).		
65					0.0				
66					0.0				
67			44		0.0		(66.0-70.0') SHALE with little interbedded sandstone; high competency; some soft clay matrix; dark gray (10YR 4/1).		
68					0.0				
69					0.0				
70					0.0				
71							End of boring at 70.0' bgs.		
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: VAP-P2-NU156

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.5') CONCRETE.	(0.0-1.0' bgs) Cement	
2					0.0		(1.5-4.0') CLAY, some silt, medium to low plasticity, no dilatancy; trace very fine sand; trace granules to medium pebbles, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2).		
3					0.0				
4					0.0				
5			114		0.0		(4.0-12.5') SAND, very fine to medium, subrounded; trace granules, subrounded; and SILT, low plasticity to nonplastic, slow dilatancy; poorly sorted; wet; medium stiff; yellowish brown (10YR 5/6).		
6					0.0				
7					0.0			(0.0-66.0' bgs) 2" Sch 40 PVC Well Casing	
8					0.0				
9					0.0				
10					0.0			(1.0-62.0' bgs) Bentonite Quick Grout	
11					0.0				
12					0.0				
13					0.0		(12.5-19.5') CLAY, little to some silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Small, fine sand seam, wet, from 14.0-14.1' bgs.		
14					0.0				
15			120		0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0		(19.5-22.0') SAND, fine to medium, subrounded; trace silt; well sorted; wet; light brownish gray (10YR 6/2).		

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Converted into 2" monitoring well MW-19-120.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 451105.6
East Coor: 13065082.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041320.GPJ ARCADIS_2013.GDT 4/16/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NU156

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-22.0') SAND, fine to medium, subrounded; trace silt; well sorted; wet; light brownish gray (10YR 6/2).	(1.0-62.0' bgs) Bentonite Quick Grout	
22					0.0				
23					0.0		(22.0-26.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
24					0.0				
25			120		0.0				
26					0.0				
27					0.0		(26.0-27.5') SILT, some clay, low plasticity, no dilatancy; moist; medium stiff to soft; grayish brown (10YR 5/2).		
28					0.0		(27.5-32.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace very fine sand; trace granules to large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
29					0.0				
30					0.0				
31					0.0				
32					0.0				
33					0.0		(32.0-35.0') SAND, very fine to fine, subrounded; and SILT, nonplastic, rapid dilatancy; well sorted; wet; soft; grayish brown (10YR 5/2).		
34					0.0				
35			120		0.0				
36					0.0		(35.0-51.0') CLAY, little to some silt, low to medium plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry; very stiff; gray (10YR 5/1).		
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041320.GPJ ARCADIS_2013.GDT 4/16/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NU156

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
43					0.0		(35.0-51.0') CLAY, little to some silt, low to medium plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry; very stiff; gray (10YR 5/1).		
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51					0.0		(51.0-62.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded, moist; medium stiff to stiff; grayish brown (10YR 5/2).	(1.0-62.0' bgs) Bentonite Quick Grout	
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0				
63					0.0		(62.0-65.0') SILT, trace clay, nonplastic, slow dilatancy to no dilatancy; some fine sand, subrounded; trace granules to large pebbles, subrounded; moist to wet; stiff; dark gray (10YR 4/1).	(62.0-63.0') Bentonite Pellets.	

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041320.GPJ ARCADIS_2013.GDT 4/16/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NU156

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-65.0') SILT, trace clay, nonplastic, slow dilatancy to no dilatancy; some fine sand, subrounded; trace granules to large pebbles, subrounded; moist to wet; stiff; dark gray (10YR 4/1).	(63.0-64.0') Choker Sand	
65			120		0.0				
66					0.0		(65.0-66.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Heavily weathered with little consolidated pieces in mostly soft sand matrix. No competency.		
67					0.0		(66.0-67.0') WEATHERED SANDSTONE and SHALE, very fine; well sorted; interbedded; light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Heavily weathered with no competency.	(64.0-71.0' bgs) K&E 00 Filter Pack Sand (66.0-71.0') 2" Stainless Steel 10-Slot Well Screen	
68				VAP-P2-NU156(66-70) (101519) @ 1700	0.0		(67.0-71.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Some consolidated pieces in mostly a soft sand matrix. No competency.		
69					0.0				
70					0.0				
71			12		0.0		End of boring at 71.0' bgs.		
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041320.GPJ ARCADIS_2013.GDT 4/16/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NX100

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-9.5') CONCRETE.		
2					0.0				
3			50		0.0				
4					0.0				
5					0.0				
6					0.0				
7					0.0				
8			50		0.0				
9					0.0				
10					0.0		(9.5-17.0') SAND, very fine to very coarse, subrounded; some silt, little to some clay; poorly sorted; wet; loose; brownish yellow (10YR 6/6) to gray (10YR 6/1).		
11					0.0				
12					0.0				
13					0.0				
14			77		0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-20.0') SAND, fine, subrounded to subangular; trace small to very large pebbles, subrounded; poorly sorted; moist; very loose; grayish brown (10YR 5/2).		
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.1
North Coor: 451081.6
East Coor: 13064523.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NX100

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0- 26.5') CLAY, some silt, medium to high plasticity, slow to rapid dilatancy; little sand, very fine to fine, trace very coarse sand, subrounded, moist; medium stiff to soft; gray (10YR 6/1).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0		(26.5-28.5') SAND, very fine to medium, subangular to subrounded; some silt, little clay, low plasticity, rapid dilatancy; poorly sorted; moist to dry; medium dense; gray (10YR 6/1).		
28					0.0				
29					0.0		(28.5-37.0') SAND, very fine to medium, subrounded; well sorted; dry; very loose; light gray (10YR 7/1).		
30					0.0				
31					0.0				
32			67		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0		(37.0-42.0') SAND, very fine to fine; trace granules, subangular to subrounded; and SILT, little clay, low plasticity, rapid dilatancy; well sorted; moist to wet; medium dense; gray (10YR 6/1).		
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NX100

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			100		0.0				
43					0.0		(42.0-49.5') SAND, very fine to fine; trace granules; little silt; well sorted; dry; very loose to dense; gray (10YR 6/1).		
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0		(49.5-53.5') WEATHERED SANDSTONE with some interbedded shale; few consolidated sandstone pieces; very dark gray (10YR 3/1). Note: Heavily weathered.		
51					0.0				
52			120		0.0				
53					0.0				
54					0.0		(53.5-59.0') WEATHERED SANDSTONE wth some interbedded shale; some consolidated sandstone pieces; very dark gray (10YR 3/1). Note: Heavily weathered.		
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0		(59.0-64.0') SANDSTONE and SHALE; interbedded; moderate competency; very dark gray (10YR 3/1) to light gray (10YR 7/1).		
61			84	VAP-P2-NX100(59-64) (092519) @ 1045	0.0				
62					0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 051420.GPJ ARCADIS 2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: VAP-P2-NX100

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(59.0-64.0') SANDSTONE and SHALE; interbedded; moderate competency; very dark gray (10YR 3/1) to light gray (10YR 7/1).		
							End of boring at 64.0' bgs.		
65									
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-06

Soil Boring Log

Sheet: 1 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/01/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: Rain, 70F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-0.7') CONCRETE.		
2			60		0.0		(0.7-5.0') CLAY, little silt, high plasticity, slow dilatancy; trace granules, subrounded; stiff; moist; brown (10YR 5/3).		
3					0.0				
4					0.0				
5					0.0				
6					0.0		(5.0-10.0') CLAY, some silt, medium plasticity, slow dilatancy; trace granules, subrounded; stiff; moist; pale brown (10YR 6/3).		
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0		(10.0-11.0') SAND, fine to very coarse; poorly sorted; moist; light brownish gray (10YR 6/2).		
12					0.0		(11.0-13.0') SILT, some clay, low plasticity, slow dilatancy; dry; stiff; brown (10YR 5/3).		
13					0.0				
14					0.0		(13.0-18.0') CLAY, little silt; trace granules, subrounded to subangular; dry; stiff; gray (10YR 5/1).		
15			120		0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0		(18.0-20.0) SILT, no plasticity, rapid dilatency; and SAND, very fine to fine; dry; stiff; gray (10YR 5/1).		
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.:
North Coor:
East Coor:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BIOSPARGE\WELL INSTALLS\BORING LOGS\RACER LANSING PLANTS 2 AND 3 BIOSPARGE_062320.GPJ ARCADIS_2013.GDT 7/9/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-06

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/01/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: Rain, 70F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-23.5') SAND, very fine to fine; well sorted; little silt; dry; brown (10YR 5/3).		
22					0.0				
23					0.0				
24					0.0		(23.5-29.0') CLAY, trace silt, high plasticity, no dilatancy; trace granules, subrounded to subangular; dry; stiff; gray (10YR 5/1).		
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0		(29.0-32.0') SAND, fine to medium, well sorted; dry; light brownish gray (10YR 6/2).		
31					0.0				
32					0.0				
33					0.0		(32.0-37.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/2).		
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0		(37.0-42.0') SAND, very fine to very coarse, trace granules, subrounded to subangular; poorly sorted; dry; pale brown (10YR 6/3).		
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BIOSPARGE\WELL INSTALLS\BORING LOGS\RACER LANSING PLANTS 2 AND 3 BIOSPARGE_062320.GPJ ARCADIS_2013.GDT 7/9/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-06

Soil Boring Log

Sheet: 3 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/01/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: Rain, 70F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0				
43					0.0		(42.0-44.0') SAND, very fine to fine; well sorted; dry; pale brown (10YR 6/3).		
44					0.0				
45			120		0.0		(44.0-46.0') SAND, very fine; well sorted; dry; light brownish gray (10YR 6/2).		
46					0.0				
47					0.0		(46.0-46.5') SILT, nonplastic, rapid dilatancy; soft; gray (10YR 5/1).		
48					0.0		(46.5-47.5') SAND, very fine to very coarse, trace granules to small pebbles, subrounded to subangular; poorly sorted; dry; light gray (10YR 7/1).		
49					0.0		(47.5-52.0') SAND, fine to medium; well sorted; dry; brown (10YR 4/3).		
50					0.0				
51					0.0				
52					0.0				
53					0.0		(52.0-59.0') SAND, very fine; well sorted; dry; pale brown (10YR 6/3). Note: Depth to water measured at 53.0' bgs before pumping begins for VAP sample.		
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0		(59.0-67.0') SAND, very fine; and SILT, nonplastic, rapid dilatancy; well sorted; wet; soft; dark brown (10YR 3/3).		
61					0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BIOSPARGE\WELL INSTALLS\BORING LOGS\RACER LANSING PLANTS 2 AND 3 BIOSPARGE_062320.GPJ ARCADIS_2013.GDT 7/9/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-06

Sheet: 4 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/01/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: Rain, 70F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(59.0-67.0') SAND, very fine; and SILT, nonplastic, rapid dilatancy; well sorted; wet; soft; dark brown (10YR 3/3).		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0		(67.0-69.0') SAND, very fine; well sorted; dry; light gray (10YR 7/1).		
69					0.0				
70					0.0		(69.0-70.0') SAND, very fine; and SILT; trace clay, low plasticity, rapid dilatancy; soft; moist; light gray (10YR 7/1).		
71					0.0		(70.0-77.5') SILT, nonplastic, slow dilatancy; and SAND, very fine; medium stiff; dry; gray (10YR 5/1).		
72					0.0				
73					0.0				
74					0.0				
75			120		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0		(77.5-88.0') SILT, little clay, low plasticity, rapid dilatancy; dry; stiff; gray (10YR 5/1).		
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BIOSPARGE\WELL INSTALLS\BORING LOGS\RACER LANSING PLANTS 2 AND 3 BIOSPARGE_062320.GPJ ARCADIS_2013.GDT 7/9/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-06

Soil Boring Log

Sheet: 5 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/01/2019
Weather Conditions: Rain, 70F

Logger: S. Presswood
Editor: S. Presswood

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85			120		0.0		(77.5-88.0') SILT, little clay, low plasticity, rapid dilatancy; dry; stiff; gray (10YR 5/1).		
86					0.0				
87					0.0				
88					0.0				
89					0.0		(88.0-92.0') SILT, trace clay, low plasticity to nonplastic, medium dilatancy; trace very fine sand; dry; dark gray (10YR 4/1).		
90					0.0				
91					0.0				
92					0.0				
93			60		0.0		(92.0-98.0') WEATHERED SANDSTONE, very fine to fine; loosely consolidated; wet; gray (10YR 5/1). NOTE: Little consolidated pieces of sandstone present in soft sand matrix.		
94					0.0				
95					0.0				
96				AS-19-06_050119 (94-98) @1400	0.0				
97			36		0.0				
98					0.0				
99					0.0		(98.0-110.0') SANDSTONE, very fine to fine; highly consolidated with little soft sand matrix; moist; gray (10YR 5/1). Note: Distinct consilidated/unconsolidated boundary at 98.0' bgs with little gradation from weathered to compact.		
100			24		0.0				
101					0.0				
102					0.0				
103					0.0				
104					0.0				
105					0.0				
			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BIOSPARGE\WELL INSTALLS\BORING LOGS\RACER LANSING PLANTS 2 AND 3 BIOSPARGE_062320.GPJ ARCADIS_2013.GDT 7/9/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-06

Sheet: 6 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/01/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: Rain, 70F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
106					0.0		(98.0-110.0') SANDSTONE, very fine to fine; highly consolidated with little soft sand matrix; moist; gray (10YR 5/1).		
107					0.0		Note: Distinct consilidated/unconsolidated boundary at 98.0' bgs with little gradation from weathered to compact.		
108					0.0				
109					0.0				
110							End of Boring at 110.0' bgs.		
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									
121									
122									
123									
124									
125									
126									
127									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BIOSPARGE\WELL INSTALLS\BORING LOGS\RACER LANSING PLANTS 2 AND 3 BIOSPARGE_062320.GPJ ARCADIS_2013.GDT 7/9/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-07

Soil Boring Log

Sheet: 1 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/03/2019
Date Completed: 05/03/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			60		0.0		(0.0-0.7') CONCRETE.		
					0.0		(0.7-1.5') SAND, fine to coarse, subrounded; little granules to small pebbles, subrounded; little silt; poorly sorted; wet; yellowish brown (10YR 5/6).		
2							(1.5-4.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; pale brown (10YR 6/3).		
3					0.0				
4					0.0		(4.0-5.5') SAND, fine to coarse, subrounded; little granules to small pebbles, subrounded; little to some silt; poorly sorted; wet; yellowish brown (10YR 5/6).		
5					0.0				
6			36		0.0		(5.5-10.0') CLAY, little silt, high plasticity, no dilatancy; little fine sand, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/6). NOTE: Large cobble at 8.0' bgs.		
7					0.0				
8					0.0				
9					0.0				
10					0.0				
11			120		0.0		(10.0-12.0') SAND, very fine to fine, subrounded; trace granules to small pebbles, subrounded; little to some silt; poorly sorted; moist; brownish yellow (10YR 6/6).		
12					0.0				
13					0.0		(12.0-15.5') CLAY, some silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; brown (10YR 5/3).		
14					0.0				
15					0.0				
16					0.0		(15.5-19.5') CLAY, trace to little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.4
North Coor: 452776.0
East Coor: 13063765.5

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-07

Soil Boring Log

Sheet: 2 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/03/2019
Date Completed: 05/03/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-23.5') SAND, very fine to fine, subrounded; little to some silt; dry to moist; brown (10YR 5/3).		
22					0.0				
23					0.0				
24					0.0		(23.5-24.0') CLAY and SILT, medium plasticity, no dilatancy; moist; medium stiff; brown (10YR 5/3).		
25			84		0.0		(24.0-30.0') SAND, fine to medium, subrounded; trace silt; well sorted; dry; light brownish gray (10YR 6/2).		
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0		(30.0-33.5') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		
32					0.0				
33					0.0				
34					0.0		(33.5-39.0') SAND, fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0		(39.0-40.5') SAND, fine, subrounded; trace silt; well sorted; dry; pale brown (10YR 6/3).		
41					0.0		(40.5-42.0') SAND, fine to coarse, subrounded; little granules to very large pebbles, subrounded; trace silt; poorly sorted; dry; light gray (10YR 7/2).		

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-07

Soil Boring Log

Sheet: 3 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/03/2019
Date Completed: 05/03/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0				
43					0.0		(42.0-45.0') SAND, very fine; little silt; well sorted; dry; light gray (10YR 7/1).		
44					0.0				
45			120		0.0				
46					0.0		(45.0-45.5') SILT, little very fine sand, well sorted; moist; gray (10YR 5/1).		
47					0.0		(45.5-47.0') SAND, very fine to fine; little silt; well sorted; dry; light gray (10YR 7/1). NOTE: Trace large pebbles, subrounded, from 46.0-46.3' bgs.		
48					0.0		(47.0-49.0') SAND, fine, subrounded; trace silt; well sorted; moist; pale brown (10YR 6/3).		
49					0.0		(49.0-49.5') SILT, little very fine sand; well sorted; moist; gray (10YR 5/1).		
50					0.0		(49.5-51.0') SAND, fine, subrounded; trace silt; well sorted; moist; pale brown (10YR 6/3).		
51					0.0		(51.0-60.0') SAND, very fine; dry; trace silt; well sorted; pale brown (10YR 6/3).		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-75.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; wet; grayish brown (10YR 5/2).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-07

Soil Boring Log

Sheet: 4 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/03/2019
Date Completed: 05/03/2019
Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-75.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; wet; grayish brown (10YR 5/2).		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0				
72					0.0				
73					0.0				
74					0.0				
75			120		0.0		(75.0-75.5') CLAY and SILT, low plasticity, no dilatancy; little very fine sand; moist; stiff; grayish brown (10YR 5/2).		
76					0.0		(75.5-79.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; well sorted; wet; grayish brown (10YR 5/2).		
77					0.0				
78					0.0				
79					0.0				
80					0.0		(79.0-84.0') SILT, little clay, low plasticity, no dilatancy; dry to moist; stiff; gray (10YR 5/1).		
81					0.0				
82					0.0				
83					0.0				
84					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-07

Soil Boring Log

Sheet: 5 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/03/2019
Date Completed: 05/03/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85			120		0.0		(84.0-93.0') SILT, little to some clay, low plasticity to nonplastic, slow dilatancy to no dilatancy; trace very fine sand; dry to moist; dark gray (10YR 4/1). NOTE: Some very fine sand from 91.0-93.0' bgs.		
86					0.0				
87					0.0				
88					0.0				
89					0.0				
90					0.0				
91					0.0				
92					0.0				
93			60		0.0				
94					0.0		(93.0-95.0') WEATHERED SANDSTONE, very fine to fine; well sorted; loosely consolidated; wet; light gray (10YR 7/1) to gray (10YR 6/1). NOTE: Little consolidated pieces of sandstone in soft matrix.		
95					0.0				
96				AS-19-07_050319 (93-97) @1510	0.0		(95.0-110.0') SANDSTONE, very fine to fine; well sorted; distinct increase in competency with more large pieces of hard sandstone; little soft matrix.		
97			48		0.0				
98					0.0				
99					0.0				
100					0.0				
101					0.0				
102					0.0				
103					0.0				
104					0.0				
105			132		0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-07

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/03/2019
Date Completed: 05/03/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
106					0.0		(95.0-110.0') SANDSTONE, very fine to fine; well sorted; distinct increase in competency with more large pieces of hard sandstone; little soft matrix.		
107					0.0				
108					0.0				
109					0.0				
110							End of Boring at 110.0' bgs.		
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									
121									
122									
123									
124									
125									
126									
127									

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-08

Soil Boring Log

Sheet: 1 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/07/2019
Date Completed: 05/07/2019
Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 52° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-0.7') CONCRETE.		
							(0.7-1.0') SAND, very fine to very coarse; brown (10YR 5/3). NOTE: Fill.		
2					0.0		(1.0-2.5') CLAY, some silt, high plasticity, slow dilatancy; trace very fine to fine sand; trace granules, subrounded to subangular; stiff; moist; pale brown (10YR 6/3).		
3			60		0.0		(2.5-3.0') SAND, fine to very coarse; poorly sorted; trace granules to large pebbles, subrounded to subangular; moist; brown (10YR 5/3).		
4					0.0		(3.0-4.0') CLAY, trace silt, high plasticity, no dilatancy to slow dilatancy; medium stiff; moist; pale brown (10YR 6/3).		
5					0.0		SILT and CLAY, medium to low plasticity, rapid dilatancy; trace very fine sand; trace granules, subrounded to subangular; stiff; wet; brown (10YR 4/3).		
6					0.0				
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0		(10.0-13.5') SAND, fine to medium, little coarse to very coarse sand, subrounded to subangular; trace granules, subrounded to subangular; dry; pale brown (10YR 6/3).		
12					0.0				
13					0.0				
14					0.0		(13.5-15.0') SILT, little clay, low plasticity, rapid dilatancy; trace very fine sand; wet; stiff; light yellowish brown (10YR 6/4).		
15			120		0.0		(15.0-18.5') CLAY, trace silt, high plasticity, slow to no dilatancy; trace very fine sand; medium stiff; dry; gray (10YR 6/1).		
16					0.0				
17					0.0				
18					0.0				
19					0.0		(18.5-21.0') SAND, very fine to fine; and SILT; well sorted; dry; brown (10YR 5/3).		
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.1
North Coor: 452776.0
East Coor: 13063795.5

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-08

Soil Boring Log

Sheet: 2 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/07/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 52° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(18.5-21.0') SAND, very fine to fine; and SILT; well sorted; dry; brown (10YR 5/3).		
22					0.0		(21.0-22.0') SAND, fine to medium; well sorted; dry; brown (10YR 5/3).		
23					0.0		(22.0-23.5') SILT, nonplastic; and SAND, very fine; dry; stiff; gray (10YR 6/1).		
24					0.0		(23.5-24.0') SAND, very fine to very coarse; poorly sorted; moist; brown (10YR 4/3).		
25			120		0.0		(24.0-27.0') CLAY, little silt, medium to high plasticity, slow dilatancy; trace granules, subrounded to subangular; dry; stiff; gray (10YR 5/1).		
26					0.0				
27					0.0				
28					0.0		(27.0-30.0') SAND, fine to medium; well sorted; dry; light gray (10YR 7/2).		
29					0.0				
30					0.0				
31					0.0		(30.0-31.5') SAND, very fine; and SILT; well sorted; dry; pale brown (10YR 6/3).		
32					0.0		(31.5-38') SAND, fine to medium; well sorted; dry; light gray (10YR 7/1). NOTE: Trace large pebbles, subrounded to subangular, at 34.0' bgs.		
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0		(38.0-40.0') SAND, fine to medium, little granules, subrounded to subangular; well sorted; dry; pale brown (10YR 6/3).		
40					0.0				
41					0.0		(40.0-40.5') SAND, medium to coarse; well sorted; dry; brown (10YR 5/3).		

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-08

Soil Boring Log

Sheet: 3 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/07/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 52° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(40.5-44.0') SAND, fine to medium, and GRANULES, subrounded to subangular; poorly sorted; dry; light gray (10YR 7/1).		
43					0.0				
44					0.0				
45			120		0.0		(44.0-45.0') SAND, very fine; and SILT; well sorted; dry; brown (10YR 5/3).		
46					0.0		(45.0-48.0') SAND, very fine; and SILT; well sorted; dry; brown (10YR 5/3).		
47					0.0				
48					0.0				
49					0.0		(48.0-48.5') SAND, very fine; and SILT; well sorted; dry; brown (10YR 5/3). (48.5-50.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/1).		
50					0.0				
51					0.0		(50.0-51.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; soft; wet; brown (10YR 4/3).		
52					0.0		(51.0-55.0') SAND, very fine; little silt; well sorted; dry; pale brown (10YR 6/3).		
53					0.0				
54					0.0				
55			120		0.0				
56					0.0		(55.5-60.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/1).		
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-67.0') SAND, very fine to medium; well sorted; wet; brown (10YR 5/3).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-08

Sheet: 4 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/07/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 52° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-67.0') SAND, very fine to medium; well sorted; wet; brown (10YR 5/3).		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0		(67.0-71.0') SILT, trace clay, low plasticity to nonplastic, rapid dilatancy; some very fine sand; medium stiff; wet; grayish brown (10YR 6/2).		
69					0.0				
70					0.0				
71					0.0		(71.0-89.0') SILT, trace clay, low plasticity to nonplastic, rapid dilatancy; stiff; wet; dark gray (10YR 4/1).		
72					0.0				
73					0.0				
74					0.0				
75			120		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-08

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/07/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 52° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85			120		0.0		(71.0-89.0') SILT, trace clay, low plasticity to nonplastic, rapid dilatancy; stiff; wet; dark gray (10YR 4/1).		
86					0.0				
87					0.0				
88					0.0				
89					0.0				
90					0.0		(89.0-92.0') WEATHERED SANDSTONE, very fine to fine; loosely consolidated; wet; light gray (10YR 7/1).		
91					0.0				
92					0.0				
93					0.0		(92.0-106.0') SANDSTONE, very fine to fine; well sorted; increase in large sandstone pieces; little to some soft matrix. NOTE: Increase in competency at 95.0' bgs.		
94					0.0				
95			120		0.0				
96					0.0				
97					0.0				
98					0.0				
99					0.0				
100					0.0				
101					0.0				
102					0.0				
103			72		0.0				
104					0.0				
105					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-08

Sheet: 6 of 6

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/07/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 52° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
106							End of Boring at 106.0' bgs.		
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									
119									
120									
121									
122									
123									
124									
125									
126									
127									

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-09

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/06/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 71° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-0.7') CONCRETE.		
							(0.7-1.0') Sand, very fine to very coarse; brown (10YR 5/3). Note: Fill.		
2					0.0		(1.0-2.0') CLAY, little silt, high plasticity, slow dilatancy; trace very coarse sand to large pebbles, subrounded to subangular; stiff; moist; brown (10YR 5/3).		
3			60		0.0		(2.5-3.0') SAND, very fine to very coarse; trace granules, subrounded to subangular; moist; brown (10YR 4/3).		
4					0.0		(3.0-3.5') CLAY, some silt, medium plasticity, slow dilatancy; little small to large pebbles, subrounded to subangular; moist; stiff; pale brown (10YR 6/3).		
5					0.0		(3.5-10.0') CLAY, and SILT, medium to low plasticity; slow dilatancy; trace very fine sand; medium stiff; moist; pale brown (10YR 6/3).		
6					0.0				
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0		(10.0-20.0') NO RECOVERY. Note: Cobble jammed in core barrel.		
12					0.0				
13					0.0				
14					0.0				
15			0		0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.3
North Coor: 452776.0
East Coor: 13063825.5

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-09

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/06/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 71° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-23.0') SILT, low plasticity to nonplastic, rapid dilatancy; and SAND, very fine; medium stiff; moist; pale brown (10YR 6/3).		
22					0.0				
23					0.0				
24					0.0		(23.0-24.5') SAND, very fine to very coarse; trace to little granules to small pebbles, subrounded to subangular; poorly sorted; moist; gray (10YR 5/1).		
25			120		0.0		(24.5-27.0') SILT, little clay, low plasticity, rapid dilatancy; little very fine sand; stiff; dry; gray (10YR 5/1).		
26					0.0				
27					0.0				
28					0.0		(27.0-36.5') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/1).		
29					0.0				
30					0.0				
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0		(36.5-37.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; medium stiff; pale brown (10YR 6/3).		
38					0.0		(37.0-40.0') SAND, very fine to fine; well sorted; trace granules, subrounded; dry; light gray (10YR 7/1).		
39					0.0				
40					0.0				
41					0.0		(40.0-42.5') SAND, very fine to very coarse; and GRANULES, subrounded to subangular; trace small pebbles, subrounded to subangular; dry; brown (10YR 5/3).		

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-09

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/06/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 71° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(40.0-42.5') SAND, very fine to very coarse; and GRANULES, subrounded to subangular; trace small pebbles, subrounded to subangular; dry; brown (10YR 5/3).		
43					0.0		(42.5-45.0') SAND, fine; trace granules, subrounded to subangular; dry; pale brown (10YR 6/3).		
44					0.0				
45			120		0.0		(45.0-48.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/1).		
46					0.0				
47					0.0				
48					0.0		(48.0-50.0') SAND, fine to medium; well sorted; dry; pale brown (10YR 6/3).		
49					0.0				
50					0.0		(50.0-51.0') SAND, very fine; and SILT; well sorted; dry; brown (10YR 5/3).		
51					0.0		(51.0-56.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/1).		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0		(56.0-60.0') SAND, very fine; little silt; well sorted; dry; pale brown (10YR 6/3).		
58					0.0				
59					0.0		Note: Wet at 58.0' bgs.		
60					0.0				
61					0.0		(60.0-69.5') SAND, fine to medium; well sorted; wet; dark grayish brown (10YR 4/2).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-09

Soil Boring Log

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/06/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 71° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-69.5') SAND, fine to medium; well sorted; wet; dark grayish brown (10YR 4/2).		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.5-83.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; medium stiff; moist; very dark grayish brown (10YR 3/2).		
71					0.0				
72					0.0				
73					0.0				
74					0.0				
75			120		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84			96		0.0		(83.0-88.0') SILT, trace clay, nonplastic to low plasticity; trace very fine sand; stiff; moist; brown (10YR 5/3).		

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-09

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/06/2019
Date Completed: 05/07/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 71° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85					0.0		(83.0-88.0') SILT, trace clay, nonplastic to low plasticity; trace very fine sand; stiff; moist; brown (10YR 5/3).		
86					0.0				
87					0.0				
88					0.0				
89					0.0		(88.0-90.0') WEATHERED SANDSTONE, very fine to fine; loosely consolidated; wet; light gray (10YR 7/1). Note: Little consolidated sandstone pieces in soft matrix.		
90					0.0				
91					0.0		(90.0-105.0') SANDSTONE, very fine to fine; some to little soft sand matrix with increase in large competent fragments; light gray (10YR 7/1). Note: Increase in competency at 92.0' bgs.		
92					0.0				
93			120		0.0				
94					0.0				
95					0.0				
96					0.0				
97					0.0				
98					0.0				
99					0.0				
100					0.0				
101			84		0.0				
102					0.0				
103					0.0				
104					0.0				
105					0.0				
							End of boring at 105.0' bgs.		

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-10

Soil Boring Log

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/05/2019
Date Completed: 05/05/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-0.8') CONCRETE.		
2					0.0		(0.8-17.0') CLAY, some silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; brown (10YR 5/3).		
3			60		0.0				
4					0.0				
5					0.0				
6					0.0				
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0				
12					0.0				
13					0.0				
14					0.0				
15			120		0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-19.5') CLAY, little silt, high plasticity, no dilatancy; little fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; stiff to very stiff; brown (10YR 4/3).		
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.4
North Coor: 452776.0
East Coor: 13063855.5

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-10

Sheet: 2 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/05/2019
Date Completed: 05/05/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-20.5') SAND, fine, subrounded; trace silt; well sorted; moist; brown (10YR 5/3).		
							(20.5-21.5') SILT, nonplastic, rapid dilatancy; some very fine sand; well sorted; wet; soft; yellowish brown (10YR 5/4).		
22					0.0		(21.5-22.0') SAND, fine to coarse, subrounded; little granules, subrounded; little to some silt; poorly sorted; wet; brown (10YR 5/3).		
23					0.0		(22.0-33.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 4/2).		
24					0.0				
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32					0.0				
33					0.0				
34					0.0		(33.0-40.0') SAND, very fine to fine, subrounded; trace silt; trace granules to small pebbles, subrounded; poorly sorted; dry; pale brown (10YR 6/3).		
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0		(40.0-46.0') SAND, fine to coarse, subangular; little to some granules to small pebbles, subrounded; trace silt; poorly sorted; dry; pale brown (10YR 6/3).		

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-10

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/05/2019
Date Completed: 05/05/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(40.0-46.0') SAND, fine to coarse, subangular; little to some granules to small pebbles, subrounded; trace silt; poorly sorted; dry; pale brown (10YR 6/3).		
43					0.0				
44					0.0				
45					0.0				
46					0.0				
47					0.0		(46.0-51.0') SAND, very fine to fine; little medium sand, subrounded; trace granules to small pebbles, subrounded; trace to little silt; poorly sorted; dry; pale brown (10YR 6/3).		
48					0.0				
49					0.0				
50					0.0				
51			120		0.0		(51.0-55.0') SAND, very fine to fine, subrounded; little to some silt; well sorted; dry; pale brown (10YR 6/3).		
52					0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0		(55.0-56.0') SILT and SAND, very fine to fine, subrounded; well sorted; moist; pale brown (10YR 6/3).		
57					0.0		(56.0-63.0') SAND, very fine to fine, subrounded; little to some silt; well sorted; dry; pale brown (10YR 6/3).		
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0				

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-10

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/05/2019
Date Completed: 05/05/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-78.0') SILT, nonplastic, slow dilatancy; and SAND, very fine to fine, subrounded; well sorted; wet; brown (10YR 5/3).		
65			96		0.0		Note: Very large cobble at 63.0' bgs.		
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0				
72					0.0				
73					0.0				
74					0.0				
75			120		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0		(78.0-84.0') SILT, some clay, nonplastic to low plasticity, slow dilatancy; little very fine to fine sand, subrounded; wet; stiff; brown (10YR 5/3).		
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84			96		0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-10

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/05/2019
Date Completed: 05/05/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85					0.0		(84.0-86.0') WEATHERED SANDSTONE, very fine to fine; well sorted; loosely consolidated; wet; light gray (10YR 7/1) to gray (10YR 6/1).		
86					0.0				
87					0.0		(86.0-101.0') SANDSTONE, very fine to fine; well sorted; increase in large pieces of sandstone in little to some soft sand matrix.		
88					0.0		Note: Increased competancy at 88.0' bgs.		
89					0.0				
90					0.0				
91					0.0				
92			84		0.0				
93					0.0				
94					0.0				
95					0.0				
96					0.0				
97					0.0				
98			72		0.0				
99					0.0				
100					0.0				
101					0.0				
102							End of boring at 101.0' bgs.		
103									
104									
105									

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-11

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/04/2019
Date Completed: 05/04/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-0.7') CONCRETE.		
2			60		0.0		(0.7-5.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; brown (10YR 5/3).		
3					0.0				
4					0.0				
5					0.0				
6					0.0		(5.0-10.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; very dark gray (10YR 3/1).		
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0		(10.0-14.0') CLAY, little silt, high plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; medium stiff; brown (10YR 5/3).		
12					0.0				
13					0.0				
14					0.0				
15			120		0.0		(14.0-15.0') SAND, very fine to fine, subrounded; trace granules to medium pebbles, subrounded; little to some silt; poorly sorted; moist; brownish yellow (10YR 6/6).		
16					0.0		(15.0-19.5') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
17					0.0				
18					0.0				
19					0.0				
20					0.0		(19.5-20.0') SILT, trace clay, nonplastic, no dilatancy; little		

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.2
North Coor: 452776.0
East Coor: 13063885.5

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-11

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/04/2019
Date Completed: 05/04/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		to some very fine to fine sand, subrounded; well sorted; dry to moist; yellowish brown (10YR 5/6).		
							(20.0-21.5') SAND, fine, subrounded; trace silt; well sorted; moist; light yellowish brown (10YR 6/4).		
22					0.0		(21.5-23.0') SAND, very fine to fine, subrounded; and SILT; well sorted; moist; pale brown (10YR 6/3).		
23					0.0				
24					0.0		(23.0-25.0') SAND, very fine to fine, subrounded; little silt; well sorted; moist; light yellowish brown (10YR 6/4).		
25			120		0.0				
26					0.0		(25.0-26.0') SILT, trace clay, nonplastic, slow dilatancy; some very fine to fine sand; well sorted; wet; grayish brown (10YR 5/2).		
27					0.0		(26.0-27.0') SAND, fine to coarse, subangular; little granules to medium pebbles, subrounded; little silt; poorly sorted; wet; grayish brown (10YR 5/2).		
28					0.0		(27.0-34.5') CLAY, little to some silt, high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
29					0.0				
30					0.0				
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0		(34.5-40.0') SAND, very fine to fine, subrounded; trace granules to small pebbles, subrounded; poorly sorted; dry; pale brown (10YR 6/3).		
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0		(40.0-40.5') SAND, coarse to very coarse, subangular; little to some granules to small pebbles; trace medium to large pebbles, subrounded; trace silt; poorly sorted; dry; pale brown (10YR 6/3).		

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-11

Soil Boring Log

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/04/2019
Date Completed: 05/04/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(40.5-42.0') SAND, fine, subrounded; trace silt, well sorted; dry; pale brown (10YR 6/3).		
43					0.0		(42.0-43.0') SAND, fine to medium; little coarse sand, subrounded; trace to little granules, subrounded; poorly sorted; moist; pale brown (10YR 6/3).		
44					0.0		(43.0-45.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; dry; pale brown (10YR 6/3).		
45			120		0.0		(45.0-45.5') SAND, very fine; some silt; well sorted; dry to moist; light yellowish brown (10YR 6/4).		
46					0.0		(45.5-48.0') SAND, medium to coarse, little very coarse sand, subangular; trace to little granules to large pebbles, subrounded; trace silt; poorly sorted; dry; pale brown (10YR 6/3).		
47					0.0				
48					0.0		(48.0-57.0') SAND, very fine to fine, subrounded; little to some silt; well sorted; dry to moist; pale brown (10YR 6/3).		
49					0.0				
50					0.0				
51					0.0				
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-57.5') SILT; and SAND, very fine to fine, subrounded; well sorted; moist; yellowish brown (10YR 5/6).		
59					0.0		(57.5-63.5') SAND, very fine to fine, subrounded; little to some silt; well sorted; dry; pale brown (10YR 6/3).		
60					0.0				
61					0.0				
62					0.0				

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-11

Soil Boring Log

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/04/2019
Date Completed: 05/04/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0				
65			120		0.0		(63.5-65.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; dark gray (10YR 4/1).		
66					0.0		(65.0-69.0') SILT, nonplastic, slow dilatancy; and SAND, very fine to fine, subrounded; well sorted; wet; brown (10YR 5/3).		
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.0-76.0') SILT, nonplastic, rapid dilatancy; little to some very fine sand, subrounded; well sorted; wet; brown (10YR 5/3).		
71					0.0				
72					0.0				
73					0.0				
74					0.0				
75			120		0.0				
76					0.0				
77					0.0		(76.0-83.0') SILT, some clay, nonplastic to low plasticity, slow dilatancy; little very fine to fine sand; subrounded; wet; stiff; brown (10YR 5/3).		
78					0.0				
79					0.0				
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84					0.0				

Remarks:

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-11

Soil Boring Log

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/04/2019
Date Completed: 05/04/2019

Logger: A. Westhuis
Editor: S. Presswood
Weather Conditions: 60° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85			120		0.0		(83.0-86.0') WEATHERED SANDSTONE, very fine to fine; well sorted; loosely consolidated; wet; light gray (10YR 7/1) to gray (10YR 6/1). Note: Trace to little consolidated pieces in soft sand matrix. Increase in competency at 86.0' bgs.		
86					0.0				
87					0.0		(86.0-100.0') SANDSTONE, very fine to fine; well sorted; increase in large pieces of consolidated sandstone in little soft sand matrix.		
88					0.0				
89					0.0				
90					0.0				
91					0.0				
92					0.0				
93					0.0				
94					0.0				
95			120		0.0				
96					0.0				
97					0.0				
98					0.0				
99					0.0				
100					0.0				
101							End of boring at 100.0' bgs.		
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-12

Soil Boring Log

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/02/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			60		0.0		(0.0-0.7') CONCRETE.		
2					0.0		(0.7-5.0') CLAY, some silt, medium plasticity, slow dilatancy; trace granules, subrounded; stiff; moist; brown (10YR 5/3).		
3					0.0				
4					0.0				
5					0.0				
6			60		0.0		(5.0-6.0') SAND, fine to medium, well sorted; moist; brown (10YR 5/3).		
7					0.0		(6.0-10.0') CLAY, trace silt, high plasticity, slow dilatancy; trace granules, subrounded to subangular; stiff; dry; very dark grayish brown (10YR 3/1).		
8					0.0				
9					0.0				
10					0.0				
11			120		0.0		(10.0-12.0') SAND, very fine to very coarse; poorly sorted; trace granules, subrounded to subangular; moist; brown (10YR 5/3).		
12					0.0				
13					0.0		(12.0-17.0') SILT, little clay, low plasticity, slow dilatancy; trace granules to small pebbles, subrounded; stiff; moist; brown (10YR 4/3).		
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-21.5') CLAY, some silt, medium plasticity, slow dilatancy; trace granules, subrounded; dry; stiff; gray (10YR 5/1).		
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.2
North Coor: 452776.1
East Coor: 13063915.2

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-12

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/02/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(17.0-21.5') CLAY, some silt, medium plasticity, slow dilatancy; trace granules, subrounded; dry; stiff; gray (10YR 5/1).		
22					0.0		(21.5-24.0') SAND, fine to medium; well sorted; dry; very pale brown (10YR 7/3).		
23					0.0				
24					0.0		(24.0-27.0') SAND, very fine; little silt; well sorted; moist; brown (10YR 5/3).		
25			120		0.0				
26					0.0				
27					0.0		(27.0-29.0') SAND, fine to medium; well sorted; moist; light brownish gray (10YR 6/2).		
28					0.0				
29					0.0		(29.9-34.5') CLAY, some silt, high plasticity, rapid dilatancy; little very fine sand; stiff; dry; gray (10YR 5/1).		
30					0.0				
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0		(34.5-38.5') SAND, very fine to very coarse; trace to little granules to small pebbles, subrounded to subangular; poorly sorted; dry; pale brown (10YR 6/3).		
36					0.0				
37					0.0				
38					0.0				
39					0.0		(38.5-41.0') SAND, very fine; well sorted; dry; light gray (10YR 7/1).		
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-12

Soil Boring Log

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/02/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(41.0-46.0') SAND, fine to medium; well sorted; dry; brown (10YR 4/3).		
43					0.0				
44					0.0				
45			120		0.0				
46					0.0				
47					0.0		(46.0-46.5') GRANULES and PEBBLES, small to large, subrounded to subangular; some fine to very coarse sand; dry; dark grayish brown (10YR 4/2).		
48					0.0		(46.5-49.5') SAND, fine to medium; well sorted; dry; brown (10YR 4/2).		
49					0.0				
50					0.0		(49.5-51.5') PEBBLES, small to large, subrounded to subangular; and GRANULES, subrounded to subangular; some coarse to very coarse sand, subrounded to subangular; dry; dark grayish brown (10YR 4/2).		
51					0.0				
52					0.0		(51.5-53.0') SAND, very fine to fine, subrounded to subangular; well sorted; dry; light gray (10YR 7/1).		
53					0.0		(53.0-53.5') SILT, nonplastic, rapid dilatancy; and SAND, very fine, subrounded to subangular; dry; dark gray (10YR 4/1).		
54					0.0		(53.5-56.9') SAND, very fine to fine, subrounded to subangular; well sorted; light gray (10YR 7/2).		
55			120		0.0				
56					0.0				
57					0.0		(56.9-57.0') CLAY, medium plasticity, no dilatancy; dry; stiff; dark gray (10YR 4/1).		
58					0.0		(57.0-60.5') SAND, very fine to fine, subrounded to subangluar; well sorted; dry; light gray (10YR 4/1) to light brownish gray (10YR 6/2). Note: Wet at 59.5' bgs.		
59					0.0				
60					0.0				
61					0.0		(60.5-63.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine, subrounded to subangular; wet; dark gray (10YR 4/1).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-12

Soil Boring Log

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/02/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-65.5') SAND, fine to medium; some small pebbles, subrounded to subangular; wet; dark gray (10YR 4/1).		
65			96		0.0				
66					0.0				
67					0.0		(66.5-70.0') SAND, very fine to fine, subrounded to subangular; some silt, no plasticity, rapid dilatancy; moist; dark gray (10YR 4/1) to very pale brown (10YR 7/3). Note: Glacial till. Trace very large pebbles to small cobbles from 66.5-67.0' bgs.		
68					0.0				
69					0.0				
70					0.0		(70.0-72.1') SILT, nonplastic, rapid dilatancy; and SAND, very fine; poorly sorted; wet; dark gray (10YR 4/1) Note: Small pebbles, subrounded to subangular from 70.0 to 70.6' bgs.		
71					0.0				
72					0.0		(72.1-73.6') SILT, trace clay, low plasticity, rapid dilatancy; trace granules; stiff; dry; dark gray (10YR 4/1).		
73					0.0				
74					0.0		(73.6-78.5') SILT, trace clay, low plasticity, rapid dilatancy; some sand, very fine; poorly sorted; soft; wet; dark gray (10YR 4/1).		
75			104		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0		(78.5-83.0') SILT, trace clay, low plasticity, rapid dilatancy; trace granules; stiff; dry; dark gray (10YR 4/1). Note: Some small cobbles, subrounded from 82.0-83.0' bgs.		
80					0.0				
81					0.0				
82			36		0.0				
83					0.0				
84					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-12

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 05/01/2019
Date Completed: 05/02/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85					0.0		(83.0-87.0') WEATHERED SANDSTONE, fine to medium; well sorted; loosely consolidated; wet; light gray (10YR 7/1). Note: Heavily weathered. Small consolidated pieces of sandstone in soft sand matrix.		
86					0.0				
87			66		0.0				
88					0.0		(87.0-100.0') SANDSTONE, fine to medium; well sorted; wet; light gray (10YR 7/1). Note: Increased competecy and decrease in weathering at 87.0' bgs.		
89					0.0				
90					0.0				
91					0.0				
92					0.0				
93					0.0				
94					0.0				
95			62		0.0				
96					0.0				
97					0.0				
98					0.0				
99					0.0				
100					0.0				
101							End of boring at 100.0' bgs.		
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: AS-19-13

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 04/30/2019
Date Completed: 04/30/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 42° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			60		0.0		(0.0-0.7') CONCRETE.		
2					0.0		(0.7-4.0') SAND, very fine to medium; trace coarse sand; poorly sorted; wet; brown (10YR 5/3).		
3					0.0				
4					0.0				
5					0.0		(4.0-5.0') CLAY, little silt, high plasticity, slow dilatancy; trace granules, subrounded; moist; brown (10YR 4/3).		
6			60		0.0		(5.0-7.0') SAND, fine to medium; well sorted; wet; brown (10YR 4/3).		
7					0.0				
8					0.0		(7.0-10.0') CLAY, trace silt, high plasticity, slow dilatancy; moist; dark grayish brown (10YR 4/2).		
9					0.0				
10					0.0				
11			120		0.0		(10.0-12.5') SAND, very fine to medium; trace silt; poorly sorted; moist; brown (10YR 4/3).		
12					0.0				
13					0.0		(12.5-18.0') CLAY, little silt, high plasticity, slow dilatancy; trace granules to medium pebbles, subrounded; stiff; dry; dark gray (10YR 4/1).		
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0		(18.0-20.0') SILT, little clay, low plasticity, rapid dilatancy; dry; stiff; dark gray (10YR 4/1).		
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.2
North Coor: 452776.0
East Coor: 13063945.5

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-13

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 04/30/2019
Date Completed: 04/30/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 42° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-21.5') CLAY, trace silt, high plasticity, slow dilatancy; stiff; dry; gray (10YR 5/1).		
22					0.0		(21.5-25.0') SILT, nonplastic, rapid dilatancy; some very fine sand; stiff; dry; grayish brown (10YR 5/2).		
23					0.0				
24					0.0				
25			120		0.0		(25.0-30.0') SAND, very fine; and SILT; well sorted; dry; grayish brown (10YR 5/2).		
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0		(30.0-34.0') CLAY, some silt, high plasticity, slow dilatancy; stiff; dry; gray (10YR 5/1).		
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			110		0.0		(34.0-36.5') SAND, very fine to very coarse; poorly sorted; little granules to small pebbles, subrounded to subangular; dry; light yellowish brown (10YR 6/4).		
36					0.0				
37					0.0		(36.5-39.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/2).		
38					0.0				
39					0.0				
40					0.0		(39.0-42.0') SAND, fine to very coarse; poorly sorted; trace granules, subrounded to subangular; moist; brown (10YR 5/3).		
41					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-13

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 04/30/2019
Date Completed: 04/30/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 42° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0				
43					0.0		(42.0-47.5') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/1).		
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0		(47.5-53.0') SAND, very fine; well sorted; dry; very pale brown (10YR 7/3).		
49					0.0				
50					0.0				
51					0.0				
52					0.0				
53					0.0				
54					0.0		(53.0-55.5') SILT, nonplastic, rapid dilatancy; and SAND, very fine; dry; dark gray (10YR 4/1).		
55			120		0.0				
56					0.0		(55.5-67.0') SAND, very fine to fine; well sorted; dry; light brownish gray (10YR 6/2).		
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-13

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 04/30/2019
Date Completed: 04/30/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 42° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(55.5-67.0') SAND, very fine to fine; well sorted; dry; light brownish gray (10YR 6/2).		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0		(67.0-69.5') SAND, very fine to medium; poorly sorted; dry; very pale brown (10YR 7/3).		
69					0.0				
70					0.0		(69.5-73.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; dry; pale brown (10YR 6/3).		
71					0.0				
72					0.0				
73					0.0		(73.0-81.5') SILT, trace clay, low plasticity, rapid dilatancy; trace granules, subangular; stiff; dry; dark gray (10YR 4/1).		
74					0.0				
75			120		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81					0.0				
82			36		0.0		(81.5-86.0') WEATHERED SANDSTONE, very fine to fine; well sorted; loosely consolidated; wet; light gray (10YR 7/1).		
83					0.0				
84									

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-13

Soil Boring Log

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 04/30/2019
Date Completed: 04/30/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: 42° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85					0.0		(81.5-86.0') WEATHERED SANDSTONE, very fine to fine; well sorted; loosely consolidated; wet; light gray (10YR 7/1).		
86					0.0				
87			84		0.0		(86.0-100.0') SANDSTONE, fine to very fine; well sorted; wet; light gray (10YR 7/1).		
88				AS-19-13_043019 (86-90) @1715	0.0		Note: Increase in competency and decrease in weathering at 86.0' bgs.		
89					0.0				
90					0.0				
91					0.0				
92					0.0				
93					0.0				
94					0.0				
95			120		0.0				
96					0.0				
97					0.0				
98					0.0				
99					0.0				
100					0.0				
101							End of boring at 100.0' bgs.		
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 5/14/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/16/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 860.9
North Coor: 451555.8
East Coor: 13064286.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/16/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/16/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47					0.0		(47.0-48.0') SILT, trace clay, nonplastic, no dilatancy; trace fine sand, subrounded; trace small to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
48					0.0		(48.0-56.0') SAND, very fine; some silt; well sorted; dry; light brownish gray (10YR 6/2).		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0		(56.0-57.0') SILT, nonplastic, no dilatancy; some very fine sand; well sorted, dry; medium stiff; grayish brown (10YR 5/2).		
58					0.0		(57.0-58.5') SAND, fine, little medium sand, subrounded, little silt; well sorted; moist; pale brown (10YR 6/3).		
59					0.0		(58.5-68.0') CLAY and SILT, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Little small sandstone fragments starting at 64.0' bgs.		
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B01

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/16/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(58.5-68.0') CLAY and SILT, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Little small sandstone fragments starting at 64.0' bgs.		
65					0.0				
66					0.0				
67					0.0				
68					0.0		(68.0-72.0') WEATHERED SANDSTONE, very fine; well sorted; trace to little sandstone fragments in mostly a soft sand matrix. Note: Heavily weathered from 68.0-72.0' bgs.		
69					0.0				
70				ASP-B01(68-73) (080819) @ 1335	0.0				
71					0.0				
72			120		0.0		(72.0-75.0') SANDSTONE, very fine to fine; well sorted, light gray (10YR 7/1). Note: Mostly large fragments of highly consolidated sandstone. Trace soft sand matrix. Moderate to high competency. Sonic drilling noticeably harder at 73.0' bgs.		
73					0.0				
74					0.0				
75					0.0		(75.0-77.0') SANDSTONE with some very fine shale laminations, very fine; well sorted; light gray (10YR 7/1) to gray (10YR 6/1). Note: Highly competent.		
76					0.0				
77					0.0				
78					NA		Note: Bedrock not logged from 77.0-82.0' bgs.		
79					NA				
80			0		NA				
81					NA				
82					NA				
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/02/2019
Date Completed: 08/09/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 860.9
North Coor: 451555.9
East Coor: 13064316.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B02

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/02/2019
Date Completed: 08/09/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B02

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/02/2019
Date Completed: 08/09/2019
Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-48.5') SILT, trace clay, nonplastic, no dilatancy; trace medium pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
49					0.0		(48.5-54.0') SAND, very fine, and SILT; well sorted; dry; light brownish gray (10YR 6/2).		
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0		(54.0-56.0') SILT, nonplastic, no dilatancy; some very fine sand; well sorted; dry; medium stiff, grayish brown (10YR 5/2).		
56					0.0				
57					0.0		(56.0-57.0') SAND, fine to medium, subrounded; little silt; well sorted, moist; pale brown (10YR 6/3).		
58					0.0		(57.0-68.0') CLAY and SILT, low plasticity to nonplastic; no dilatancy; little very fine to fine sand, subrounded; little granules to large pebbles, subrounded; moist; stiff to very stiff; grayish brown (10YR 5/2). Note: Little sandstone fragments intermixed starting at 50.0' bgs.		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/02/2019
Date Completed: 08/09/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(57.0-68.0') CLAY and SILT, low plasticity to nonplastic; no dilatancy; little very fine to fine sand, subrounded; little granules to large pebbles, subrounded; moist; stiff to very stiff; grayish brown (10YR 5/2). Note: Little sandstone fragments intermixed starting at 50.0' bgs.		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.0-71.0') Weathered Sandstone, very fine; well sorted, little sandstone fragments in mostly a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered. No competency.		
70				ASP-B02(68-73) (080219) @ 1515	0.0				
71					0.0				
72			120		0.0		(71.0-74.0') WEATHERED SANDSTONE and SHALE, light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Some small to medium fragments of sandstone and shale. Low to medium competency.		
73					0.0				
74					0.0				
75					0.0		(74.0-82.0') Sandstone with some fine shale laminations, slightly weathered, light gray (10YR 7/1). Note: Some small to medium sandstone fragments. Medium competency from 74.0-75.0' bgs. Highly competent starting at 75.0' bgs.		
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80			60		0.0				
81					0.0				
82					0.0				
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B03

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/30/2019
Date Completed: 08/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0-0.8') CONCRETE.		
2					0.0		(0.8-2.0') SAND, fine, subrounded; trace to little granules to small pebbles, subrounded; little silt; poorly sorted; dry; yellowish brown (10YR 5/6).		
3					0.0		(2.0-28.0') CLAY, some silt, medium plasticity to high plasticity, no dilatancy; little fine sand, subrounded; moist; medium siff; gray (10YR 5/1).		
4			84		0.0				
5					0.0				
6					0.0				
7					0.0				
8					0.0				
9					0.0				
10					0.0				
11					0.0				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 860.9
North Coor: 451555.9
East Coor: 13064346.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B03

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/30/2019
Date Completed: 08/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(2.0-28.0') CLAY, some silt, medium plasticity to high plasticity, no dilatancy; little fine sand, subrounded; moist; medium siff; gray (10YR 5/1).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0		Note: Fine sand seams, well sorted, wet, from 26.5-26.7' and 26.0-26.2' bgs.		
28					0.0		(28.0-35.5') CLAY, some silt, low plasticity, no dilatancy; little fine sand, subrounded, trace granules to large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
29					0.0				
30					0.0				
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0		(35.5-39.0') SAND, very fine to fine, subrounded; little to some silt; well sorted; dry; light gray (10YR 7/1).		
37					0.0				
38					0.0				
39					0.0				
40					0.0		(39.0-47.0') SAND, very fine to fine, trace to little silt, well sorted; dry, light gray (10YR 7/2).		
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B03

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/30/2019
Date Completed: 08/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(39.0-47.0') SAND, very fine to fine, trace to little silt, well sorted; dry, light gray (10YR 7/2).		
43					0.0				
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-48.5') SILT, trace clay, nonplastic, no dilatancy; trace large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
49					0.0		(48.5-55.0') SAND, very fine, and SILT, well sorted; dry; light brownish gray (10YR 6/2).		
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0		(55.0-58.0') SILT, nonplastic, no dilatancy; some very fine sand; well sorted; dry; medium stiff; grayish brown (10YR 5/2).		
57					0.0				
58					0.0		(58.0-59.5') SAND, fine to medium, subrounded; little silt; well sorted; moist to wet; pale brown (10YR 6/3).		
59					0.0				
60					0.0		(59.5-69') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; little granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Trace to little sandstone fragments starting at 64.0' bgs. Increase in sandstone fragment size at 67.0' bgs.		
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-B03

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/30/2019
Date Completed: 08/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(59.5-69') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; little granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Trace to little sandstone fragments starting at 64.0' bgs. Increase in sandstone fragment size at 67.0' bgs.		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.0-75.0') WEATHERED SANDSTONE, very fine, well sorted; trace to little sandstone fragments in a primarily soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered from 69.0-74.0'bgs.		
71			84	ASP-B03(69-74) (073019) @ 1430	0.0				
72					0.0				
73					0.0				
74					0.0				
75					0.0				
76					0.0		(75.0-80.0') SANDSTONE with few fine shale laminations, very fine; well sorted; light gray (10YR 7/1). Note: High competency. Many large sandstone cores and fragments with trace soft sand matrix.		
77					0.0				
78					0.0				
79			60		0.0				
80					0.0				
81					0.0		(80.0-81.0') SHALE, dark gray (10YR 3/1). Note: Highly competent.		
82					0.0		(81.0-82.0') SANDSTONE, very fine; well sorted; light gray (10 YR 7/1). Note: Highly competent.		
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B04

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/31/2019
Date Completed: 07/31/2019

Logger: A. Westhuis
Editor: S. Presswood and K. Donahue
Weather Conditions: 75° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-1.0') SAND, very fine to fine, subrounded, trace to little granules to small pebbles, subrounded; little silt; poorly sorted; dry; light yellowish brown (10YR 6/4). Note: Fill. Trace concrete fragments.		
2					0.2		(1.0-3.0') SAND, very fine to fine, subrounded; some silt; well sorted; moist; pale brown (10YR 6/3). Note: Fill.		
3					0.2				
4			84		0.6		(3.0-4.5') CLAY, some silt, high plasticity, no dilatancy; little fine sand, subrounded; little granules to medium pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Fill.		
5					1.8		(4.5-5.0') ASPHALT.		
6					0.3		(5.0-6.0') SAND, very fine; and SILT, nonplastic, no dilatancy; moist; well sorted; soft; brown (10YR 5/3). Note: Fill.		
7					0.1		(6.0-7.0') SAND, very fine to fine, subrounded; trace granules, subrounded; trace silt; well sorted; dry to moist; light yellowish brown (10YR 6/4).		
8					0.0		(7.0-15.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; stiff to very stiff; grayish brown (10YR 5/2). Note: Glacial till.		
9					0.0				
10					0.0				
11					0.0				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0		(15.0-16.0') SAND, very fine to fine, subrounded; trace silt; well sorted; wet; brown (10YR 5/3).		
17					0.0		(16.0-26.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace to little fine sand, subrounded; moist, medium stiff to stiff; grayish brown (10YR 5/2). Note: Glacial Till.		
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 861.0
North Coor: 451562.1
East Coor: 13064530.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B04

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/31/2019
Date Completed: 07/31/2019

Logger: A. Westhuis
Editor: S. Presswood and K. Donahue
Weather Conditions: 75° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(16.0-26.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace to little fine sand, subrounded; moist, medium stiff to stiff; grayish brown (10YR 5/2). Note: Glacial Till.		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0		(26.0-32.0') CLAY, little silt, medium plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to very large pebbles, subrounded, moist; medium stiff; gray (10YR 5/1).		
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32			120		0.0				
33					0.0		(32.0-37.0') SAND, very fine to fine, subrounded; little to some silt, well sorted; dry; light gray (10YR 7/1).		
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0		(37.0-41.0') SAND, very fine; some silt; trace granules, subrounded; poorly sorted; dry to moist; brown (10YR 5/3).		
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B04

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/31/2019
Date Completed: 07/31/2019

Logger: A. Westhuis
Editor: S. Presswood and K. Donahue
Weather Conditions: 75° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(41.0-45.0') SILT, trace clay, nonplastic, no dilatancy; some very fine sand; trace granules to medium pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
43					0.0				
44					0.0				
45					0.0				
46					0.0		(45.0-55.0') SAND, very fine; some silt; well sorted; dry; light brownish gray (10YR 6/2).		
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0		(55.0-57.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded, moist; stiff; grayish brown (10YR 5/2).		
57					0.0				
58					0.0		(57.0-58.0') SANDSTONE, large cobble, very fine; well sorted; light gray (10YR 7/1).		
59					0.0		(58.0-59.0') SAND, very fine to medium, subrounded; little silt; poorly sorted; wet; brown (10YR 5/3).		
60					0.0		(59.0-65.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; little granules to large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2). Note: Trace sandstone fragments.		
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-B04

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/31/2019
Date Completed: 07/31/2019

Logger: A. Westhuis
Editor: S. Presswood and K. Donahue
Weather Conditions: 75° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(59.0-65.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; little granules to large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2). Note: Trace sandstone fragments.		
65					0.0				
66					0.0		(65.0-66.0') SAND, very fine to medium, subrounded; little silt; trace granules to small pebbles, subrounded; poorly sorted; wet; brown (10YR 5/3).		
67					0.0		(66.0-70.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; little granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
68					0.0				
69					0.0				
70			60		0.0				
71					0.0		(70.0-75.0') WEATHERED SANDSTONE, very fine, well sorted; loosely consolidated; light gray (10YR 7/1). Note: Heavily weathered from 70.0-71.0' bgs.		
72					0.0				
73				ASP-B04(70-75) (073119) @ 1655	0.0				
74			36		0.0				
75					0.0				
76							End of boring at 75.0' bgs.		
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-C02

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/22/2019
Date Completed: 08/22/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.5') CONCRETE.		
2					NA		(1.5-3.0') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded; little silt; poorly sorted; dry; yellowish brown (10YR 5/6).		
3					0.3				
4			84		0.3		(3.0-5.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist, medium stiff, dark grayish brown (10YR 4/2).		
5					0.6				
6					0.2		(5.0-7.5') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to small pebbles, subrounded; moist; stiff brown (10YR 5/3).		
7					0.1				
8					0.0		(7.5-8.5') SAND, very coarse, subangular; trace silt; well sorted; wet; yellowish brown (10YR 5/4).		
9					0.0		(8.5-10.5') CLAY, trace silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to small pebbles, subrounded; moist; stiff; brown (10YR 5/3).		
10					0.0				
11					0.0		(10.5-16.0') CLAY, some silt, low to medium plasticity, no dilatancy; little fine sand, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
12					0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0		(16.0-20.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451161.7
East Coor: 13064329.1

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-C02

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/22/2019
Date Completed: 08/22/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-21.0') SAND, fine to medium, subrounded; trace granules, subrounded; little to some silt; poorly sorted; wet; grayish borwn (10YR 5/2).		
22			120		0.0		(21.0-31.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace to little granules to very large pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32			120		0.0		(31-32.5') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little to some fine sand, subrounded; trace to little granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
33					0.0		(32.5-42.5') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light brown (10YR 7/1).		
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-C02

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/22/2019
Date Completed: 08/22/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(32.5-42.5') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light brown (10YR 7/1).		
43					0.0		(42.5-44') CLAY, some silt, low plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to medium pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
44					0.0				
45					0.0		(44.0-47.5') SAND, very fine to fine, subrounded; and SILT; poorly sorted; dry; light brownish gray (10YR 6/2).		
46					0.0				
47					0.0				
48					0.0		(47.5-49.0') CLAY, some silt, low plasticity to nonplastic, no dilatancy; trace to little sand, fine to medium, subangular; little granules to large pebbles, subrounded; dry to moist; very stiff; dark grayish brown (10YR 4/2) Note: Glacial till.		
49					0.0				
50					0.0		(49.0-50.0') SAND, medium to little coarse sand to pebbles, subangular; trace to little silt; little clay, nonplastic, no dilatancy; poorly sorted; dry; brown (10YR 5/3).		
51					0.0		(50.0-57.0') CLAY, some silt, low plasticity to nonplastic, no dilatancy; trace sand, fine to medium, subangular; little granules to large pebbles, subrounded; dry; very stiff to hard; dark grayish brown (10YR 4/2).		
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-70.0') CLAY, little to some silt, nonplastic, no dilatancy; little sand, very fine to fine, subrounded; trace to little granules to large pebbles, subrounded; dry; very stiff; dark gray (10YR 4/1). Note: Trace small to large sandstone and shale fragements.		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-C02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/22/2019
Date Completed: 08/22/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(57.0-70.0') CLAY, little to some silt, nonplastic, no dilatancy; little sand, very fine to fine, subrounded; trace to little granules to large pebbles, subrounded; dry; very stiff; dark gray (10YR 4/1). Note: Trace small to large sandstone and shale fragements.		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70			78		0.0		(70.0-72.0') WEATHERED SANDSTONE and SHALE; light gray (10YR 7/1) to gray (10YR 5/1). Note: Heavily weathered, many small brittle fragments. No competency.		
71					0.0				
72					0.0		(72.0-73.0') WEATHERED SHALE, gray (10YR 5/1). Note: Moderately weathered, many small brittle fragments with trace to little larger fragments. No competency.		
73							(73.0-76.0') SANDSTONE, very fine, well sorted; light gray (10YR 7/1). Note: Trace fine shale laminations, highly competent.		
74				ASP-C02(72-77) (082219) @ 1345	0.0				
75			42		0.0				
76					0.0				
77					0.0		(76.0-76.6') SHALE, very dark gray (10YR 3/1). Note: Highly competent. (76.6-77.0') SANDSTONE.		
78							End of boring at 77.0' bgs.		
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-D01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/25/2019
Date Completed: 09/25/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 71° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.1
North Coor: 450954.6
East Coor: 13064343.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-D01

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/25/2019
Date Completed: 09/25/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 71° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-D01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/25/2019
Date Completed: 09/25/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 71° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-52.0') SAND, very fine to medium, subangular to subrounded; little to some SILT; trace very coarse to granules, subrounded; poorly sorted; moist; loose to medium dense, gray (10YR 6/1).		
49					0.0				
50					0.0				
51					0.0				
52			100		0.0		(52.0-56.0') WEATHERED SHALE with little sandstone, gray (10YR 5/1). Note: Highly weathered.		
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57							(56.0-57.0') WEATHERED SHALE and SANDSTONE, interbedded, few competent sandstone pieces in soft sand matrix, gray (10YR 5/1). Note: Highly weathered.		
58					0.0		(57.0-58.0') WEATHERED SANDSTONE, few consolidated pieces in a soft sand matrix, trace interbedded shale, gray (10YR 5/1). Note: Highly weathered.		
59					0.0		(58.0-62.0') WEATHERED SANDSTONE and SHALE, few consolidated shale and sandstone pieces, gray (10YR 5/1). Note: Highly weathered.		
60					0.0				
61					0.0				
62			120		0.0		(62.0-62.5') SHALE, moderate competency, dry, gray (10YR 5/1).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-D01

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/25/2019
Date Completed: 09/25/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 71° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64				ASP-D01(62-67) (092519) @ 1610	0.0		(62.5-67.0') SANDSTONE and SHALE, moderate competency, in soft sand matrix, light gray (10YR 7/1) to gray (10YR 6/1).		
65					0.0				
66					0.0				
67					0.0				
68			16		0.0		(67.0-69.5') SHALE, moderate competency, little to some interbedded sandstone, gray (10YR 5/1) to light gray (10YR 7/1).		
69					0.0				
70					0.0		End of boring at 69.5' bgs.		
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-D04

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/27/2019
Date Completed: 09/27/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.1
North Coor: 450958.1
East Coor: 13064524.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-D04

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/27/2019
Date Completed: 09/27/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-D04

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/27/2019
Date Completed: 09/27/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-48.0') SAND, very fine to granules, subangular to subrounded; some SILT; poorly sorted; wet; loost to medium dense; light brownish gray (10YR 6/2).		
49					0.0		(48.0-50.0') WEATHERED SANDSTONE and SHALE, interbedded, small competent pieces, gray (10YR 5/1). Note: Highly weathered.		
50					0.0				
51					0.0		(50.0-55.5') WEATHERED SANDSTONE, little shale, few competent pieces of sandstone, gray (10YR 5/1) to light gray (10YR 7/1). Note: Highly weathered.		
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0		(55.5-56.5') WEATHERED SHALE, little sandstone, gray (10YR 5/1). Note: Highly weathered.		
57					0.0		(56.5-59.0') WEATHERED SANDSTONE and SHALE, few competent pieces of sandstone and shale, gray (10YR 5/1) to light gray (10YR 7/1). Note: Highly weathered.		
58				ASP-D04(56-61) (093019) @ 0830	0.0				
59					0.0				
60					0.0		(59.0-66.0') SANDSTONE and SHALE, some interbedding, low to moderate competency, gray (10YR 5/1) to light gray (10YR 7/1). Note: Poor recovery. The drillers indicated the drilling became very hard at 65.0' bgs.		
61					0.0				
62			31		0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-D04

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/27/2019
Date Completed: 09/27/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(59.0-66.0') SANDSTONE and SHALE, some interbedding, low to moderate competency, gray (10YR 5/1) to light gray (10YR 7/1). Note: Poor recovery. The drillers indicated the drilling became very hard at 65.0' bgs.		
65					0.0				
66					0.0				
67							(66.0-66.5') SANDSTONE, very fine, subrounded, light gray (10YR 7/1).		
68							(66.5-72.0') SHALE with some fine sandstone laminations, gray (10YR 5/1). Note: Low to medium competency.		
69									
70									
71									
72									
73							End of boring at 72.0' bgs.		
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-0.5') CONCRETE.		
							(0.5-2.0') PEBBLES, large to very large. Note: Fill.		
2					0.1				
3			60		0.9		(2.0-3.5') SAND, fine, subrounded; trace to little silt; well sorted; moist; very dark brown (10YR 2/2) to dark yellowish brown (10YR 3/4). Note: Trace slag fragments. Fill.		
4					0.7		(3.5-7.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; little very fine sand; moist; medium stiff; grayish brown (10YR 5/2).		
5					0.0				
6					0.0				
7					0.0				
8			60		0.0		(7.0-14.0') SAND, very fine to coarse, subangular; little to some silt; poorly sorted; wet; pale brown (10YR 6/3).		
9					0.0				
10					0.9				
11					0.0				
12					0.0				
13					0.0				
14					0.0				
15			120		0.0		(14.0-16.5') CLAY, some silt, high plasticity, no dilatancy; little fine to medium sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Small, fine to medium, interbedded sand seams, wet.		
16					0.0				
17					0.0		(16.5-21.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; little granules to medium pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.4
North Coor: 451270.3
East Coor: 13064856.9

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-F01

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0				
22					0.0		(21.0-23.5') SAND, fine to very coarse, subangular; little silt; trace granules to small pebbles, subrounded; wet; poorly sorted; grayish brown (10YR 5/2).		
23					0.0				
24					0.0		(23.5-28.0') CLAY, little silt, high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
25			108		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0		(28.0-30.0') SILT, trace clay, nonplastic, rapid dilatancy; little to some fine sand, subrounded; well sorted; wet; grayish brown (10YR 5/2).		
30					0.0				
31					0.0		(30.0-47.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-F01

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(30.0-47.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
43					0.0				
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-60.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/2).		
49					0.0				
50					0.0				
51					0.0				
52					0.0				
53					0.4				
54					0.0				
55			120		0.2				
56					0.5				
57					0.0				
58					0.0				
59					0.7				
60					0.7				
61					0.9		(60.0-64.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; gray (10YR 6/1). Note: Trace fragments of sandstone.		
62					0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 041720.GPJ ARCADIS 2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F01

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/15/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0				
					0.0		(64.0-64.5') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Low competency.		
65			120				(64.5-70.0') WEATHERED SHALE, trace fine sandstone laminations; dark gray (10YR 4/1). Note: Low competency.		
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71			24		0.0		(70.0-72.0') WEATHERED SHALE and SANDSTONE, dark gray (10YR 4/1) to light gray (10YR 7/1). Note: Low to medium competency.		
72					0.0				
73				ASP-F01(71-75) (071519) @ 1650	0.0		(72.0-73.5') SANDSTONE, very fine; well sorted; highly consolidated; light gray (10YR 7/1). Note: High competency with many large sandstone cores and fragments in little soft sand matrix.		
74			36		0.0		(73.5-76.0') SHALE, trace interbedded sandstone, dark gray (10YR 4/1). Note: Medium competency.		
75					0.0				
76					0.0				
					0.0		(76.0-82.0') SANDSTONE, very fine; well sorted; highly consolidated. Note: High competency with many large sandstone cores and fragments in trace soft sand matrix.		
77					0.0				
78			60		0.0				
79					0.0				
80					0.0				
81			24		0.0				
82					0.0				
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/24/2019
Date Completed: 07/24/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 62° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.1
North Coor: 451287.9
East Coor: 13064827.4

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F02

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/24/2019
Date Completed: 07/24/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 62° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F02

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/24/2019
Date Completed: 07/24/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 62° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-61.0') SAND, very fine to fine; trace granules; well sorted; wet to moist; very loose to loose; light brownish gray (10YR 6/2).		
52					0.0				
53					0.0				
54					0.4				
55			67		0.5				
56					0.3				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0		(61.0-64.0') CLAY and SILT, low to medium plasticity, medium dilatancy; trace small to large pebbles, subrounded; moist to wet; stiff; dark gray (10YR 4/1).		
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/24/2019
Date Completed: 07/24/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 62° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-64.0') CLAY and SILT, low to medium plasticity, medium dilatancy; trace small to large pebbles, subrounded; moist to wet; stiff; dark gray (10YR 4/1).		
65			115		0.0		(64.0-67.0') WEATHERED SHALE, little to some interbedded very fine to fine sandstone; well sorted; low competency; gray (10YR 5/4).		
66					0.1				
67					0.0				
68					0.0		(67.0-67.5') WEATHERED SANDSTONE, very fine to fine; little interbedded shale; trace medium sand, subrounded; low to medium competency; gray (10YR 7/4).		
69				ASP-F02(67-71) (072419) @ 1255	0.0		(67.5-72.0') WEATHERED SANDSTONE and SHALE, very fine; well sorted; medium competency; gray (10YR 5/4).		
70					0.0				
71					0.0				
72					0.0				
73			60		0.0		(72.0-74.0') WEATHERED SHALE, some interbedded very fine sandstone; medium competency; gray (10YR 5/1). Note: Very competent shale fragments within core.		
74					0.0				
75					0.0		(74.0-76.0') SHALE, trace interbedded very fine sandstone; high competency; gray (10YR 7/1). Note: Calcified.		
76					0.0				
77					0.0		(76.0-83.0') SANDSTONE, trace interbedded shale; very fine to fine; well sorted; medium to highly consolidated; little soft sand matrix; high competency; gray (10YR 6/1). Note: Calcified from 79.0-82.0' bgs.		
78					0.0				
79			96		0.0				
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84							End of boring at 83.0' bgs.		

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-F03

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/25/2019
Date Completed: 07/30/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 73° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-2.0') SAND, fine to large pebbles, subrounded to subangular; poorly sorted; dry; very loose; gray (10YR 6/1). Note: Fill material from 0.0-2.0' bgs. Some aggregate stone, angular; loose; white (10YR 8/1).		
2					0.0				
3			16		0.0		(2.0-7.0') CLAY, medium to high plasticity, low dilatancy; and SAND, very fine to granules, subrounded to subangular; poorly sorted; wet to moist; medium stiff; gray (10YR 5/1).		
4					0.0				
5					0.0				
6					0.0		Note: Wet at 5.0' bgs.		
7					0.0				
8			48		0.0		(7.0-12.0') CLAY, some silt, medium to high plasticity, no dilatancy; moist; soft to medium stiff; grayish olive (10Y-5GY 5/2).		
9					0.0				
10					0.0				
11					0.0				
12					0.0				
13					0.0		(12.0-16.5') CLAY, little silt, high plasticity, no dilatancy; moist; very soft; grayish olive (10Y-5GY 5/2).		
14					0.0				
15			120		0.0				
16					0.0				
17					0.0				
18					0.0		(16.5-18.5') SAND, very fine to medium, subrounded to subangular; and CLAY, little silt, low to medium plasticity, medium to high dilatancy; poorly; sorted; moist to wet; medium dense to dense; gray (10YR 6/1).		
19					0.0		(18.5-25.0') SAND, very fine to fine; and SILT, little clay, low plasticity, medium dilatancy; moist to wet; dense to very dense; gray (10YR 6/1).		
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.1
North Coor: 451301.9
East Coor: 13064803.1

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F03

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/25/2019
Date Completed: 07/30/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 73° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(18.5-25.0') SAND, very fine to fine; and SILT, little clay, low plasticity, medium dilatancy; moist to wet; dense to very dense; gray (10YR 6/1).		
22					0.0				
23					0.0				
24					0.0				
25			110		0.0		(25.0-28.5') SAND, fine to very coarse, subrounded to subangular; trace silt; poorly sorted; wet; loose; grayish brown (10YR 5/2).		
26					0.0				
27					0.0				
28					0.0				
29					0.0		(28.5-30.0') SILT, little clay, low plasticity, no dilatancy; little sand, very fine to fine; moist; very dense; gray (10YR 5/1).		
30					0.0		(30.0-34.0') SAND, very fine to medium, subrounded to subangular; some clay, medium plasticity, high dilatancy; well sorted; wet; very loose to medium dense; gray (10YR 6/1).		
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			95		0.0		(34.0-47.0') CLAY, some silt, medium plasticity, no dilatancy; little sand, very fine to fine; moist; very stiff; grayish brown (10YR 5/2).		
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F03

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/25/2019
Date Completed: 07/30/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 73° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(34.0-47.0') CLAY, some silt, medium plasticity, no dilatancy; little sand, very fine to fine; moist; very stiff; grayish brown (10YR 5/2).		
43					0.0				
44					0.0				
45			98		0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-60.5') SAND, very fine to fine; little silt; trace medium sand; trace small to large pebbles; well sorted; dry to wet; light gray (10YR 7/2).		
49					0.0				
50					0.0				
51					0.0				
52					0.0				
53					0.0				
54					0.0				
55			81		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.1		(60.5-66.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace medium sand, subrounded; stiff; moist; gray (10YR 5/1).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-F03

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/25/2019
Date Completed: 07/30/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 73° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.5-66.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace medium sand, subrounded; stiff; moist; gray (10YR 5/1).		
65			107		0.0				
66					0.0				
67					0.0		(66.0-68.0') WEATHERED SHALE, interbedded sandstone; low competency; dark gray (10YR 4/1).		
68					0.0				
69					0.0		(68.0-68.5') WEATHERED SANDSTONE, very fine to fine; medium competency; light gray (10YR 7/1).		
							(68.5-69.5') WEATHERED SHALE and SANDSTONE, interbedded; low competency; dark gray (10YR 4/1).		
70					0.0		(69.5-70.5') SANDSTONE, very fine to fine; well sorted; medium to high competency; some large fragments of consolidated sandstone; light gray (10YR 7/1).		
71					0.0		(70.5-73.0') SHALE, interbedded sandstone, very fine to fine; moderately weathered; medium competency with some high cometency fragments; dark gray (10YR 4/1) and light gray (10YR 7/1).		
72					0.0				
73			60	ASP-F03(71-75) (072619) @ 0905	0.0		(73.0-74.0') SANDSTONE, some shale lamination, very fine to fine; low to medium competency; light gray (10YR 7/1) and very dark gray (10YR 5/1).		
74					0.0		(74.0-76.0') SHALE, trace sandstone laminations; high competency; gray (10YR 6/1).		
75									
76					0.0				
77					0.0		(76.0-82.0') SHALE and SANDSTONE, interbedded, very fine; high competency; dark gray (10YR 4/1), dark gray (10YR 3/1) and gray (10YR 6/1).		
78					0.0				
79			84		0.0				
80					0.0				
81					0.0				
82					0.0				
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-G01

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/13/2019
Date Completed: 07/13/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.0') CONCRETE.		
2			60		0.0		(1.0-4.0') SAND, fine to coarse, subrounded; little granules to large pebbles, subrounded; little silt; poorly sorted; dark yellowish brown (10YR 4/4).		
3					0.1				
4					0.1				
5					0.0		(4.0-18.5') CLAY, some silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
6					0.0				
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0				
12					0.0				
13					0.0				
14					0.0				
15			120		0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0		(18.5-20.0') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded; trace to little silt; well sorted; wet; gray (10YR 5/1).		

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 861.1
North Coor: 450785.7
East Coor: 13064463.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-G01

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/13/2019
Date Completed: 07/13/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-28.5') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
22					0.0				
23					0.0				
24					0.0				
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0		(28.5-38.0') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; light brownish gray (10YR 6/2).		
30					0.0				
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0		(38.0-44.0') CLAY and SILT, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; gray (10YR 5/1).		
40					0.0		Note: Large sandstone fragment, very fine, light gray (10YR 7/1) at 39.5' bgs.		
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-G01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/13/2019
Date Completed: 07/13/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(38.0-44.0') CLAY and SILT, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; gray (10YR 5/1).		
43					0.0				
44					0.0				
45			120		0.0		(44.0-45.5') SAND, very fine; trace silt; well sorted; dry; light gray (10YR 7/1).		
46					0.0		(45.5-47.0') SILT, trace clay, nonplastic, no dilatancy; trace to little very fine sand; moist; stiff; gray (10YR 6/1).		
47					0.0				
48					0.0		(47.0-50.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; dry to moist; stiff; gray (10YR 5/1). Note: Large sandstone fragments, very fine, light gray (10YR 7/1) at 46.5' bgs and 48.0' bgs. Some loosely consolidated sandstone and shale fragments from 49.0' bgs to 50.0' bgs.		
49					0.0				
50					0.0				
51					0.0		(50.0-54.0') WEATHERED SANDSTONE, very fine to fine; well sorted; loosely consolidated fragments in a soft sand matrix; dark gray (10YR 4/1). Note: Little shale, black (10YR 2/1).		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0		(54.0-58.0') CLAY and SILT, nonplastic to low plasticity, no dilatancy; little to some fine sand, subrounded; trace granules to medium pebbles, subrounded; dry to moist; stiff; dark gray (10YR 4/1). Note: Little small to large fragments of finely interbedded sandstone and shale.		
56					0.0				
57					0.0				
58					0.0				
59					0.0		(58.0-60.0') WEATHERED SANDSTONE and SHALE, very fine; well sorted; loosely consolidated. Note: Medium competency with little large fragments. Little soft sand matrix.		
60					0.0				
61					0.0		(60.0-64.5') WEATHERED SHALE, little interbedded sandstone, loosely consolidated; dark gray (10YR 4/1). Note: Low to moderate competency.		
62					0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANAL YSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-G01

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/13/2019
Date Completed: 07/13/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64			84		0.0		(60.0-64.5') WEATHERED SHALE, little interbedded sandstone, loosely consolidated; dark gray (10YR 4/1). Note: Low to moderate competency.		
65				ASP-G01(63-67) (071319) @ 1740	0.0		(64.5-68.0') SANDSTONE, very fine to fine, subrounded; well sorted; moderately consolidated. Note: Medium to high competency with many large fragments of sandstone. Little soft sand matrix.		
66					0.0				
67					0.0				
68					0.0				
69			36		0.0		(68.0-73.0') SHALE, some interbedded sandstone; dark gray (10YR 4/1). Note: Medium competency with many large fragments. Little soft sand matrix.		
70					0.0				
71					0.0				
72					0.0				
73					0.0				
74					0.0		(73.0-80.0') SANDSTONE, very fine to fine, subrounded; well sorted; highly consolidated; light gray (10YR 7/1). Note: High competency with many large sandstone cores. Trace soft sand matrix.		
75			120		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-G02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/10/2019
Date Completed: 07/12/2019

Logger: E. Redner
Editor: A. Westhuis
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-5.0') SAND, very fine to large pebbles, subrounded to subangular; poorly sorted; dry; very loose; grayish brown (10YR 5/2). Note: Fill. Wet at 5.0' bgs.		
2					0.0				
3			12		0.0				
4					0.0				
5					0.0				
6					0.0		(5.0-7.5') SAND, fine to small pebbles, trace granules, subrounded to subangular; some clay and silt, medium to high plasticity, medium dilatancy; poorly sorted; wet; medium dense; dark gray (10YR 4/1) to dark yellowish brown (10YR 4/6).		
7					0.0				
8			60		0.0		(7.5-10.0') SAND, very fine to fine, trace to some small to large pebbles, subrounded; and SILT, trace clay, low plasticity, medium dilatancy; well sorted; wet to moist; medium dense to loose; black (10YR 2/1).		
9					0.0				
10					0.9				
11					0.0		(10.0-15.0') CLAY, high plasticity, medium to slow dilatancy; some very fine sand to large pebbles, subangular to subrounded; trace very large pebbles; wet; soft; dark gray (10YR 4/1).		
12					0.0				
13					0.0				
14					0.0				
15			46		0.0				
16					0.0		(15.0-20.0') SAND, very fine to fine; and SILT, trace clay, low plasticity, medium dilatancy; some small to large pebbles, subrounded; well sorted; wet to moist; medium dense to loose, black (10YR 2/1).		
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 450824.0
East Coor: 13064615.1

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-G02

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/10/2019
Date Completed: 07/12/2019
Logger: E. Redner
Editor: A. Westhuis
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-24.0') CLAY, medium plasticity, slow dilatancy; and SAND, fine to coarse, subrounded to subangular; wet; medium stiff to stiff; grayish brown (10YR 5/2). Note: Sand lenses at 22.5' bgs and 23.0' bgs.		
22					0.0				
23					0.0				
24					0.0				
25			120		0.0		(24.0-28.0') CLAY, high plasticity, slow dilatancy; some very fine to medium sand, subangular to subrounded; moist to wet; stiff to very stiff; grayish brown (10YR 5/2). Note: Sand lens at 27.0' bgs.		
26					0.0				
27					0.0				
28					0.0				
29					0.0		(28.0-40.0') SAND, very fine to medium pebbles, subrounded to subangular; little silt; poorly sorted; moist to wet; medium dense to very dense; gray (10YR 5/1).		
30					0.0				
31					0.0		Note: Small sand lense at 30.0' bgs, fine to large pebbles, subangular to subrounded; loose to medium dense; poorly sorted.		
32					0.0				
33					0.0				
34					0.0				
35			113		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0		(40.0-47.0') CLAY, medium to high plasticity, slow dilatancy; some very fine to fine sand; moist; medium stiff to stiff; gray (10YR 6/1).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-G02

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/10/2019
Date Completed: 07/12/2019
Logger: E. Redner
Editor: A. Westhuis
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(40.0-47.0') CLAY, medium to high plasticity, slow dilatancy; some very fine to fine sand; moist; medium stiff to stiff; gray (10YR 6/1).		
43					0.0				
44					0.0				
45			88		0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-51.0') SAND, fine to medium, subrounded; trace coarse to very coarse sand; well sorted; moist to dry; loose; gray (10YR 5/1).		
49					0.0				
50					0.0				
51					0.0		(51.0-52.0') SAND, very fine to fine; some clay, medium plasticity, slow dilatancy; well sorted; moist; very dense; dark gray (10YR 4/1).		
52					0.0		(52.0-55.0') SAND, very fine to very large pebbles, subrounded to subangular; poorly sorted; moist to dry; loose to very loose; dark grayish brown (10YR 4/2) to dark gray (10YR 4/1).		
53					0.0				
54					0.0				
55			120		0.0		(55.0-60.0') WEATHERED SANDSTONE, very fine; gray (10YR 7/1) to dark gray (10YR 4/1). Note: Highly weathered; medium competency.		
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-64.0') WEATHERED SANDSTONE and SHALE, very fine; dark gray (10YR 4/1). Note: Medium competency.		
62					0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 041720.GPJ ARCADIS 2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-G02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/10/2019
Date Completed: 07/12/2019

Logger: E. Redner
Editor: A. Westhuis
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-64.0') WEATHERED SANDSTONE and SHALE, very fine; dark gray (10YR 4/1). Note: Medium competency.		
65			120		0.0		(64.0-66.0') WEATHERED SANDSTONE, very fine to fine; gray (10YR 5/1). Note: Low competency.		
66					0.0				
67					0.0		(66.0-68.0') WEATHERED SANDSTONE, very fine to fine; gray (10YR 6/1). Note: Medium competency.		
68					0.0				
69					0.0		(68.0-70.0') WEATHERED SANDSTONE, very fine; gray (10YR 6/1). Note: Low competency.		
70					0.0				
71			19	ASP-G02(68-72) (071019) @ 1220	0.0		(70.0-72.0') SANDSTONE, very fine; gray (10YR 6/1) to light gray (10YR 7/1). NOTE: High competency.		
72					0.0				
73					0.0		(72.0-80.0') SHALE, very fine to fine; gray (10YR 5/1). Medium to high competency.		
74					0.0				
75					0.0				
76			90		0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-G03

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/14/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 450833.5
East Coor: 13064644.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-G03

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/14/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: ASP-G03

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/14/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-50.5') CLAY and SILT, low plasticity to nonplastic, no dilatancy; some very fine sand; moist; stiff; gray (10YR 5/1). Note: Little small to large fragments of sandstone.		
51					0.0		(50.5-61.0') WEATHERED SANDSTONE, some interbedded shale, very fine; well sorted; dry; loosely consolidated. Note: Low competency. Little small to large fragments of sandstone.		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(61.0-65.0') WEATHERED SHALE, dark gray (10YR 4/1) to black (10YR 2/1). Note: Medium competency.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: ASP-G03

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/14/2019
Date Completed: 07/14/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 90° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-65.0') WEATHERED SHALE, dark gray (10YR 4/1) to black (10YR 2/1). Note: Medium competency.		
65			120		0.0				
					0.0		(65.0-66.0') WEATHERED SANDSTONE and SHALE, interbedded, light gray (10YR 7/1). Note: Medium competency.		
66									
67					0.0		(66.0-68.0') WEATHERED SANDSTONE, little shale, very fine; well sorted; moist; light gray (10YR 7/1). Note: Medium competency.		
68				ASP-G03(66-70) (071419) @ 1120	0.0				
69					0.0		(68.0-70.0') SANDSTONE, very fine to fine, subrounded; well sorted; highly consolidated; light gray (10YR 7/1). Note: High competency with large sandstone cores in trace soft sand matrix.		
70					0.0				
71					0.0		(70.0-72.5') SHALE, trace interbedded sandstone, dark gray (10YR 4/1). Note: Medium to high competency.		
72					0.0				
73					0.0		(72.5-76.0') SANDSTONE, very fine to fine, subrounded; well sorted; light gray (10YR 7/1). Note: High competency with many large cores and fragments.		
74			96		0.0				
75					0.0				
76					0.0				
77					0.0		(76.0-78.0') SHALE, trace interbedded sandstone, dark gray (10YR 4/1). Note: Medium to high competency.		
78					0.0				
79							End of boring at 78.0' bgs.		
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: CSP-B01

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/15/2019
Date Completed: 08/20/2019
Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-3.0') SAND, very fine to fine, subrounded; little small pebbles, angular to subangular; trace medium pebbles, angular to subangular; poorly sorted; dry; yellowish brown (10YR 7/8).		
2					0.0				
3					0.0				
4			84		0.0		(3.0-9.5') CLAY and SILT, high plasticity, no dilatancy; some small pebbles, angular to subangular; little medium pebbles, angular to subangular; dry; stiff; dark grayish brown (10YR 4/2).		
5					0.0				
6					0.0				
7					0.0				
8					0.0				
9					0.0				
10					0.0		(9.5-17.0') CLAY, high plasticity, no dilatancy; moist; stiff; pale brown (10YR 6/3).		
11					0.0				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-19.5') CLAY and SILT, medium plasticity, no dilatancy; wet; soft; pale brown (10YR 6/3).		
19					0.0				
20					0.0		(19.5-20.0') SILT; and SAND, very fine, subrounded; low		

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 861.0
North Coor: 451554.1
East Coor: 13064249.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-B01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/15/2019
Date Completed: 08/20/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		plasticity; rapid dilatancy; soft; moist; little small pebbles, angular to subangular; pale brown (10YR 6/3).		
22			120		0.0		(20.0-30.0') CLAY, some silt, high plasticity, no dilatancy; trace small pebbles; moist; stiff; light brownish gray (10YR 6/2).		
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0		(30.0-37.0') SILT and CLAY, medium plasticity, no dilatancy; trace small pebbles, angular to subangular; moist; medium stiff; grayish brown (10YR 5/2).		
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0		(37.0-40.0') SILT and CLAY, medium plasticity, no dilatancy; some small pebbles, angular to subangular; moist; medium stiff; grayish brown (10YR 5/2).		
39					0.0				
40					0.0				
41					0.0		(40.0-47.0') CLAY some SILT, high plasticity, no dilatancy; trace small pebbles, angular to subangular; moist; stiff; grayish brown (10YR 5/2).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-B01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/15/2019
Date Completed: 08/20/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(40.0-47.0') CLAY some SILT, high plasticity, no dilatancy; trace small pebbles, angular to subangular; moist; stiff; grayish brown (10YR 5/2).		
43					0.0				
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-48.0') SILT, nonplastic, rapid dilatancy; moist; soft; grayish brown (10YR 5/2).		
49					0.0		(48.0-50.5') SAND, very fine to fine, subrounded; some silt; little small pebbles, angular to subangular; moist; grayish brown (10YR 5/2).		
50					0.0				
51					0.0		(50.5-55.5') SAND, very fine, subrounded; some silt; dry; grayish brown (10YR 5/2).		
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0		(55.5-62.0') SILT; nonplastic, rapid dilatancy; dry; soft; grayish brown (10YR 5/2).		
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				
					0.0		(62.0-63.0') SAND, very fine to fine, subrounded; some silt; well sorted; moist; grayish brown (10YR 5/2).		

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 041720.GPJ ARCADIS 2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: CSP-B01

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/15/2019
Date Completed: 08/20/2019
Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: NR

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-64.0') CLAY, medium plasticity, slow dilatancy; some silt; little sand, very fine; little small pebbles, angular to subangular; stiff; moist; grayish brown (10YR 5/2).		
65					0.0		(64.0-67.0') SAND, very fine, subrounded; some silt; trace small pebbles; well sorted; moist; brown (10YR 5/3).		
66					0.0				
67					0.0				
68					0.0		(67.0-70.0') CLAY, medium plasticity, no dilatancy; some sand, very fine; some small pebbles, angular to subangular; little medium pebbles, angular to subangular; trace cobbles of sandstone, subangular; grayish brown (10YR 5/2).		
69					0.0				
70					0.0				
71					0.0		(70.0-72.0') WEATHERED SANDSTONE, very fine, subrounded, well sorted; light gray (10YR 7/2). Note: Highly weathered in a mostly soft sand matrix.		
72			120	CSP-B01(70-75) (081519) @ 1220	0.0				
73					0.0		(72.0-74.0') SANDSTONE, very fine, subrounded, well sorted; light gray (10YR 7/2). Note: Moderately competent.		
74					0.0				
75					0.0		(74.0-76.5') SHALE with very fine sandstone laminations; dark grayish brown (10YR 4/2) to light gray (10YR 7/2). Note: Moderately competent.		
76					0.0				
77					0.0		(76.5-77.0') SHALE; dark grayish brown (10YR 4/2). Note: Moderately to highly competent. End of boring at 77.0' bgs.		
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-D01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/03/2019
Date Completed: 10/03/2019
Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 63° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.2
North Coor: 450923.2
East Coor: 13064358.4

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-D01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/03/2019
Date Completed: 10/03/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 63° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-D01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/03/2019
Date Completed: 10/03/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 63° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-50.0') SILT, some clay, medium plasticity, no dilatancy; trace small pebbles, subangular to subrounded; wet; medium stiff; dark gray (10YR 4/1).		
49					0.0				
50					0.0				
51					0.0		(50.0-54.0') SAND, very fine, subrounded; some silt; trace small to medium pebbles; well sorted; moist; dark gray (10YR 4/1).		
52			120		0.0				
53					0.0				
54					0.0				
55					0.0		(54.0-58.0') SILT and CLAY, high plasticity, no dilatancy; little small to large pebbles; medium stiff; moist; dark gray (10YR 4/1).		
56					0.0				
57					0.0				
58					0.0				
59					0.0		(58.0-63.0') SILT, nonplastic, rapid dilatancy; andSAND, very fine, subrounded; some small to large pebbles; stiff; dry; gray (10YR 5/1). Note: Some fragments of sandstone intermixed.		
60					0.0				
61					0.0				
62			72		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: CSP-D01

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/03/2019
Date Completed: 10/03/2019
Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 63° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-64.0') SHALE, very dark gray (10YR 3/1) with some fine sandstone laminations. Note: Highly weathered. Little competency.		
65					0.0		(64.0-65.5') SANDSTONE, some fragments in a soft sand matrix, light gray (10YR 7/1), dry. Note: Highly weathered. Little competency.		
66					0.0		(65.5-66.5') SANDSTONE, light gray (10YR 7/1). Note: High competency. Large cores.		
67				CSP-D01(64-69) (100419) @ 0847	0.0		(66.5-72.0') SHALE and SANDSTONE, interbedded, very dark gray (10YR 3/1) and light gray (10YR 7/1).		
68					0.0				
69			48		0.0				
70					0.0				
71					0.0				
72					0.0				
73							End of boring at 72.0' bgs.		
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-F01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: S. Presswood and A. Westhuis
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): 68.0
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.2
North Coor: 451326.2
East Coor: 13064789.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-F01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: S. Presswood and A. Westhuis
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-F01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: S. Presswood and A. Westhuis
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-53.0') CLAY, little silt, medium plasticity, slow dilatancy; trace very course sand, subrounded to subangular; moist; stiff; gray (10YR 6/1).		
52					0.0				
53					0.0				
54					0.0		(53.0-57.5') SAND, very fine to fine, well sorted; dry; light gray (10YR 7/1).		
55			108		0.0				
56					0.0				
57					0.0				
58					0.0		(57.5-59.0') SAND, very fine; well sorted; dry; light gray (10YR 7/1).		
59					0.0				
60					0.0		(59.0-60.0') SAND, very fine to fine; well sorted; moist; dark gray (10YR 4/1).		
61					0.0		(60.0-63.0') CLAY, little silt, medium plasticity, slow dilatancy; trace fine to course sand; stiff; moist; dark gray (10YR 4/1).		
62					0.0				
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: CSP-F01

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: S. Presswood and A. Westhuis
Editor: K. Donahue
Weather Conditions: 72° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-65.0') WEATHERED SHALE; interbedded sandstone, very fine to fine; low competency; dry; dark gray (10YR 4/1). Note: Highly weathered.		
65			115		0.0				
66					0.0		(65.0-68.0') WEATHERED SANDSTONE; very fine to fine, small consolidated pieces in soft sand matrix; interbedded weathered shale; dry; light gray (10YR 7/1). Note: Highly weathered.		
67				CSP-F01(65-69) (080719) @ 1535	0.0				
68					0.0				
69					0.0		(68.0-73.0') WEATHERED SHALE with interbedded sandstone; wet; medium competency with some fine sand matrix; dark gray (10YR 4/1). Note: Slightly weathered.		
70					0.0				
71					0.0				
72					0.0				
73					0.0				
74					0.0		(73.0-75.0') SANDSTONE, very fine, well sorted, light gray (10YR 7/1). Note: Trace soft sand matrix with mostly large sandstone fragments. Highly competent.		
75			120		0.0				
76					0.0		(75.0-80.0') SANDSTONE with many small shale lenses, very fine, well sorted; light gray (10YR 7/1) to dark gray (10YR 3/1). Note: Highly consolidated. No soft sand matrix. High competency.		
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-G02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/23/2019
Date Completed: 07/23/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 77° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.1		(0.0-7.5') SAND, very fine to large pebble, subrounded to angular; poorly sorted; dry to wet; very loose to loose; little clay, nonplastic to low plasticity, medium dilatancy; white (10YR 8/1), dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2). Note: Possible fill material from 0.0-7.5' bgs. Wet at 5.0' bgs. Bentonite noted at 7.0' bgs.		
2					0.0				
3			32		0.0				
4					0.0				
5					0.0				
6					0.0				
7					0.3				
8			60		0.0		(7.5-15.0') SAND, very fine to small pebbles, subrounded to subangular; poorly sorted; little silt; moist to wet; very loose to loose; black (10YR 2/1) to dark gray (10YR 4/1). Note: Trace wood pieces. Wet at 10.0' bgs.		
9					0.0				
10					0.0				
11					0.0				
12					0.0				
13					0.0				
14					0.0				
15			80		0.0				
16					0.0		(15.0-16.0') CLAY, trace silt, high plasticity, low dilatancy; trace very fine to fine sand; moist; soft to medium stiff; light gray (10YR 7/1) to olive gray (5YR 4/2).		
17					0.0		(16.0-28.0') SAND, very fine to very coarse, subrounded to subangular; some silt; little clay, low plasticity to nonplastic, high dilatancy; poorly sorted; moist to wet; loose to very loose; dark gray (10YR 4/1) to brown (10YR 5/3).		
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450843.3
East Coor: 13064672.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-G02

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/23/2019
Date Completed: 07/23/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 77° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(16.0-28.0') SAND, very fine to very coarse, subrounded to subangular; some silt; little clay, low plasticity to nonplastic, high dilatancy; poorly sorted; moist to wet; loose to very loose; dark gray (10YR 4/1) to brown (10YR 5/3).		
22					0.0				
23					0.0				
24					0.0				
25			120		0.0				
26					0.2				
27					0.0				
28					0.0				
29					0.0		(28.0-38.0') SAND, very fine to coarse, subrounded to subangular; some silt; poorly sorted; moist; to wet; loose; grayish brown (10YR 5/2).		
30					0.0				
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			80		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0		(38.0-44.0') CLAY and SILT, medium to high plasticity, medium dilatancy; little very fine to fine sand; trace large pebbles, subrounded; moist; soft to medium stiff; dark gray (10YR 4/1).		
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: CSP-G02

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/23/2019
Date Completed: 07/23/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 77° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(38.0-44.0') CLAY and SILT, medium to high plasticity, medium dilatancy; little very fine to fine sand; trace large pebbles, subrounded; moist; soft to medium stiff; dark gray (10YR 4/1).		
43					0.0				
44					0.0				
45			70		0.0		(44.0-50.0') SAND, very fine to fine, trace medium sand; well sorted; dry; loose to very loose; gray (10YR 6/1).		
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51					0.0		(50.0-54.0') WEATHERED SANDSTONE, very fine to medium, subrounded; poorly sorted; dry to moist; loose; low to medium competency; grayish brown (10YR 5/2). Note: Small fragments of higher competency sandstone present.		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0		(54.0-56.0') WEATHERED SANDSTONE, interbedded shale, very fine to medium, subrounded to subangular; poorly sorted; dry; loose; low competency; dark grayish brown (10YR 4/2).		
56					0.0				
57					0.0		(56.0-57.0') WEATHERED SANDSTONE, very fine to medium, subrounded; well sorted; dry to moist; loose; low to medium competency; gray (10YR 5/1) to gray (10YR 6/1).		
58					0.0		(57.0-60.0') WEATHERED SHALE, little interbedded very fine sandstone; well sorted; medium competency; very dark ray (10YR 3/1) to dark gray (10YR 4/1). Note: Large fragments of higher competency sandstone present.		
59					0.0				
60					0.0				
61					0.0		(60.0-64.0') WEATHERED SANDSTONE, some shale, very fine to fine; dry; low competency; gray (10YR 6/1). Note: Small to large fragments of harder and higher competency sandstone present.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: CSP-G02

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/23/2019
Date Completed: 07/23/2019

Logger: E. Redner
Editor: S. Presswood
Weather Conditions: 77° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0				
65			120	CSP-G02(63-67) (072319) 1740	0.0		(64.0-68.0') WEATHERED SHALE and SANDSTONE, interbedded, very fine; well sorted; dry to wet; low to medium competency; gray (10YR 6/1) to dark gray (10YR 4/1).		
66					0.0				
67					0.0				
68					0.0				
69					0.0		(69.0-70.0') WEATHERED SHALE, trace interbedded very fine sandstone; well sorted; moist; high competency; very dark gray (10YR 3/1).		
70					0.0				
71					0.0		(70.0-72.5') SHALE, and SANDSTONE, interbedded, very fine to fine; well sorted; wet; high competency; very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2).		
72					0.0				
73			60		0.0		(72.5-75.0') SHALE, trace interbedded very fine sandstone; well sorted; wet to moist; high competency; very dark brown (10YR 2/2).		
74					0.0				
75					0.6				
76							End of boring at 75.0' bgs.		
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-115/PSP-C01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019
Logger: A. Westhuis
Editor: C. Cisco
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NM		(0.0-47.0') Blind drilled, no lithology recorded.	Stick-up Casing (0.0-1.0') Cement	
2					NM				
3					NM				
4					NM				
5					NM			(1.0-68.5') Bentonite Quik Grout	
6					NM				
7					NM				
8					NM				
9					NM				
10					NM			6.0" dia drilled hole	
11					NM				
12					NM				
13					NM				
14					NM				
15					NM				
16					NM			2.0" dia PVC riser	
17					NM				
18					NM				
19					NM				
20					NM				
21					NM				
22					NM				
23					NM				
24					NM				
25					NM				

Drilling Co.: Cascade
Driller: Joe Lary III
Drilling Method: Sonic Drilling / Air Rotary
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.2
North Coor: 451169.8
East Coor: 13064355.8

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-115/PSP-C01

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019

Logger: A. Westhuis
Editor: C. Cisco
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
26					NM		(0.0-47.0') Blind drilled, no lithology recorded.		
27					NM				
28					NM				
29					NM				
30					NM				
31					NM				
32					NM				
33					NM				
34					NM				
35					NM				
36					NM				
37					NM				
38					NM				
39					NM				
40					NM				
41					NM				
42					NM				
43					NM				
44					NM				
45					NM				
46					NM				
47					NM				
48					0.0		(47.0-52.5') CLAY, low plasticity to nonplastic, no dilatancy; some silt; little sand, fine to medium, subrounded; little granules, subrounded; little pebbles, small to medium, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Glacial till.		
49					0.0				
50					0.0				
51					0.0				
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-115/PSP-C01

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019
Logger: A. Westhuis
Editor: C. Cisco
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
53			120		0.0				
54					0.0		(52.5-54.0') SAND, fine to medium; little sand, coarse, subrounded; little pebbles, small, subrounded; trace to little silt; poorly sorted; dry; brown (10YR 5/3).		
55					0.0		(54.0-63.0') CLAY, low plasticity to nonplastic, no dilatancy; some silt; little sand, fine to medium, subrounded; little granules, subrounded; little pebbles, small to large, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Glacial till. Trace small fragments of sandstone starting at 56.0' bgs.		
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				
63					0.0				
64					0.0		(63.0-67.0') CLAY, low plasticity, no dilatancy; little to some silt; little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small, subrounded; dry; very stiff; light brownish gray (10YR 6/2). Note: Little to some small to large fragments of sandstone.		
65					0.0				
66					0.0				
67					0.0				
68					0.0		(67.0-73.5') SHALE, weathered; grayish brown (10YR 6/2). Note: Mostly many very small, brittle fragments of heavily-weathered shale. No competency.		
69					0.0			(68.5-69.5') Bentonite Pellets	
70					0.0			(69.5-70.5') Choker Sand	
71			78		0.0				
72					0.0			(70.5-79.0') Filter Pack Sand	
73					0.0				
74					0.0		(73.5-77.0') SANDSTONE; and SHALE; weathered; very fine; grayish brown (10YR 6/2) to light gray (10YR 7/1). Note: Finely laminated. Moderately weathered. Little small to medium fragments; a mostly brittle material from 73.5-75.0' bgs. Increase in competency at 75.0' bgs.		
75					0.0			(72.5-77.5') 2.0" dia. Stainless-Steel 0.010-Slot Screen	
76			42	PSP-C01(73.5-78.5) (082719) @ 13:40	0.0				
77					0.0				
78					0.0		(77.0-78.0') SANDSTONE; very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MII\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-115/PSP-C01

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019
Weather Conditions: 75° F, Cloudy

Logger: A. Westhuis
Editor: C. Cisco

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
79			60		0.0		(78.0-82.0') SANDSTONE; and SHALE; interbedded; light gray (10YR 7/1) to gray (10YR 5/1). Note: Highly competent.	(79.0-82.0') Bentonite Chips	
80					0.0				
81					0.0				
82					0.0				
83							End of boring at 82.0' bgs.		
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-116/VAP-P2-NF97

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 63° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1					NA		(0.0-1.5') CONCRETE.	(0.0-1.0' bgs) Cement
2					0.0		(1.5-7.5') SILT and CLAY, medium to high plasticity, no dilatancy; some granules, subangular; wet; medium stiff; yellowish brown (10YR 6/6).	
3					0.0			
4			48		0.0			
5					0.0			
6					0.0			
7					0.0			(-3.0-65.0' bgs) 2" Sch 40 PVC Well Casing
8					0.0		(7.5-9.0') SAND, very fine to fine, subrounded; well sorted; dry; yellowish brown (10YR 6/6).	
9					0.0			
10					0.0		(9.0-19.0') SILT, some clay, medium plasticity, no dilatancy; trace small pebbles; moist; medium stiff; yellowish brown (10YR 6/6). Note: Color change at 11.0' bgs to light brownish gray (10YR 6/2).	(1.0-61.0' bgs) Bentonite Quick Grout
11					0.0			
12			120		0.0			
13					0.0			
14					0.0			
15					0.0			
16					0.0			
17					0.0			
18					0.0			
19					0.0			
20					0.0		(19.0-24.5') CLAY, some silt, medium to high plasticity, no dilatancy; wet; soft; dark gray (10YR 4/1).	

3' Stick Up Stainless Steel Riser

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Converted into 2" monitoring well MW-19-116.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 451259.5
East Coor: 13064492.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-116/VAP-P2-NF97

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019
Weather Conditions: 63° F, Rain

Logger: S. Johnson
Editor: K. Donahue

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.0-24.5') CLAY, some silt, medium to high plasticity, no dilatancy; wet; soft; dark gray (10YR 4/1).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0		(24.5-27.0') SAND, very fine, subrounded; some silt; well sorted; moist; dark gray (10YR 4/1).		
26					0.0				
27					0.0		(27.0-39.5') SAND, very fine to fine; trace small to large pebbles, subangular; dry; gray (10YR 5/1).		
28					0.0				
29					0.0				
30					0.0			(1.0-61.0' bgs) Bentonite Quick Grout	
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0		(39.5-43.0') CLAY, high plasticity, no dilatancy; some sand, very fine; little small to large pebbles, subangular; dry; very stiff; dark gray (10YR 4/1).		
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-116/VAP-P2-NF97

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019
Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 63° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(39.5-43.0') CLAY, high plasticity, no dilatancy; some sand, very fine; little small to large pebbles, subangular; dry; very stiff; dark gray (10YR 4/1).		
43					0.0				
44					0.0		(43.0-48.5') SAND, medium to coarse, subrounded; little granules to medium, subangular; poorly sorted; dry; light gray (10YR 7/1).		
45					0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0		(48.5-50.5') SILT, some clay, low plasticity, no dilatancy; little small to large pebbles, subangular; dry; stiff; dark gray (10YR 4/1). Note: Trace fragments of sandstone.		
50					0.0				
51					0.0		(50.5-52.0') SANDSTONE, very fine, subrounded; some soft sand matrix; some small to large pebbles, subangular; dry; light gray (10YR 4/1).	(1.0-61.0' bgs) Bentonite Quick Grout	
52			120		0.0		(52.0-57.0') SILT and CLAY, low plasticity, no dilatancy; little small to medium pebbles, subangular; moist; medium stiff; very dark gray (10YR 3/1).		
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-61.0') SILT, little clay, low plasticity, some dilatancy; little small to medium pebbles, subangular; moist; medium stiff; very dark gray (10YR 3/1).		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0		(61.0-64.0') SILT, nonplastic, rapid dilatancy; some sand, very fine, subangular; little small pebbles, subangular; dry to moist; stiff; dark gray (10YR 4/2). Note: Sandstone fragments increase at 64.0' bgs.	(61.0-62.0') Bentonite Pellets. (62.0-63.0') Choker Sand	

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-116/VAP-P2-NF97

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/12/2019
Date Completed: 09/12/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 63° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0				
65					0.0		(64.0-70.0') WEATHERED SANDSTONE and SHALE, very fine, subrounded; interbedded; light gray (10YR 7/1) to very dark gray (10YR 3/1). Note: Heavily weathered with little to no competency.		
66					0.0			(63.0-70.0' bgs) K&E 00 Filter Pack Sand (65.0-70.0') 2" Stainless Steel 10-Slot Well Screen	
67				VAP-P2-NF97(64-69) (091219) @ 1430	0.0				
68					0.0				
69			24		0.0				
70					0.0		End of boring at 70.0' bgs.		
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-121/VAP-P2-OQ129

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1					NA		(0.0-1.5') CONCRETE.	(0.0-1.0' bgs) Cement
2					0.0		(1.5-3.0') SAND, very fine to medium, subrounded; trace granules to medium pebbles, subrounded; little silt; poorly sorted; dry; yellowish brown (10YR 5/6).	
3					0.0		(3.0-11.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; light yellowish brown (10YR 6/4).	
4					0.0			
5			120		0.0			
6					0.0			
7					0.0			(-3.0-66.0' bgs) 2" Sch 40 PVC Well Casing
8					0.0			
9					0.0			
10					0.0			(1.0-62.0' bgs) Bentonite Quick Grout
11					0.1			
12					0.3		(11.0-13.0') SAND, very fine, subrounded; and SILT; trace clay, low plasticity to nonplastic, no dilatancy; moist; well sorted; soft; grayish brown (10YR 5/2). Note: Slight odor.	
13					0.5			
14					0.2		(13.0-26.0') CLAY, some silt, low plasticity to medium plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; brown (10YR 5/3).	
15			120		0.0			
16					0.0			
17					0.0			
18					0.0			
19					0.0			
20					0.0			

3' Stick Up Stainless Steel Riser

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Converted into 2" monitoring well MW-19-121.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 450900.0
East Coor: 13064791.8

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-121/VAP-P2-OQ129

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(13.0-26.0') CLAY, some silt, low plasticity to medium plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; brown (10YR 5/3).		
22					0.0				
23					0.0				
24					0.0				
25			120		0.0				
26					0.0				
27					0.0		(26.0-26.5') SAND, coarse to very coarse, little fine to medium sand, subangular; little silt; poorly sorted; wet; light brownish gray (10YR 6/2).		
28					0.0		(26.5-34.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
29					0.0				
30					0.0			(1.0-62.0' bgs) Bentonite Quick Grout	
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0		(34.0-36.0') SILT, trace clay, nonplastic, slow dilatancy; little very fine sand; well sorted; moist to wet; soft; grayish brown (10YR 5/2).		
36					0.0				
37					0.0		(36.0-42.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-121/VAP-P2-OQ129

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0				
43					0.0		(42.0-55.0') SAND, very fine to fine, subrounded; little to some silt; poorly sorted; dry; light brownish gray (10YR 6/2).		
44					0.0				
45			108		0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51					0.0				
52					0.0			(1.0-62.0' bgs) Bentonite Quick Grout	
53					0.0				
54					0.0				
55			120		0.0				
56					0.0		(55.0-62.0') SILT, little clay, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to small pebbles, subrounded; dry; stiff; grayish brown (10YR 6/2). Note: Some small to large fragments of sandstone and shale. Increase in sandstone and shale fragments at 59.0' bgs.		
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0		(62.0-64.0') WEATHERED SHALE with some interbedded sandstone. Note: Heavily weathered with no competency.	(62.0-63.0') Bentonite Pellets	

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-121/VAP-P2-OQ129

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/15/2019
Date Completed: 10/18/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 60° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-64.0') WEATHERED SHALE with some interbedded sandstone. Note: Heavily weathered with no competency.	(63.0-64.0') Choker Sand	
65			120		0.0		(64.0-69.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Moderate weathering with low to moderate competency.		
66					0.0				
67					0.0			(64.0-71.0' bgs) K&E 00 Filter Pack Sand	
68				VAP-P2-OQ129(66-70) (101610) @ 1115	0.0				
69					0.0			(66.0-71.0') 2" Stainless Steel 10-Slot Well Screen	
70					0.0		(69.0-71.0') SHALE; dark gray (10YR 4/1). Note: Moderate competency with little weathering.		
71			12		0.0				
							End of boring at 71.0' bgs.		
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-122/VAP-P2-OM112

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy/Light Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1					NA		(0.0-1.5') CONCRETE.	(0.0-1.0' bgs) Cement
2					0.0		(1.5-3.0') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded; little silt; poorly sorted; dry to moist; yellowish brown (10YR 5/6).	
3					0.1			
4					0.3		(3.0-8.0') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles subrounded; moist; stiff; dark grayish brown (10YR 4/2). Note: Slight odor from 3.0-5.0' bgs.	
5			84		1.8			
6					0.1			
7					0.0			(-3.0-59.0' bgs) 2" Sch 40 PVC Well Casing
8					0.0			
9					0.0		(8.0-17.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace very fine sand; soft; moist; gray (10YR 6/1).	
10					0.0			
11					0.0			(1.0-55.0' bgs) Bentonite Quick Grout
12					0.0			
13					0.0			
14					0.0			
15			120		0.0			
16					0.0			
17					0.0			
18					0.0		(17.0-21.0') SAND, very fine to coarse, subangular; trace granules to large pebbles, subangular; trace to little silt; poorly sorted; wet; grayish brown (10YR 5/2).	
19					0.0			
20					0.0			

3' Stick Up Stainless Steel Riser

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Converted into 2" monitoring well MW-19-122.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450937.5
East Coor: 13064663.5

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-122/VAP-P2-OM112

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy/Light Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(17.0-21.0') SAND, very fine to coarse, subangular; trace granules to large pebbles, subangular; trace to little silt; poorly sorted; wet; grayish brown (10YR 5/2).		
22					0.0		(21.0-28.0') CLAY, some silt, medium plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
23					0.0				
24					0.0				
25			96		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0		(28.0-34.0') SAND, very fine to coarse, subangular; trace granules to medium pebbles, subangular; little silt; poorly sorted; wet; grayish brown (10YR 5/2).		
30					0.0			(1.0-55.0' bgs) Bentonite Quick Grout	
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0		(34.0-37.0') CLAY, little to some silt; medium plasticity, no dilatancy; trace fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; medium stiff; gray (10YR 5/1).		
36					0.0				
37					0.0				
38					0.0		(37.0-38.0') SAND, very fine to fine, subrounded; trace granules, subrounded; trace to little silt, well sorted; wet; light brownish gray (10YR 6/2).		
39					0.0		(38.0-47.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; stiff; grayish brown (10R 5/2).		
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-122/VAP-P2-OM112

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy/Light Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(38.0-47.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; stiff; grayish brown (10R 5/2).		
43					0.0				
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-50.0') SAND, very fine to fine, subrounded; trace silt; well sorted; dry to moist; gray (10YR 5/1).	(1.0-55.0' bgs) Bentonite Quick Grout	
49					0.0				
50					0.0				
51					0.0		(50.0-57.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; trace to little fine sand, subrounded; trace granules to small pebbles, subrounded; dry; stiff to very stiff; grayish brown (10YR 5/2). Note: Little small to large fragments of sandstone intermixed.		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0			(55.0-56.0') Bentonite Pellets.	
57					0.0			(56.0-57.0') Choker Sand	
58					0.0		(57.0-58.0') SAND, fine, subrounded; trace silt; well sorted; brown (10YR 5/3).		
59					0.0		(58.0-60.5') WEATHERED SANDSTONE with trace shale laminations, very fine; well sorted; light gray (10YR 7/2) to dark gray (10YR 4/1). Note: Heavily weathered with no competency.		
60					0.0			(57.0-65.0' bgs) K&E 00 Filter Pack Sand	
61				VAP-P2-OM112(58-62) (101619) @ 1630	0.0		(60.5-64.0') WEATHERED SHALE, dark gray (10YR 4/1) with little to some interbedded sandstone, very fine; well sorted; light gray (10YR 7/2). Note: Moderate to little weathering with little to no competency.		
62					0.0				
			60		0.0			(59.0-64.0')	

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-122/VAP-P2-OM112

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy/Light Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0			2" Stainless Steel 10-Slot Well Screen	
65					0.0		(64.0-65.0') SHALE; dark gray (10YR 4/1). Note: Moderate to high competency with no weathering.		
66							End of boring at 65.0' bgs.		
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-123/VAP-P2-PG104

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy/Windy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1					NA		(0.0-1.0') CONCRETE.	(0.0-1.0' bgs) Cement
2					0.0		(1.0-16.0') SAND, fine to medium, little coarse sand, subangular; little silt; poorly sorted; moist to wet; yellowish brown (10YR 5/6).	
3					0.0			
4					0.0			
5			96		0.0			
6					0.0			
7					0.0			(-3.0-66.0' bgs) 2" Sch 40 PVC Well Casing
8					0.0			
9					0.0			
10					0.0			(1.0-62.0' bgs) Bentonite Quick Grout
11					0.0			
12					0.0			
13					0.0			
14					0.0			
15			120		0.0			
16					0.0			
17					0.0		(16.0-18.0') CLAY, trace silt, high plasticity, no dilatancy; moist; soft; gray (10YR 5/1).	
18					0.0			
19					0.0		(18.0-18.5') SAND, very fine to fine, subrounded; trace silt; well sorted; wet; grayish brown (10YR 5/2).	
20					0.0		(18.5-31.5') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).	

3' Stick Up Stainless Steel Riser

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Converted into 2" monitoring well MW-19-123.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450721.7
East Coor: 13064589.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-123/VAP-P2-PG104

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy/Windy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(18.5-31.5') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).	(1.0-62.0' bgs) Bentonite Quick Grout	
22					0.0				
23					0.0				
24					0.0				
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32					0.0		(31.5-33.0') SILT, trace clay, nonplastic, slow dilatancy; trace very fine sand; well sorted; wet; soft; grayish brown (10YR 5/2).		
33					0.0				
34					0.0		(33.0-35.0') SAND, very fine to medium, trace coarse sand, subangular; trace granules, subrounded to subangular; little silt; poorly sorted; wet; pale brown (10YR 6/3).		
35			120		0.0				
36					0.0		(35.0-42.0') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subrounded; trace, granules to very large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-123/VAP-P2-PG104

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy/Windy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0				
43					0.0		(42.0-49.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry to moist; pale brown (10YR 6/3).		
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0		(49.0-52.5') CLAY and SILT, low plasticity, no dilatancy; trace to little very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; grayish brown 10YR 5/2). Note: Trace small to very large fragments of sandstone.		
51					0.0			(1.0-62.0' bgs) Bentonite Quick Grout	
52					0.0				
53					0.0		(52.5-61.0') SILT, trace clay, nonplastic, no dilatancy; and SAND, very fine to fine, subrounded; trace granules to small pebbles, subrounded; poorly sorted; moist; grayish brown (10YR 5/2).		
54					0.0				
55			108		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(61.0-64.5') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered.		
62					0.0			(62.0-63.0') Bentonite Pellets	

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-123/VAP-P2-PG104

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/16/2019
Date Completed: 10/19/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 45° F, Cloudy/Windy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-64.5') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered.	(63.0-64.0') Choker Sand	
65			120		0.0		(64.5-68.5') WEATHERED SANDSTONE, very fine, well sorted; light gray (10YR 7/2) with some interbedded shale, dark gray (10YR 4/1). Note: Moderate to low weathering with low competency.		
66					0.0				
67					0.0			(64.0-71.0' bgs) K&E 00 Filter Pack Sand	
68				VAP-P2-PG104(66-70) (101719) @ 1120	0.0				
69					0.0		(68.5-71.0') SHALE; dark gray (10YR 4/1) with trace interbedded sandstone; light gray (10YR 7/2).	(66.0-71.0') 2" Stainless Steel 10-Slot Well Screen	
70					0.0				
71			12		0.0				
							End of boring at 71.0' bgs.		
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-124/VAP-P2-OA135

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/17/2019
Date Completed: 10/21/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1					NA		(0.0-2.0') CONCRETE.	(0.0-1.0' bgs) Cement
2					NA			
3					0.3		(2.0-3.0') SAND, very fine to coarse, subangular; little granules to medium pebbles, subrounded; little to some silt; poorly sorted; moist; yellowish brown (10YR 5/6). Note: Fill.	
4					NA		(3.0-6.0') CONCRETE.	
5			108		NA			
6					NA			
7					0.3		(6.0-6.5') SAND, fine to coarse, subangular, little granules to small pebbles, subrounded; little silt; poorly sorted; moist; dark gray (10YR 4/1). Note: Slight sheen at 6.0' bgs. Slight odor from 6.0-6.5' bgs. Fill.	(-3.0-65.0' bgs) 2" Sch 40 PVC Well Casing
8					0.0		(6.5-14.0') SAND, very fine to fine, subrounded, trace silt; well sorted; moist; very dark gray (10YR 3/1). Note: No odor or sheen. Fill.	
9					0.1			
10					0.0			(1.0-61.0' bgs) Bentonite Quick Grout
11					0.0			
12					0.0			
13					0.0			
14					0.0			
15			120		0.0		(14.0-17.0') SAND, very fine to coarse, subangular; little granules to large pebbles; subrounded; some silt; poorly sorted; moist to wet; grayish brown (10YR 5/2). Note: No odor or sheen. Fill.	
16					0.0			
17					0.0			
18					0.0		(17.0-22.0') CLAY, some silt, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).	
19					0.0			
20					0.0			

3' Stick Up Stainless Steel Protective Casing

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Converted into 2" monitoring well MW-19-124.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 451069.2
East Coor: 13064915.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-124/VAP-P2-OA135

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/17/2019
Date Completed: 10/21/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(17.0-22.0') CLAY, some silt, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
22					0.0				
23					0.0		(22.0-28.5') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
24					0.0				
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0		(28.5-30.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
30					0.0		(30.0-43.5') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; stiff to very stiff; grayish brown (10YR 5/2).	(1.0-61.0' bgs) Bentonite Quick Grout	
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-124/VAP-P2-OA135

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/17/2019
Date Completed: 10/21/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(30.0-43.5') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; stiff to very stiff; grayish brown (10YR 5/2).		
43					0.0				
44					0.0		(43.5-46.5') SAND, very fine to fine, subrounded; little silt; well sorted; dry to moist; light brownish gray (10YR 6/2).		
45			120		0.0				
46					0.0				
47					0.0		(46.5-47.0') CLAY, some silt, medium to high plasticity, no dilatancy; moist; medium stiff; gray (10YR 5/1).		
48					0.0		(47.0-55.0') SAND, very fine to fine, subrounded; trace medium to coarse sand, subrounded; trace granules, subrounded; poorly sorted; dry; light brownish gray (10YR 6/2).		
49					0.0				
50					0.0				
51					0.0			(1.0-61.0' bgs) Bentonite Quick Grout	
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0		(55.0-61.0') SILT, little clay, nonplastic, no dilatancy; little fine sand, subrounded; trace granules to medium pebbles, subrounded; dry; stiff to very stiff; grayish brown (10YR 5/2). Note: Little small to large fragments of sandstone and shale intermixed.		
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(61.0-66.0') WEATHERED SANDSTONE and SHALE; interbedded; light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Heavily weathered with no competency.	(61.0-62.0') Bentonite Pellets. (62.0-63.0') Choker Sand	
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-124/VAP-P2-OA135

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 10/17/2019
Date Completed: 10/21/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 50° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64			108		0.0		(61.0-66.0') WEATHERED SANDSTONE and SHALE; interbedded; light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Heavily weathered with no competency.	(63.0-70.0' bgs) K&E 00 Filter Pack Sand (65.0-70.0') 2" Stainless Steel 10-Slot Well Screen	
65					0.0				
66					0.0				
67				VAP-P2-OA135(65-69) (101819) @ 0845	0.0		(66.0-67.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		
68					0.0		(67.0-68.5') SHALE; dark gray (10YR 4/1). Note: Highly competent.		
69					0.0		(68.5-70.0') SANDSTONE with some shale laminations, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		
70			12		0.0				
71							End of boring at 70.0' bgs.		
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_051420.GPJ ARCADIS_2013.GDT 6/22/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/14/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 75° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 860.9
North Coor: 451556.0
East Coor: 13064376.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/14/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 75° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/14/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 75° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		47.0-51.0') SAND, very fine to fine, subrounded; well sorted; trace medium pebbles; wet; dark yellowish brown (10YR 4/5).		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0		(51.0-55.0') SAND, very fine, subrounded; well sorted; little silt; dry; light brownish gray (10YR 6/2).		
53					0.0				
54					0.0				
55					0.0				
56					0.0		(55.0-56.0') SAND, very fine, subrounded; and SILT, nonplastic, rapid dilatancy; well sorted; moist; pale brown (10YR 6/3).		
57					0.0		(56.0-57.0') SILT, nonplastic, rapid dilatancy; little sand, very fine; moist; medium stiff; pale brown (10YR 6/3).		
58					0.0		(57.0-59.0') SILT, little clay, low plasticisty, slow dilatancy; wet; soft; brown (10YR 5/3).		
59					0.0				
60					0.0		(59.0-59.5') SAND, very fine, subrounded; well sorted; wet; brown (10YR 5/3).		
61					0.0		(59.5-62.0') SILT, nonplastic, rapid dilatancy; some sand, very fine; wet; soft; brown (10YR 5/3).		
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B01

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/14/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 75° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-65.0') CLAY, high plasticity, no dilatancy; some small pebbles, angular to subangular; trace medium pebbles, angular to subangular; moist; very stiff; dark grayish brown (10YR 5/3).		
65					0.0				
66					0.0		(65.0-74.0') CLAY, high plasticity, no dilatancy; some small pebbles, angular to subangular; some medium pebbles, angular to subangular; little cobbles of sandstone, angular to subangular; dark grayish brown (10YR 5/3). Note: Poor recovery from 67.0-74.0'.		
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0				
72			120		0.0				
73					0.0				
74					0.0				
75					0.0		(74.0-77.0') SANDSTONE with very fine SHALE laminations; well sorted; light brownish gray (10YR 6/2). Note: Highly competent.		
76					0.0				
77					0.0				
78					NA		Note: No bedrock logged from 77.0-82.0' bgs.		
79					NA				
80			0		NA				
81					NA				
82					NA				
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/01/2019
Date Completed: 08/01/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
							(0.0-47.0') Blind drilled.		

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 860.9
North Coor: 451556.1
East Coor: 13064406.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B02

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/01/2019
Date Completed: 08/01/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B02

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/01/2019
Date Completed: 08/01/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-49.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; dry; light gray (10YR 7/2).		
49					0.0				
50					0.0		(49.0-52.0') SAND, very fine to medium, subrounded; little granules to medium pebbles, subrounded; some silt; poorly sorted; moist; gray (10YR 5/1).		
51					0.0				
52			120		0.0				
53					0.0		(52.0-56.0') SILT, nonplastic, no dilatancy; some very fine sand, subrounded; trace granules to medium pebbles, subrounded; medium stiff; moist; grayish brown (10YR 5/2).		
54					0.0				
55					0.0				
56					0.0				
57					0.0		(56.0-64.0') SAND, fine to medium, subrounded, little silt; well sorted; moist; pale brown (10YR 6/3).		
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0				
			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/01/2019
Date Completed: 08/01/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(56.0-64.0') SAND, fine to medium, subrounded, little silt; well sorted; moist; pale brown (10YR 6/3).		
65					0.0		(64.0-68.0') SILT, nonplastic, no dilatancy; and SAND, very fine; moist to wet; well sorted; grayish brown (10YR 5/2).		
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.0-70.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded, little granules to large pebbles, subrounded, moist; stiff; grayish brown (10YR 5/2). Note: Trace medium to large sandstone fragments.		
70					0.0				
71					0.0		(70.0-73.0') WEATHERED SANDSTONE, very fine, well sorted; trace to little sandstone fragments in mostly a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered. Trace shale laminations.		
72			84		0.0				
73					0.0				
74					0.0		(73.0-74.0') WEATHERED SHALE, very dark gray (10YR 3/1).		
75					0.0		(74.0-82.0') SANDSTONE, very fine, well sorted, highly competent, light gray (10YR 7/1). Note: Trace to little fine sandstone laminations. Large sandstone cores.		
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80			60		0.0				
81					0.0				
82					0.0				
83							End of boring at 82' bgs.		
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B03

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/20/2019
Date Completed: 08/20/2019
Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-0.8') CONCRETE.		
2					0.0		(0.8-2.0') SAND, fine, subrounded; little silt; trace granules to large pebbles, subrounded; poorly sorted; dry to moist; dark yellowish brown (10YR 4/6). Note: Fill.		
3					0.0		(2.0-6.0') CLAY, high plasticity, no dilatancy; trace silt; little to trace granles to very large pebbles, subrounded; trace very fine to fine sand, subrounded; dry to moist; medium stiff to stiff; dark gray (10YR 4/1). Note: Fill.		
4			84		0.0				
5					0.4				
6					0.5				
7					0.0		(6.0-6.3') ASPHALT.		
8					0.0		(6.3-17.0') CLAY, medium to high plasticity, no dilatancy; little to trace granules to very large pebbles; trace very fine to fine sand, subrounded; stiff to very stiff; dark gray (10YR 4/1).		
9					0.0				
10					0.0		Note: Color change to gary (10YR 5/1) with some brown (10YR 5/3) streaks.		
11					0.0				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-25.0') SAND, very fine to very coarse, subangular to subrounded; some to little silt; little to trace granules to medium pebbles, subrounded to subangular; poorly sorted; wet; grayish brown (10YR 5/2).		
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.1
North Coor: 451556.2
East Coor: 13064436.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-B03

Soil Boring Log

Sheet: 2 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/20/2019
Date Completed: 08/20/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(17.0-25.0') SAND, very fine to very coarse, subangular to subrounded; some to little silt; little to trace granules to medium pebbles, subrounded to subangular; poorly sorted; wet; grayish brown (10YR 5/2).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0		(25.0-29.0') CLAY, high plasticity, no dilatancy; trace silt; trace very fine sand; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
27					0.0				
28					0.0				
29					0.0				
30					0.0		(29.0-30.0') CLAY, low plasticity to nonplastic, no dilatancy to slow dilatancy; and SILT; some to little very fine sand, subrounded; trace granules to very large pebbles, subrounded; moist to wet; stiff; grayish brown (10YR 5/2).		
31					0.0		(30.0-34.0') SAND, very fine to fine, subrounded; some silt; little medium sand, subrounded; trace granules to small pebbles, subrounded; poorly sorted; wet; brown (10YR 5/3).		
32			120		0.0				
33					0.0				
34					0.0				
35					0.0		(34.0-35.5') CLAY, low plasticity, no dilatancy; and SILT; little fine sand, subrounded; trace granules to small pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
36					0.0		(35.5-37.5') SAND, very fine; little silt; well sorted; wet; brown (10YR 5/2).		
37					0.0				
38					0.0		(37.5-42.0') CLAY, high plasticity, no dilatancy; little silt; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; gray (10YR 5/1). Note: Glacial till.		
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-B03

Soil Boring Log

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/20/2019
Date Completed: 08/20/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0				
43					0.0		(42.0-47.0') SAND, very fine; some to little silt; well sorted; dry; light gray (10YR 7/1).		
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-50.0') SAND, very fine to fine, subrounded; and SILT, nonplastic, slow dilatancy; little granules to medium pebbles, subrounded; poorly sorted; moist to wet; brown (10YR 5/3).		
49					0.0				
50					0.0				
51					0.0		(50.0-57.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/1).		
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-63.0') SAND, fine, subrounded; little to trace silt; well sorted; wet; grayish brown (10YR 5/2).		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 041720.GPJ ARCADIS 2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B03

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/20/2019
Date Completed: 08/20/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-65.0') SAND, medium to very coarse, subrounded; trace silt; poorly sorted; wet; grayish brown (10YR 5/2).		
65					0.0				
66					0.0		(65.0-67.0') SILT, nonplastic, rapid dilatancy; trace clay; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; poorly sorted; wet; grayish brown (10YR 5/2).		
67					0.0				
68					0.0		(67.0-69.0') CLAY, high plasticity, no dilatancy; little silt; little granules to large pebbles, subrounded; trace fine sand, subrounded; moist; stiff; gray (10YR 5/1).		
69					0.0				
70					0.0		(69.0-77.0') CLAY, low plasticity, no dilatancy; some silt; little fine sand, subrounded; little granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
71					0.0				
72			120		0.0		Note: Some small to large fragments of very fine sandstone. Large sandstone cobble at 72.0' bgs.		
73					0.0				
74					0.0				
75					0.0				
76					0.0				
77					0.0		(77.0-78.0') SHALE with little interbedded sandstone, black (10YR 2/1). Note: Highly competent forming large cores.		
78					0.0		(78.0-80.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent forming large corse. Many small holes and vugs.		
79					0.0				
80					0.0		(80.0-82.0') SANDSTONE and SHALE, interbedded. Note: Highly competent forming large cores.		
81			84		0.0				
82					0.0		(82.0-89.0') SANDSTONE, very fine; well sorted. Note: Highly competent forming large cores.		
83					0.0				
84							Note: Poor recovery from 84.0-89.0' bgs.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B03

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/20/2019
Date Completed: 08/20/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85					0.0		(82.0-89.0') SANDSTONE, very fine; well sorted. Note: Highly competent forming large cores.		
86					0.0				
87			24		NA				
88					NA				
89					NA				
90							End of boring log at 89.0' bgs.		
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B04

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/19/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.1
North Coor: 451556.2
East Coor: 13064466.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B04

Sheet: 2 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/19/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B04

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/19/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-50.0') SAND, very fine, subrounded; well sorted; moist; loose; gray (10YR 6/1).		
49					4.2				
50					0.3				
51					0.1		(50.0-54.0') SAND, very fine, subrouned; well sorted; trace silt; dry; gray (10YR 6/1).		
52			120		0.2				
53					0.0				
54					0.0				
55					0.0		(54.0-56.5') SILT, nonplastic, slow dilatancy; trace sand, very fine; moist; stiff; gray (10YR 6/1).		
56					0.0				
57					0.0		(56.5-58.0') SILT, medium plasticity, slow dilatancy; some clay; trace small pebbles, angular to subangular; wet; very stiff; dark grayish brown (10YR 4/2).		
58					0.0		(58.0-61.0') CLAY, high plasticity, no dilatancy; trace small pebbles, angular to subangular; moist; very stiff; dark grayish brown (10YR 4/2).		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0		(61.0-64.0') SAND, very fine, subrounded; well sorted; moist; light brownish gray (10YR 6/2).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-B04

Soil Boring Log

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/19/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-64.0') SAND, very fine, subrounded; well sorted; moist; light brownish gray (10YR 6/2).		
65					0.0		(64.0-67.0') SAND, very fine to fine, subrounded; well sorted; moist; light brownish gray (10YR 6/2).		
66					0.0				
67					0.0				
68					0.0		(67.0-72.0') CLAY, high plasticity, no dilatancy; trace small pebbles, angular to subangular; moist; very stiff; dark grayish brown (10YR 4/2).		
69					0.0				
70					0.0				
71					0.0				
72			120		0.0		(72.0-72.5') WEATHERED SANDSTONE, very fine; well sorted; little sandstone fragments in a soft sand matrix.		
73					0.0		(72.5-74.5') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		
74				PSP-B04(72-77) (081319) @ 1257	0.0				
75					0.0		(74.5-77.0') WEATHERED SHALE with some sandstone laminations; very dark grayish brown (10YR 3/2).		
76					0.0				
77					0.0		(77.0-84.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent. Some fine shale laminations.		
78					0.0				
79					0.0				
80			60		0.0				
81					0.0				
82					0.0				
83			24		0.0				
84					0.0				

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B04

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/13/2019
Date Completed: 08/19/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85							End of boring at 84.0' bgs.		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B05

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/05/2019
Date Completed: 08/05/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Scott Parkes
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 861.0
North Coor: 451563.8
East Coor: 13064498.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B05

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/05/2019
Date Completed: 08/05/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B05

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/05/2019
Date Completed: 08/05/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47					0.0		(47.0-56.0') SAND, very fine; some silt; well sorted; dry; light brownish gray (10 YR 6/2).		
48					0.0				
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0		(56.0-65.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded, little granules to large pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-B05

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/05/2019
Date Completed: 08/05/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 85° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(56.0-65.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded, little granules to large pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
65					0.0				
66					0.0		(65.0-70.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded, little granules to large pebbles, subrounded; moist; stiff to very stiff; grayish brown (10YR 5/2). Note: Trace small to medium fragments of sandstone.		
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0		(70.0-77.0') WEATHERED SANDSTONE, very fine, well sorted; some fine shale laminations, loosely consolidated; light gray (10YR 7/1). Note: Heavily weathered from 70.0-73.0' bgs.		
72			120	PSP-B05(70-75) (080519) @ 1745	0.0				
73					0.0				
74					0.0				
75					0.0				
76					0.0				
77					0.0				
78							End of boring at 77.0' bgs.		
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1							(0.0-47.0') Blind drilled.	(0.0-1.0' bgs) Cement
2								
3								
4								
5								
6								
7								(-3.0-72.5' bgs) 2" Sch 40 PVC Well Casing
8								
9								
10								(4.0-68.5' bgs) Bentonite Quick Grout
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

3' Stick Up Stainless Steel Steel Riser

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Converted into 2" monitoring well MW-19-115.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.4
North Coor: 451169.8
East Coor: 13064355.8

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31								(4.0-68.5' bgs) Bentonite Quick Grout	
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.	(4.0-68.5' bgs) Bentonite Quick Grout	
43									
44									
45									
46									
47									
48					0.0		(47.0-52.5') CLAY, some silt, low plasticity to nonplastic, no dilatancy; little fine to medium sand, subrounded; little granules to medium pebbles, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Glacial till.		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0		(52.5-54.0') SAND, fine to medium, little coarse sand to small pebbles, subrounded; trace to little silt; poorly sorted; dry; brown (10YR 5/3).		
54					0.0		(54.0-63.0') CLAY, some silt, low plasticity to nonplastic, no dilatancy; little fine to medium sand, subrounded; little granules to large pebbles, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Glacial till. Trace small fragments of sandstone starting at 56.0' bgs.		
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C01

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/27/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-67.0') CLAY, little to some silt, low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to small pebbles, subrounded; dry; very stiff; light brownish gray (10YR 6/2). Note: Little to some small to large fragments of sandstone.		
65					0.0				
66					0.0			(4.0-68.5' bgs) Bentonite Quick Grout	
67					0.0				
68					0.0		(67.0-73.5') WEATHERED SHALE, grayish brown (10YR 6/2). Note: Mostly many very small, brittle fragments of heavily weathered shale. No competency.		
69					0.0			(68.5-69.5') Bentonite Pellets.	
70			78		0.0			(69.5-70.5') Choker Sand	
71					0.0				
72					0.0				
73					0.0				
74					0.0		(73.5-77.0') WEATHERED SANDSTONE and SHALE, finely laminated; very fine; grayish brown (10YR 6/2) to light gray (10YR 7/1). Note: Moderately weathered. Little small to medium fragments in a mostly brittle material from 73.5-75.0'. Increase in competency at 75.0' bgs.	(70.5-79.0' bgs) K&E 00 Filter Pack Sand	
75			42		0.0				
76				PSP-C01(73.5-78.5) (082719) @ 1340	0.0			(72.5-77.5') 2" Stainless Steel 10-Slot Well Screen	
77					0.0				
78					0.0		(77.0-78.0') SANDSTONE, very fine; well sorted, light gray (10YR 7/1). Note: Highly competent.		
79					0.0		(78.0-82.0') SANDSTONE and SHALE, interbedded; light gray (10YR 7/1) to gray (10YR 5/1). Note: Highly competent.		
80			60		0.0				
81					0.0			(79.0-82.0') Bentonite Pellets.	
82					0.0				
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/29/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.1
North Coor: 451184.4
East Coor: 13064389.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C02

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/29/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C02

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/29/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-62.0') CLAY, some silt, low plasticity to nonplastic, no dilatancy; little fine to medium sand, subrounded; trace to little granules to large pebbles, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Glacial till.		
49					0.0				
50					0.0				
51					0.0				
52			108		0.0		Note: Trace small to large fragments of sandstone starting at 52.0' bgs. Little coarse to very coarse sand, subangular, from 52.0-52.3' bgs.		
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/29/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-72.0') CLAY and SILT, nonplastic, no dilatancy; little to some fine to medium sand, subrounded; little granules to small pebbles, trace medium to large pebbles, subrounded; dry; hard; dark grayish brown (10YR 4/2).		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70			84		0.0				
71					0.0				
72					0.0				
73					0.0		(72.0-72.5') WEATHERED SANDSTONE, very fine; light gray (10YR 7/1). Note: Small to medium fragments of brittle, soft sandstone with trace fine shale laminations. Weathered. No competency.		
74					0.0		(72.5-77.0') WEATHERED SHALE with some very fine sandstone laminations, dark gray (10YR 4/1). Note: Many small fragments, very brittle.		
75				PSP-C02(72-77) (082919) @ 1330	0.0				
76					0.0				
77					0.0				
78					0.0		(77.0-83.0') SANDSTONE and SHALE, very fine; light gray (10YR 7/1) to gray (10YR 5/1). Interbedded. Note: Highly competent.		
79			84		0.0				
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84							End of boring at 83.0' bgs.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C03

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/03/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.3') CONCRETE.		
2					0.2		(1.3-3.0') SAND, fine to medium, subrounded; little silt; trace granules to small pebbles, subrounded; poorly sorted; dry; yellowish brown (10YR 5/6). Note: Fill.		
3					0.2				
4			84		0.1		(3.0-14.0') CLAY, medium to high plasticity, no dilatancy; little silt; little fine sand, subrounded; trace granules to small pebbles, subrounded; moist; stiff; brown (10YR 5/3).		
5					0.0				
6					0.2				
7					0.1				
8					0.0				
9					0.0				
10					0.0				
11					0.0				
12			120		0.0		Note: Small sand seam, medium to coarse, subangular; wet; from 12.0-12.1' bgs.		
13					0.0				
14					0.0				
15					0.0		(14.0-18.0') CLAY, high plasticity, no dilatancy; little silt; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
16					0.0				
17					0.0				
18					0.0		(18.0-19.5') SAND, fine to medium, subrounded; some to little silt; well sorted; wet; grayish brown (10YR 5/2).		
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451192.2
East Coor: 13064418.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C03

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/03/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-25.5') CLAY, medium to high plasticity, no dilatancy; some silt; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff to stiff.		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0		(25.5-27.0') SAND, very fine to fine, subrounded; some silt; well sorted; wet; grayish brown (10YR 5/2).		
27					0.0				
28					0.0		(27.0-32.0') CLAY, high plasticity, no dilatancy; little silt; little to trace granules to very large pebbles, subrounded; trace fine sand, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
29					0.0				
30					0.0				
31					0.0				
32			120		0.0				
33					0.0		(32.0-40.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light brown (10YR 7/1).		
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0		(40.0-42.0') CLAY, low plasticity, no dilatancy; some silt; little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C03

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/03/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0				
43					0.0		(42.0-45.0') CLAY; and SILT, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; little granules to medium pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
44					0.0				
45					0.0				
46					0.0		(45.0-47.0') SAND, very fine to fine, subrounded; and SILT; poorly sorted; dry; light brownish gray (10YR 6/2).		
47					0.0				
48					0.0		(47.0-59.0') CLAY, low plasticity to nonplastic, no dilatancy; some silt; little fine to medium sand, subrounded; little granules to large pebbles, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Trace small fragments of sandstone and shale.		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0		(59.0-71.0') CLAY and SILT, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; dry; very stiff to hard; dark gray (10YR 4/1). Note: Little small to very large sandstone fragments.		
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C03

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/03/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Cloudy/Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(59.0-71.0') CLAY and SILT, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; dry; very stiff to hard; dark gray (10YR 4/1). Note: Little small to very large sandstone fragments.		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0				
72			108		0.0		(71.0-72.0') WEATHERED SHALE; gray (10YR 5/1) to dark gray (10YR 4/1). Note: Heavily weathered, no competency. Many small brittle fragments.		
73				PSP-C03(71-76) (090319) @ 1300	0.0		(72.0-76.0') WEATHERED SANDSTONE and SHALE; finely interbedded; light gray (10YR 7/1) to gray (10YR 5/1). Note: Heavily weathered, no competency. Many small brittle fragments.		
74					0.0				
75					0.0				
76					0.0				
77							End of boring at 76.0' bgs.		
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C04

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/05/2019
Date Completed: 09/05/2019
Weather Conditions: 75° F, Sunny

Logger: A. Westhuis
Editor: C.Weaver

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451205.3
East Coor: 13064445.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C04

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/05/2019
Date Completed: 09/05/2019

Logger: A. Westhuis
Editor: C.Weaver
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C04

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/05/2019
Date Completed: 09/05/2019

Logger: A. Westhuis
Editor: C.Weaver
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-58.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry; very stiff; dark grayish brown (10YR 4/2). Note: Little small to large fragments of sandstone.		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0		(58.0-65.0') CLAY and SILT, nonplastic, no dilatancy; little very fine to fine sand, subrounded; little to trace granules, subrounded; trace small to large pebbles, subrounded; dry; very stiff to hard; dark gray (10YR 4/1). Note: Little small to large fragments of sandstone.		
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C04

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/05/2019
Date Completed: 09/05/2019

Logger: A. Westhuis
Editor: C.Weaver
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(58.0-65.0') CLAY and SILT, nonplastic, no dilatancy; little very fine to fine sand, subrounded; little to trace granules, subrounded; trace small to large pebbles, subrounded; dry; very stiff to hard; dark gray (10YR 4/1). Note: Little small to large fragments of sandstone.		
65					0.0				
66					0.0		(65.0-72.0') CLAY and SILT, no plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules, subrounded; dry; very stiff; grayish brown (10YR 5/2). Note: Some small to large fragments of finely interbedded shale and sandstone.		
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71			84		0.0				
72					0.0				
73					0.0		(72.0'-73.0') WEATHERED SHALE; gray (10YR 5/1); little to trace very fine interbbeded sandstone, light gray (10YR 7/1).		
74					0.0		(73.0-79.0') WEATHERED SHALE and SANDSTONE, finely interbedded, gray (10YR 5/1). Note: Moderately to highly weathered. No to low competency.		
75				PSP-C04(72-77) (090519) @1445	0.0				
76					0.0				
77			42		0.0				
78					0.0				
79					0.0				
80							End of boring at 79.0' bgs.		
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C05

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/23/2019
Date Completed: 08/26/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1–20							(0.0-47.0') No soils logged, blind drill.		

Drilling Co.: Cascade
Driller: Mike Bond
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: 4" pvc casing installed. Biosparge well installation not completed.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.2
North Coor: 451221.4
East Coor: 13064478.1

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C05

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/23/2019
Date Completed: 08/26/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') No soils logged, blind drill.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C05

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/23/2019
Date Completed: 08/26/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') No soils logged, blind drill.		
43									
44									
45									
46									
47					0.0		(47.0-49.0') CLAY, low plasticity to nonplastic, no dilatancy; some very fine to fine sand, subrounded; little granules to very large pebbles, subrounded; little granules to very large pebbles, subrounded; dry to moist; very stiff; dark grayish brown (10YR 4/2). Note: Little small to large fragments of sandstone.		
48					0.0				
49					0.0		(49.0-50.0') SAND, fine, subrounded; little silt; well sorted; dry; light brownish gray (10YR 6/2).		
50					0.0		(50.0-63.0') CLAY and SILT, nonplastic, no dilatancy; some very fine to fine sand, subrounded; little granules to large pebbles, subrounded; dry to moist; very stiff; dark grayish brown (10YR 4/2). Note: Some small to large fragments of sandstone. Increase in fragments near 60.0' bgs.		
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C05

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/23/2019
Date Completed: 08/26/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-63.5') WEATHERED SANDSTONE and SHALE, very fine; well sorted; light gray (10YR 7/1) to gray (10YR 6/1).		
65					0.0		(63.5-68.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Trace shale laminations. Note: Trace to little small to medium size fragments of sandstone in mostly a soft sand matrix. Low competency.		
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.0-70.0') SANDSTONE and SHALE; interbedded; finely lamninated; light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Highly competent.		
70					0.0				
71					0.0		(70.0-70.5') SHALE, dark gray (10YR 4/1). Note: Highly competent.		
72			120		0.0		(70.5-80.0') SANDSTONE and SHALE; interbedded; finely laminated; light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Highly competent.		
73					0.0				
74					0.0				
75					0.0				
76					0.0				
77					0.0				
78					0.0				
79			36		0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C06

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/28/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.3') Concrete.		
2					0.0		(1.3-2.0') SAND, fine, subrounded; little silt; well sorted; dry; brownish yellow (10YR 6/6).		
3					0.0		(2.0-9.0') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subrounded; trace granules to small pebbles, subrounded; yellowish brown (10YR 5/6). Note: Mottled.		
4			84		0.0				
5					0.0				
6					0.0				
7					0.0				
8					0.0				
9					0.0				
10					0.0		(9.0-10.5') SAND, fine, subrounded; and SILT, little clay, nonplastic, rapid dilatancy; moist to wet; well sorted; soft; yellowish brown (10YR 5/6).		
11					0.0		(10.5-12.0') CLAY, some silt, medium to low plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; yellowish brown (10YR 5/4).		
12			120		0.0		(12.0-16.0') SAND, fine, subrounded; some silt; well sorted; wet; light yellowish brown (10YR 6/4).		
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0		(16.0-28.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: 4" pvc casing installed. Biosparge well installation not completed.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.1
North Coor: 451233.1
East Coor: 13064508.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C06

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/28/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(16.0-28.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
22			120		0.0				
23					0.0				
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					0.0		(28.0-40.0') SAND, fine, subrounded; trace silt; well sorted; dry; light brownish gray (10YR 6/2).		
29					0.0				
30					0.0				
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0		(40.0-45.5') CLAY, some silt, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; very stiff; grayish brown (10YR 5/2).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C06

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/28/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(40.0-45.5') CLAY, some silt, low plasticity, no dilatancy; little fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; very stiff; grayish brown (10YR 5/2).		
43					0.0				
44					0.0				
45					0.0				
46					0.0		(45.5-46.5') SAND, very fine to fine, subrounded; little silt, well sorted; dry; light brownish gray (10YR 6/2).		
47					0.0		(46.5-48.0') SILT, trace clay, nonplastic to low plasticity, no dilatancy; moist; medium stiff; light gray (10YR 7/2).		
48					0.0		(48.0-62.0') CLAY, some silt, low plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; very stiff; dark grayish brown (10YR 4/2). Note: Little fragments of shale starting at 57.0' bgs.		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61			96		0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C06

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/27/2019
Date Completed: 08/28/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Partly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-69.0') WEATHERED SHALE with little fine sandstone laminations, gray (10YR 4/1). Note: Mostly many small fragments of brittle shale with little fine sandstone laminations. Heavily weathered. No competency. Note: Increase in sandstone laminations starting at 64.0' bgs. Note: Poor recovery of the weathered material from 65.0-69.0' bgs. Sample likely washed away while using water to help drill through the sandstone.		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.0-70.0') SANDSTONE and SHALE, some fine shale laminations, interbedded; light gray (10YR 7/1). Note: Moderate to high competency. Many medium to large fragments.		
71			96		0.0		(70.0-71.0') SANDSTONE, very fine; light gray (10YR 7/1). Note: Highly competent. Large cores.		
72					0.0		(71.0-72.5') SHALE and SANDSTONE, mostly shale with some fine light gray (10YR 7/1) sandstone laminations. Note: Many large cores, highly competent.		
73					0.0		(72.5-73.5') SANDSTONE, very fine; light gray (10YR 7/1). Note: Many large fragments. Highly competent.		
74					0.0		(73.5-76.0') SANDSTONE and SHALE, very fine; light gray (10YR 7/1) with many dark gray (10YR 4/1) shale laminations. Note: Very large cores. Highly competent.		
75					0.0				
76					0.0				
77					0.0		(76.0-80.0') SANDSTONE, very fine; light gray (10YR 7/1). Note: Large cores, highly competent.		
78					0.0				
79					0.0				
80			60		0.0				
81					0.0		(80.0-80.5') SHALE, dark gray (10YR 4/1). Note: Highly competent.		
82					0.0		(80.5-82.0') SANDSTONE, very fine; light gray (10YR 7/1). Note: Highly competent.		
83							End of boring at 82.0' bgs.		
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C07

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/30/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks: 4" pvc casing installed. Biosparge well installation not completed.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.1
North Coor: 451244.1
East Coor: 13064536.9

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C07

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/30/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C07

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/30/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-65.0') CLAY, some silt, low plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; very stiff; dark gray (10YR 4/1). Note: Some small to large sandstone fragments starting at 51.0' bgs.		
49					0.0				
50					0.0				
51			84		0.0				
52					0.0				
53					0.0				
54					0.0				
55					0.0				
56			36		0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61			90		0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C07

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/29/2019
Date Completed: 08/30/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(47.0-65.0') CLAY, some silt, low plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; very stiff; dark gray (10YR 4/1). Note: Some small to large sandstone fragments starting at 51.0' bgs.		
65					0.0				
66			30		0.0		(65.0-68.0') WEATHERED SHALE, dark gray (10YR 4/1). Note: Heavily weathered. Mostly small, brittle fragments. No competency.		
67					0.0				
68					0.0				
69					0.0		(68.0-69.0') SHALE with little fine sandstone laminations. Note: Moderate to high competency. Some large cores.		
70			72		0.0		(69.0-70.0') SANDSTONE with some very fine shale laminations. Note: High competency. Large cores.		
71					0.0		(70.0-72.5') SHALE with little very fine sandstone laminations. Note: Many large cores. Highly competent.		
72					0.0				
73					0.0		(72.5-83.0') SANDSTONE, very fine; light gray (10YR 7/1). Note: High competency.		
74					0.0				
75					0.0				
76					0.0				
77					0.0				
78			84		0.0				
79					0.0				
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84							End of boring at 83.0' bgs.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C08

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/04/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: 4" pvc casing installed. Biosparge well installation not completed.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451256.3
East Coor: 13064568.7

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C08

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/04/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C08

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/04/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47					0.0		(47.0-68.0') CLAY, some silt, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; dark gray (10YR 4/1). Note: Trace small to large sandstone fragments starting at 49.0' bgs.		
48					0.0				
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C08

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/03/2019
Date Completed: 09/04/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(47.0-68.0') CLAY, some silt, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; dark gray (10YR 4/1). Note: Trace small to large sandstone fragments starting at 49.0' bgs.		
65					0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.0-71.0') WEATHERED SHALE with some fine sandstone laminations, gray (10YR 5/1). Note: Heavily weathered. Many small brittle fragments.		
70					0.0				
71					0.0				
72			84		0.0		(71.0-75.0') SANDSTONE with little fine shale laminations, light gray (10YR 7/1). Note: High competency. Many large cores.		
73					0.0				
74					0.0				
75					0.0				
76					0.0		(75.0-76.0') SHALE with trace fine sandstone laminations, gray (10YR 5/1) to dark gray (10YR 4/1). Note: High competency. Large cores.		
77					0.0		(76.0-82.0') SANDSTONE with little fine shale laminations, light gray (10YR 7/1). Note: High competency.		
78					0.0				
79					0.0				
80			84		0.0				
81					0.0				
82					0.0				
83					0.0				
84							End of boring at 83.0' bgs.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C09

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/06/2019
Date Completed: 09/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.6') CONCRETE.		
2					0.0		(1.6-2.0') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded, little silt; poorly sorted; dry; brownish yellow (10YR 6/6).		
3					0.0		(2.0-11.0') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subrounded; trace granules, subrounded; dry; stiff; yellowish brown (10YR 5/6). Note: Mottled.		
4			84		0.2				
5					0.1				
6					0.1				
7					0.1				
8					0.0				
9					0.0				
10					0.0				
11					0.0				
12			120		0.0		(11.0-11.5') SAND, fine to medium, subrounded; trace granules to small pebbles, subrounded; little silt; poorly sorted; moist to wet; yellowish brown (10YR 5/6).		
13					0.0		(11.5-17.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded, moist; medium stiff; yellowish brown (10YR 5/6).		
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-27.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff to stiff; gray (10YR 5/1).		
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks: 4" pvc casing installed. Biosparge well installation not completed.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451268.8
East Coor: 13064600.5

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C09

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/06/2019
Date Completed: 09/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(17.0-27.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff to stiff; gray (10YR 5/1). Note: Small, fine sand seam, wet, at 21.0' bgs.		
22			120		0.0				
23					0.0				
24					0.0		Note: Small, fine sand seam, wet, at 23.0' bgs.		
25					0.0				
26					0.0				
27					0.0				
28					0.0		(27.0-41.5') SAND, fine, subrounded; trace silt; well sorted; dry; light brownish gray (10YR 6/2).		
29					0.0				
30					0.0				
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C09

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/06/2019
Date Completed: 09/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(41.5-42.0') CLAY, some silt, low plasticity to nonplastic, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; dry; very stiff; grayish brown (10YR 5/2).		
43					0.0		(42.0-46.5') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light brownish gray (10YR 6/2).		
44					0.0				
45					0.0				
46					0.0				
47					0.0		(46.5-50.0') CLAY, some silt, low to medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to small cobbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
48					0.0				
49					0.0				
50					0.0				
51					0.0		(50.0-63.0') CLAY, and SILT, low plasticity to nonplastic, no dilatancy; trace to little fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; very stiff; dark grayish brown (10YR 4/2). Note: Little to some fragments of sandstone and shale, small pebble to large cobble in size.		
52			120		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		Note: Poor recovery from 57.0-64.0' bgs. Attempted to retrieve sample mulitple times, but unable to collect full recovery in the core barrel.		
59					0.0				
60					0.0				
61			48		0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C09

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/06/2019
Date Completed: 09/06/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-69.0') Weathered SHALE and SANDSTONE, interbedded, gray (10YR 5/1) to light gray (10YR 7/1). Note: Many small to medium fragments, very brittle, no competency.		
65			36		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.0-72.0') SANDSTONE with trace to little fine shale laminations, light gray (10YR 7/1). Note: Highly competent with very large cores.		
71					0.0				
72			90		0.0				
73					0.0		(72.0-74.0') SHALE with trace fine sandstone laminations, gray (10YR 5/1). Note: Moderate to high competency. Many large cores.		
74					0.0				
75					0.0		(74.0-77.0') SANDSTONE with trace fine shale laminations, light gray (10YR 7/1). Note: Highly competent with many large cores.		
76					0.0				
77					0.0				
78					0.0		(77.0-78.5') SHALE with trace fine sandstone laminations, gray (10YR 5/1). Note: Highly competent.		
79			36		0.0		(78.5-80.0') SANDSTONE with some shale, very fine; light gray (10YR 7/1). Note: Highly competent.		
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C10

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/09/2019
Date Completed: 09/09/2019

Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 55° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-44.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: 4" pvc casing installed. Biosparge well installation not completed.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451277.9
East Coor: 13064624.7

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C10

Sheet: 2 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/09/2019
Date Completed: 09/09/2019

Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 55° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-44.0') Blind drilled.		
22			528						
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C10

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/09/2019
Date Completed: 09/09/2019

Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 55° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-44.0') Blind drilled.		
43									
44									
45					0.4		(44.0-45.5') SAND, very fine, subrounded; little clay; little small pebbles, subangular; poorly sorted; wet; dark gray (10YR 4/1).		
46					0.1		(45.5-46.0') SAND, very fine to fine, subrounded; trace small pebbles; moist; well sorted; pale brown (10YR 6/3).		
47					0.0		(46.0-49.0') SILT, medium plasticity, no dilatancy; some clay; dry; stiff; dark gray (10YR 4/1).		
48					0.0				
49			120		0.0				
50					0.0		(49.0-49.5') SAND, fine to medium, subrounded; some small to large pebbles, subangular; little clay; poorly sorted; dry; dark gray (10YR 4/1).		
51					0.0		(49.5-57.0') SILT, medium plasticity, no dilatancy; some clay; little small to large pebbles; dry; stiff; very dark gray (10YR 6/1).		
52					0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-59.0') SAND, fine to medium, subrounded; little coarse sand, subrounded; trace pebbles, subanguler; poorly sorted; moist; brown (10YR 4/3).		
59			120		0.0				
60					0.0		(59.0-62.5') SILT, nonplastic, rapid dilatancy; some sand, very fine; little small to large pebbles, subangular; moist; medium stiff; dark gray (10YR 4/1). Note: Fragments of sandstone.		
61					0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-C10

Soil Boring Log

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/09/2019
Date Completed: 09/09/2019

Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 55° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.5-64.0') WEATHERED SANDSTONE, very fine, subrounded; well sorted; light gray (10YR 7/1) to gray (10YR 5/1). Note: Highly weathered. Little to no competency.		
65					0.0		(64.0-66.0') SANDSTONE, very fine, subrounded; well sorted; light gray (10YR 7/1). Note: Highly competent. Large cores.		
66					0.0				
67					0.0		(66.0-72.5') SHALE; very dark gray (10YR 3/1). Note: Highly competent. Some fine sandstone laminations.		
68					0.0				
69			120		0.0				
70					0.0				
71					0.0				
72					0.0				
73					0.0		(72.5-77.5') SANDSTONE, very fine, subrounded; well sorted; light gray (10YR 7/1). Note: Highly competent.		
74					0.0				
75					0.0				
76					0.0				
77					0.0				
78					0.0				
79			120		0.0		(77.5-84.0') SHALE; very dark gray (10YR 3/1); some fine sandstone laminations; gray (10YR 7/1). Note: Highly competent.		
80					0.0				
81					0.0				
82					0.0				
83					0.0				
84					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C10

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/09/2019
Date Completed: 09/09/2019

Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 55° F, Rain

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85							End of boring at 84.0' bgs.		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C11

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/10/2019

Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 66° F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.0
North Coor: 451283.5
East Coor: 13064652.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C11

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/10/2019

Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 66° F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C11

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/10/2019
Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 66° F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-50.0') SAND, very fine, subrounded; and SILT, nonplastic, rapid dilatancy; well sorted; moist; dark gray (10YR 4/1).		
49					0.0				
50					0.0				
51					0.0		(50.0-51.5') SAND, fine to medium, subrounded; some medium pebbles, subangular; some cobbles, subangular; poorly sorted; dry; gray (10YR 5/1). Note: Fragments of sandstone.		
52			120		0.0		(51.5-57.0') SILT and CLAY, medium plasticity, no dilatancy; some small to large pebbles, subangular; dry; stiff; very dark gray (10YR 3/1). Note: Fragments of sandstone.		
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-61.5') SILT, low to medium plasticity, no dilatancy; some clay; trace small to medium pebbles; wet; soft; dark gray (10YR 4/1).		
59					0.0				
60					0.0				
61			48		0.0		Note: Poor recovery from 57.0-64.0' bgs.		
62					0.0		(61.5-64.0') WEATHERED SANDSTONE, very fine, subrounded; some shale; some to little small to medium pebbles, subrounded; moist; dark gray (10YR 4/1). Note: No competency.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-C11

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/10/2019
Date Completed: 09/10/2019
Logger: S. Johnson
Editor: C. Weaver
Weather Conditions: 66° F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0				
65				PSP-C11(62-67) (091019) @1048	0.0		(64.0-65.0') SANDSTONE, very fine, subrounded; well sorted; light gray (10YR 7/1). Note: Some fine shale laminiations. Highly competent. Large cores.		
66					0.0		(65.0-67.0') SHALE; very dark gray (10YR 3/1). Note: Some fine sandstone laminations. Highly competent. Note: Poor recovery from 64.0-77.0' bgs.		
67					0.0				
68							(67.0-77.0') NO RECOVERY.		
69									
70									
71			36						
72									
73									
74									
75									
76									
77									
78							End of boring at 77.0' bgs.		
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-D02

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/26/2019
Date Completed: 09/26/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-2.0') CONCRETE.		
2					0.0				
3					0.0		(2.0-4.0') SAND, very fine to small pebbles, subrounded, little silt, poorly sorted, dry to moist; loose to medium dense, dark yellowish brown (10YR 4/6).		
4			65		0.0				
5					0.0		(4.0-7.0') SAND, very fine to medium, subrounded; well worted; dry; very loose; light yellowish brown (10YR 6/4).		
6					0.0				
7									
8					0.0		(7.0-9.0') SAND, very fine to granule, subrounded to subangular; trace small to medium pebbles, subrounded to subangular; poorly sorted; wet; very loose; yellowish brown (10YR 5/6).		
9					0.0				
10					0.0		(9.0-20.0') SAND, fine to medium, subrounded; trace very coarse sand to granules, subrounded to subangular; well sorted; moist; very loose; light yellowish brown (10YR 6/4) to yellowish brown (10YR 5/6).		
11					0.0				
12			82		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17									
18					0.0				
19					0.0				
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: Soil boring abandoned.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☐ Yes ☒ No
Surface Elev.: 862.1
North Coor: 450958.1
East Coor: 13064465.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-D02

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/26/2019
Date Completed: 09/26/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-22.5') SAND, fine, subangular to subrounded; poorly sorted; trace granules, subrounded; moist; loose; grayish brown (10YR 5/2).		
22			84		0.0				
23					0.0		(22.5-34.0') CLAY, medium to high plasticity, slow dilatancy; some SILT; little sand, very fine to fine; trace very coarse sand, subangular, moist, soft to medium stiff; gray (10YR 5/1).		
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32			78		0.0				
33					0.0				
34					0.0		(34.0-36.5') SAND, fine to medium, subrounded to subangular; well sorted; trace coarse sand, subrounded to subangular; moist; very loose; light yellowish brown (10YR 6/4).		
35					0.0				
36					0.0				
37					0.0		(36.5-43.0') SILT, trace clay, nonplastic, rapid dilatancy; and SAND, very fine to fine; trace coarse sand; trace small cobbles; well sorted; moist; dense, gray (10YR 5/1).		
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-D02

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/26/2019
Date Completed: 09/26/2019
Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0		(36.5-43.0') SILT, trace clay, nonplastic, rapid dilatancy; and SAND, very fine to fine; trace coarse sand; trace small cobbles; well sorted; moist; dense, gray (10YR 5/1).		
43					0.0				
44					0.0		(43.0-45.0') SAND, fine to medium, subangular to subrounded; trace coarse sand; well sorted; moist to dry; very loose; light gray (10YR 7/1).		
45					0.0				
46					0.0		(45.0-46.0') SILT, some clay, low plasticity, rapid dilatancy; some sand, very fine to fine; well sorted; moist; medium dense to dense; gray (10YR 6/1).		
47							(46.0-47.0') SAND, fine to medium, trace coarse sand, subrounded to subangular; well sorted; dry; very loose; light gray (10YR 7/1).		
48					0.0		(47.0-56.0') SILT, trace to little clay, nonplastic, rapid dilatancy; some SAND, very fine to fine, trace to little very coarse sand to small pebbles, subangular to subrounded; poorly sorted; dry; medium dense to dense; dark gray (10YR 4/1). Note: Trace interbedded shale and sandstone.		
49					0.0				
50					0.0				
51					0.0				
52			114		0.0				
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0		(56.0-59.0') WEATHERED SHALE, dark gray (10YR 4/1). Note: Highly weathered. Trace small competent sandstone pieces.		
58					0.0				
59					0.5		(59.0-61.5') WEATHERED SANDSTONE, dark gray (10YR 4/1). Note: Highly weathered.		
60			90		0.0				
61				PSP-D02(59-64) (092719) @ 0750	0.0				
62					0.0		(61.5-63.0') WEATHERED SANDSTONE and SHALE, interbedded, gray (10YR 5/1) to light gray (10YR 7/1). Note: Moderate to heavily weathered. Some competent sandstone pieces.		

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-D02

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/26/2019
Date Completed: 09/26/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 64° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0 0.0		(63.0-64.0') SANDSTONE with little shale, medium competency; gray (10YR 5/1) to light gray (10YR 7/1). Note: Moderate to highly competent		
							End of boring at 64.0' bgs.		
65									
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E01

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/13/2019
Weather Conditions: 75° F, Cloudy

Logger: A. Westhuis
Editor: K. Donahue

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 450882.3
East Coor: 13064786.1

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E01

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/13/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E01

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/13/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-51.0') SAND, very fine to medium, trace coarse, subrounded, trace granules, subrounded; little silt; poorly sorted; dry to moist; grayish brown (10YR 5/2).		
51					0.0		(51.0-52.0') SANDSTONE, well sorted; light gray (10YR 7/2).		
52					0.0		(52.0-53.0') CLAY, some silt, medium to low plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
53					0.0		(53.0-53.5') SAND, fine to medium, subrounded; trace granules, surbrounded; little silt; well sorted; dry to moist; light brownish gray (10YR 6/2).		
54					0.0		(53.5-57.0') SILT, little clay, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules, subrounded; dry; stiff; grayish brown (10YR 5/2). Note: Many small to large pebble sized fragments of sandstone intermixed.		
55			120		0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-63.0') WEATHERED SHALE with little interbedded sandstone, dark gray (10YR 4/1) to light gray (10YR 7/2). Note: Very little competency.		
59					0.0				
60					0.0				
61					0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E01

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/13/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-67.0') WEATHERED SHALE with interbedded sandstone, gray (10YR 5/1) to light gray (10YR 7/2). Note: Slightly weathered. Moderate competency.		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0		(67.0-70.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		
69					0.0				
70					0.0				
71					0.0		(70.0-73.0') SANDSTONE with some interbedded shale. Note: Highly competent.		
72					0.0				
73					0.0				
74					0.0		(73.0-75.0') SHALE, dark gray (10YR 4/1). Note: Moderate to high competency.		
75			120		0.0				
76					0.0		(75.0-80.0') SANDSTONE and SHALE, interbedded, dark gray (10YR 4/1) to light gray (10YR 7/2). Note Highly competent.		
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E02

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450892.1
East Coor: 13064814.4

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E02

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E02

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-51.3') CLAY, little to some silt, medium plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; medium stiff to stiff; gray (10YR 5/1).		
51					0.0		(51.3-54.5') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to small pebbles, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Little small to large pebbles sized fragments of sandstone.		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0		(54.5-56.5') SAND, fine to medium, subrounded; trace granules to medium pebbles, subrounded; little silt; poorly sorted; dry to moist; light brownish gray (10YR 6/2).		
56					0.0				
57					0.0		(56.5-61.0') SILT, little clay, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules, subrounded; dry; stiff; grayish brown (10YR 5/2). Note: Many fragments of sandstone at 58.0' bgs.		
58					0.0				
59					0.0				
60					0.0				
61					0.0		(61.0-66.0') WEATHERED SHALE with little interbedded sandstone, dark gray (10YR 4/1) to light gray (10YR 7/2). Note: Heavily weathered. Little to no competency.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-E02

Soil Boring Log

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 09/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 80° F, Mostly Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-66.0') WEATHERED SHALE with little interbedded sandstone, dark gray (10YR 4/1) to light gray (10YR 7/2). Note: Heavily weathered. Little to no competency.		
65			120		0.0				
66					0.0				
67					0.0		(66.0-69.5') SANDSTONE, very fine, well sorted; light gray (10YR 7/1). Note: Highly competent.		
68					0.0				
69					0.0				
70					0.0		(69.5-72.0') SHALE with little interbedded sandstone, dark gray (10YR 4/1) to light gray (10YR 7/2). Note: Moderate competency. Many brittle fragments with some hard.		
71					0.0				
72					0.0		(72.0-72.5') SANDSTONE with some interbedded shale. Note: Moderate competency.		
73					0.0		(72.5-74.0') SHALE, dark gray (10YR 4/1). Note: Moderate competency.		
74					0.0		(74.0-75.5') SANDSTONE with some interbedded shale, gray (10YR 5/1).		
75			120		0.0				
76					0.0		(75.5-79.0') SHALE with little sandstone lenses, light gray (10YR 7/2) to gray (10YR 5/1).		
77					0.0				
78					0.0				
79					0.0				
80					0.0		(79.0-80.0') SANDSTONE, well sorted; light gray (10YR 7/2).		
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-E03

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/14/2019
Date Completed: 09/14/2019
Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.5') CONCRETE.		
2			60		0.1		(1.5-3.0') SAND, very fine to medium, subrounded; trace granules to medium pebbles, subrounded; little silt, poorly sorted; yellowish brown (10YR 5/6). Note: Fill material.		
3					0.1				
4					0.2		(3.0-6.5') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; light yellowish brown (10YR 6/4).		
5					0.1				
6					0.0				
7			60		0.1		(6.5-7.0') SAND, medium to coarse, subangular; trace granules to medium pebbles, subangular; little to some silt; poorly sorted; dark yellowish brown (10YR 3/4).		
8					0.0		(7.0-8.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; light yellowish brown (10YR 6/4).		
9					0.0		(8.0-8.5') SAND, medium to coarse, subangular; trace granules to medium pebbles, subangular; little to some silt; poorly sorted; dark yellowish brown (10YR 3/4).		
10					0.0		(8.5-11.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; light yellowish brown (10YR 6/4).		
11					0.1				
12					0.0		(11.0-14.0') SAND, very fine, subrounded; and SILT; trace clay, low plasticity to nonplastic, slow dilatancy; wet; well sorted; soft; grayish brown (10YR 5/2). Note: Slight odor.		
13					0.2				
14					0.1				
15			120		0.3		(14.0-15.5') CLAY and SILT, low plasticity, no dilatancy; some very fine to fine sand, subrounded; trace granules, subrounded; moist; medium stiff to stiff; brown (10YR 5/3).		
16					0.7		(15.5-16.5') SAND, very fine to fine, subrounded; some silt; well sorted; wet; brown (10YR 5/3). Note: Slight odor.		
17					0.1		(16.5-17.5') CLAY, some silt, low plasticity, no dilatancy; some fine sand, subrounded; trace granules to small pebbles, subrounded; moist; stiff; brown (10YR 5/3).		
18					0.2		(17.5-18.5') SAND, very fine to fine, subrounded; little to some silt; well sorted; wet; brown (10YR 5/3).		
19					0.0		(18.5-19.5') CLAY and SILT, low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to small pebbles, subrounded; moist; stiff; brown (10YR 5/3).		
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450901.8
East Coor: 13064842.8

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-E03

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/14/2019
Date Completed: 09/14/2019
Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-29.5') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to very large pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
22					0.0				
23					0.0				
24					0.0				
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0		(29.5-41.5') CLAY, some silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to very large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E03

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/14/2019
Date Completed: 09/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(41.5-50.5') SAND, very fine to fine, subrounded; little to some silt, poorly sorted; dry; light brownish gray (10YR 6/2).		
43					0.0				
44					0.0				
45			120		0.0				
46					0.0				
47					0.0		Note: Some granules to large pebbles, subrounded, from 46.5-47.0' bgs.		
48					0.0		Note: Increase in silt at 48.0' bgs.		
49					0.0				
50					0.0				
51					0.0		(50.5-53.0') CLAY and SILT, low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; dry to moist; stiff; dark grayish brown (10YR 4/2). Note: Trace to little small to large pebbles sized fragments of sandstone.		
52					0.0				
53					0.0		(53.0-55.0') SAND, fine to medium, subrounded; trace granules to large pebbles, subrounded; little silt; poorly sorted; dry to moist; light brownish gray (10YR 6/2).		
54					0.0				
55			120		0.0		(55.0-62.0') SILT, little to some clay, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules, subrounded; dry; stiff; grayish brown (10YR 5/2). Note: Some small to medium pebble sized fragments of sandstone intermixed.		
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E03

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/14/2019
Date Completed: 09/14/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-66.0') WEATHERED SHALE with some interbedded sandstone, dark gray (10YR 4/1) to light gray (10YR 7/2). Note: Heavily weathered. No competency.		
65			120		0.0				
66					0.0				
67					0.0		(66.-67.5') WEATHERED SHALE, dark gray (10YR 4/1). Note: Heavily weathered. No competency.		
68				PSP-E03 (66-70) (091419) at 1510	0.0		(67.5-68.0') SANDSTONE, very fine, well sorted; light gray (10YR 7/2).		
69					0.0		(68.0-73.0') SHALE with very finely interbedded sandstone laminations; light gray (10YR 7/2). Note: Slightly weathered, increase in competency.		
70					0.0				
71					0.0				
72					0.0				
73					0.0				
74					0.0		(73.0-74.0') SANDSTONE with some interbedded shale. Note: Moderated competency.		
75			120		0.0		(74.0-78.0') SHALE with little interbedded sandstone lenses, gray (10YR 5/1) to dark gray (10YR 4/1). Note: Highly competent.		
76					0.0				
77					0.0				
78					0.0				
79					0.0		(78.0-80.0') SANDSTONE, well sorted, light gray (10YR 7/2). Note: Highly competent.		
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E04

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/15/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dann Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 450911.6
East Coor: 13064871.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E04

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/15/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E04

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/15/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-51.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to medium pebbles, surbounded; dry to moist; stiff; grayish brown (10YR 5/2).		
52					0.0		(51.0-53.5') SAND, very fine to medium, subrounded; trace granules, subrounded; little to some silt; poorly sorted; dry; light brownish gray (10YR 6/2).		
53					0.0				
54					0.0		(53.5-60.5') SILT, little to some clay, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules, subrounded; dry; stiff; grayish brown (10YR 5/2). Note: Little to some small to large pebble sized fragments of sandstone intermixed, starting around 55.0' bgs.		
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.5-63.0') WEATHERED SANDSTONE, very fine, well sorted, light gray (10YR 7/1). Note: Many fragmented pieces. Low competency.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E04

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/15/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-66.5') SHALE and SANDSTONE, very finely interbedded with thin laminations, gray (10YR 5/1) to light gray (10YR 7/1). Note: Weathered with many small brittle fragments. Low competency.		
65			120		0.0				
66					0.0				
67					0.0		(66.5-68.5') WEATHERED SHALE, dark gray (10YR 4/1). Note: Moderate to low weathering. Increase in competency from low to moderate.		
68					0.0				
69					0.0		(68.5-72.0') SANDSTONE and SHALE, very finely interbedded with thin laminations; light gray (10YR 7/2) to gray (10YR 5/1). Note: Moderate competency.		
70					0.0				
71					0.0				
72					0.0		(72.0-75.0') SHALE, dark gray (10YR 4/1). Note: Increase in competency from moderate to high.		
73					0.0				
74					0.0				
75			120		0.0		(75.0-78.5') SANDSTONE, very fine; well sorted; light gray (10YR 7/1).		
76					0.0				
77					0.0				
78					0.0				
79					0.0		(78.5-80.0') SANDSTONE with some finely interbedded shale, light gray (10YR 7/1). Note: Highly competent.		
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E05

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/16/2019
Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450921.3
East Coor: 13064899.5

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E05

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/16/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E05

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/16/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-54.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
52					0.0				
53					0.0.				
54					0.0				
55			120		0.0		(54.0-60.0') SILT, little clay, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules, subrounded; dry; stiff; grayish brown (10YR 5/2). Note: Little to some small to large pebble sized fragments of sandstone intermixed.		
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-61.0') SAND, very fine to fine, subrounded; some silt; well sorted; dry; light grayish brown (10YR 6/2).		
62					0.0		(61.0-64.0') SILT, little clay, nonplastic, no dilatancy; little very fine to fine sand, subrounded; trace granules, subrounded; dry; stiff; dark grayish brown (10YR 4/2). Note: Some small to large fragments of sandstone.		
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E05

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/15/2019
Date Completed: 09/16/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0.				
65			84		0.0		(64.0-64.5') WEATHERED SANDSTONE, well sorted, light gray (10YR 7/1). Note: Heavily weathered. Many small fragments in a mostly soft sand matrix. No competency.		
66					0.0		(64.5-65.5') WEATHERED SHALE and SANDSTONE, very finely interbedded with thin laminations, gray (10YR 5/1) to light gray (10YR 7/2). Note: Many small fragments. Little to no competency.		
67					0.0		(65.5-70.0') SANDSTONE with little fine shale laminations, very fine to fine; light gray (10YR 7/2). Note: Moderate competency.		
68					0.0				
69					0.0				
70					0.0				
71					0.0		(70.0-72.0') SHALE with some interbedded sandstone laminations, gray (10YR 5/1). Note: Moderate competency.		
72					0.0				
73			72		0.0		(72.0-74.0') SHALE, gray (10YR 5/1). Note: Moderate to high competency.		
74					0.0				
75					0.0.		(74.0-77.5') SANDSTONE, very fine, light gray (10YR 7/2), with little very fine shale laminations, gray (10YR 5/1). Note: Moderate competency to high competency.		
76					0.0				
77					0.0				
78			24		0.0		(77.5-80.0') SANDSTONE, very fine, well sorted, light gray (10YR 7/1) with some interbedded shale laminations, gray (10YR 5/1). Note: Moderate to high competency.		
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E06

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.3') CONCRETE.		
2					0.0		(1.3-2.0') SAND, fine to medium, subrounded; trace granules to medium pebbles, subrounded, little silt; poorly sorted; dry; yellowish brown (10 YR 5/6).		
3			60		0.0		(2.0-13.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace to little granules to large pebbles, subrounded; dry to moist; medium stiff to soft; light yellowish brown (10YR 6/4).		
4					0.0				
5					0.0				
6					0.0				
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0				
12					0.0				
13					0.0				
14					0.0		(13.0-31.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; trace granules to very large pebbles, subrounded; trace very fine to fine sand, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
15			120		0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450937.7
East Coor: 13064924.7

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-E06

Soil Boring Log

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(13.0-31.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; trace granules to very large pebbles, subrounded; trace very fine to fine sand, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
22					0.0				
23					0.0				
24					0.0				
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0		(31.0-48.5') CLAY, little silt, medium plasticity, no dilatancy; little very fine to fine sand, subrounded; little granules to very large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0				
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E06

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(31.0-48.5') CLAY, little silt, medium plasticity, no dilatancy; little very fine to fine sand, subrounded; little granules to very large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
43					0.0				
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0		(48.5-56.0') SAND, very fine to fine, subrounded; some silt; poorly sorted; dry; light brownish gray (10YR 6/2).		
51					0.0				
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0		Note: Some granules to very large pebbles, subrounded, from 55.5-56.0' bgs.		
57					0.0		(56.0-61.0') SILT, little clay, nonplastic, no dilatancy; little vary fine to fine sand, subrounded; trace granules, subrounded; poorly sorted; dry to moist; stiff; grayish brown (10YR 5/2). Note: Some small fragments of sandstone intermixed.		
58					0.0				
59					0.0				
60					0.0				
61					0.0		(61.0-67.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/2). Note: Heavily weathered. Some small to large, brittle fragments of sandstone in a soft sand matrix. No competency.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E06

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-67.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/2). Note: Heavily weathered. Some small to large, brittle fragments of sandstone in a soft sand matrix. No competency.		
65			120		0.0				
66				PSP-E06 (64-68) (091619)	0.0				
67					0.0				
68					0.0		(67.0-69.0') WEATHERED SANDSTONE and SHALE, interbedded; light gray (10YR 7/1) to gray (10YR 5/1). Note: Low competency.		
69					0.0				
70					0.0		(69.0-72.0') SANDSTONE, well sorted; light gray (10YR 7/1). Note: Moderate to high competency.		
71					0.0				
72					0.0		(72.0-75.0') SHALE with interbedded sandstone, light gray (10YR 7/1). Note: Moderate to high competency.		
73					0.0				
74					0.0				
75			120		0.0		(75.0-78.5') SHALE, gray (10YR 5/1). Note: Highly competent.		
76					0.0				
77					0.0				
78					0.0				
79					0.0		(78.5-80.0') SANDSTONE, very fine, well sorted; light gray (10YR 7/1). Note: Highly competent.		
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E07

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450963.6
East Coor: 13064942.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E07

Sheet: 2 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E07

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-53.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
52					0.0				
53					0.0				
54					0.0		(53.0-55.0') SAND, very fine to fine, subrounded; some silt; poorly sorted; dry; light brownish gray (10YR 6/2).		
55			120		0.0		(55.0-57.5') SILT, trace clay, nonplastic, no diltancy; little very fine sand; moist; stiff; light brownish gray (10YR 6/2).		
56					0.0				
57					0.0				
58					0.0		(57.5-60.0') SILT, little clay, nonplastic, no dilatancy; little very fine sand; dry to moist; stiff; light brownish gray (10YR 6/2). Note: Some small to large pebble size fragments of sandstone and shale intermixed.		
59					0.0				
60					0.0				
61					0.0		(60.0-68.0') WEATHERED SANDSTONE, very fine, well sorted; light gray (10YR 7/2) to gray (10YR 6/1). Note: Heavily weathered. Some small to large pebble size brittle fragments of sandstone in mostly a soft sand matrix. No competency.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-E07

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-68.0') WEATHERED SANDSTONE, very fine, well sorted; light gray (10YR 7/2) to gray (10YR 6/1). Note: Heavily weathered. Some small to large pebble size brittle fragments of sandstone in mostly a soft sand matrix. No competency.		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.0-71.0') WEATHERED SHALE and SANDSTONE, interbedded, gray (10YR 5/1) to dark gray (10YR 4/1). Note: Moderate competency.		
70					0.0				
71					0.0		(71.0-74.0') SANDSTONE with finely interbedded shale, light gray (10YR 7/2). Note: Moderate to high competency.		
72					0.0				
73					0.0				
74					0.0		(74.0-79.0') SHALE, gray (10YR 5/1). Note: Highly competent.		
75			96		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0		(79.0-84.0') SANDSTONE, very fine, well sorted; light gray (10YR 7/1). Note: Trace finely interbedded shale. Highly competent.		
81					0.0				
82			36		0.0				
83					0.0				
84					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E07

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/24/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85							End of boring at 84.0' bgs.		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATANOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E08

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/25/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 450988.4
East Coor: 13064956.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E08

Sheet: 2 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/25/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E08

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/25/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-53.0') CLAY, little silt, high plasticity, no dilatancy; trace very fine to fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff to stiff; gray (10YR 5/1).		
52					0.0				
53					0.0				
54					0.0		(53.0-55.0') SAND, very fine to fine, subrounded; some silt; poorly sorted; dry; light brownish gray (10YR 6/2). Note: Trace medium to large pebbles at 55.0' bgs.		
55			108		0.0				
56					0.0		(55.0-58.5') SILT, trace clay, nonplastic, no dilatancy; little very fine sand; dry to moist; stiff; light brownish gray (10YR 6/2).		
57					0.0				
58					0.0				
59					0.0		(58.5-63.0') SILT, little clay, nonplastic, no dilatancy; little very fine sand; dry; stiff; light brownish gray (10YR 6/2). Note: Some small to large pebble size fragments of sandstone and shale intermixed.		
60					0.0				
61					0.0				
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-E08

Soil Boring Log

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/25/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-65.0') WEATHERED SANDSTONE, very fine, well sorted; light gray (10YR 7/2) to gray (10YR 6/1). Note: Heavily weathered. Some small to large pebble size brittle fragments of sandstone in mostly a soft sand matrix. No competency.		
65			120		0.0				
					0.0		(65.0-66.0') WEATHERED SHALE with some interbedded sandstone, light gray (10YR 7/2). Note: Heavily weathered. Low competency.		
66					0.0		(66.0-68.0') WEATHERED SANDSTONE, very fine, well sorted; light gray (10YR 7/2). Note: Heavily weathered. Some small to large pebble size brittle fragmetns of sandstone in mostly a soft sand matrix. No competency.		
67					0.0				
68					0.0		(68.0-73.0') WEATHERED SHALE and SANDSTONE, interbedded, gray (10YR 5/1) to dark gray (10YR 4/1). Note: Moderate competency.		
69					0.0				
70					0.0				
71					0.0				
72					0.0				
73					0.0		(73.0-77.0') SANDSTONE with finely interbedded shale, light gray (10YR 7/2). Note: Moderate to high competency.		
74					0.0				
75			96		0.0				
76					0.0				
77					0.0				
78					0.0		(77.0-80.0') SHALE, gray (10YR 5/1). Note: High competency.		
79					0.0				
80					0.0				
81					0.0		(80.0-84.0') SANDSTONE, very fine, well sorted, light gray (10YR 7/1). Note: Highly compentent.		
82			48		0.0				
83					0.0				
84					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E08

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/24/2019
Date Completed: 09/25/2019

Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: 75° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85							End of boring at 84.0' bgs.		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-E09

Soil Boring Log

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/18/2019
Date Completed: 09/18/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 65° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NA		(0.0-1.0') CONCRETE.		
2					0.0		(1.0-2.0') SAND; very fine to granules, subangular to subrounded, poorly sorted, moist to wet, loose, yellowish brown (10YR 5/4).		
3					0.0		(2.0-3.5') SAND, very fine to granules, subangular to subrounded; some clay, medium plasticity, slow to rapid dilatancy; poorly sorted; moist; loose to medium dense; brown (10YR 5/3).		
4			44		0.0		(3.5-7.0') SAND, very fine to granules, subangular to subrounded; little silt, trace clay, low plasticity, rapid dilatancy; poorly sorted; moist; loose; pale brown (10YR 6/3).		
5					0.0				
6					0.0				
7					0.0				
8					0.0		(7.0-20.0') CLAY, some silt, medium to high plasticity, slow dilatancy; some sand, very fine to fine; trace granules, subangular to subrounded; moist; soft; brown (10YR 5/3) to grayish brown (10YR 5/2) to gray (10YR 6/1).		
9					0.0				
10					0.0				
11					0.0				
12			120		0.0				
13					0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 451012.2
East Coor: 13064970.4

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E09

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/18/2019
Date Completed: 09/18/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 65° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-22.0') SAND, very fine to very coarse, subangular to subrounded; poorly sorted; loose; grayish brown (11YR 5/2).		
22			120		0.0				
23					0.0		(22.0-27.0') CLAY and SILT, medium plasticity, slow to rapid dilatancy; little sand, very fine to fine; trace granules, subangular to subrounded; moist; medium stiff; gray (10YR 6/1).		
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28					0.0		(27.0-30.0') CLAY, little silt, high plasticity, no dilatancy; little sand, very fine to fine; moist to wet; very soft to soft; gray (10YR 6/1).		
29					0.0				
30					0.0		(30.0-34.5') SAND, very fine to very coarse, subangular to subrounded; and SILT; poorly sorted; moist, loose to medium dense; gray (10YR 6/1).		
31					0.0				
32			120		0.0				
33					0.0				
34					0.0				
35					0.0		(34.5-39.0') SILT, little sand, very fine to fine; trace granules, subangular to subrounded; well sorted; dry; dense; gray (10YR 5/1).		
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0		(39.0-39.5') SAND, very fine to very coarse, subrounded to subangular; poorly sorted.		
41					0.0		(39.5-42.0') SILT, some clay, low to medium plasticity, slow dilatancy; little sand, very fine to fine; trace granules, subangular to subrounded; well sorted; moist to dry; medium dense to dense; gray (10YR 5/1).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E09

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/18/2019
Date Completed: 09/18/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 65° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42			120		0.0				
43					0.0		(42.0-47.0') SILT and CLAY, low to medium plasticity, slow dilatancy; trace sand, very fine to fine; trace granules, subrounded; well sorted; dry; dense; gray (10YR 5/1).		
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-48.5') CLAY, little silt, medium to high plasticity, slow dilatancy; trace granules, subrounded; dry; stiff; gray (10YR 5/1).		
49					0.0		(48.5-50.0') SAND, very fine to coarse, subangular to subrounded; trace granules, subangular to subrounded; and SILT; poorly sorted; moist; medium dense; gray (10YR 5/1).		
50					0.0		(50.0-54.5') CLAY, medium to high plasticity, slow dilatancy; little silt; trace granules, subangular to subrounded; dry; very stiff; gray (10YR 5/1) to dark grayish brown (10YR 4/2). Note: Very fine to very coarse, poorly sorted sand seams at 50.5' bgs and 51.5' bgs.		
51			108		0.0				
52					0.0				
53					0.0				
54					0.0				
55					0.0		(54.5-56.0') SAND, very fine to fine; well sorted; dry; very loose; gray (10YR 6/1).		
56					0.0				
57					0.1		(56.0-59.0') SAND, very fine to medium; trace granules to very large pebbles, subangular to subrounded; some silt, little clay, low to medium plasticity, slow to rapid dilatancy; poorly sorted; moist; loose to medium dense; gray (10YR 5/1).		
58					0.1				
59					0.0				
60					0.0		(59.0-61.0') SILT, little clay, nonplastic to low plasticity, rapid dilatancy; little sand, very fine to fine; dry; medium stiff; gray (10YR 5/1).		
61			89		0.0				
62					0.0		(61.0-67.5') WEATHERED SANDSTONE and SHALE, interbedded, little consolidated sandstone pieces, dark gray (10YR 4/1) to light gray (10YR 7/1). Note: Heavily weathered.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E09

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/18/2019
Date Completed: 09/18/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 65° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-67.5') WEATHERED SANDSTONE and SHALE, interbedded, little consolidated sandstone pieces, dark gray (10YR 4/1) to light gray (10YR 7/1). Note: Heavily weathered.		
65				PSP-E09(63-68) (091819) @ 1440	0.0				
66					0.0				
67			24		0.0				
68					0.0		(67.5-72.0') SANDSTONE, consolidated, high competency, few areas with interbedded shale, light gray (10YR 7/1).		
69					0.0				
70					0.0				
71			27		0.0				
72					0.0				
73					0.0		(72.0-72.5') SANDSTONE and SHALE, interbedded, high competency, light gray (10YR 7/1) to very dark gray (10YR 3/1).		
74					0.0		Note: Unable to recover sample from 72.5-77.0' bgs.		
75			0		0.0				
76					0.0				
77					0.0				
78			12		0.0		(77.0-78.0') SANDSTONE, consolidated, high competency, some interbedded shale, light gray (10YR 7/1) to very dark gray (10YR 3/1).		
79							End of boring at 78.0' bgs.		
80									
81									
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E10

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
							(0.0-47.0') Blind drilled.		

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 451043.7
East Coor: 13064979.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E10

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E10

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47									
48					0.0		(47.0-54.0') CLAY, trace silt, high plasticity, no dilatancy; trace very coarse sand to medium pebbles, subrounded; moist; very stiff; gray (10YR 6/1).		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					0.0				
54					0.0				
55					0.0		(54.0-57.0') CLAY, little to some silt, high plasticity, slow dilatancy to no dilatancy; little to some silt; moist; stiff to very stiff; gray (10YR 6/1). Note: Trace very coarse sand to medium pebbles, subrounded.		
56					0.0				
57					0.0				
58					0.0		(57.0-61.0') SAND, very fine to medium; trace small to large pebbles, subrounded; some silt; poorly sorted; moist to dry; loose to medium dense; gray (10YR 6/1).		
59					0.0				
60					0.0				
61					0.0				
62			120		0.0		(61.0-63.0') SILT; some sand, very fine to fine; well sorted; dry to moist; loose to medium dense; dark gray (10YR 4/1). Note: Some interbedded, heavily weathered sandstone and shale.		

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 041720.GPJ ARCADIS 2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E10

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/16/2019
Date Completed: 09/17/2019

Logger: E. Redner
Editor: K. Donahue
Weather Conditions: 70° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-66.0') SILT; little sand, very fine to fine; little granules to small pebbles, subangular to subrounded; poorly sorted; dry; loose to medium dense; gray (10YR 5/1). Note: Some interbedded, heavily weathered sandstone and shale.		
65					0.0				
66					0.0				
67					0.0		(66.0-72.0') WEATHERED SANDSTONE, some competent consolidated fragments in a soft sand matrix, light gray (10YR 7/1) to gray (10YR 5/1). Note: Heavily weathered.		
68					0.0				
69					0.0				
70			72		0.0				
71					0.0				
72					0.0				
73					0.0		(72.0-73.0') WEATHERED SHALE, with some interbedded sandstone, moderately consolidated, dark gray (10YR 4/1). Note: Moderately to heavily weathered.		
74					0.0		(73.0-80.0') SHALE and SANDSTONE, interbedded, very competent, very dark gray (10YR 3/1) to gray (10YR 6/1).		
75					0.0				
76					0.0				
77			54		0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E11

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/12/2019
Date Completed: 08/12/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
							(0.0-50.0') Blind drilled.		

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 451066.4
East Coor: 13065001.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E11

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/12/2019
Date Completed: 08/12/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E11

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/12/2019
Date Completed: 08/12/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-51.5') CLAY and SILT, medium plasticity, rapid dilatancy; little very fine sand; medium soft; gray (10YR 5/1).		
51					0.0		(51.5-56.0') CLAY, trace silt, high plasticity; no dilatancy; stiff; dry; gray (10YR 5/1).		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0		(56.0-57.6') SAND and SILT, very fine; well sorted; dry; gray (10YR 6/1).		
57					0.0		(57.5-59.0') SAND, very fine to very coarse; and GRANULES to large pebbles; poorly sorted; dry; dark gray (10YR 4/1).		
58					0.0				
59					0.0		(59.0-61.0') SAND, fine to medium; well sorted; dry; light gray (10YR 7/1).		
60					0.0				
61					0.0		(61.0-64.0') SILT, trace clay, low plasticity to nonplastic; rapid dilatancy; dry; stiff; dark gray (10YR4/1).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E11

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/12/2019
Date Completed: 08/12/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.0-64.0') SILT, trace clay, low plasticity to nonplastic; rapid dilatancy; dry; stiff; dark gray (10YR4/1).		
65			120		0.0		(64.0-69.5') WEATHERED SANDSTONE, some consolidated fragments in a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered.		
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.5-71.0') WEATHERED SHALE; poorly consolidated; dark gray (10YR 4/1). Note: Heavily weathered.		
71					0.0		(71.0-73.0') WEATHERED SANDSTONE, poorly consolidated; light gray (10YR 7/1). Note: Heavily weathered.		
72					0.0				
73					0.0		(73.0-78.0') SHALE and SANDSTONE; interbedded; dark gray (10YR 4/1).		
74					0.0				
75			120		0.0				
76					0.0				
77					0.0				
78					0.0				
79					0.0		(78.0-80.0') SHALE; consolidated; dark gray (10YR 4/1).		
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E12

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/11/2019
Date Completed: 08/11/2019
Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-1.0') CONCRETE.		
2					0.0		(1.0-2.5') SAND and SILT, very fine to fine; some clay; poorly sorted; dry; brown (10YR 5/3).		
3					0.0		(2.5-5.0') CLAY, little silt, high plasticity, slow dilatancy; trace granules, subrounded; medium stiff; dry; dark gray (10YR 4/1). Note: Color change to brown (10YR 5/3) at 4.0' bgs.		
4					0.0				
5			120		0.0		(5.0-9.0') SILT and SAND, very fine; little clay; low plasticity, rapid dilatancy; medium stiff; wet; brown (10YR 5/3).		
6					0.0				
7					0.0				
8					0.0				
9					0.0				
10					0.0		(9.0-20.0') CLAY, little silt, high plasticity, slow dilatancy; trace granules, subrounded to subangular; stiff; dry; gray (10YR 5/1).		
11					0.0				
12					0.0				
13					0.0				
14					0.0				
15			120		0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.1
North Coor: 451092.2
East Coor: 13065017.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E12

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/11/2019
Date Completed: 08/11/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-22.0') SAND, very fine to very coarse; poorly sorted; dry; brown (10YR 5/3).		
22					0.0				
23					0.0		(22.0-27.0') CLAY, trace silt, high plasticity, no dilatancy; trace granules, subrounded to subangular; stiff; dry; gray (10YR 5/1).		
24					0.0				
25			120		0.0				
26					0.0				
27					0.0				
28					0.0		(27.0-29.0') SAND, very fine to very coarse; poorly sorted; dry; grayish brown (10YR 5/2).		
29					0.0				
30					0.0		(29.0-39.0') SILT, nonplastic, rapid dilatancy; little very fine sand; medium soft; wet; light brownish gray (10YR 6/2).		
31					0.0				
32					0.0				
33					0.0				
34					0.0				
35			120		0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0		(39.0-42.0') SILT, some clay, low plasticity, slow dilatancy; trace granules, subrounded to subangular; stiff; dry; gray (10YR 5/1).		
41					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MII\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E12

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/11/2019
Date Completed: 08/11/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0				
43					0.0		(42.0-53.0') CLAY, little silt, high plasticity, slow dilatancy; trace granules, subrounded; dry; stiff; gray (10YR 5/1).		
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51					0.0				
52					0.0				
53					0.0		(53.0-59.0') CLAY, high plasticity, no dilatancy; dry; stiff; gray (10YR 5/1).		
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0		(59.0-60.5') SAND, very fine to very coarse; trace granules to large pebbles, subrounded to subangular; dry; brown (10YR 5/3).		
61					0.0		(60.5-65.0') SILT, some clay, medium plasticity, rapid dilatancy; stiff; wet; brown (10YR 5/3).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-E12

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/11/2019
Date Completed: 08/11/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 75° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.5-65.0') SILT, some clay, medium plasticity, rapid dilatancy; stiff; wet; brown (10YR 5/3).		
65			120		0.0				
66					0.0		(65.0-68.0') WEATHERED SANDSTONE; little consolidated pieces in a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered.		
67					0.0				
68				PSP-E12(66-70) (081119) @ 1500	0.0		(68.0-73.0') WEATHERED SANDSTONE and SHALE; interbedded; poorly consolidated; gray (10YR 5/1). Note: Heavily weathered.		
69					0.0				
70					0.0				
71					0.0				
72					0.0				
73					0.0		(73.0-76.0') WEATHERED SANDSTONE and SHALE; interbedded; gray (10YR 5/1). Note: Slightly weathered.		
74					0.0				
75			120		0.0				
76					0.0		(76.0-80.0') SANDSTONE, consolidated; mostly consolidated fragments in trace soft sand matrix; light gray (10YR 7/1).		
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F05

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 82° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
							(0.0-50.0') Blind drilled.		

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 451120.2
East Coor: 13065033.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F05

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 82° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F05

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 82° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-55.0') CLAY, trace silt, high plasticity, slow dilatancy; stiff; gray (10YR 5/1).		
51					0.0				
52					0.0				
53					0.0				
54					0.0				
55			120		0.0		(55.0-56.0') SILT, little clay, low plasticity, rapid dilatancy; wet; stiff; gray (10YR 5/1).		
56					0.0		(56.0-57.0') SAND, very fine to very coarse; some granules to large pebbles, subrounded to subangular; dry; dark gray (10YR 4/1).		
57					0.0		(57.0-60.0') SAND, very fine to very coarse; poorly sorted; dry; grayish brown (10YR 5/2).		
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-64.0') SILT and SAND, very fine; nonplastic; rapid dilatancy; stiff; dark gray (10YR 4/1).		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F05

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 82° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(60.0-64.0') SILT and SAND, very fine; nonplastic; rapid dilatancy; stiff; dark gray (10YR 4/1).		
65			120		0.0		(64.0-65.0') WEATHERED SANDSTONE; some consolidated pieces in a soft sand matrix; gray (10YR 5/1). Note: Heavily weathered.		
66					0.0		(65.0-69.0') WEATHERED SHALE and SANDSTONE; interbedded; poorly consolidated; dark gray (10YR 4/1). Note: Heavily weathered.		
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.0-73.0') WEATHERED SANDSTONE; some consolidated pieces in a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered.		
71					0.0				
72					0.0				
73					0.0				
74					0.0		(73.0-76.0') WEATHERED SANDSTONE; increase in competency; light gray (10YR 7/1). Note: Slightly weathered.		
75			120		0.0				
76					0.0				
77					0.0		(76.0-79.0') SHALE and SANDSTONE; competent; interbedded; dark gray (10YR 4/1).		
78					0.0				
79					0.0				
80					0.0		(79.0-80.0') SANDSTONE; competent; highly consolidated with little sand matrix; light gray (10YR 7/1).		
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F06

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 862.0
North Coor: 451145.0
East Coor: 13065016.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F06

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F06

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-53.0') CLAY, high plasticity, no dilatancy; dry; stiff; gray (10YR 5/1).		
52					0.0				
53					0.0				
54					0.0		(53.0-56.5') SILT, little clay, low plasticity, rapid dilatancy; little very fine sand; stiff; wet; gray (10YR 5/1).		
55			120		0.0				
56					0.0				
57					0.0		(56.5-58.0') SAND, very fine to very coarse; some granules to large pebbles, subrounded to subangular; dry; brown (10YR 5/3).		
58					0.0				
59					0.0		(58.0-62.0') SAND, very fine to very coarse; little granules to small pebbles, subrounded to subangular; poorly sorted; dry; brown (10YR 5/3).		
60					0.0				
61					0.0				
62					0.0				
					0.0		(62.0-63.0') SILT, nonplastic, rapid dilatancy; stiff; wet; dark gray (10YR 4/1).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F06

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/10/2019
Date Completed: 08/10/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 78° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-68.5') WEATHERED SHALE; poorly consolidated; trace interbedded sandstone; dark gray (10YR 4/1). Note: Heavily weathered.		
65			118		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.5-72.0') WEATHERED SANDSTONE; poorly consolidated; some competent fragments in a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered.		
70					0.0				
71					0.0				
72					0.0		(72.0-74.0') WEATHERED SHALE and SANDSTONE; moderately consolidated; interbedded; increase in competency; dark gray (10YR 4/1). Note: Slightly weathered.		
73					0.0				
74					0.0		(74.0-77.0') SANDSTONE; competent; mostly consolidated pieces with little soft sand matrix; light gray (10YR 7/1).		
75			120		0.0				
76					0.0				
77					0.0				
78					0.0		(77.0-79.0') SHALE and SANDSTONE; interbedded; competent; dark gray (10YR 4/1).		
79					0.0				
80					0.0		(79.0-80.0') SANDSTONE; competent; mostly consolidated pieces with little soft sand matrix; light gray (10YR 7/1).		
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F07

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/09/2019
Date Completed: 08/09/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 73° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.4
North Coor: 451165.0
East Coor: 13064988.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F07

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/09/2019
Date Completed: 08/09/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 73° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F07

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/09/2019
Date Completed: 08/09/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 73° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-54.0') CLAY, trace silt, high plasticity, slow dilatancy; stiff; dry; dark grayish brown (10YR 4/2).		
51					0.0				
52					0.0				
53					0.0				
54					0.0		(54.0-55.0') SILT, trace clay, low plasticity, rapid dilatancy; wet; stiff; dark gray (10YR 4/1).		
55			120		0.0		(55.0-56.0') SAND, very fine to medium; trace coarse to very coarse sand; trace granules, subrounded to subangular; dry; light gray (10YR 7/1).		
56					0.0		(56.0-59.0') CLAY and SILT; some very fine to medium sand; some granules to medium pebbles, subrounded to subangular; medium stiff; dark gray (10YR 4/1).		
57					0.0				
58					0.0				
59					0.0				
60					0.0		(59.0-64.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; wet; brown (10YR 4/3).		
61					0.0				
62					0.0				
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F07

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/09/2019
Date Completed: 08/09/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 73° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(59.0-64.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; wet; brown (10YR 4/3).		
65			120		0.0		(64.0-69.0') WEATHERED SHALE and SANDSTONE; interbedded; poorly consolidated; low competency; dark gray (10YR 4/1). Note: Heavily weathered.		
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.0-72.0') SHALE; low competency; dark gray (10YR 4/1). Note: Heavily weathered.		
71					0.0				
72					0.0				
73					0.0		(72.0-76.5') WEATHERED SANDSTONE and SHALE; increased competency; dark gray (10YR 4/1). Note: Slightly weathered.		
74					0.0				
75			120		0.0				
76					0.0				
77					0.0				
78					0.0		(76.5-79.0') WEATHERED SHALE; competent; dark gray (10YR 4/1).		
79					0.0				
80					0.0		(79.0-80.0') SANDSTONE; competent pieces in little soft sand matrix; very fine to fine; well sorted; light gray (10YR 7/1).		
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F08

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/08/2019
Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 76° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-1.0') CONCRETE.		
2					0.0		(1.0-2.5') SAND, very fine to fine; well sorted; little silt; wet; black (10YR 2/1).		
3			60		0.0		(2.5-3.0') CLAY, trace silt; high plasticity, slow dilatancy; medium soft; wet; light brownish gray (10YR 6/2).		
4					0.0		(3.0-4.5') SILT, some clay; low plasticity, rapid dilatancy; some fine sand; soft; wet; brown (10YR 5/3).		
5					0.0		(4.5-9.5') SAND, very fine to coarse; poorly sorted; little silt; wet; brown (10YR 5/3).		
6					0.0				
7					0.0				
8			60		0.0				
9					0.0				
10					0.0		(9.5-10.0') CLAY, little silt; high plasticity, slow dilatancy; medium stiff; wet; gray (10YR 5/1).		
11					0.0		(10.0-15.0') SAND, very fine to very coarse; trace granules, subrounded to subangular; poorly sorted; dry; light yellowish brown (10YR 6/4).		
12					0.0				
13					0.0				
14					0.0				
15			108		0.0				
16					0.0		(15.0-22.0') SILT, little clay, low plasticity, slow dilatancy; stiff; dry; gray (10YR 5/1).		
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.4
North Coor: 451181.5
East Coor: 13064965.1

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F08

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/08/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 76° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(15.0-22.0') SILT, little clay, low plasticity, slow dilatancy; stiff; dry; gray (10YR 5/1).		
22					0.0				
23					0.0		(22.0-32.0') CLAY and SILT, medium plasticity, slow dilatancy; trace very fine sand; soft; dry; gray (10YR5/1).		
24					0.0				
25			105		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32					0.0				
33					0.0		(32.0-36.0') SILT; nonplastic to low plasticity, rapid dilatancy; and SAND, very fine; stiff; wet; brown (10YR 5/3).		
34					0.0				
35			118		0.0				
36					0.0				
37					0.0		(36.0-40.0') SILT, trace clay, low plasticity to nonplastic, rapid dilatancy; trace granules, subrounded; stiff; dry; gray (10YR 5/1).		
38					0.0				
39					0.0				
40					0.0				
41					0.0		(40.0-51.0') CLAY, some silt, medium plasticity, slow dilatancy; trace granules, subrounded; stiff; dry; gray (10YR 5/1).		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F08

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/08/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 76° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					0.0		(40.0-51.0') CLAY, some silt, medium plasticity, slow dilatancy; trace granules, subrounded; stiff; dry; gray (10YR 5/1).		
43					0.0				
44					0.0				
45			120		0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51					0.0		(51.0-55.0') SILT, trace clay, low plasticity, slow dilatancy; stiff; dry; grayish brown (10YR 5/2).		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0		(55.0-58.0') WEATHERED SANDSTONE; poorly consolidated; some competent pieces in a soft sand matrix; little interbedded shale; light gray (10YR 7/1). Note: Heavily weathered.		
56					0.0				
57					0.0				
58					0.0				
59					0.0		(58.0-58.5') WEATHERED SANDSTONE; some competent pieces in a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered.		
60					0.0		(58.5-61.0') SHALE and SANDSTONE; slight increase in competent fragments in a soft sand matrix; light gray (10YR 7/1). Note: Heavily weathered.		
61					0.0				
62					0.0		(61.0-63.0') SANDSTONE; highly consolidated; trace fine sand matrix; light gray (10YR 7/1).		
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F08

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/08/2019
Date Completed: 08/08/2019

Logger: S. Presswood
Editor: K. Donahue
Weather Conditions: 76° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-68.0') SANDSTONE and SHALE; consolidated fragments in some soft sand matrix; light gray (10YR 7/1).		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.0-71.0') SHALE; laminated; dark gray (10YR 4/1).		
70					0.0				
71					0.0		(71.0-75.0') SANDSTONE and SHALE, interbedded; competent; dark gray (10YR 4/1). Note: Increased competency at 73.0' bgs.		
72					0.0				
73					0.0				
74					0.0				
75			120		0.0		(75.0-80.0') SANDSTONE; competent; some fine sand matrix with consolidated pieces; light gray (10YR 7/1).		
76					0.0				
77					0.0				
78					0.0				
79					0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F09

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: A. Westhuis and S. Presswood
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-50.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.5
North Coor: 451199.8
East Coor: 13064928.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F09

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: A. Westhuis and S. Presswood
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: PSP-F09

Soil Boring Log

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: A. Westhuis and S. Presswood
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-50.5') CLAY, some silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to medium pebbles, subrounded; dry to moist; medium stiff; grayish brown (10YR 5/2).		
51					0.0		(50.5-51.5') SAND, very fine to fine, subrounded; trace silt; well sorted; light gray (10YR 7/1).		
52					0.0		(51.5-53.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to small pebbles, subrounded; dry to moist; medium stiff; grayish brown (10YR 5/2).		
53					0.0		(53.0-58.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/1).		
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0		(58.0-59.0') SAND, very fine; and SILT; well sorted; moist; pale brown (10YR 6/3).		
60					0.0		(59.0-59.5') SILT, some fine sand, subrounded; trace medium pebbles, subrounded; poorly sorted; soft; moist; grayish brown (10YR 5/2).		
61					0.0		(59.5-62.0') WEATHERED Shale, with thin sandstone laminations, dark gray (10YR 3/1). Note: Heavily weathered.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F09

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 08/07/2019
Date Completed: 08/07/2019

Logger: A. Westhuis and S. Presswood
Editor: K. Donahue
Weather Conditions: 80° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-65.0') WEATHERED SANDSTONE with fine shale laminations, very fine to fine; well sorted; gray (10YR 5/1). Note: Many small to medium size sandstone fragments in some soft sand matrix. No consolidation, no competency.		
65			120		0.0				
66					0.0		(65.0-66.0') WEATHERED SANDSTONE, very fine to fine; well sorted; light gray (10YR 7/1). Note: Many large sandstone fragments in little soft sand matrix. Low competency.		
67					0.0		(66.0-67.0') WEATHERED SANDSTONE with fine shale laminations, very fine to fine; well sorted; dark gray (10YR 3/1). Note: Slight consolidation. Low to moderate competency.		
68					0.0		(67.0-70.0') WEATHERED SANDSTONE, very fine to fine; well sorted; light gray (10YR 7/1) to gray (10YR 5/1). Note: Trace shale laminations. Moderate competency. Many large sandstone fragments in trace soft sand matrix.		
69					0.0				
70					0.0				
71					0.0		(70.0-73.0') WEATHERED SHALE; low competency; little fine sand matrix; dark gray (10YR 4/1). Note: Heavily weathered.		
72					0.0				
73					0.0				
74					0.0		(73.0-76.0') WEATHERED SHALE with some interbedded sandstone; little fine sand matrix; dark gray (10YR 4/1). Note: Heavily weathered.		
75			120		0.0				
76					0.0				
77					0.0		(76.0-79.0') WEATHERED SHALE; increased competency; trace fine sand matrix; dark gray (10YR 4/1). Note: Slightly weathered.		
78					0.0				
79					0.0				
80					0.0		(79.0-80.0') WEATHERED SANDSTONE; mostly consolidated and competent fragments in soft sand matrix; light gray (10YR 7/1). Note: Slightly weathered.		
81					0.0		(80.0-81.5') WEATHERED SHALE and SANDSTONE; mostly consolidated; little soft sand matrix; dark gray (10YR 4/1). Note: Slightly weathered.		
82			36		0.0		(81.5-83.0') SANDSTONE, very fine to fine; consolidated; little soft sand matrix; light gray (10YR 7/1).		
83					0.0				
84							End of boring at 83.0' bgs.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F10

Sheet: 1 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/16/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
							(0.0-50.0') Blind drilled.		

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gel
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.3
North Coor: 451225.8
East Coor: 13064909.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F10

Sheet: 2 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/16/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F10

Sheet: 3 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/16/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50									
51					0.0		(50.0-51.5') CLAY, little to some silt, high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
52					0.0		(51.5-60.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/2).		
53					0.0				
54					0.0				
55			120		0.0				
56					0.1				
57					0.3				
58					0.5				
59					0.3				
60					0.0				
61					0.0		(60.0-61.5') SILT, trace clay, nonplastic, no dilatancy; little very fine sand; moist; stiff; grayish brown (10YR 5/2). Note: Little small fragments of sandstone.		
62					0.0		(61.5-69.0') WEATHERED SANDSTONE, very fine; well sorted; slightly consolidated; light gray (10YR 7/1) to gray (10YR 5/1). Note: Low competency consisting of mostly soft sand matrix.		
					0.5				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F10

Sheet: 4 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/16/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(61.5-69.0') WEATHERED SANDSTONE, very fine; well sorted; slightly consolidated; light gray (10YR 7/1) to gray (10YR 5/1). Note: Low competency consisting of mostly soft sand matrix.		
65			120		0.0				
66					0.0				
67					0.0				
68					0.2				
69					0.1				
70					0.0		(69.0-71.0') WEATHERED SANDSTONE, very fine; light gray (10YR 7/1) to gray (10YR 5/1). Note: Little soft sand matrix.		
71					0.9		(71.0-74.0') SANDSTONE and SHALE, very fine; light gray (10YR 7/1) to gray (10YR 5/1). Note: Moderate competency.		
72					0.0				
73					0.0				
74					0.0				
75			120		0.0		(74.0-77.5') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Moderate to high competency with little soft sand matrix.		
76					0.0				
77					0.0				
78					0.0		(77.5-79.0') SHALE, little very fine sandstone laminations; gray (10YR 5/1). Note: Moderate to high competency.		
79					0.1				
80					0.0		(79.0-82.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: High competency.		
81					0.0				
82			48		0.0				
83					0.0		(82.0-84.0') SANDSTONE and SHALE. Note: High competency.		
84					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F10

Sheet: 5 of 5

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/16/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 85° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85							End of Boring at 84.0' bgs.		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F11

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
							(0.0-50.0') Blind drilled.		

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water and Bentonite Quik-Gek
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.6
North Coor: 451243.7
East Coor: 13064890.4

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F11

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-50.0') Blind drilled.		
22									
23									
24									
25			600						
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F11

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-50.0') Blind drilled.		
43									
44									
45									
46									
47									
48									
49									
50					0.0		(50.0-51.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
51					0.0		(51.0-60.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/2).		
52					0.0				
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-63.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules, subrounded; moist; medium stiff; gray (10YR 6/1). Note: Trace fragments of sandstone.		
62					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F11

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 07/15/2019
Date Completed: 07/16/2019

Logger: A. Westhuis
Editor: A. Westhuis
Weather Conditions: 80° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(63.0-69.0') WEATHERED SANDSTONE and SHALE, light gray (10YR 7/1) to gray (10YR 5/1). Note: Low competency.		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0		(69.0-72.0') SANDSTONE, very fine; well sorted; highly consolidated; light gray (10YR 7/1). Note: Medium to high competency with many large sandstone fragments and some cores in little soft sand matrix.		
71				PSP-F11(69-73) (071619) @ 0940	0.0				
72					0.0				
73			60		0.0		(72.0-80.0') SANDSTONE and SHALE, interbedded; light gray (10YR 7/1) to gray (10YR 5/1). Note: Medium to high competency.		
74					0.0				
75					0.0				
76					0.0				
77					0.0				
78			60		0.0				
79					0.0				
80					0.0				
81							End of Boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F12

Sheet: 1 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 10/08/2019
Weather Conditions: 66° F, Cloudy

Logger: S. Johnson
Editor: K. Donahue

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1							(0.0-47.0') Blind drilled.		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade
Driller: Joe Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks:

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 861.0
North Coor: 451331.8
East Coor: 13064764.7

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F12

Sheet: 2 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 10/08/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 66° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21							(0.0-47.0') Blind drilled.		
22									
23									
24			564						
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV1-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F12

Sheet: 3 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 10/08/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 66° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42							(0.0-47.0') Blind drilled.		
43									
44									
45									
46									
47					0.0		(47.0-52.0') CLAY, some silt, high plasticity, no dilatancy; little sand, very fine; little small to medium pebbles, subangular; wet to moist; soft; dark gray (10YR 4/1).		
48					0.0				
49					0.0				
50					0.0				
51					0.0				
52			120		0.0		(52.0-62.0') SAND, very fine to fine; some small to large pebbles, subangular; little silt; poorly sorted; dry; light gray (10YR 7/1) to dark gray (10YR 4/1). Note: Sandstone fragments increase at 62.0' bgs.		
53					0.0				
54					0.0				
55					0.0				
56					0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0				
62			120		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: PSP-F12

Sheet: 4 of 4

Project Name: RACER Lansing
Project Number: 30006870.04600
Project Location: Lansing, MI

Date Started: 09/13/2019
Date Completed: 10/08/2019

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: 66° F, Cloudy

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(62.0-63.5') SILT, little clay, low plasticity, slow dilatancy; trace small to large pebbles; moist; soft; very dark gray (10YR 3/1). Note: Trace sandstone fragments.		
65					0.0		(63.5-65.5') SHALE, very dark gray (10YR 3/1), with some fine sandstone laminations; dry; light gray (10YR 7/1). Note: Heavily weathered.		
66					0.0		(65.5-70.0') SANDSTONE and SHALE, very fine; interbedded; light gray (10YR 7/1) and very dark gray (10YR 3/1). Note: Moderately to highly competent. Increase in sandstone at 70.0' bgs.		
67				PSP-F12(64-69) (091319) @ 0830	0.0				
68					0.0				
69			24		0.0				
70					0.0				
71					0.0		(70.0-73.5') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		
72					0.0				
73					0.0				
74			84		0.0		(73.5-75.0') SANDSTONE with some interbedded shale, very fine; well sorted; light gray (10YR 7/1) to dark gray (10YR 3/1). Note: Highly competent.		
75					0.0				
76					0.0		(75.0-80.0') SANDSTONE with trace fine shale laminations, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		
77					0.0				
78					0.0				
79			36		0.0				
80					0.0				
81							End of boring at 80.0' bgs.		
82									
83									
84									

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_041720.GPJ ARCADIS_2013.GDT 4/20/20

ATTACHMENT 2

Laboratory Analytical Reports

Analytical Laboratory Report

Report ID: S04504.01(01)
Generated on 07/16/2019

Report to

Attention: Daniel Stockard
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-722-2945 FAX: 248-994-2241
Email: Daniel.Stockard@arcadis.com

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrew Lorenz

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S04504.01-S04504.02
Project: B0064479.2019.04600 / RACER Lansing
Collected Date(s): 07/13/2019 - 07/14/2019
Submitted Date/Time: 07/15/2019 08:00
Sampled by: Austin Westhuis
P.O. #: B0064479.2019.04600

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Report Narrative (Page 2)
Laboratory Certifications (Page 3)
Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S04504.01	ASP-G01(63-67)(071319)	Groundwater	07/13/19 17:40
S04504.02	ASP-G03(66-70)(071419)	Groundwater	07/14/19 11:20

Analytical Laboratory Report

Lab Sample ID: S04504.01
Sample Tag: ASP-G01(63-67)(071319)
Collected Date/Time: 07/13/2019 17:40
Matrix: Groundwater
COC Reference: 118227

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/16/19 12:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/16/19 11:52, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	3	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S04504.02
Sample Tag: ASP-G03(66-70)(071419)
Collected Date/Time: 07/14/2019 11:20
Matrix: Groundwater
COC Reference: 118227

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/16/19 12:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/16/19 12:14, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	119	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S04504
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600 / RACER Lansing
Submitted: 07/15/2019 08:00 Login User: MMC

Attention: Daniel Stockard
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-722-2945 FAX: 248-994-2241
Email: Daniel.Stockard@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.9
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118227

CHAIN OF CUSTODY RECORD * Rush 24-Hour TAT *

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: B0064479.2019.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: B0064479.2019.04600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☒ Other MI
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMs
04504.01	7/13/19	1740	ASP-G01(63-67)(071319)	GW	3		3						X
02	7/14/19	1120	ASP-G03(66-70)(071419)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Arcadis ☐ Sampler	DATE 7/15/19	TIME 0800
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE 7/15/19	TIME 8:00
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES | TEMP. ON ARRIVAL 5.9

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.16.12

Analytical Laboratory Report

Report ID: S04583.01(01)
Generated on 07/17/2019

Report to

Attention: Daniel Stockard
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-722-2945 FAX: 248-994-2241
Email: Daniel.Stockard@arcadis.com

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrew Lorenz

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S04583.01
Project: B0064479.2019.04600 / RACER Lansing
Collected Date(s): 07/15/2019
Submitted Date/Time: 07/16/2019 08:28
Sampled by: Austin Westhuis
P.O. #: B0064479.2019.04600

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Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S04583.01	ASP-F01(71-75)(071519)	Groundwater	07/15/19 16:50

Analytical Laboratory Report

Lab Sample ID: S04583.01
Sample Tag: ASP-F01(71-75)(071519)
Collected Date/Time: 07/15/2019 16:50
Matrix: Groundwater
COC Reference: 118228

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/17/19 11:40	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/16/19 13:17, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	99	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S04583
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600 / RACER Lansing
Submitted: 07/16/2019 08:28 Login User: MMC

Attention: Daniel Stockard
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-722-2945 FAX: 248-994-2241
Email: Daniel.Stockard@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.4
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118228

CHAIN OF CUSTODY RECORD * Rush 24-Hour TAT *

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-348-0377 FAX NO.: 248-994-2241 P.O. NO.: B0064479.2019.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: B0064479.2019.04600 / PACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIM's
04583.01	7/15/19	1650	ASP-F01(71-75)(071519)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis	☒ Sampler	DATE: 7/16/19	TIME: 0828
RECEIVED BY: SIGNATURE/ORGANIZATION: M Chilcote		DATE: 7/16/19	TIME: 0828
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 4.4

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

* Please also email results to: Alex.Villhauer@arcadis.com

Analytical Laboratory Report

Report ID: S04594.01(01)
Generated on 07/19/2019

Report to

Attention: Daniel Stockard
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-722-2945 FAX: 248-994-2241
Email: Daniel.Stockard@arcadis.com

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrew Lorenz

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S04594.01
Project: B0064479.2019.04600 / RACER Lansing
Collected Date(s): 07/16/2019
Submitted Date/Time: 07/16/2019 11:58
Sampled by: Austin Westhuis
P.O. #: B0064479.2019.04600

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S04594.01	PSP-F11(69-73)(071619)	Groundwater	07/16/19 09:40

Analytical Laboratory Report

Lab Sample ID: S04594.01
Sample Tag: PSP-F11(69-73)(071619)
Collected Date/Time: 07/16/2019 09:40
Matrix: Groundwater
COC Reference: 118253

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/19/19 15:50	KAG	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/19/19 14:48, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	165	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S04594
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600 / RACER Lansing
Submitted: 07/16/2019 11:58 Login User: MMC

Attention: Daniel Stockard
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-722-2945 FAX: 248-994-2241
Email: Daniel.Stockard@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118253

* 3 Day TAT *

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: B0064479.2019.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: B0064479.2019.04600 / BALER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☒ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☒ Other MI
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
04594.01	7/16/19	0940	PSP-FII(69-73)(071619)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION [signature] / Arcadis ☒ Sampler	DATE 7/16/19	TIME 1158	
RECEIVED BY: SIGNATURE/ORGANIZATION [signature]	DATE 7/16/19	TIME 1158	
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 6.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

* Please also email results to Alex.Villhauer@arcadis.com

Analytical Laboratory Report

Report ID: S04913.01(01)
Generated on 07/25/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S04913.01
Project: B0064479.2019.04600
Collected Date(s): 07/23/2019
Submitted Date/Time: 07/24/2019 08:45
Sampled by: Ellen Redner
P.O. #: B0064479.2019.04600

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Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S04913.01	CSP-GO2(63-67)(072319)	Groundwater	07/23/19 17:40

Analytical Laboratory Report

Lab Sample ID: S04913.01
Sample Tag: CSP-GO2(63-67)(072319)
Collected Date/Time: 07/23/2019 17:40
Matrix: Groundwater
COC Reference: 117110

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/25/19 13:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/24/19 15:27, Analyst: WAT

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	470	10		ug/L	10	123-91-1	Y

Y-Elevated reporting limit due to high target concentration

Merit Laboratories Login Checklist

Lab Set ID: S04913
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600
Submitted: 07/24/2019 08:45 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.6
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

117110

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: andrew.lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: B0064479.2019.046D0
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner / Ellen

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4 dioxane by 8260 SIM
04913.01	7/23/19	1740	CSP-GW2(63-67)(072319)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Ellen / Arcadis (Sampler) DATE: 7/24/19 TIME: 0825
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 7/24/19 TIME: 08:25
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: 7/24/19 TIME: 08:45
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 7/24/19 TIME: 0845

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 4.6

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S04935.01(01)
Generated on 07/25/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S04935.01-S04935.02
Project: B0064479.2019.04600 RACER Lansing
Collected Date(s): 07/24/2019
Submitted Date/Time: 07/24/2019 14:45
Sampled by: E. Redner
P.O. #: B0064479.2019.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S04935.01	ASP-FO2(67-71)(072419)	Groundwater	07/24/19 12:55
S04935.02	ChtrTwnsphWater_072419	Wastewater	07/24/19 11:50

Analytical Laboratory Report

Lab Sample ID: S04935.01
Sample Tag: ASP-FO2(67-71)(072419)
Collected Date/Time: 07/24/2019 12:55
Matrix: Groundwater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/25/19 13:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/24/19 16:30, Analyst: WAT

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	64	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S04935.02
Sample Tag: ChtrTwnsphWater_072419
Collected Date/Time: 07/24/2019 11:50
Matrix: Wastewater
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/25/19 13:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/24/19 16:08, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S04935
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600 RACER Lansing
Submitted: 07/24/2019 14:45 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.8
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Labs

SGS North America Inc - Orlando

Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, FL32811
TEL. 407-425-6700 FAX: 407-425-0707
www.sgs.com

SGS - ORLANDO JOB # :

PAGE 1 OF 1

SGS - ORLANDO Quote #	SKIFF #

Client / Reporting Information

Company Name: Arcadis
Address: 28550 Cabot Dr. Suite 500
City: Novi State: MI Zip: 48377
Project Contact: Andrew Lorenz Email: andrew.lorenz@arcadis.com
Phone #: 312-343-0377
Sampler(s) Name(s) (Printed)
Sampler 1: E. Redner Sampler 2:

Project Information

Project Name: RACER Lansing
Street
City Lansing State MI
Project # B006479.2019.04600
Fax #
Client Purchase Order #

Analytical Information

1,4 Dioxane (SIM)

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNA	DI WATER	MEOH	LAB USE ONLY
	ASP-FB2(67-71)(072419)	7/24/19	1255	ER	GW	3			X							04935.01
	ChtrTwnshpWater_072419	7/24/19	1150	ER	WW	3			X							02

Turnaround Time (Business days)

10 Day (Business) Approved By: / Date:
7 Day
5 Day
3 Day *RUSH*
2 Day *RUSH*
1 Day *RUSH*
Other
Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [ ] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1		7/24/19 1307	2	3		4
5	Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
		7-24-19 1745	6	7		8

Lab Use Only: Cooler Temperature (s) Celsius (corrected): 5.8

http://www.sgs.com/en/terms-and-conditions

Analytical Laboratory Report

Report ID: S05074.01(01)
Generated on 07/29/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra

Report Summary

Lab Sample ID(s): S05074.01
Project: B0064479.2019.04600 RACER Lansing
Collected Date(s): 07/26/2019
Submitted Date/Time: 07/26/2019 12:10
Sampled by: Ellen Redner
P.O. #: B0064479.2019.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
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40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05074.01	ASP-FO3(71-75)(072619)	Groundwater	07/26/19 09:05

Analytical Laboratory Report

Lab Sample ID: S05074.01
Sample Tag: ASP-FO3(71-75)(072619)
Collected Date/Time: 07/26/2019 09:05
Matrix: Groundwater
COC Reference: 118650

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.5	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/29/19 17:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/29/19 18:06, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	350	10		ug/L	10	123-91-1	Y

Y-Elevated reporting limit due to high target concentration

Merit Laboratories Login Checklist

Lab Set ID: S05074
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600 RACER Lansing
Submitted: 07/26/2019 12:10 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.5
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118650

CHAIN OF CUSTODY RECORD

REPORT TO

Andrew Lorenz

CONTACT NAME
COMPANY Arcadis
ADDRESS 28550 Cabot Dr. Suite 500
CITY Novi STATE MI ZIP CODE 48377
PHONE NO. 312-343-0377 FAX NO.
E-MAIL ADDRESS andrew.lorenz@arcadis.com
P.O. NO.
QUOTE NO.

INVOICE TO

CONTACT NAME ☐ SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

PROJECT NO./NAME B0064479.2019.01600
SAMPLER(S) - PLEASE PRINT/SIGN NAME Ellen Redner

TURNAROUND TIME REQUIRED ☒ DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8270 SIM
05074.01	7/26/19	0905	ASP-PB3(71-75)(072619)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
Ellen Redner / Arcadis ☑ Sampler	7/26/19	1150
RECEIVED BY: SIGNATURE/ORGANIZATION	7/26/19	1150
RELINQUISHED BY: SIGNATURE/ORGANIZATION	7-26-19	1210
RECEIVED BY: SIGNATURE/ORGANIZATION	7/26/19	1210

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 4.5

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S05176.01(01)
Generated on 07/31/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra

Report Summary

Lab Sample ID(s): S05176.01
Project: 30006870.04600 RACER Lansing
Collected Date(s): 07/30/2019
Submitted Date/Time: 07/30/2019 15:05
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
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j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

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MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05176.01	ASP-BO3(69-74)(073019)	Groundwater	07/30/19 14:30

Analytical Laboratory Report

Lab Sample ID: S05176.01
Sample Tag: ASP-BO3(69-74)(073019)
Collected Date/Time: 07/30/2019 14:30
Matrix: Groundwater
COC Reference: 125629

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	10.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/31/19 16:50	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/31/19 16:32, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	200	10		ug/L	10	123-91-1	Y

Y-Elevated reporting limit due to high target concentration

Merit Laboratories Login Checklist

Lab Set ID: S05176
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 RACER Lansing
Submitted: 07/30/2019 15:05 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 10.7
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

125629

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: 248-994-2241 P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870.04600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED: X 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
X Other MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS										
05176.01	7/30/19	1430	ASP-B03(64-74)(073019)	GW	3		3						X										

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] Sampler DATE: 7/30/19 TIME: 1505
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] DATE: 7/30/19 TIME: 1505
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS
SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS

NOTES: TEMP. ON ARRIVAL 10.7

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

* Please also send results to: Eric.Feenstra@arcadis.com and Andrea.Kreinghaus@arcadis.com

Analytical Laboratory Report

Report ID: S05301.01(01)
Generated on 08/02/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard

Report Summary

Lab Sample ID(s): S05301.01
Project: 30006870.04600 RACER Lansing
Collected Date(s): 07/31/2019
Submitted Date/Time: 08/01/2019 08:10
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05301.01	ASP-BO4(70-75)(073119)	Groundwater	07/31/19 16:55

Analytical Laboratory Report

Lab Sample ID: S05301.01
Sample Tag: ASP-BO4(70-75)(073119)
Collected Date/Time: 07/31/2019 16:55
Matrix: Groundwater
COC Reference: 125630

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	>2	N/A	08/02/19 13:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/02/19 13:06, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05301
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 RACER Lansing
Submitted: 08/01/2019 08:10 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

125630

CHAIN OF CUSTODY RECORD * 24-Hour TAT *

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: 248-994-2241 P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870.046600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane SIM 8270
05301.01	7/31/19	1655	ASP-804(70-75)(073119)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION Austin Westhuis/Arcadis ☒ Sampler DATE 8/01/19 TIME 0810
RECEIVED BY: SIGNATURE/ORGANIZATION M Whitcomb DATE 8/01/19 TIME 0810
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS
SEAL NO. SEAL INTACT YES☐ NO☐ INITIALS

NOTES: TEMP. ON ARRIVAL 6.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S05376.01(01)
Generated on 08/06/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard

Report Summary

Lab Sample ID(s): S05376.01
Project: 30006870.04600 RACER Lansing
Collected Date(s): 08/02/2019
Submitted Date/Time: 08/05/2019 09:25
Sampled by: Unknown
P.O. #: 30006870.04600

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Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05376.01	ASP-BO2(68-73)(080219)	Groundwater	08/02/19 15:15

Analytical Laboratory Report

Lab Sample ID: S05376.01
Sample Tag: ASP-BO2(68-73)(080219)
Collected Date/Time: 08/02/2019 15:15
Matrix: Groundwater
COC Reference: 125631

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/05/19 14:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/06/19 14:10, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	179	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05376
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 RACER Lansing
Submitted: 08/05/2019 09:25 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.2
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

125631

CHAIN OF CUSTODY RECORD ★24-Hour TAT★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: 248-994-2241 P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com Austin.Westhuis@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870.046600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☒1 DAY ☐2 DAYS ☐3 DAYS ☐STANDARD ☐OTHER

DELIVERABLES REQUIRED ☐STD ☐LEVEL II ☐LEVEL III ☐LEVEL IV ☐EDD ☐OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐OHIO VAP ☐Drinking Water
☐DoD ☐NPDES

Project Locations
☐Detroit ☐New York
☒Other MI

Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
053716.01	8/2/19	1515	ASP-B02(68-73)(080219)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	☒Sampler	DATE	TIME
Andrew Lorenz / Arcadis		8/5/19	0925
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME
		8/5/19	0925
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS

NOTES: TEMP. ON ARRIVAL 5.2

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S05410.01(01)
Generated on 08/07/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S05410.01
Project: 30006870.04600 RACER Lansing
Collected Date(s): 08/05/2019
Submitted Date/Time: 08/06/2019 09:30
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Maya Murshak
Technical Director

Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05410.01	PSP-B05(70-75)(080519)	Groundwater	08/05/19 17:45

Analytical Laboratory Report

Lab Sample ID: S05410.01
Sample Tag: PSP-B05(70-75)(080519)
Collected Date/Time: 08/05/2019 17:45
Matrix: Groundwater
COC Reference: 125632

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/06/19 14:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/06/19 16:33, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05410
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 RACER Lansing
Submitted: 08/06/2019 09:30 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

125632

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com, Austin.Westhuis@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.046600
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
05410.01	8/5/19	1745	PSP-B05(70-75)(080519)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION [signature] / Arcadis ☒ Sampler	DATE 8/6/19	TIME 0930	
RECEIVED BY: SIGNATURE/ORGANIZATION [signature]	DATE 8/6/19	TIME 0930	
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 5.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev 5.18.12

Analytical Laboratory Report

Report ID: S05508.01(01)
Generated on 08/08/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S05508.01
Project: B0064479.2019 RACER Lansing
Collected Date(s): 08/07/2019
Submitted Date/Time: 08/07/2019 16:45
Sampled by: Severin Presswood
P.O. #: B0064479.2019

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Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
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MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05508.01	CSP-F01(65-69)(080719)	Groundwater	08/07/19 15:35

Analytical Laboratory Report

Lab Sample ID: S05508.01
Sample Tag: CSP-F01(65-69)(080719)
Collected Date/Time: 08/07/2019 15:35
Matrix: Groundwater
COC Reference: 125634

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	15.5	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/08/19 15:15	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/08/19 15:03, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	110	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05508
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019 RACER Lansing
Submitted: 08/07/2019 16:45 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 15.5
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

125634

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorentz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr Ste 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO. | P.O. NO.
E-MAIL ADDRESS: andrew.lorentz@arcadis.com | QUOTE NO.

INVOICE TO

CONTACT NAME | ☑ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: B0064479.2019
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Severin Presswood

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☑ Other Lansing, MI
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-dioxane (8260 SIM)
05508.01	8-1-19	1535	CSP-F01 (65-69) (080719)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Kevin Pruett / Arcadis ☑ Sampler — DATE: 8-1-19 — TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: M Dilcato — DATE: 8/1/19 — TIME: 1645
RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 15.5

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.16.12

Analytical Laboratory Report

Report ID: S05561.01(01)
Generated on 08/09/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S05561.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 08/08/2019
Submitted Date/Time: 08/08/2019 15:22
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
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'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
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Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05561.01	ASP-B01(68-73)(080819)	Groundwater	08/08/19 13:35

Analytical Laboratory Report

Lab Sample ID: S05561.01
Sample Tag: ASP-B01(68-73)(080819)
Collected Date/Time: 08/08/2019 13:35
Matrix: Groundwater
COC Reference: 125637

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/09/19 16:40	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/09/19 17:19, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	77	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05561
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 08/08/2019 15:22 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.7
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

125637

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com; Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.046600 / RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]

TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES
Project Locations: ☐ Detroit ☐ New York ☒ Other MI
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
055601.01	8/8/19	1335	ASP-B01(68-73)(080819)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] / Arcadis ☒ Sampler — DATE: 8/8/19 — TIME: 1502
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] — DATE: 8/8/19 — TIME: 1522
RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 5.7

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S05641.01(01)
Generated on 08/15/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S05641.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 08/11/2019
Submitted Date/Time: 08/12/2019 12:34
Sampled by: Severin Presswood
P.O. #: 30006870.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05641.01	PSP-E12(66-70)(081119)	Groundwater	08/11/19 15:00

Analytical Laboratory Report

Lab Sample ID: S05641.01
Sample Tag: PSP-E12(66-70)(081119)
Collected Date/Time: 08/11/2019 15:00
Matrix: Groundwater
COC Reference: 125633

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	11.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/15/19 12:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/14/19 15:56, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	88	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05641
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 08/12/2019 12:34 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 11.8
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

125633

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorentz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr Ste 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO. | P.O. NO. | QUOTE NO.
E-MAIL ADDRESS

INVOICE TO

CONTACT NAME | ☑ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: B006479.2019
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Severin Presswood / Ken Ruff

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☑ Other Lansing, MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	1-4 dioxane (8260 SIM)
056411.01	8-11-19	1500	PSP - E12 (66-70) (081119)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Ken Ruff / Arcadis ☑ Sampler	DATE 8-12-19	TIME 1100
RECEIVED BY: SIGNATURE/ORGANIZATION	Lora Damato	DATE 8-12-19	TIME 11:00
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Lora Damato	DATE 8-12-19	TIME 12:34
RECEIVED BY SIGNATURE/ORGANIZATION	M Chilcote	DATE 8/12/19	TIME 1234
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 11.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S05847.01(01)
Generated on 08/14/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S05847.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 08/13/2019
Submitted Date/Time: 08/13/2019 13:48
Sampled by: Shantel Johnson
P.O. #: 30006870.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05847.01	PSP-B04(72-77)(081319)	Groundwater	08/13/19 12:57

Analytical Laboratory Report

Lab Sample ID: S05847.01
Sample Tag: PSP-B04(72-77)(081319)
Collected Date/Time: 08/13/2019 12:57
Matrix: Groundwater
COC Reference: 125638

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/14/19 13:50	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/14/19 13:26, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	180	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05847
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 08/13/2019 13:48 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.7
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # _____ OF _____

125638

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: ANDREW LORENZ
COMPANY: ARCADIS OF MICHIGAN, LLC
ADDRESS: 28550 CABOT DR. STE 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 212-343-0577 FAX NO.: 248-994-2241 P.O. NO.: 30006870.04600
E-MAIL ADDRESS: ANDREW.LORENZ@ARCADIS-US.COM QUOTE NO.:

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870.04600
SAMPLER(S) - PLEASE PRINT/SIGN NAME: SHANTEL JOHNSON

TURNAROUND TIME REQUIRED: X 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

1,4-DIOXANE 8260 SIMS

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
X Other MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-DIOXANE 8260 SIMS
05847.01	8/13/19	1257	BSP-B04 (72-77)(081319)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] / ARCADIS — DATE: 8/13/19 — TIME: 1348
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] — DATE: 8/13/19 — TIME: 1348
RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE: — TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE: — TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE: — TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE: — TIME:

SEAL NO. — SEAL INTACT YES ☐ NO ☐ — INITIALS:
SEAL NO. — SEAL INTACT YES ☐ NO ☐ — INITIALS:

NOTES: TEMP. ON ARRIVAL: 5.7

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S05947.01(01)
Generated on 08/16/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S05947.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 08/15/2019
Submitted Date/Time: 08/15/2019 13:38
Sampled by: Shantel Johnson
P.O. #: 30006870.04600

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Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S05947.01	CSP-B01(70-75)(081519)	Groundwater	08/15/19 12:20

Analytical Laboratory Report

Lab Sample ID: S05947.01
Sample Tag: CSP-B01(70-75)(081519)
Collected Date/Time: 08/15/2019 12:20
Matrix: Groundwater
COC Reference: 118667

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.5	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/16/19 14:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/16/19 13:08, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S05947
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 08/15/2019 13:38 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.5
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118667

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: ANDREW LORENZ
COMPANY: ARCADIS OF MICHIGAN, LLC
ADDRESS: 28550 CABOT DR, STE 500
CITY: NOVI STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: 248-994-2241
E-MAIL ADDRESS: ANDREW.LORENZ@ARCADIS.COM; AUSTIN.WESTHOIS@ARCADIS.COM
P.O. NO.: 30068710.016000
QUOTE NO.:
PROJECT NO./NAME: 30068710.016000
SAMPLER(S) - PLEASE PRINT/SIGN NAME: SHANTEL JOHNSON

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

TURNAROUND TIME REQUIRED: X 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER
DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

1,4-Dioxane 8270 SIM

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES
Project Locations: ☐ Detroit ☐ New York X Other MI
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8270 SIM
05947.01	8/5/19	1220	CSP-B61 (70-75) (081519)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] / ARCADIS ☐ Sampler DATE: 8/5/19 TIME: 1330
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] DATE: 8/5/19 TIME: 1338
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 0.5

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S06260.01(01)
Generated on 08/23/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S06260.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 08/22/2019
Submitted Date/Time: 08/22/2019 14:43
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
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p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
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Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S06260.01	ASP-C02(72-77)(082219)	Groundwater	08/22/19 13:45

Analytical Laboratory Report

Lab Sample ID: S06260.01
Sample Tag: ASP-C02(72-77)(082219)
Collected Date/Time: 08/22/2019 13:45
Matrix: Groundwater
COC Reference: 119051

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/23/19 15:55	JGH	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/23/19 15:41, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S06260
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 08/22/2019 14:43 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
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www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119051

CHAIN OF CUSTODY RECORD *24-Hour TAT*

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com, Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.04600 / RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]
TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER
DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
06260.01	8/22/19	1345	ASP-CO2 (72-77)(082219)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	[signature] / Arcadis (Sampler)	DATE 8/22/19	TIME 1443
RECEIVED BY: SIGNATURE/ORGANIZATION	M Chilcott	DATE 8/22/19	TIME 1443
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 6.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S06385.01(01)
Generated on 08/28/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S06385.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 08/27/2019
Submitted Date/Time: 08/27/2019 14:40
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Maya Murshak
Technical Director

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40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
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X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
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Glossary of Abbreviations

Abbreviation	Description
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MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S06385.01	PSP-C01(73.5-78.5)(082719)	Groundwater	08/27/19 13:40

Analytical Laboratory Report

Lab Sample ID: S06385.01
Sample Tag: PSP-C01(73.5-78.5)(082719)
Collected Date/Time: 08/27/2019 13:40
Matrix: Groundwater
COC Reference: 119052

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/28/19 15:40	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/28/19 15:36, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S06385
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 08/27/2019 14:40 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.4
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119052

CHAIN OF CUSTODY RECORD * 24-Hour TAT *

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com; Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.04600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES
Project Locations: ☐ Detroit ☐ New York ☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
960385.01	8/27/19	1340	PSP-C01(73.5-78.5)(082719)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ☒ Sampler — DATE: 8/27/19 — TIME: 1440
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE: 8/27/19 — TIME: 1440
RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE — TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE — TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL: 5.4

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5

Analytical Laboratory Report

Report ID: S06500.01(01)
Generated on 08/30/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S06500.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 08/29/2019
Submitted Date/Time: 08/29/2019 14:20
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S06500.01	PSP-C02(72-77)(082919)	Groundwater	08/29/19 13:30

Analytical Laboratory Report

Lab Sample ID: S06500.01
Sample Tag: PSP-C02(72-77)(082919)
Collected Date/Time: 08/29/2019 13:30
Matrix: Groundwater
COC Reference: 119053

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	7.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	08/30/19 12:50	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/30/19 12:32, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S06500
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 08/29/2019 14:20 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 7.6
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119053

CHAIN OF CUSTODY RECORD * 24-Hour TAT *

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.044600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com, Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.044600 / RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
065001	8/29/19	1330	PSP-Co2(72-77)(082919)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ☒ Sampler | DATE: 8/29/19 | TIME: 1420
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] | DATE: 8/29/19 | TIME: 1420
RELINQUISHED BY: SIGNATURE/ORGANIZATION | DATE | TIME
RECEIVED BY: SIGNATURE/ORGANIZATION | DATE | TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION | DATE | TIME
RECEIVED BY: SIGNATURE/ORGANIZATION | DATE | TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 7.6

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.16.12

Analytical Laboratory Report

Report ID: S06587.01(01)
Generated on 09/04/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S06587.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 09/03/2019
Submitted Date/Time: 09/03/2019 14:56
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S06587.01	PSP-C03(71-76)(090319)	Groundwater	09/03/19 13:00

Analytical Laboratory Report

Lab Sample ID: S06587.01
Sample Tag: PSP-C03(71-76)(090319)
Collected Date/Time: 09/03/2019 13:00
Matrix: Groundwater
COC Reference: 119054

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.5	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/04/19 14:50	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/04/19 14:34, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S06587
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 09/03/2019 14:56 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.5
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119054

CHAIN OF CUSTODY RECORD

★ 24-Hour TAT ★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com
Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.046600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

1,4-Dioxane SIM 8260

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane SIM 8260
06587.01	9/3/19	1300	PSP-C03(71-76)(090319)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ☒ Sampler | DATE: 9/3/19 | TIME: 1456
RECEIVED BY: SIGNATURE/ORGANIZATION: M Arcadis | DATE: 9/3/19 | TIME: 1456
RELINQUISHED BY: SIGNATURE/ORGANIZATION | DATE | TIME
RECEIVED BY: SIGNATURE/ORGANIZATION | DATE | TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION | DATE | TIME
RECEIVED BY: SIGNATURE/ORGANIZATION | DATE | TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL: 5.5

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S06715.01(01)
Generated on 09/06/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S06715.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 09/05/2019
Submitted Date/Time: 09/05/2019 16:19
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S06715.01	PSP-C04(72-77)(090519)	Groundwater	09/05/19 14:45

Analytical Laboratory Report

Lab Sample ID: S06715.01
Sample Tag: PSP-C04(72-77)(090519)
Collected Date/Time: 09/05/2019 14:45
Matrix: Groundwater
COC Reference: 118668

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/06/19 14:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/06/19 13:14, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S06715
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 09/05/2019 16:19 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.8
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118668

CHAIN OF CUSTODY RECORD

* 24-Hour TAT *

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com; Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☐ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.046600/RALER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIM
006715.01	9/5/19	1445	PSP-CO4(72-77)(090519)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ☒ Sampler — DATE: 9/5/19 — TIME: 1619
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE: 9/5/19 — TIME: 1619
RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE — TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE — TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL: 5.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.15.12

Analytical Laboratory Report

Report ID: S06979.01(01)
Generated on 09/12/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S06979.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/11/2019
Submitted Date/Time: 09/11/2019 11:36
Sampled by: Shantel Johnson
P.O. #: 30006870

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S06979.01	PSP-C11(62-67)(091119)	Groundwater	09/11/19 10:48

Analytical Laboratory Report

Lab Sample ID: S06979.01
Sample Tag: PSP-C11(62-67)(091119)
Collected Date/Time: 09/11/2019 10:48
Matrix: Groundwater
COC Reference: 118669

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	8.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	>2	N/A	09/12/19 12:50	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/12/19 12:55, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S06979
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/11/2019 11:36 Login User: REJ

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 8.7
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118669

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: ANDREW LORENZ
COMPANY: ARCADIS
ADDRESS: 28550 CABOT DR STE 500
CITY: NOVI STATE: MI ZIP CODE: 48377
PHONE NO: 312-343-0377 FAX NO: PO NO: 30006870
E-MAIL ADDRESS: ANDREA.KREVINCHAS@ARCADIS.COM QUOTE NO:

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO. MAIL ADDRESS:

PROJECT NO./NAME: ANDREW.LORENZ@ARCADIS.COM 30006870
SAMPLER(S) - PLEASE PRINT/SIGN NAME: SHANTEL JANSON

TURNAROUND TIME REQUIRED: X 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
X Other LANSING, MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	1-4 DIOXANE (8270 SIM)
06979.01	9/11/19	1048	PSP-CH (62-67)(091119)	GW	3		X					/	X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE 9/11/19	TIME 1136	RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE 9/11/19	TIME 1136	RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 8.7

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07061.01(01)
Generated on 09/13/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07061.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/12/2019
Submitted Date/Time: 09/12/2019 16:38
Sampled by: Shantel Johnson
P.O. #: 30006870

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
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40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07061.01	VAP-P2-NF97(64-69)(091219)	Groundwater	09/12/19 14:30

Analytical Laboratory Report

Lab Sample ID: S07061.01
Sample Tag: VAP-P2-NF97(64-69)(091219)
Collected Date/Time: 09/12/2019 14:30
Matrix: Groundwater
COC Reference: 118670

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	9.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/13/19 16:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/13/19 15:38, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	11	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07061
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/12/2019 16:38 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 9.3
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118670

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: ANDREW LORENZ
COMPANY: ARCADIS
ADDRESS: 28550 CABOT DR STE 500
CITY: NOVI STATE: MI ZIP CODE: 48377
PHONE NO.: 312-345-6377 FAX NO.: 3000687O
E-MAIL ADDRESS: ANDREW.LORENZ@ARCADIS.COM QUOTE NO.:

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 3000687O
SAMPLER(S) - PLEASE PRINT/SIGN NAME: SHANTEL JOHNSON

TURNAROUND TIME REQUIRED: X 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
X Other LANSING, MI
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-H DioxANE (8260 SIM)
07061.01	9/12/19	1530	VAP-B2-NF97(01-09)(091219)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: X Sampler DATE: 9/12/19 TIME: 1638
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 9/12/19 TIME: 1638
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL: 9.3

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07062.01(01)
Generated on 09/19/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07062.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 09/12/2019
Submitted Date/Time: 09/12/2019 16:38
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Report Narrative (Page 2)
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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07062.01	PSP-G04(66-70)(091219)	Groundwater	09/12/19 14:25

Analytical Laboratory Report

Lab Sample ID: S07062.01
Sample Tag: PSP-G04(66-70)(091219)
Collected Date/Time: 09/12/2019 14:25
Matrix: Groundwater
COC Reference: 118671

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	9.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/16/19 12:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/13/19 17:15, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	20	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07062
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 09/12/2019 16:38 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 9.3
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118671

CHAIN OF CUSTODY RECORD

Standard TAT

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | X SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.046600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
070620	9/12/19	1425	PSP-604(66-70)(091219)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] Arcadis (Sampler) — DATE: 9/12/19 — TIME: 1617
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] Arcadis — DATE: 9/12/19 — TIME: 1617
RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] ARCADIS — DATE: 9/12/19 — TIME: 1658
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] — DATE: 9/12/19 — TIME: 1638
RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE — TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 9.3

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07121.01(01)
Generated on 09/19/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07121.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 09/14/2019
Submitted Date/Time: 09/16/2019 10:10
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07121.01	PSP-E03(66-70)(091419)	Groundwater	09/14/19 15:10

Analytical Laboratory Report

Lab Sample ID: S07121.01
Sample Tag: PSP-E03(66-70)(091419)
Collected Date/Time: 09/14/2019 15:10
Matrix: Groundwater
COC Reference: 119776

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	10.5	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/18/19 11:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/17/19 17:19, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	54	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07121
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 09/16/2019 10:10 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 10.5
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119776

CHAIN OF CUSTODY RECORD ★ Standard TAT ★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Austin.Westhuis@arcadis.com; Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.04600 / RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8270 SIMS
07121.01	9/14/19	1510	PSP-E03 (66-70) (091419)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] / Arcadis ☒ Sampler — DATE 9/16/19 — TIME 0945
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] / Arcadis — DATE 9/16/19 — TIME 0945

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] / Arcadis — DATE 9/16/19 — TIME 1016
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] — DATE 9/16/19 — TIME 1016

RELINQUISHED BY: SIGNATURE/ORGANIZATION: — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: — DATE — TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 10.5

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07122.01(01)
Generated on 09/17/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07122.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/16/2019
Submitted Date/Time: 09/16/2019 10:10
Sampled by: Unknown
P.O. #: 30006870

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Maya Murshak
Technical Director

General Report Notes

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Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07122.01	PSP-F12(64-69)(091619)	Groundwater	09/16/19 08:30

Analytical Laboratory Report

Lab Sample ID: S07122.01
Sample Tag: PSP-F12(64-69)(091619)
Collected Date/Time: 09/16/2019 08:30
Matrix: Groundwater
COC Reference: 119778

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	10.5	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/17/19 14:48	JGH	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/17/19 13:54, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	41	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07122
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/16/2019 10:10 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 10.5
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119778

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr. Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.:
P.O. NO.: 30006870
E-MAIL ADDRESS: Andrea.Creviinghaus@arcadis.com andrew.lorenz@arcadis.com
QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870
SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☒ 10 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other Lansing, MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 Dioxane (8260) SIM	
07122.01	9/10/19	0830	PSP-F12(64-66)(091019)	GW	3		X						X	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
Erin Arcadis	9/16/19	1010
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
M Chilcote	9/16/19	1010
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07199.01(01)
Generated on 09/19/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07199.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 09/16/2019
Submitted Date/Time: 09/17/2019 11:15
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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General Report Notes (Page 2)
Report Narrative (Page 2)
Laboratory Certifications (Page 3)
Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07199.01	PSP-E06(64-68)(091619)	Groundwater	09/16/19 15:25

Analytical Laboratory Report

Lab Sample ID: S07199.01
Sample Tag: PSP-E06(64-68)(091619)
Collected Date/Time: 09/16/2019 15:25
Matrix: Groundwater
COC Reference: 119777

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/18/19 11:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/17/19 17:40, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07199
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 09/17/2019 11:15 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.2
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119777

CHAIN OF CUSTODY RECORD

Standard TAT

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: 248-994-2241 P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME ☐ SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.04600 / RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / AuLWL

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMs
07199.01	9/6/19	1525	PSP-E06 (64-68)(091619)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: AuLWL / Arcadis (Sampler) DATE: 9/17/19 TIME: 1115
RECEIVED BY: SIGNATURE/ORGANIZATION: M. Calcatt DATE: 9/17/19 TIME: 1115
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 5.2

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07312.01(01)
Generated on 09/24/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07312.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/18/2019
Submitted Date/Time: 09/20/2019 11:40
Sampled by: Ellen Redner
P.O. #: 30006870

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07312.01	PSP-E09(63-68)(091819)	Groundwater	09/18/19 14:40

Analytical Laboratory Report

Lab Sample ID: S07312.01
Sample Tag: PSP-E09(63-68)(091819)
Collected Date/Time: 09/18/2019 14:40
Matrix: Groundwater
COC Reference: 119781

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	20.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/24/19 11:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/23/19 15:39, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07312
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/20/2019 11:40 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 20.3
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119781

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr. suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: FAX NO.: P.O. NO.: 30006870
E-MAIL ADDRESS: Andrea.Kreinghaus@arcadis.com andrew.lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER See special instructions

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 dioxane (8260 SIM)	Special Instructions
07312.01	9/18/19	1440	PSP-ED9(63-68)(091819)	GW	3		X						X	Standard TAT
07313.01	9/20/19	1115	VAP-P2-NC103(63-68)(092019)	GW	3		X						X	24-hr TAT ***

RELINQUISHED BY: SIGNATURE/ORGANIZATION	☒ Sampler	DATE	TIME
Ellen Redner / Arcadis		9/20/19	1140
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME
M Metcalfe		9/20/19	1140
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 20.3

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07313.01(01)
Generated on 09/23/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07313.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/20/2019
Submitted Date/Time: 09/20/2019 11:40
Sampled by: Ellen Redner
P.O. #: 30006870

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Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07313.01	VAP-P2-NC103(63-68)(092019)	Groundwater	09/20/19 11:15

Analytical Laboratory Report

Lab Sample ID: S07313.01
Sample Tag: VAP-P2-NC103(63-68)(092019)
Collected Date/Time: 09/20/2019 11:15
Matrix: Groundwater
COC Reference: 119781

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	20.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/23/19 16:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/23/19 15:18, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	3	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07313
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/20/2019 11:40 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 20.3
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119781

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr. suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: FAX NO.: P.O. NO.: 30006870
E-MAIL ADDRESS: Andrea.Kreyinghaus@arcadis.com andrew.lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner
TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☒ OTHER See special instructions
DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 dioxane (8260 SIM)	Special Instructions
07312.01	9/18/19	1440	PSP-ED9(63-68)(091819)	GW	3		x						x	Standard TAT
07313.01	9/20/19	1115	VAP-P2-NC103(63-68)(092019)	GW	3		x						x	24-hr TAT ***

RELINQUISHED BY: SIGNATURE/ORGANIZATION		☒ Sampler	DATE	TIME
	Arcadis		9/20/19	1140
RECEIVED BY: SIGNATURE/ORGANIZATION			DATE	TIME
	M Chilcote		9/20/19	1140
RELINQUISHED BY: SIGNATURE/ORGANIZATION			DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION			DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS

NOTES: TEMP. ON ARRIVAL 20.3

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07352.01(01)
Generated on 09/24/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07352.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/23/2019
Submitted Date/Time: 09/23/2019 10:30
Sampled by: Ellen Redner
P.O. #: 30006870

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Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
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Results reported on a dry weight basis where applicable.
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40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
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O	Analysis performed by outside laboratory. See attached report.
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X	Elevated reporting limit due to matrix interference
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Glossary of Abbreviations

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MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07352.01	VAP-P2-NL100(65-70)(092319)	Groundwater	09/23/19 09:05

Analytical Laboratory Report

Lab Sample ID: S07352.01
Sample Tag: VAP-P2-NL100(65-70)(092319)
Collected Date/Time: 09/23/2019 09:05
Matrix: Groundwater
COC Reference: 124331

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	16.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/24/19 11:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/23/19 16:01, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07352
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/23/2019 10:30 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 16.1
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☒ No	☐ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

124331

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr. Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: FAX NO.: P.O. NO.: 30006870
E-MAIL ADDRESS: andrea.krevinghaus@arcadis-com (andrew.lorenz@arcadis.com) QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870-046OD
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner/

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 Dioxane (8260 SIM)
07352.01	9/23/19	0905	VAP-P2-NL100(65-70)(092319)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION ☒ Sampler DATE 9/23/19 TIME 1030
RECEIVED BY: SIGNATURE/ORGANIZATION DATE 9/23/19 TIME 1030
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 16.1

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07440.01(01)
Generated on 09/25/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07440.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/24/2019
Submitted Date/Time: 09/24/2019 13:00
Sampled by: Ellen Redner
P.O. #: 30006870

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Maya Murshak
Technical Director

General Report Notes

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40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
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G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
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T	No correction for total solids
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Y	Elevated reporting limit due to high target concentration
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MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07440.01	VAP-P2-NI108(61-66)(092419)	Groundwater	09/24/19 10:40

Analytical Laboratory Report

Lab Sample ID: S07440.01
Sample Tag: VAP-P2-NI108(61-66)(092419)
Collected Date/Time: 09/24/2019 10:40
Matrix: Groundwater
COC Reference: 119779

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	19.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/25/19 16:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/25/19 13:28, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07440
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/24/2019 13:00 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 19.1
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☒ No	☐ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119779

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr., Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.:
P.O. NO.: 30006870
E-MAIL ADDRESS: Andrea.Kreuzinghaus@arcadis.com Andrew.lorenz@arcadis.com
QUOTE NO:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870-04700
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner / [signature]

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4 dioxane (8260 SIM)
07440.01	9/24/19	1040	VAP-P2-NI168(61-66)(092419)	GW	3		X						6

RELINQUISHED BY: SIGNATURE/ORGANIZATION [signature] /Arcadis ☒ Sampler DATE 9/24/19 TIME 1300
RECEIVED BY: SIGNATURE/ORGANIZATION [signature] DATE 9/24/19 TIME 1300
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 19.1

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev 5.18.12

Analytical Laboratory Report

Report ID: S07496.01(01)
Generated on 09/25/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07496.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/25/2019
Submitted Date/Time: 09/25/2019 12:05
Sampled by: Ellen Redner
P.O. #: 30006870

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07496.01	VAP-P2-NX100(59-64)(092519)	Groundwater	09/25/19 10:45

Analytical Laboratory Report

Lab Sample ID: S07496.01
Sample Tag: VAP-P2-NX100(59-64)(092519)
Collected Date/Time: 09/25/2019 10:45
Matrix: Groundwater
COC Reference: 119784

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	15.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/25/19 16:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/25/19 13:49, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	6	2		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07496
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/25/2019 12:05 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 15.4
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119784

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr., Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: P.O. NO.: 30006870-04700
E-MAIL ADDRESS: Andrea.Krewinghaus@arcadis.com
andrew.lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Reaner/

TURNAROUND TIME REQUIRED ☒ DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 Dioxane (8260 SIM)
07496.01	9/25/19	1045	VAP-P2-NX100(61-66)(092519)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ☒ Sampler DATE: 9/25/19 TIME: 1205
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 9/25/19 TIME: 1205

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:

NOTES: TEMP. ON ARRIVAL: 15.4

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5 18.12

Analytical Laboratory Report

Report ID: S07534.01(01)
Generated on 09/26/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07534.01
Project: 30006870 / RACER Lansing
Collected Date(s): 09/25/2019
Submitted Date/Time: 09/25/2019 16:35
Sampled by: Ellen Redner
P.O. #: 30006870

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Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07534.01	ASP-D01(62-67)(092519)	Groundwater	09/25/19 16:10

Analytical Laboratory Report

Lab Sample ID: S07534.01
Sample Tag: ASP-D01(62-67)(092519)
Collected Date/Time: 09/25/2019 16:10
Matrix: Groundwater
COC Reference: 119782

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	15.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/26/19 13:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/25/19 17:04, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	42	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07534
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 / RACER Lansing
Submitted: 09/25/2019 16:35 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 15.1
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119782

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr. Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.:
P.O. NO.: 30006870
E-MAIL ADDRESS: andrea.kreyingmay5@arcadis.com andrew.lorenz@arcadis.com
QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870 - 04700
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 Dioxane (1624 SIM)
07534.01	9/25/19	1610	ASP-001(62-67)(092519)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Ellen Redner / Arcadis ☒ Sampler DATE: 9/25/19 TIME: 1635
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 9/25/19 TIME: 1635
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:

NOTES: TEMP. ON ARRIVAL 15.1

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Preliminary Report

Report ID: S07567.01(01)
Generated on 09/30/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07567.01-S07567.04
Project: 30006870 -04700 / RACER Lansing
Collected Date(s): 09/26/2019 - 09/27/2019
Submitted Date/Time: 09/27/2019 08:20
Sampled by: Ellen Redner
P.O. #: 30006870

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

1,4-Dioxane preliminary results reported

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (4 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07567.01	PSP-D04(59-64)(092719)	Groundwater	09/27/19 07:50
S07567.02	VAP-P2-NC103(56-61)(092619)	Groundwater	09/26/19 16:00
S07567.03	VAP-P2-NI108(53-58)(092619)	Groundwater	09/26/19 16:15
S07567.04	MW-15-72_092619	Groundwater	09/26/19 16:35

Lab Sample ID: S07567.01
Sample Tag: PSP-D04(59-64)(092719)
Collected Date/Time: 09/27/2019 07:50
Matrix: Groundwater
COC Reference: 119785

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	7.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/30/19 16:15	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/30/19 15:37, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	7	2		ug/L	1	123-91-1	R

Method: SW8260B - SIM, Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane (Replicate 01)*	Incomplete			ug/L			

R-Preliminary result

Lab Sample ID: S07567.02

Sample Tag: VAP-P2-NC103(56-61)(092619)

Collected Date/Time: 09/26/2019 16:00

Matrix: Groundwater

COC Reference: 119785

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	7.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	>2	N/A	09/30/19 16:15	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/30/19 15:59, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	7	2		ug/L	1	123-91-1	R

Method: SW8260B - SIM, Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane (Replicate 01)*	Incomplete			ug/L			

R-Preliminary result

Lab Sample ID: S07567.03

Sample Tag: VAP-P2-NI108(53-58)(092619)

Collected Date/Time: 09/26/2019 16:15

Matrix: Groundwater

COC Reference: 119785

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	7.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	>2	N/A	09/30/19 16:15	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/30/19 16:20, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	10	1		ug/L	1	123-91-1	R

Method: SW8260B - SIM, Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane (Replicate 01)*	Incomplete			ug/L			

R-Preliminary result

Lab Sample ID: S07567.04
Sample Tag: MW-15-72_092619
Collected Date/Time: 09/26/2019 16:35
Matrix: Groundwater
COC Reference: 119785

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	7.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	09/30/19 16:15	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 09/30/19 16:41, Analyst: JGH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	17	1		ug/L	1	123-91-1	R

Method: SW8260B - SIM, Run Date: / /, Analyst:

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane (Replicate 01)*	Incomplete			ug/L			

R-Preliminary result

Merit Laboratories Login Checklist

Lab Set ID: S07567
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 -04700 / RACER Lansing
Submitted: 09/27/2019 08:20 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 7.6
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119785

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr. Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.:
E-MAIL ADDRESS: andrea.kreinghaus@arcadis.com; andrew.lorenz@arcadis.com
P.O. NO.: 30006870
QUOTE NO.:

INVOICE TO

CONTACT NAME: ☐ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870-04700
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner / [signature]

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4 Dioxane (8260 SIM)
07567.01	9/26/19	0750	PSP-D04(59-64)(092619)	GW	3		X						X
.02	9/26/19	1600	VAP-P2-NC103(56-61)(092619)	GW	3		X						X
.03	9/26/19	1615	VAP-P2-NI108(53-58)(092619)	GW	3		X						X
.04	9/26/19	1635	MW-15-72_092619	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION [signature] / NCAIS (Sampler) DATE 9/27/19 TIME 0820
RECEIVED BY: SIGNATURE/ORGANIZATION [signature] DATE 9/27/19 TIME 0820

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 7.4

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07633.01(01)
Generated on 10/01/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07633.01
Project: 30006870 -04700 / RACER Lansing
Collected Date(s): 09/30/2019
Submitted Date/Time: 09/30/2019 12:45
Sampled by: Ellen Redner
P.O. #: 30006870

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Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
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Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07633.01	ASP-D04(56-61)(093019)	Groundwater	09/30/19 08:30

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S07633.01
Sample Tag: ASP-D04(56-61)(093019)
Collected Date/Time: 09/30/2019 08:30
Matrix: Groundwater
COC Reference: 119786

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/01/19 11:50	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/01/19 14:23, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07633
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 -04700 / RACER Lansing
Submitted: 09/30/2019 12:45 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
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Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119786

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr., Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: P.O. NO.: 30006870
E-MAIL ADDRESS: andrea.krevinghaus@arcadis.com andrew.lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870-04700
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner

TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4 Dioxane (8260 SIM)
076633.01	9/26/19	0830	ASP-D04 (56-61) (092619)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] ☒ Sampler DATE: 9/26/19 TIME: 1245
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] DATE: 9/30/19 TIME: 1245
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:

NOTES: TEMP. ON ARRIVAL 6.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Revised Report

Report ID: S07633.01(02)
Generated on 10/01/2019
Replaces report S07633.01(01) generated on 10/01/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

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East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

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Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07633.01
Project: 30006870 -04700 / RACER Lansing
Collected Date(s): 09/30/2019
Submitted Date/Time: 09/30/2019 12:45
Sampled by: Ellen Redner
P.O. #: 30006870

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Maya Murshak
Technical Director

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40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

Result corrected

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07633.01	ASP-D04(56-61)(093019)	Groundwater	09/30/19 08:30

Lab Sample ID: S07633.01
Sample Tag: ASP-D04(56-61)(093019)
Collected Date/Time: 09/30/2019 08:30
Matrix: Groundwater
COC Reference: 119786

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/01/19 11:50	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/01/19 15:50, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	6	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07633
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870 -04700 / RACER Lansing
Submitted: 09/30/2019 12:45 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119786

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr., Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: P.O. NO.: 30006870
E-MAIL ADDRESS: andrea.krevinghaus@arcadis.com andrew.lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: X SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870-04700
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Ellen Redner

TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4 Dioxane (8260 SIM)
076633.01	9/26/19	0830	ASP-D04 (56-61) (092619)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] ☒ Sampler DATE: 9/26/19 TIME: 1245
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] DATE: 9/30/19 TIME: 1245
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS:

NOTES: TEMP. ON ARRIVAL 6.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S07863.01(01)
Generated on 10/07/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07863.01-S07863.02
Project: 30006870.04700 / RACER Lansing
Collected Date(s): 10/04/2019
Submitted Date/Time: 10/04/2019 15:12
Sampled by: Shantel Johnson
P.O. #: 30006870

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Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07863.01	CSP-D01(64-69)(100419)	Groundwater	10/04/19 08:47
S07863.02	MW-15-72(100419)	Groundwater	10/04/19 14:23

Analytical Laboratory Report

Lab Sample ID: S07863.01
Sample Tag: CSP-D01(64-69)(100419)
Collected Date/Time: 10/04/2019 08:47
Matrix: Groundwater
COC Reference: 124307

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	10.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/07/19 15:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/07/19 13:53, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	12	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S07863.02
Sample Tag: MW-15-72(100419)
Collected Date/Time: 10/04/2019 14:23
Matrix: Groundwater
COC Reference: 124307

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	10.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/07/19 15:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/07/19 15:07, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	16	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07863
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04700 / RACER Lansing
Submitted: 10/04/2019 15:12 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 10.9
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☒ No	☐ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

124307

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: ANDREW LORENZ
COMPANY: ARCADIS
ADDRESS: 28550 CABOT DR STE 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 317-343-0377 FAX NO.: P.O. NO.: 30066870
E-MAIL ADDRESS: ANDREW.LORENZ@ARCADIS.COM ANDREA.KRAWIEC@ARCADIS.COM QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30066870
SAMPLER(S) - PLEASE PRINT/SIGN NAME: SHANTEL JOHNSON
TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER
DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other LANSING

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4 Dioxane (8270 SIM)	
078603.01	10/4/19	0847	CSP-D01(64-69)(100419)	GW	3		X						X	
.02	10/4/19	1423	MW-15-72(100419)	GW	3		X						X	

RELINQUISHED BY: SIGNATURE/ORGANIZATION: ☒ Sampler DATE: 10/4/19 TIME: 1517
RECEIVED BY: SIGNATURE/ORGANIZATION: M. Chilcote DATE: 10/4/19 TIME: 1612
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 10.9

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Analytical Laboratory Report

Report ID: S07873.01(01)
Generated on 10/07/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S07873.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 10/07/2019
Submitted Date/Time: 10/07/2019 11:55
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S07873.01	VAP-P2-MX71(68-73)(100719)	Groundwater	10/07/19 08:55

Analytical Laboratory Report

Lab Sample ID: S07873.01
Sample Tag: VAP-P2-MX71(68-73)(100719)
Collected Date/Time: 10/07/2019 08:55
Matrix: Groundwater
COC Reference: 119783

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	10.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/07/19 15:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/07/19 14:35, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	18	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S07873
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 10/07/2019 11:55 Login User: REJ

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 3.8
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

119783

CHAIN OF CUSTODY RECORD ★24-Hour TAT★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: 248-994-2241 P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870.04600 / BALER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
07873.01	10/7/19	0855	VAP-P2-MX71(68-73)(100719)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION [signature] / Arcadis ☒ Sampler DATE 10/7/19 TIME 1155
RECEIVED BY: SIGNATURE/ORGANIZATION M Chilcote DATE 10/7/19 TIME 1155
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 3.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev 5 18 12

Analytical Laboratory Report

Report ID: S08203.01(01)
Generated on 10/14/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S08203.01-S08203.02
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 10/11/2019
Submitted Date/Time: 10/11/2019 13:57
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S08203.01	VAP-P2-MJ125(65-70)(101119)	Groundwater	10/11/19 12:25
S08203.02	VAP-P2-MQ114(66-71)(101119)	Groundwater	10/11/19 08:40

Analytical Laboratory Report

Lab Sample ID: S08203.01
Sample Tag: VAP-P2-MJ125(65-70)(101119)
Collected Date/Time: 10/11/2019 12:25
Matrix: Groundwater
COC Reference: 124301

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/14/19 14:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/14/19 13:51, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S08203.02
Sample Tag: VAP-P2-MQ114(66-71)(101119)
Collected Date/Time: 10/11/2019 08:40
Matrix: Groundwater
COC Reference: 124301

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/14/19 14:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/14/19 14:12, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S08203
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 10/11/2019 13:57 Login User: REJ

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
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www.meritlabs.com

C.O.C. PAGE # 1 OF 1 — 124301

CHAIN OF CUSTODY RECORD ★ 24-Hour TAT ★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.046000
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com | QUOTE NO:

INVOICE TO

CONTACT NAME: | ☒ SAME
COMPANY:
ADDRESS:
CITY: | STATE: | ZIP CODE:
PHONE NO.: | E-MAIL ADDRESS:

PROJECT NO./NAME: 30006870.046000 / RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260B SIM
0820301	10/11/19	1225	VAP-P2-MJ125(65-70)(101119)	GW	3		3						X
02	10/11/19	840	VAP-P2-MQ114(66-71)(101119)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
[signature] / Arcadis ☒ Sampler	10/11/19	1357
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
[signature]	10/11/19	1357
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 6.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S08252.01(01)
Generated on 10/15/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S08252.01-S08252.02
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 10/14/2019
Submitted Date/Time: 10/14/2019 15:23
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S08252.01	VAP-P2-ME106(71-76)(101419)	Groundwater	10/14/19 08:15
S08252.02	VAP-P2-MT92(71-76)(101419)	Groundwater	10/14/19 14:30

Analytical Laboratory Report

Lab Sample ID: S08252.01
Sample Tag: VAP-P2-ME106(71-76)(101419)
Collected Date/Time: 10/14/2019 08:15
Matrix: Groundwater
COC Reference: 124302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/15/19 11:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/14/19 16:44, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	12	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S08252.02
Sample Tag: VAP-P2-MT92(71-76)(101419)
Collected Date/Time: 10/14/2019 14:30
Matrix: Groundwater
COC Reference: 124302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/15/19 11:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/15/19 12:27, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S08252
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 10/14/2019 15:23 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.8
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

124302

CHAIN OF CUSTODY RECORD

★ 24 - Hour TAT ★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-348-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.046600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.046600/BAKER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/[signature]
TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER
DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☒ Other MF
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260C SIM	
08252.01	10/14/19	0815	VAP-P2-ME106(71-76)(101419)	GW	3		3						X	
.02	10/14/19	1430	VAP-P2-MT92(71-76)(101419)	GW	3		3						X	

RELINQUISHED BY: SIGNATURE/ORGANIZATION [signature]/Arcadis ☒ Sampler — DATE 10/14/19 — TIME 1523
RECEIVED BY: SIGNATURE/ORGANIZATION [signature] — DATE 10/14/19 — TIME 1523
RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION — DATE — TIME
RECEIVED BY: SIGNATURE/ORGANIZATION — DATE — TIME

SEAL NO. — SEAL INTACT YES ☐ NO ☐ — INITIALS
SEAL NO. — SEAL INTACT YES ☐ NO ☐ — INITIALS

NOTES: TEMP. ON ARRIVAL 5.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.16.12

Analytical Laboratory Report

Revised Report

Report ID: S08354.01(02)
Generated on 10/17/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis

Report Summary

Lab Sample ID(s): S08354.01-S08354.02
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 10/15/2019 - 10/16/2019
Submitted Date/Time: 10/16/2019 11:53
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Qualifier Descriptions (Page 3)
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Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

.02 sample tag revised per client request

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S08354.01	VAP-P2-NU156(66-70)(101519)	Groundwater	10/15/19 17:00
S08354.02	VAP-P2-OQ129(66-70)(101619)	Groundwater	10/16/19 11:15

Lab Sample ID: S08354.01

Sample Tag: VAP-P2-NU156(66-70)(101519)

Collected Date/Time: 10/15/2019 17:00

Matrix: Groundwater

COC Reference: 124304

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/17/19 13:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/16/19 15:16, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	92	1		ug/L	1	123-91-1	

Lab Sample ID: S08354.02

Sample Tag: VAP-P2-OQ129(66-70)(101619)

Collected Date/Time: 10/16/2019 11:15

Matrix: Groundwater

COC Reference: 124304

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/17/19 13:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/16/19 15:38, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	110	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S08354
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 10/16/2019 11:53 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.7
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

124304

CHAIN OF CUSTODY RECORD *24-Hour TAT*

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.04600/RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis/

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260B SCM
08354.01	10/15/19	1700	VAP-P2-NW156(66-70)(101519)	GW	3		3						X
.02	10/16/19	1115	VAP-P2-DQ129(66-70)(101619)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: [signature] Arcadis (☒ Sampler) DATE: 10/16/19 TIME: 1153
RECEIVED BY: SIGNATURE/ORGANIZATION: [signature] DATE: 10/16/19 TIME: 1153
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 5.7

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S08404.01(01)
Generated on 10/18/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis, Patrick Curry

Report Summary

Lab Sample ID(s): S08404.01-S08404.02
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 10/16/2019 - 10/17/2019
Submitted Date/Time: 10/17/2019 12:11
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S08404.01	VAP-P2-OM112(58-62)(101619)	Groundwater	10/16/19 16:30
S08404.02	VAP-P2-PG104(66-70)(101719)	Groundwater	10/17/19 11:20

Analytical Laboratory Report

Lab Sample ID: S08404.01
Sample Tag: VAP-P2-OM112(58-62)(101619)
Collected Date/Time: 10/16/2019 16:30
Matrix: Groundwater
COC Reference: 124305

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	>2	N/A	10/18/19 12:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/17/19 18:48, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	135	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S08404.02
Sample Tag: VAP-P2-PG104(66-70)(101719)
Collected Date/Time: 10/17/2019 11:20
Matrix: Groundwater
COC Reference: 124305

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	6.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/18/19 12:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/17/19 19:10, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	5	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S08404
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 10/17/2019 12:11 Login User: REJ

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 6.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

124305

CHAIN OF CUSTODY RECORD ★24-Hour TAT★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO: 248-994-2241 P.O. NO.: 30006870.04600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME ☐ SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.04600 / RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other MI

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	1,4-Dioxane 8260B SIM
08404.01	10/16/19	1630	VAP-P2-OM112(58-62)(101619)	GW	3		3						X
.02	10/17/19	1120	VAP-P2-PG104(66-70)(101719)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION	[signature] Arcadis ☒ Sampler	DATE 10/17/19	TIME 1271
RECEIVED BY SIGNATURE/ORGANIZATION	[signature]	DATE 10/17/19	TIME 12[illegible]
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 6.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.17

Analytical Laboratory Report

Report ID: S08438.01(01)
Generated on 10/21/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Addtional Contacts: Alex Villhauer, Randy Christensen, Christine Gregg, Mike Spacil, Andrea Krevinghaus, Eric Feenstra, Daniel Stockard, Austin Westhuis, Patrick Curry

Report Summary

Lab Sample ID(s): S08438.01
Project: 30006870.04600 / RACER Lansing
Collected Date(s): 10/18/2019
Submitted Date/Time: 10/18/2019 09:24
Sampled by: Austin Westhuis
P.O. #: 30006870.04600

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Maya Murshak
Technical Director

General Report Notes

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40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
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Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S08438.01	VAP-P2-OA135(65-69)(101819)	Groundwater	10/18/19 08:45

Analytical Laboratory Report

Lab Sample ID: S08438.01
Sample Tag: VAP-P2-OA135(65-69)(101819)
Collected Date/Time: 10/18/2019 08:45
Matrix: Groundwater
COC Reference: 124306

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	10/21/19 13:48	JGH	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 10/18/19 16:58, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	196	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S08438
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: 30006870.04600 / RACER Lansing
Submitted: 10/18/2019 09:24 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

124306

CHAIN OF CUSTODY RECORD ★24-Hour TAT★

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: 248-994-2241 | P.O. NO.: 30006870.041600
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☒ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: 30006870.041600 / RACER Trust
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Austin Westhuis / [signature]
TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER
DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☒ Other MI
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260B SIM
084381	10/18/19	0845	MW-P2-0A135(65-69)(101819)	GW	3		3						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION [signature] Arcadis (Sampler) | DATE 10/18/19 | TIME 0924
RECEIVED BY: SIGNATURE/ORGANIZATION [signature] | DATE 10/18/19 | TIME 0924
RELINQUISHED BY: SIGNATURE/ORGANIZATION | DATE | TIME
RECEIVED BY: SIGNATURE/ORGANIZATION | DATE | TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION | DATE | TIME
RECEIVED BY: SIGNATURE/ORGANIZATION | DATE | TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 4.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S04323.01(01)
Generated on 07/11/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S04323.01
Project: B0064479.2019
Collected Date(s): 07/10/2019
Submitted Date/Time: 07/10/2019 15:41
Sampled by: E. Redner
P.O. #: B0064479.2019

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Report Narrative (Page 2)
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Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S04323.01	ASP-G02(68-72)(071019)	Groundwater	07/10/19 12:20

Analytical Laboratory Report

Lab Sample ID: S04323.01
Sample Tag: ASP-G02(68-72)(071019)
Collected Date/Time: 07/10/2019 12:20
Matrix: Groundwater
COC Reference: 118199

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	07/10/19 14:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 07/11/19 12:13, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	141	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S04323
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019
Submitted: 07/10/2019 15:41 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.0
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

118199

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr. Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: P.O. NO.:
E-MAIL ADDRESS: andrew.lorenz@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: B006479.2019
SAMPLER(S) - PLEASE PRINT/SIGN NAME: E. Redner

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES
Project Locations
☐ Detroit ☐ New York
☐ Other
Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	MS 0923 Acrylamide
04323.01	7/10/19	1220	ASP-602(68-72)(071019)	GW	3		X						X

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ☒ Sample DATE: 7/10/19 TIME: 1500
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 7/10/19 TIME: 15:00
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: 7/10/19 TIME: 15:41
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 7/10/19 TIME: 15:41
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL: 5.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.16.12

Analytical Laboratory Report

Report ID: S01453.01(01)
Generated on 05/02/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S01453.01-S01453.02
Project: B0064479.2019.04600
Collected Date: 04/30/2019
Submitted Date/Time: 05/01/2019 08:15
Sampled by: Severin Presswood
P.O. #: B0064479.2019.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S01453.01	AS-19-13_043019(87-90)	Groundwater	04/30/19 17:15
S01453.02	Trip Blank	Water	04/30/19 00:01

Analytical Laboratory Report

Lab Sample ID: S01453.01
Sample Tag: AS-19-13_043019(87-90)
Collected Date/Time: 04/30/2019 17:15
Matrix: Groundwater
COC Reference: 122823

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	3.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	>2	N/A	05/02/19 17:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 05/02/19 16:37, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	10	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S01453.02
Sample Tag: Trip Blank
Collected Date/Time: 04/30/2019 00:01
Matrix: Water
COC Reference: 122823

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	HCL	Yes	3.2	IR

Other / Misc.

Method: , Run Date: 05/02/19 10:20, Analyst: MMC

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hold until notified*	Completed				1		

Merit Laboratories Login Checklist

Lab Set ID: S01453
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600
Submitted: 05/01/2019 08:15 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 3.2
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[X] Yes	[ ] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[X] Yes	[ ] No	[ ] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[ ] Yes	[X] No	[ ] N/A	COC adequately filled out	Trip Blank not listed on COC
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

122823

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME	Andrew Lorentz
COMPANY	Arcadis of MI LLC
ADDRESS	28550 Cabot Dr Ste 500
CITY	Novi
STATE	MI
ZIP CODE	48377
PHONE NO.	312-343-0377
FAX NO.	-
P.O. NO.	
E-MAIL ADDRESS	Andrew.Lorentz@arcadis.com
QUOTE NO.	

INVOICE TO

CONTACT NAME	☑ SAME
COMPANY	
ADDRESS	
CITY	
STATE	
ZIP CODE	
PHONE NO.	
E-MAIL ADDRESS	

PROJECT NO./NAME	B0064479.2019.04600
SAMPLER(S) - PLEASE PRINT/SIGN NAME	Severin Presswood / [signature]

TURNAROUND TIME REQUIRED ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER _____

DELIVERABLES REQUIRED ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

1-4 dioxane

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other Lansing

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 dioxane
04453.01	4/30	1715	AS-19-13_043019 (87-90)	GW	3		3						X
.02													

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Severin Presswood / Arcadis ☒ Sampler	DATE	TIME
		4/30/19	1800
RECEIVED BY: SIGNATURE/ORGANIZATION	Merit Labs Overnight Drop Box	DATE	TIME
		4/30/19	1800
RELINQUISHED BY: SIGNATURE/ORGANIZATION	Merit Dropbox	DATE	TIME
		5/1/19	815
RECEIVED BY: SIGNATURE/ORGANIZATION	[signature]	DATE	TIME
		5/1/19	815

RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

NOTES: TEMP. ON ARRIVAL 3.2

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.16.12

Analytical Laboratory Report

Report ID: S01487.01(01)
Generated on 05/02/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S01487.01
Project: B0064479.2019.04600
Collected Date: 05/01/2019
Submitted Date/Time: 05/01/2019 15:15
Sampled by: Severin Presswood
P.O. #: B0064479.2019.04600

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Report Narrative (Page 2)
Laboratory Certifications (Page 3)
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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S01487.01	AS-19-06_050119(94-98)	Groundwater	05/01/19 14:00

Analytical Laboratory Report

Lab Sample ID: S01487.01
Sample Tag: AS-19-06_050119(94-98)
Collected Date/Time: 05/01/2019 14:00
Matrix: Groundwater
COC Reference: 121797

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	2.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	05/02/19 17:00	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 05/02/19 16:59, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	5	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S01487
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600
Submitted: 05/01/2019 15:15 Login User: SRS

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 2.7
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

121797

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorentz
COMPANY: Arcadis of MI LLC
ADDRESS: 28550 Cabot Dr Ste 500
CITY: Novi | STATE: MI | ZIP CODE: 48377
PHONE NO.: 312-343-0377 | FAX NO.: - | P.O. NO.:
E-MAIL ADDRESS: Andrew.Lorentz@arcadis.com | QUOTE NO.:

INVOICE TO

CONTACT NAME | ☑ SAME
COMPANY
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | E-MAIL ADDRESS

PROJECT NO./NAME: B0064479.2019.04600
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Severin Priestwood / [signature]

TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☒ Other Lansing

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1-4 dioxane
01487.01	5-01	1400	AS-19-06-050119 (94-98	GW	3		3						X

*1 DAY TAT

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
[signature]	5-1-19	15 00
RECEIVED BY: SIGNATURE/ORGANIZATION: MEA	5-1-19	1500
RELINQUISHED BY: SIGNATURE/ORGANIZATION: MEA	5-1-19	1515
RECEIVED BY: SIGNATURE/ORGANIZATION	5/1/19	1515

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS
SEAL NO. | SEAL INTACT YES ☐ NO ☐ | INITIALS

NOTES: TEMP. ON ARRIVAL 2.7

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S01607.01(01)
Generated on 05/06/2019

Report to

Attention: Andrew Lorenz
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Addtional Contacts: Alex Villhauer

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S01607.01
Project: B0064479.2019.04600 / RACER Lansing
Collected Date: 05/03/2019
Submitted Date/Time: 05/03/2019 16:30
Sampled by: Austin Westhuis
P.O. #: B0064479.2019.04600

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Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S01607.01	AS-19-07_050319(93-97)	Groundwater	05/03/19 15:10

Analytical Laboratory Report

Lab Sample ID: S01607.01
Sample Tag: AS-19-07_050319(93-97)
Collected Date/Time: 05/03/2019 15:10
Matrix: Groundwater
COC Reference: 123359

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	05/06/19 15:29	JGH	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 05/06/19 13:52, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	30	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S01607
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.04600 / RACER Lansing
Submitted: 05/03/2019 16:30 Login User: MMC

Attention: Andrew Lorenz
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-809-1813 FAX: 248-994-2241
Email: andrew.lorenz@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.6
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

123359

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Andrew Lorenz
COMPANY: Arcadis of Michigan, LLC
ADDRESS: 28550 Cabot Drive, Suite 500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 312-343-0377 FAX NO.: 248-994-2241 P.O. NO.:
E-MAIL ADDRESS: Andrew.Lorenz@arcadis.com; Alex.Villhauer@arcadis.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: B006479.2019.04600 / RACER Lansing
SAMPLER(S) - PLEASE PRINT & SIGN NAME: Austin Westhuis

TURNAROUND TIME REQUIRED: ☒ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☐ STANDARD ☐ OTHER

DELIVERABLES REQUIRED: ☐ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☒ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane	Special Instructions
01687.01	5/3/19	1510	AS-19-07_050319(93-97)	GW	3		3						X	*24-Hour TAT

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ☒ Sampler DATE: 5/3/19 TIME: 1600
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 5/3/19 TIME: 1600
RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: 5/3/19 TIME: 1630
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: 5/3/19 TIME: 1630

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE: TIME:
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE: TIME:

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL: 4.6

* Please also [illegible]

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12