Transmittal Letter

ARCADIS

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RACER Lansing Biosparge Construction Completion Report

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Revitalizing Auto Communities Environmental Response (RACER) Trust

LOWER 1,4-DIOXANE BIOSPARGE CONSTRUCTION COMPLETION REPORT

Lansing Industrial Land
Lansing, Michigan

January 2021

LOWER 1,4-DIOXANE BIOSPARGE CONSTRUCTION COMPLETION REPORT

Lansing Industrial Land
Lansing, Michigan

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ACRONYMS AND ABBREVIATIONS

%	percent
µg/L	micrograms per liter
EGLE	Michigan Department of Environment, Great Lakes and Energy
LEL	Lower Explosive Limit
NFPA	National Fire Protection Association
PVC	polyvinyl chloride
RACER	Revitalizing Auto Communities Environmental Response
ROI	radius of influence
Site	Revitalizing Auto Communities Environmental Response Trust Lansing Industrial Land, Lansing, Michigan
VAP	vertical aquifer profile

1 INTRODUCTION

Arcadis of Michigan, LLC has prepared this construction completion report (report) on behalf of the Revitalizing Auto Communities Environmental Response (RACER) Trust to document construction of the lower 1,4-dioxane biosparge system at the RACER Lansing Industrial Land (Site) located in Lansing, Michigan (**Figures 1 and 2**). This construction was completed as an interim measure to address 1,4-dioxane impacts in weathered bedrock and will be part of the final corrective measure to address 1,4-dioxane at the Site.

This report documents construction of the biosparge systems at Plants 2 and 3. The scope of work included installation of 48 biosparge wells with sand lens enhancements, two enclosed air/propane injection systems, approximately 4 miles of air/propane conveyance hose, and 10 new performance monitoring wells. The biosparge system was designed and installed based on pilot testing completed in 2016 through 2018, the Biosparge Interim Measures Work Plan (Arcadis 2018a), and changes and updates communicated to the Michigan Department of Environment, Great Lakes and Energy (EGLE) during meetings and webinars over the course of the design and installation process. The basis of the installed biosparge system layout related to the lower 1,4-dioxane plume are documented in the Lower 1,4-Dioxane Plume Conceptual Site Model Report (Arcadis 2021). Construction began with Plant 3 in April 2019, substantially concluding with Plant 2 in August 2020.

The biosparge system consists of sparge points to deliver propane, oxygen, and nutrients into targeted treatment zones within the weathered bedrock to stimulate microbes to cometabolically biodegrade 1,4-dioxane. The sparge points are installed in transects, generally perpendicular to the direction of groundwater flow, allowing the natural groundwater gradients to transport impacted groundwater through the treatment zone. As groundwater flows through the transects, microbes biodegrade 1,4-dioxane within the in-situ biodegradation zones that are created by the biosparge system. Treated groundwater moves downgradient with the natural groundwater flow, reducing 1,4-dioxane mass and groundwater concentrations throughout the plume. Treatment effectiveness will be assessed through a performance monitoring program; plume stability will continue to be evaluated through an EGLE-approved groundwater monitoring program.

2 BIOSPARGE SYSTEM

Biosparge was the selected remedy for the lower 1,4-dioxane plume based on results from two phases of pilot testing completed from 2016 through 2019 (Arcadis 2017b, Arcadis 2018b) that showed a reduction in 1,4-dioxane concentrations in performance monitoring wells as a result of biosparge operation. The design of the biosparge system includes transects of wells to reduce the concentrations 1,4-dioxane along the core of the plume migrating south from Plant 3 and provides a perimeter of biosparge wells around the south, east and northeast of the Plant 2 LNAPL area, the apparent groundwater flow and 1,4-dioxane migration directions, to eliminate further migration and reduce overall concentrations in the central part of Plant 2 (**Figure 2**). Each transect includes sparge points designed to deliver propane, oxygen, and nutrients into the weathered bedrock to stimulate microbes that co-metabolically degrade 1,4-dioxane. Transect A is located at Plant 3; and Transects B, E, F, and G are located at Plant 2 (**Figure 2**).

As groundwater flows through the transects, microbes biodegrade the 1,4-dioxane and clean water flushes downgradient with the natural flow of groundwater. The result is an overall reduction in groundwater concentrations throughout the lower 1,4-dioxane plume. A comprehensive summary of the data collected related to the lower 1,4-dioxane plume and the resulting conceptual site model that guided the design and installation of the biosparge system are presented in the RACER Lansing Biosparge System Installation Data Package, 2018-2020 (Arcadis 2020) and the Lower 1,4-Dioxane Conceptual Site Model Report (Arcadis, 2021).

The biosparge system includes:

- Biosparge points with high-permeability sand lenses to deliver compressed gases and nutrients to the treatment zone
- Above-grade conveyance network of piping to deliver gases and nutrients to the sparge points
- Above-grade injection equipment, including an air compressor for the delivery of air, bulk propane tanks to supply propane, as well as piping, valving, and manifolds to control flow and pressure to sparge points
- Tanks, pumps, and manifold for nutrient injections
- A network of performance and perimeter monitoring wells.
    - Plume stability will continue to be monitored as part of the EGLE approved interim groundwater monitoring plan.

System layouts for Plants 2 and 3 can be seen individually on **Figures 3 and 4**, respectively. Record Drawings associated with the system are included in **Appendix A**. A photographic log of the system construction is included in **Appendix B**, and installation field notes are included in **Appendix C**. Installation sampling results are included in **Appendix D**, and boring logs are included in **Appendix E**.

2.1 Biosparge Wells

A total of 48 vertical biosparge wells (or points) were installed in transects throughout the 1,4-dioxane plume at Plants 2 and 3 (**Figure 2**). Three of the biosparge wells in Transect G at Plant 2 were reused from the 2017 to 2018 pre-design study (Arcadis 2017a). Biosparge points are screened in the weathered bedrock intervals and were installed as described in Sections 2.1.2 through 2.1.4. A typical well construction detail is shown on **Figure 5**.

2.1.1 Transects

The Interim Measures Workplan: Lower 1,4-Dioxane Biosparge (Arcadis, 2018a), which was accepted by EGLE, provided the initial plan for transect location and spacing based on the range of hydraulic conductivities, average groundwater concentrations in the treatment area in December 2017, and required pore flushes to reduce groundwater concentration to meet the performance objectives. As a starting point for biosparge well locations the proposed transect locations were updated in 2019 prior to well installations based on the 2018 groundwater concentrations. Transect A at Plant 3 was field-marked based on the interpreted extent of the 72 µg/L 1,4-dioxane contour from the December 2018 sampling results. Transects B, E, F and G at Plant 2 were field-marked based on the layout in provided in the

Interim Measures Workplan and the interpreted 2018 1,4-dioxane contours. Specifically, the biosparge points were located as shown on the Interim Measures Workplan, with contingent biosparge points located within the larger 2018 interpretation of the 72 µg/L plume outline. This transect installation plan was presented in the June 28, 2019 EGLE Update meeting. The 2019 biosparge transect installation plans for Plants 2 and 3 are included in **Appendix F**.

During well installation in 2019, the final length/extent of each transect was established based on vertical aquifer profile (VAP) sampling results presented in **Appendix D, Figures D-1 and D-2,** and discussed in the RACER Lansing Biosparge System Installation Data Package, 2018-2020 (Arcadis 2020) and the Lower 1,4-Dioxane Plume Conceptual Site Model Report (Arcadis 2021).

In addition to determining the length and extent of the biosparge transects, VAP samples were also collected in the following locations:

- At performance monitoring well locations to ensure that the performance monitoring wells would provide meaningful data to assess biosparge system performance (i.e. do not want to install a performance monitoring well at a location that is already non-detect for 1,4-dioxane); and,
- Along Transects E and F adjacent to the LNAPL to provide additional high-resolution characterization of the 1,4-dioxane plume.

In general, biosparge points were only installed if the VAP sample detected 1,4-dioxane concentration was greater than 10 µg/L. Note, as a result of the VAP sampling, Transects C and D, originally planned in the central portion of Plant 2, were not installed based on low (less than 10 µg/L) or non-detect concentrations of 1,4-dioxane (Arcadis 2021) (**Appendix F**). However, well casings, which had been preemptively installed at 6 locations in Transect C (**Appendix A, Figure D-2**), were left in place in the event it is determined the biosparge system should expand to include this transect.

Within each transect, individual biosparge points are spaced approximately 30 feet on center, for a radius of influence (ROI) of 15 feet, based on the 2017 to 2018 pre-design study.

2.1.2 Biosparge Point Outer Casing Installation

The first step consisted of installing a 4-inch schedule 40 polyvinyl chloride (PVC) outer casing to weathered bedrock at depths of approximately 75 to 80 feet below ground surface using roto-sonic drilling methods. Boring logs for the biosparge points are included in **Appendix E**. Centralizers were installed on the PVC riser at a spacing of every 20 feet, with one centralizer placed as close to the bottom of the biosparge point as possible. The solid casing was completed with a threaded cap on the end. The outer annular space between the 8-inch borehole wall and 4-inch outer PVC casing was tremie grouted to grade in one lift (a standard mix of Portland cement and 3-4 percent [%] bentonite).

2.1.3 Sand Lens Installation

Following installation of the outer casing, two sand lenses were installed within each biosparge point using the same method employed during the 2017-2018 pre-design study (Arcadis 2017a). First, a high-pressure water jet was used to cut through the blank PVC casing and annular grout and notch the formation in preparation for the sand lens injection. The two notches were installed approximately 5 feet apart vertically, with the bottom lens approximately 2 feet above the top of competent bedrock. The actual

locations of the notches were determined based on conditions encountered in the field and are noted in **Table 1**.

Next, a mixture of water, sand, guar gum, borax, and LEB-H-endo-1,4-R-mannase (sand mixture) was prepared above-grade in tanks for injection into the formation as described in the pre-design study work plan (Arcadis 2017a). The sand mixture was injected through the notch and then propagated radially away from the casing, creating a 0.5- to 1-centimeter-thick horizontal sand lens. Based on the 2017 to 2018 pre-design study, the radius of these sand lenses are approximately 15 feet.

2.1.4 Biosparge Point Construction

Following the creation of the sand lenses, a 2-inch diameter biosparge point was installed within the 4-inch PVC outer casing. The sparge points are constructed with 2-inch diameter schedule 40 PVC riser pipe with a 2-inch diameter, 10-foot long, 0.010-inch continuous wire-wrapped stainless steel well screen. Although there were no operational or performance differences observed between PVC and stainless steel screens during the 2017-2018 study, stainless steel screens provide a long-term benefit because they can be more vigorously rehabilitated should biofouling occur, thereby prolonging biosparge point lifespan and reducing potential replacement costs.

Screens were placed such that a single screen is centered across both sand lenses and extend at least 1 foot below the lower lens and 1 foot above the upper lens in each biosparge point. The bottom of the screen for each biosparge well was determined in the field to target the base of the weathered bedrock zone. A silica sand pack is installed between the 2-inch diameter air sparge screen and the 4-inch blank casing to above the top of the screen. To provide an adequate seal of the borehole, 1 foot of very fine choker sand was placed above the filter pack. Portland neat cement mixture was tremied from the bottom up to a 20-foot thickness. Above the cement grout a bentonite slurry was tremied from the top of the cement to top of casing.

The completed biosparge points were set in flush mount protective covers. Each utilize a 2-inch to 4-inch seal adaptor between the casings to prevent leaking. An inventory of the completed biosparge points and relevant construction information is provided in **Table 1**. Typical biosparge point construction details are provided on **Figure 5**.

2.2 Above-Grade Conveyance Hoses

The compressed air and propane mixture are delivered to the sparge points through the above-grade conveyance hoses. The conveyance hose network is designed to allow for maximum operational flexibility while minimizing the infrastructure and power requirements. Compressed air and propane are distributed to sparge wells via 1-inch dedicated hose lines that run from the compressor to individual above-ground wellheads (**Figure 2**). Using individual well conveyance lines allows for the greatest flexibility and control of flow to each well.

The connection at each wellhead consists of stainless steel threaded pipe with minimal threaded connections, for corrosion resistance and to minimize leak points. The metal-threaded fittings are connected to the well casing utilizing a PVC union and threaded adaptor for easy maintenance access, and to the hose on the other end. A detail of the wellhead is included in the Record Drawings (**Appendix A**). The other end of the conveyance hose is connected to the manifold header at the

biosparge building. Biosparge wells are connected to one of six sparging zones at Plant 2 and one of three zones at Plant 3. Typically, one or two zones sparge at a time, providing a pulsed operation that was determined to be most effective during the 2017 to 2018 pre-design study. Hose lengths were cut slightly longer than required to be able to reach the nutrient injection manifold and any compressed air header, for maximum operational flexibility to change sparging zones in the future.

Following installation, the hose corridors were covered with 4 inches of 21AA aggregate gravel for protection from accidental vehicle loading and exposure to the elements. Six designated traffic crossings were installed to allow vehicles to cross the hose corridors. Beneath the traffic crossing, the hoses are sheathed in schedule 80 galvanized steel carrier pipes to allow vehicle traffic over the hose without any damage. Flag posts are installed on all four corners of each crossing to notify drivers of their locations and prevent damage to unprotected hose sections. It is noted that the above-grade hoses may be converted to below-grade or otherwise modified to integrate with redevelopment. Record Drawings of the hose corridors and traffic crossings are presented in **Appendix A**.

2.3 Above-grade Injection Equipment

Compressed gas injection equipment includes industrial grade air compressors, propane tanks, controls, valves, and instrumentation. The equipment is housed in shipping container style enclosures in central Plant 2 and southern Plant 3. Plant 2 power is provided to the system by a newly installed 480 volt, 3-phase power pole in central Plant 2 shown on **Figure 3**. Power for Plant 3 is provided to the system by single phase power from a commercial/residential service line, as shown on **Figure 4**. Both systems have security fence installed surrounding the enclosures and propane tank.

Record Drawings for the above-grade injection equipment are included in **Appendix A**. Generally, the industrial grade air compressors provide the compressed air that is mixed with propane supplied by a compressed gas tank. The compressed air line and the propane lines are equipped with pressure regulators, direct-acting solenoid valves, and check valves prior to a mixing chamber where they are mixed at a specified ratio controlled by mass flow controllers. The mixed gas is then directed to a distribution manifold that is segmented into six zones for Plant 2 and three zones for Plant 3. Flow to each manifold is controlled by a solenoid valve that opens according to the zone operational schedule that is set on the human machine interface of the programmable logic controllers housed in a control panel in each system enclosure.

For safety purposes, an in-line sensor is installed immediately downstream of the air-propane mixing point in both systems to monitor the Lower Explosive Limit (LEL) of the mixed gas. If the LEL in the mixed gas line exceeds a predetermined set point, the sensor will send an alarm signal to the programmable logic controller that will shut off flows of compressed air and propane and shut down the system. A second LEL meter is installed in the electrically-classified area of each system to monitor ambient breathing zone air within the enclosure near process equipment and supply lines. The set point for this sensor is 1% of the LEL; should any amount of propane be detected within the breathing zone, each individual system will shut down and an alarm condition will be sent to the operator.

Components of the system are appropriately classified based on the potential for explosive gases by adhering to National Fire Protection Association (NFPA) code 497. The purpose of adhering to NFPA code 497 is to separate the process and electronic equipment that has the potential to spark from

propane storage and distribution to prevent an explosion. Within the equipment enclosure(s), an explosion-proof barrier is used to separate process and electronic equipment from the classified area around the mixed gas line. All equipment located within the classified area that is not isolated by an explosion-proof barrier is considered Class I Division I and designed in accordance with NFPA code 497. The pressure release valve on the propane tank is considered a potential source of explosive vapors, and it triggers the classification of the area around it as Class I Division II. As guidance is not provided to classify a mixed gas line, a conservative approach was taken, and the mixed gas line is also considered a potential source of explosive propane vapors.

2.4 Performance Monitoring Wells

Ten performance monitoring wells were installed to supplement previously installed site monitoring wells that will be used to assess performance of the biosparge system (**Figures 6 and 7**). Performance monitoring wells are located so that each biosparge transect has at least one well approximately every 200 linear feet of transect, and one well within its ROI, upgradient, and downgradient.

Wells are constructed of 2-inch diameter schedule 40 PVC riser pipe with a 2-inch diameter, 5-foot long, 0.010-inch slot stainless steel well screen within the upper portion of the weathered bedrock. Screen depths were selected based on the screened interval of the biosparge points and the depth of the observed weathered bedrock. A silica sand filter pack was placed to 2 feet above the screen. The remaining annular space was filled with a bentonite grout seal. Monitoring wells were set in a stick-up protective cover and labeled. Wells within the ROI of the sparge transects have been equipped with heavy duty j-plug caps to mitigate leakage of air. The caps include a valve to safely relieve pressure prior to well sampling or gauging. Typical monitoring well construction details are provided on **Figure 5**. Boring logs and well construction diagrams for the biosparge performance monitoring wells are included in **Appendix E**.

These performance monitoring wells will be used as part of a performance monitoring plan to assess the reduction of 1,4-dioxane in the weathered bedrock. Details of the performance monitoring plan and results from the first 6 months of operation will be provided in the biosparge performance monitoring report to be submitted in the first quarter of 2021.

3 REFERENCES

Arcadis. 2017a. Approval Request: Lower 1,4-Dioxane Biosparge Pre-Design Study.

Arcadis. 2017b. RACER Lansing Propane Biosparge Pilot Test Summary. May.

Arcadis. 2018a. Biosparge Interim Measures Work Plan: Lower 1,4-Dioxane Biosparge. RACER Trust, Lansing, Michigan Plants 2 and 3. October.

Arcadis. 2018b. RACER Lansing Biosparge Pre-Design Study Results Summary. October.

Arcadis. 2020. RACER Lansing Biosparge System Installation Data Package, 2018-2020. August.

Arcadis. 2021. Lower 1,4-Dioxane Plume Conceptual Site Model Report. RACER Trust, Lansing, Michigan Plant 2. December.

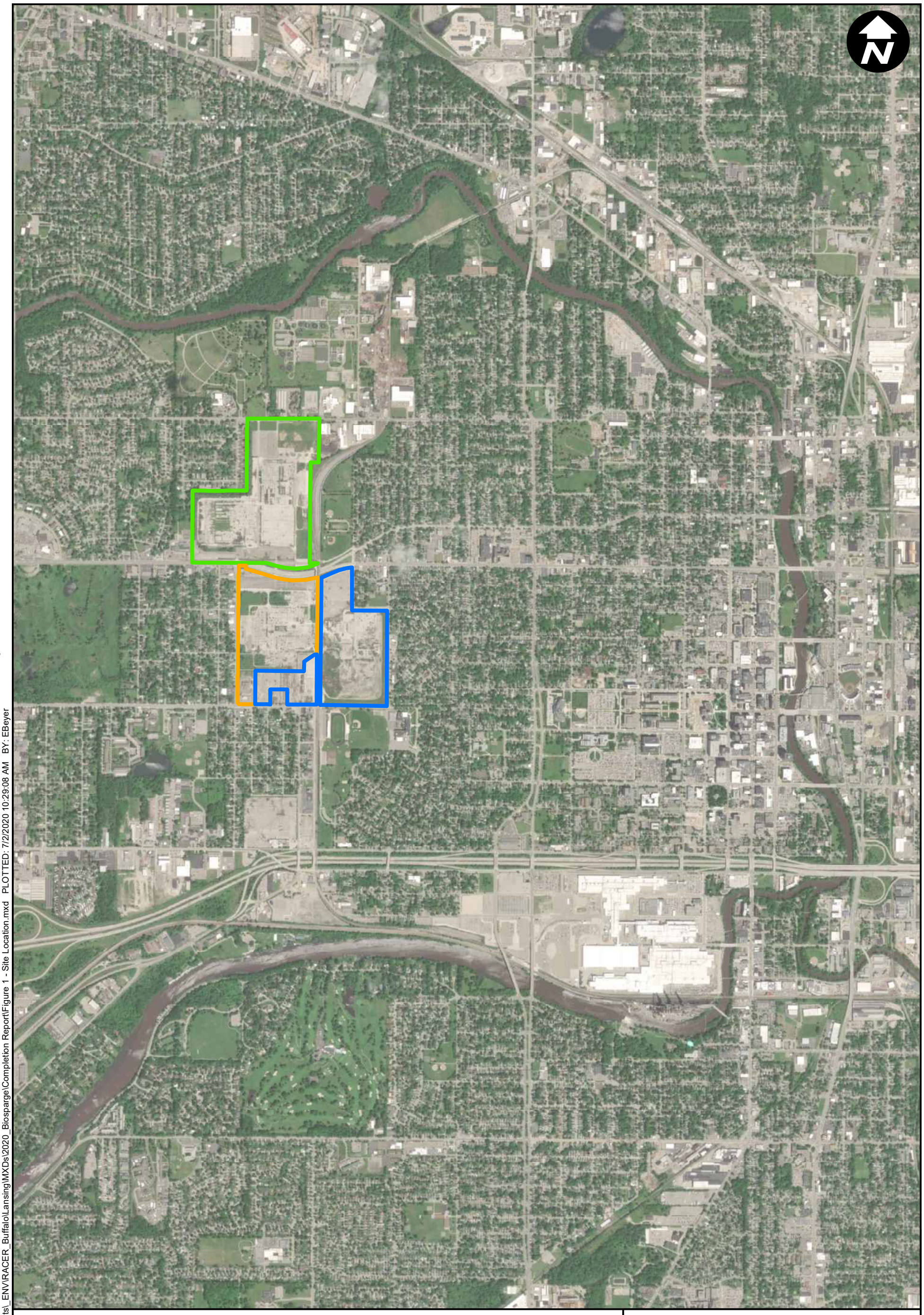
TABLE

Table 1
Biosparge Well Installation Details
Lower 1,4-Dioxane Biosparge Construction Completion Report
Plants 2, 3, and 6 - RACER Lansing Industrial Land Lansing, Michigan

Boring Name	Installation Date	Completed Name	Completed Date	Sparge Zone	1,4- Dioxane (µg/L)	Vertical Aquifer Profile Sample Date	Depth to Weathered Bedrock (ft bgs)	Screen Interval (ft bgs)	Sand Lens 1 Depth (ft bgs)	Sand Lens 2 Depth (ft bgs)
AS-19-07	5/3/2019	AS-19-A01	5/31/2019	0	30	5/3/2020	93	95-105	97	100
AS-19-08	5/7/2019	AS-19-A02	5/31/2019	0			89	92-102	94	99
AS-19-09	5/7/2019	AS-19-A03	5/31/2019	0			88	90-100	92	95
AS-19-10	5/5/2019	AS-19-A04	5/31/2019	0			84	85-95	89	92
AS-19-11	5/4/2019	AS-19-A05	5/31/2019	0			83	85-95	88	91
AS-19-12	5/2/2019	AS-19-A06	5/31/2019	0			83	85-95	88	93
AS-19-13	4/30/2019	AS-19-A07	5/31/2019	0	10	4/30/2019	81.5	83-93	84.75	88
ASP-B01	8/16/2019	AS-19-B01	10/2/2019	6			68	68-78	71	75
ASP-B02	8/9/2019	AS-19-B02	10/2/2019	5	179	8/2/2019	68	68-78	71	75
ASP-B03	8/6/2019	AS-19-B03	10/2/2019	4	200	7/30/2019	69	68-78	71	75
PSP-B01	8/14/2019	AS-19-B04	10/2/2019	6			70	68-78	71	75
PSP-B02	8/1/2019	AS-19-B05	10/2/2019	5			70	68-78	72	75
PSP-B03	8/20/2019	AS-19-B06	10/2/2019	4			77	74-84	77	82
PSP-B04	8/19/2019	AS-19-B07	10/2/2019	6	180	8/13/2019	72	71-81	74	77
PSP-E01	9/13/2019	AS-19-E01	10/19/2019	2			57	65-75	66	72
PSP-E02	9/14/2019	AS-19-E02	10/19/2019	1			61.5	65-75	66	73
PSP-E03	9/14/2019	AS-19-E03	10/19/2019	3	54	9/14/2019	62	63-73	65	70
PSP-E04	9/15/2019	AS-19-E04	10/19/2019	2			60.5	65-75	66	72
PSP-E05	9/16/2019	AS-19-E05	10/19/2019	1			64	65-75	68	72
PSP-E06	9/17/2019	AS-19-E06	10/19/2019	3	<1	9/16/2019	61	65-75	67	72
PSP-E07	9/24/2019	AS-19-E07	10/19/2019	2			60	66-76	68	74
PSP-E08	9/25/2019	AS-19-E08	10/19/2019	1			63	68-78	69	76
PSP-E09	9/18/2019	AS-19-E09	10/16/2019	3	<1	9/18/2019	61	64-74	65	71
PSP-E10	9/17/2019	AS-19-E10	10/16/2019	2			66	67-77	69	73
PSP-E11	8/12/2019	AS-19-E11	10/19/2019	5			64	65-75	68	73
PSP-E12	8/11/2019	AS-19-E12	10/19/2019	3	88	8/11/2019	65	65-75	68	73
PSP-F12	9/13/2019	AS-19-F01	9/29/2019	6	41	9/16/2019	63.5	65-75	68	73
CSP-F01	8/7/2019	AS-19-F02	9/29/2019	5	110	8/7/2019	63	65-75	68	73
ASP-F03	7/30/2019	AS-19-F03	9/29/2019	4	350	7/26/2019	66	66-76	69	74
ASP-F02	7/24/2019	AS-19-F04	9/29/2019	6	64	7/24/2019	64	66-76	69	74
ASP-F01	7/15/2019	AS-19-F05	9/29/2019	5			58	67-77	69	75
PSP-F11	7/16/2019	AS-19-F06	9/29/2019	4	165	7/16/2019	63	65-75	68	73
PSP-F10	7/16/2019	AS-19-F07	9/29/2019	6			61.5	67-77	69	75
PSP-F09	8/7/2019	AS-19-F08	9/29/2019	5			59.5	67.5-77.5	69	76
PSP-F08	8/8/2019	AS-19-F09	9/29/2019	4			55	65-75	68	73
PSP-F07	8/9/2019	AS-19-F10	9/29/2019	6			64	65-75	68	73
PSP-F06	8/10/2019	AS-19-F11	9/29/2019	5			63	65-75	68	73
PSP-F05	8/10/2019	AS-19-F12	9/29/2019	4			64	65-75	68	73
AS-17-05	11/15/2017	AS-17-G01	11/30/2017	1			60	65-75	67	73.5
AS-17-04	11/15/2017	AS-17-G02	11/30/2017	2			59.5	64-74	65	72
AS-17-03	11/14/2017	AS-17-G03	11/29/2017	1			62.5	65-75	68.5	71.5
PSP-G01	7/15/2019	AS-19-G04	9/29/2019	3			58.5	65-75	68	73
ASP-G02	7/12/2019	AS-19-G05	9/29/2019	2			55	65-75	68	73
ASP-G03	7/14/2019	AS-19-G06	9/29/2019	1			50.5	64-74	66	71
CSP-G02	7/23/2019	AS-19-G07	9/29/2019	3	470	7/23/2019	50	64-74	64.5	68
PSP-G02	9/11/2019	AS-19-G08	10/19/2019	2				60-70	62	69
PSP-G03	9/12/2019	AS-19-G09	10/19/2019	1				65-75	66	72
PSP-G04	9/12/2019	AS-19-G10	10/19/2019	3	20	9/12/2019		65-75	66	73

Acronym and Abbreviations:
µg/L = microgram(s) per liter
ft bgs = feet below ground surface

FIGURES



PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

0 1,500 3,000

SCALE IN FEET

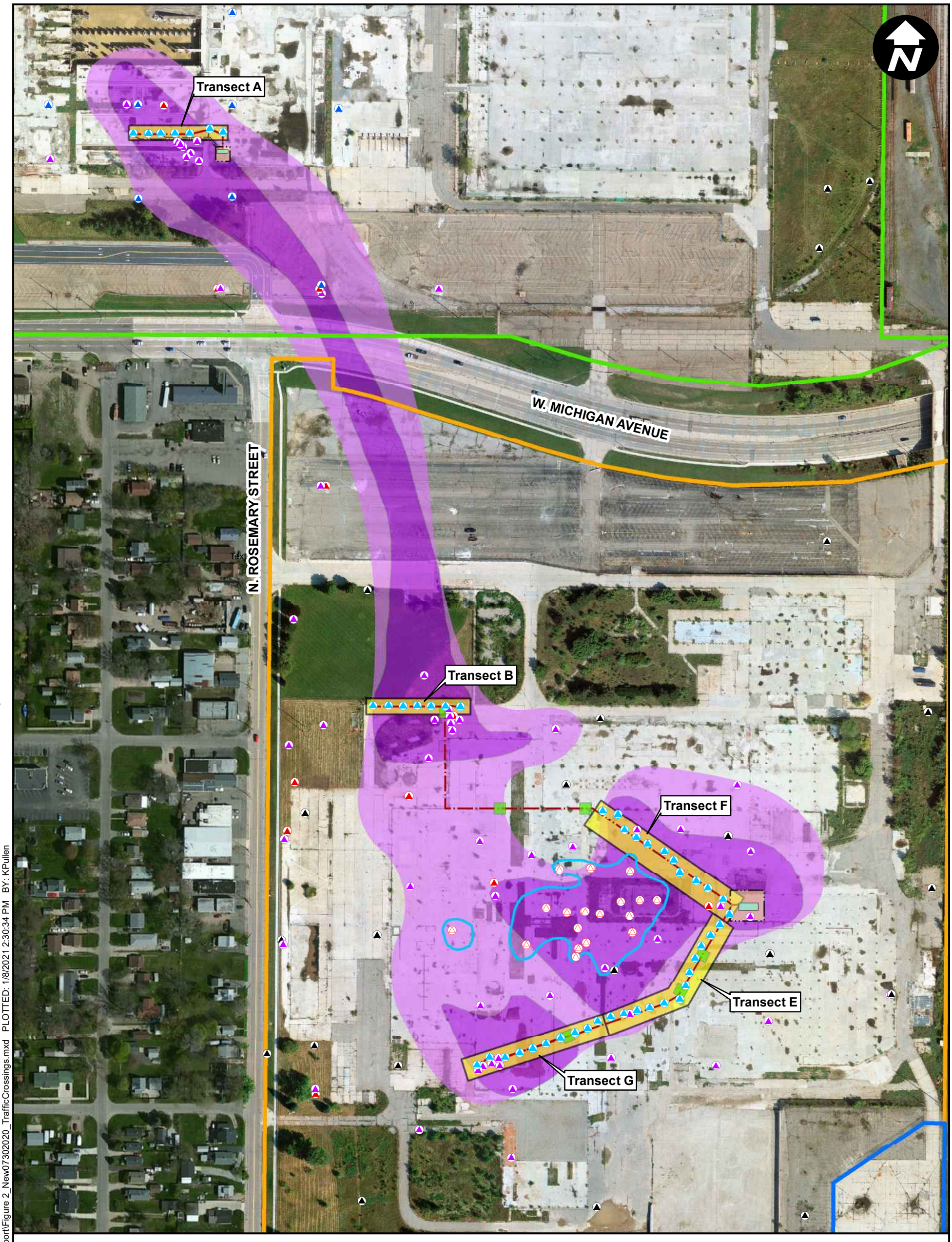
RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

SITE LOCATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: J. SALING PROJECT NUMBER: B0064479.2019.03500 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
\\arcadis-us.com\app\GIS\GISProjects_ENV\RACER_Buffalo\Lansing\MXDs\2020_Biosparge\Completion Report\Figure 1 - Site Location.mxd PLOTTED: 7/2/2020 10:29:08 AM BY: EBeyer



WELLS
- BIOSPARGE
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- DEEP OVERBUDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- LNAPL PLUME
- SYSTEM BUILDING
- FENCE
- FENCED AREA
- LOWER 1,4-DIOXANE IMPACTS > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > 7.2 µg/L

- 1-INCH CONVEYANCE HOSE
- HOSE
- TRAFFIC CROSSING

PLANT BOUNDARIES
- PLANT 2
- PLANT 3
- PLANT 6

0 200 400
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

BIOSPARGE SITE PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE **2**

DRAFT

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
T:_ENV\RACER\Buffalo\MXDs\2020_Biosparge\Completion Report\Figure 2_New07302020_TrafficCrossings.mxd PLOTTED: 1/8/2021 2:30:34 PM BY: KPullen

W. MICHIGAN AVENUE

N. ROSEMARY STREET

AS-19-B04
MW-20-126
AS-19-B02
AS-19-B05
AS-19-B06
AS-19-B01
AS-19-B07
AS-19-B03
TW-15-12
TW-14-04
TW-15-13
MW-13-43
PW-14-02
TW-13-42
TW-14-05
MW-20-127
MW-13-45
MW-16-85
AS-19-F01
AS-19-F02
MW-20-128
MW-19-116
MW-16-84
AS-19-F04
AS-19-F03
AS-19-F06
MW-19-117
MW-16-82
AS-19-F05
MW-17-86
AS-19-F08
AS-19-F07
AS-19-F10
AS-19-F11
AS-19-F09
MW-14-61
MW-19-115
MW-15-72
AS-19-F12
MW-19-120
AS-19-E11
AS-19-E12
MW-19-124
AS-19-E09
AS-19-E10
MW-16-81
AS-19-E07
AS-19-E08
MW-19-122
AS-19-E03
AS-19-E05
AS-19-E06
AS-19-E01
MW-20-129
AS-19-E04
AS-19-G07
AS-19-G09
MW-19-121
MW-16-79
AS-19-G05
AS-19-G10
AS-17-G03
AS-19-E02
AS-19-G08
AS-17-G02
AS-19-G06
MW-16-74
AS-19-G04
MW-16-78
AS-17-G01
TW-14-02
AS-17-05
AS-16-01
TW-14-01
PW-14-01
AS-16-02
TW-16-01
MW-19-123
MW-16-77
MW-16-75

WELLS
- BIOSPARGE
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- LNAPL PLUME
- ELECTRIC FEATURE
- OVERHEAD ELECTRIC
- SYSTEM BUILDING
- FENCE
- FENCED AREA
- 1-INCH CONVEYANCE HOSE

- LOWER 1,4-DIOXANE IMPACTS > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > 7.2 µg/L

SPARGE ZONES
- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5
- ZONE 6

Plant Boundaries
- PLANT 2
- PLANT 3
- PLANT 6

0 170 340
SCALE IN FEET

DRAFT

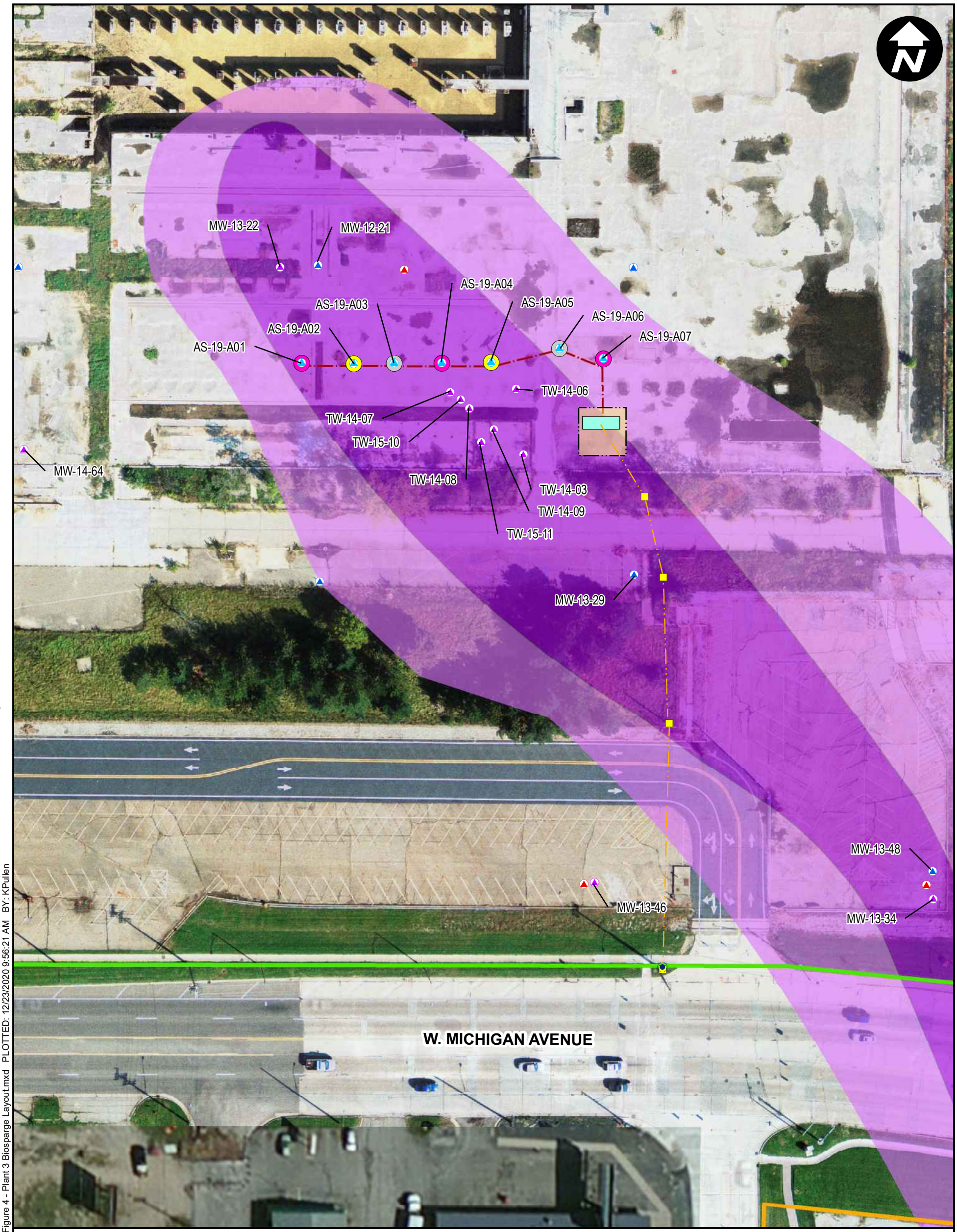
RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 2 BIOSPARGE ZONE LAYOUT

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3

CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: B006447 9.2019 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENV\RACER\Buffalo\MXDs\2020_Biosparge\Completion Report\Figure 3 - Plant 2 Biosparge Layout.mxd PLOTTED: 12/23/2020 9:54:27 AM BY: KPullen



WELLS
- BIOSPARGE
- DEEP OVERBUDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- ELECTRIC FEATURE
- POWER DROP
- OVERHEAD ELECTRIC
- SYSTEM BUILDING
- FENCE
- FENCED AREA
- 1-INCH CONVEYANCE HOSE
- LOWER 1,4-DIOXANE IMPACTS > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > 7.2 µg/L

SPARGE ZONES
- ZONE 1
- ZONE 2
- ZONE 3

PLANT BOUNDARIES
- PLANT 2
- PLANT 3

0 60 120
SCALE IN FEET

DRAFT

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 3 BIOSPARGE SYSTEM LAYOUT

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4

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
T:_ENV\RACER\Buffalo\MXDs\2020_Biosparge\Completion Report\Figure 4 - Plant 3 Biosparge Layout.mxd PLOTTED: 12/23/2020 9:56:21 AM BY: KPullen

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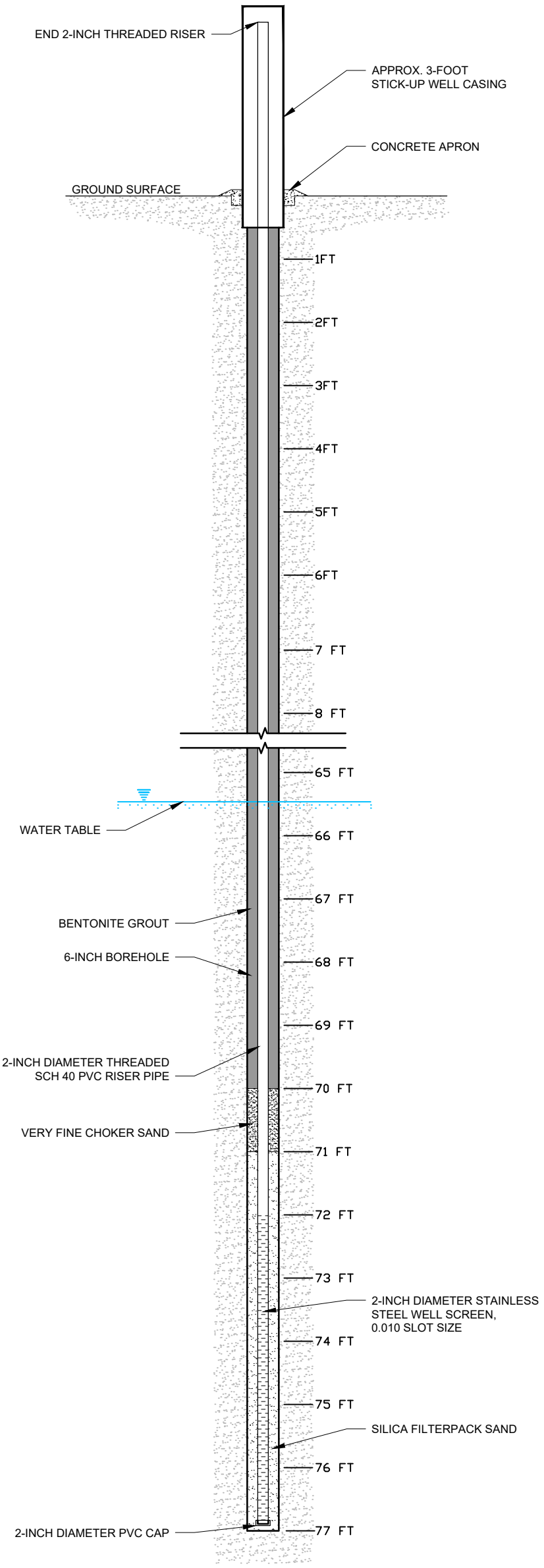
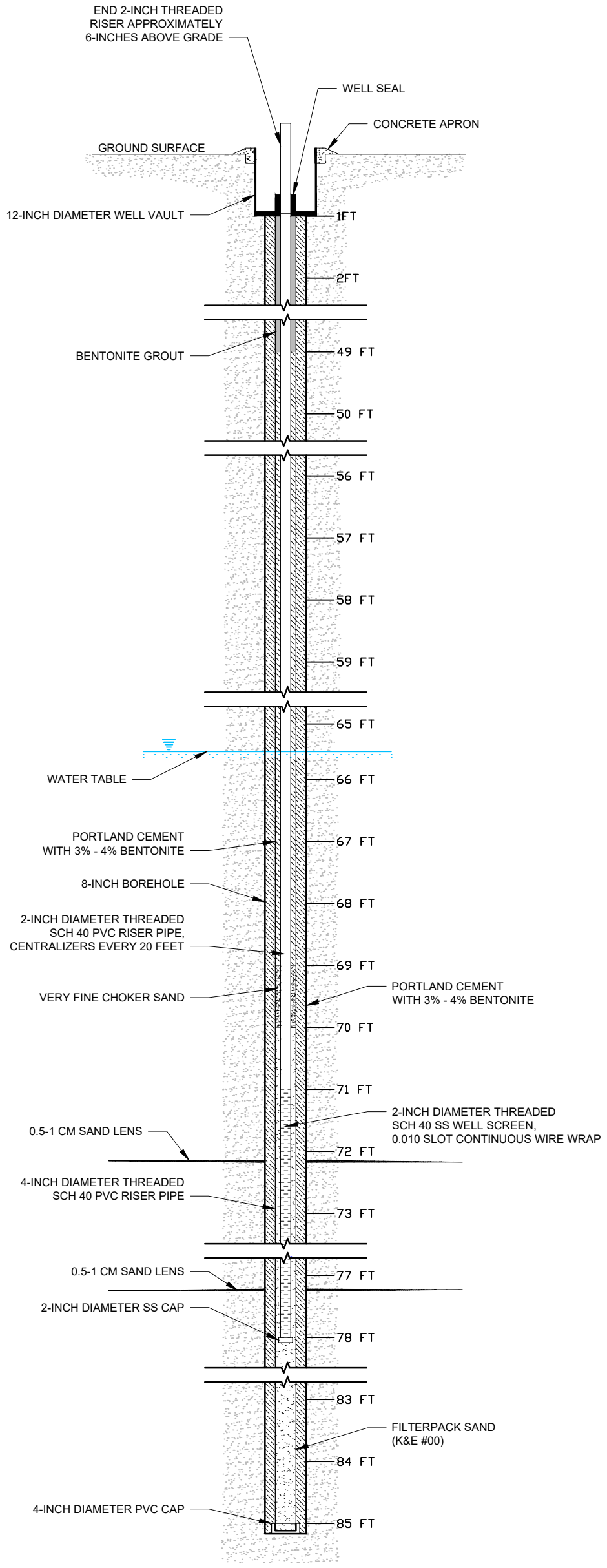


TYPICAL MONITORING WELL DETAIL



TYPICAL BIOSPARGE POINT DETAIL

ABBREVIATIONS:

CM	CENTIMETER
FT	FOOT
PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
SS	STAINLESS STEEL

RACER TRUST
LANSING, MICHIGAN

TYPICAL BIOSPARGE POINT AND MONITORING WELL CONSTRUCTION DETAILS

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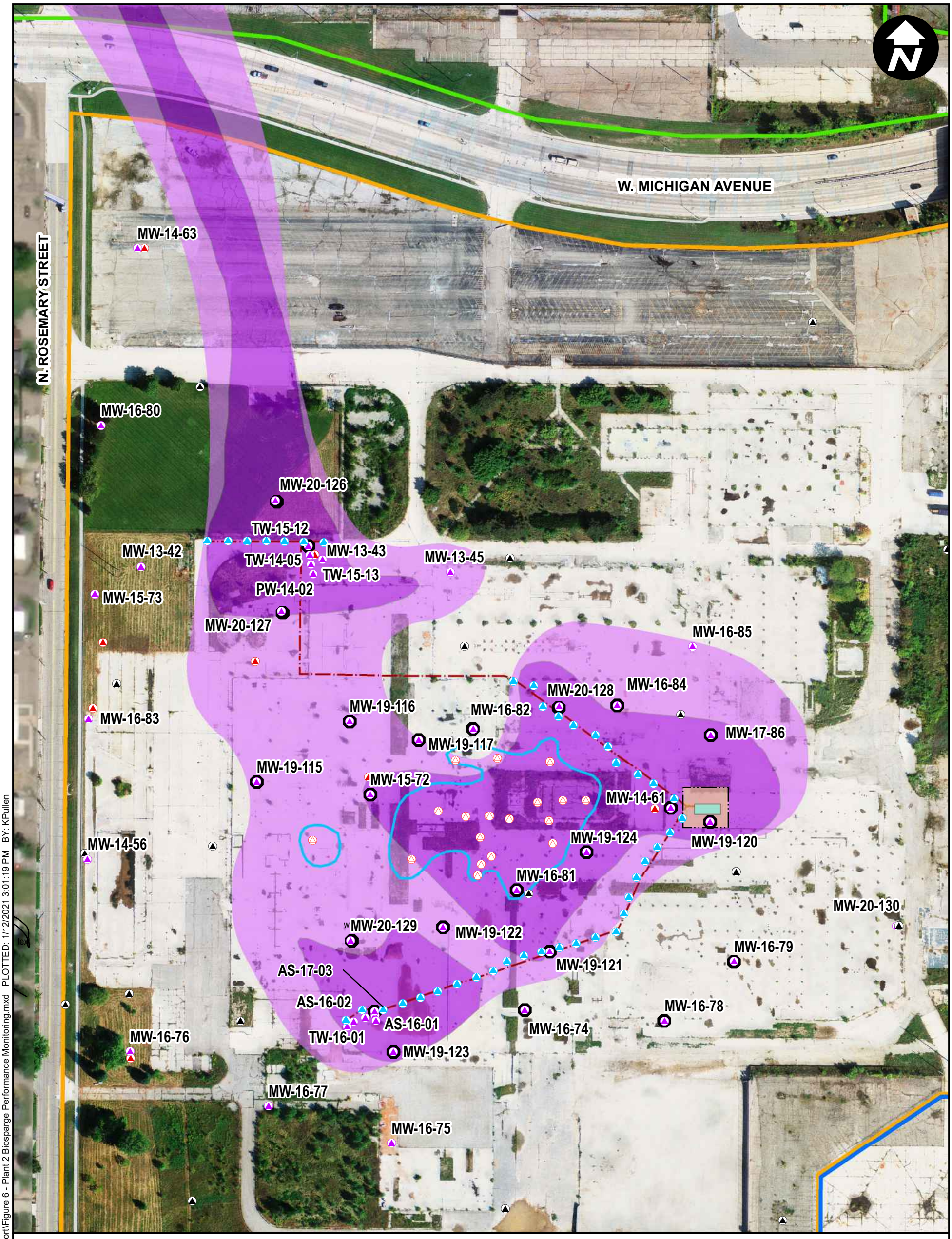
FIGURE
5



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T:_ENV\RACER\Buffalo\MXDs\2020_Biosparge\Completion Report\Figure 6 - Plant 2 Biosparge Performance Monitoring.mxd PLOTTED: 1/12/2021 3:01:19 PM BY: KPullen

WELLS

- BIOSPARGE
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- BIOSPARGE PERFORMANCE MONITORING WELL
- FENCE
- SYSTEM BUILDING
- FENCED AREA
- LNAPL PLUME
- 1-INCH CONVEYANCE HOSE
- LOWER 1,4-DIOXANE IMPACTS > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > 7.2 µg/L

PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

0 150 300
SCALE IN FEET

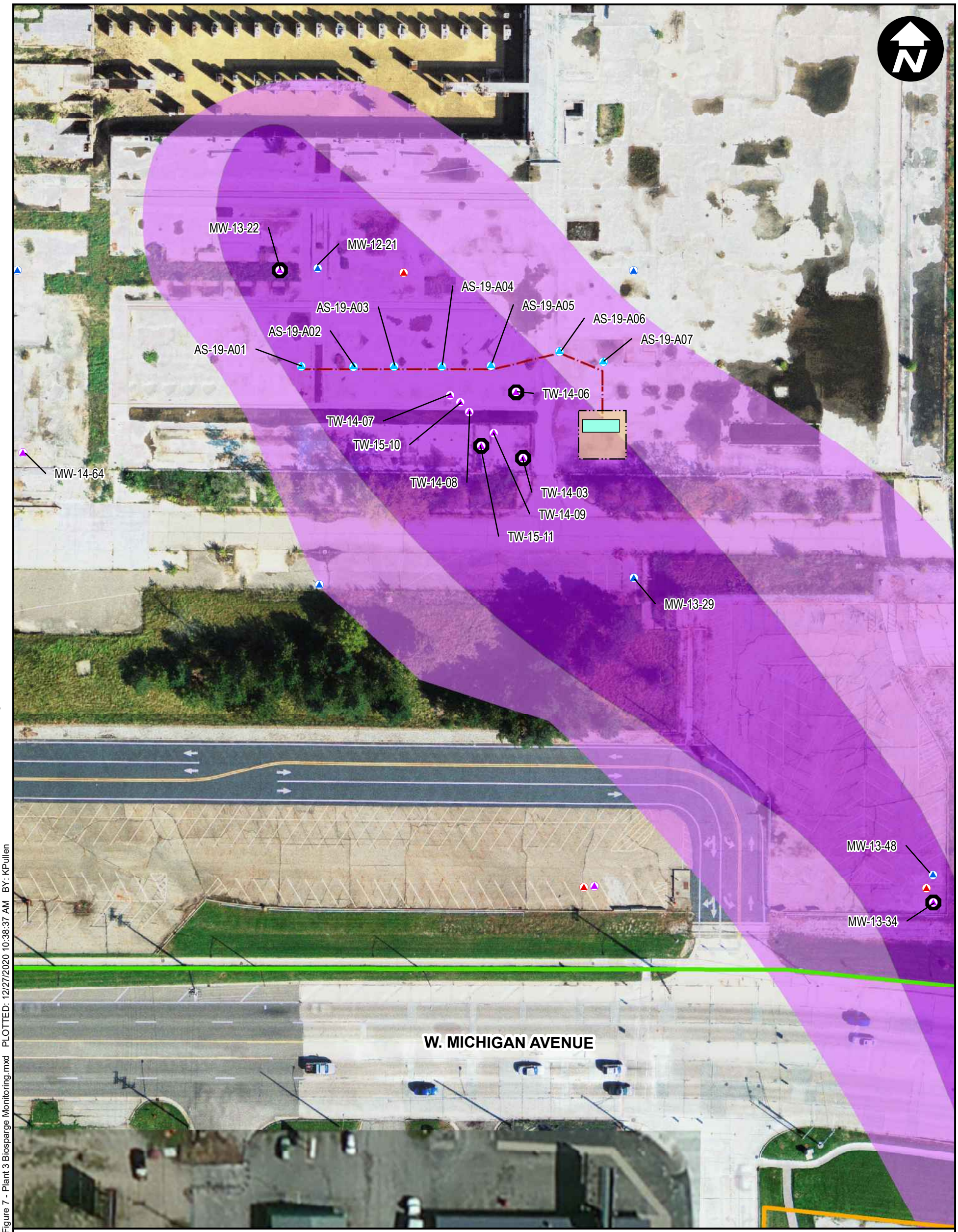
DRAFT

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 2 BIOSPARGE SYSTEM PERFORMANCE MONITORING WELLS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
6



WELLS

- BIOSPARGE
- DEEP OVERBUDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- LOWER 1,4-DIOXANE IMPACTS > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > 7.2 µg/L
- PERFORMANCE MONITORING WELL
- SYSTEM BUILDING
- FENCE
- FENCED AREA
- 1-INCH CONVEYANCE HOSE

PLANT BOUNDARIES

- PLANT 2
- PLANT 3

0 50 100

SCALE IN FEET

DRAFT

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 3 BIOSPARGE SYSTEM PERFORMANCE MONITORING WELLS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
7

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
T:_ENV\RACER\Buffalo\MXDs\2020_Biosparge\Completion Report\Figure 7 - Plant 3 Biosparge Monitoring.mxd PLOTTED: 12/27/2020 10:38:37 AM BY: KPullen

APPENDIX A

Record Drawings

CITY: DIV/GROUP: DB: A.SANCHEZ LD: PIC: PM: R.CHRISTENSEN TM: LYR:ON=* OFF=*REF*
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PROJECTNAME: 211001F02
IMAGES:
XREFS:
X-BDR-LANSING-RECDWG

SITE HEALTH AND SAFETY

A. Contractor must comply with all applicable local, state, and federal health and safety codes at all times. All Contractor and their subcontractor personnel shall be 40-hour OSHA HAZWOPER trained and current with all applicable refresher training.

B. The constituents of concern that have been detected in the Site's soil and groundwater include 1,4-Dioxane, Per and Poly Fluorinated Alkyl Substances, Volatile Organic Compounds, Semi-Volatile Organic Compounds, and Metals. Additional information regarding the types and concentrations of contaminants at the Site will be provided in the Arcadis HASP.

C. It is Contractor's responsibility for educating its supervisors, employees, and subcontractors of all health and safety requirements. Contractor is responsible for worker safety and maintenance of traffic during construction. Contractor shall maintain a Health and Safety Plan on-site during construction.

D. NO SMOKING will be permitted at any time on the facility property.

WORK SEQUENCE

A. Contractor is required to determine the method of construction and detailed work sequence, within the general terms and constraints of these Means and methods.

B. Contractor shall provide a construction schedule to Arcadis one week after notice to proceed. The construction schedule shall indicate procurement, start, duration, and completion dates of the various tasks associated with the completion of the work. The schedule shall be updated as necessary to reflect actual work sequence. If the schedule for various tasks is delayed, a description of how that time will be made up shall be provided so that the overall completion date is not impacted.

SCOPE OF WORK

The scope of work consists of constructing conveyance lines for a biosparging system. The building containing the treatment system and the remediation wells will have been already installed at the time of the work. Selected Contractor shall install hoses; procure and install soil cover, well head piping/fittings, traffic controls and crossings, security fencing, and all other components described herein to complete the system.

The scope of work shown on this sheet does not represent to complete scope of work. Please see document in Attachment A for complete scope of work.

A. PIPING

1. The Contractor shall install all new piping and hosing, and connect to all Biosparge wells. All piping and hosing will be placed aboveground and terminate at the designated wellheads as Indicated in Construction Drawing (D-4 and D-5).

2. The Contractor shall ensure that conveyance lines buried in a common hose corridor lay flat on the concrete slab.

B. RESTORATION OF SURFACES AND FENCING

1. All types of surfaces, pavement, sidewalks, curbs, gutters, culverts and other features such as fencing disturbed, damaged, or destroyed during the performance of this work shall be restored. The quality of the materials and the work used in restoration shall produce a surface or feature equivalent or superior to the prior existing condition subject to approval by Arcadis and Racer Trust .

C. CLEANUP

1. Contractor shall make every effort to prevent generation of dust and liquids during construction. Contractor shall be responsible for any damage caused to the facilities onsite that was a result of the construction activities. A clean work area shall be maintained at the end of each working day and at the completion of the project.

2. All construction debris shall be disposed of after the completion of work, including but not limited to soil, rubble, asphalt, concrete, pipe, etc. The Contractor's bid shall include costs for disposal of all construction debris at a FDEP-approved, licensed waste disposal/treatment facility.

GENERAL

1. The details for the fence, site preparation, and other non-critical items are only in the Attachment A text. Only key scope of work items are shown on the construction drawings.

2. Prior to the beginning of fence post installation, the Contractor shall meet Arcadis to review available utility maps and verify the locations of all utilities. Contractor shall contact State One Call (MISS DIG) prior to any underground activities. Damage to underground utilities or pipelines caused by the Contractor shall be repaired at the expense of the Contractor.

INDEX TO DRAWINGS:

D-1 GENERAL NOTES, P&ID LEGEND, AND DRAWING INDEX
D-2 SITE LOCATION AND ACCESS
D-3 BIOSPARGE SYSTEM 1-INCH Ø HOSE LAYOUT
D-4 BIOSPARGE SYSTEM WELLHEAD DETAILS
D-5 BIOSPARGE SYSTEM HOSE CORRIDOR CROSS SECTION DETAILS
D-6 BIOSPARGE SYSTEM P&ID 1-INCH Ø HOSE LAYOUT
D-7 ALTERNATE BID: BIOSPARGE PIPING TRENCH DETAILS

P&ID LEGEND:

- PROCESS LINE
- FLOW DIRECTION
- GROUND JOINT
- TRANSITION FITTING
- QUICK CONNECT FITTING
- HOSE BARB

ABBREVIATIONS:

Ø	DIAMETER
PI	PRESSURE INDICATOR
P&ID	PIPING AND INSTRUMENTATION DIAGRAM
PSI	POUNDS PER SQUARE INCH
SCFM	STANDARD CUBIC FEET PER MINUTE
TYP.	TYPICAL

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Professional Engineer's Name: J. SALING
Professional Engineer's No.:

State	Date Signed	Project Mgr.
MI		R.CHRISTENSEN
Designed by	Drawn by	Checked by
E.FEENSTRA	A.SANCHEZ	A.LORENZ

ARCADIS Design & Consultancy for natural and built assets

ARCADIS OF MICHIGAN, LLC.

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GENERAL NOTES AND P&ID LEGEND

ARCADIS Project No.
30006870.04500

Date
DECEMBER 2020

ARCADIS
28550 CABOT DRIVE
SUITE 500
NOVI, MICHIGAN 48377
TEL. 248.994.2240

D-1

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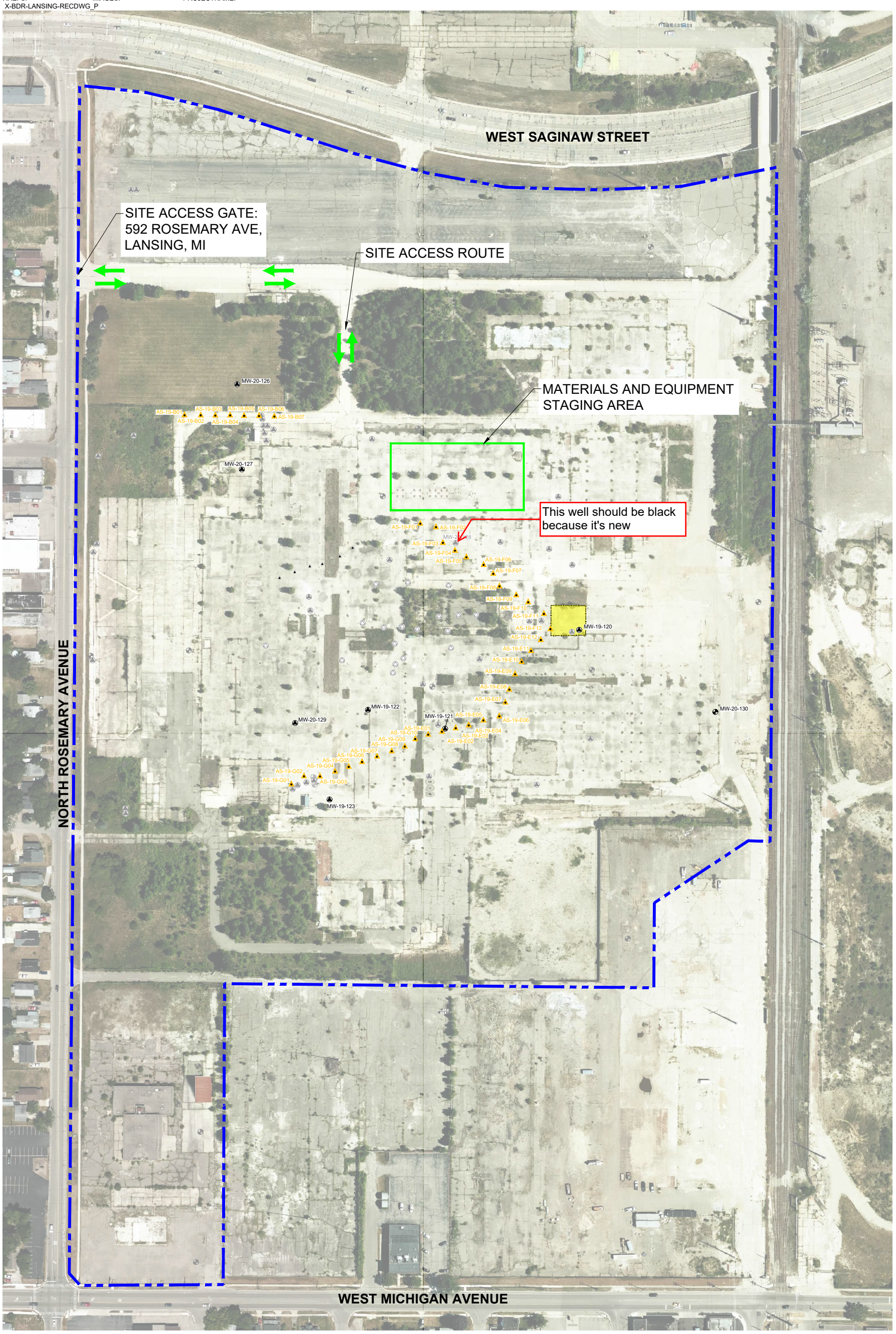

AREA LOCATION
MICHIGAN

0 100' 200'
APPROXIMATE SCALE IN FEET

LEGEND:
- PLANT 2 BOUNDARY
- SPARGE POINT (INSTALLED BY OTHERS)
- BUILDING AREA
- FENCE
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- BEDROCK OR WEATHERED BEDROCK MONITORING WELL
- UNCOMMISSIONED SPARGE POINT

D-2

ARCADIS Project No.
30006870.04500

Date
DECEMBER 2020

ARCADIS
28550 CABOT DRIVE
SUITE 500
NOVI, MICHIGAN 48377
TEL. 248.994.2240

SITE LOCATION AND ACCESS BIOSPARGE SYSTEM

RACER LANSING • 2801 W. SAGINAW STREET, LANSING, MI 48917
RECORD DRAWING

ARCADIS | Design & Consultancy for natural and built assets
ARCADIS OF MICHIGAN, LLC.

Professional Engineer's Name
J. SALING
Professional Engineer's No.

State	Date Signed	Project Mgr.
MI		R.CHRISTENSEN
Designed by	Drawn by	Checked by
E.FEENSTRA	A.SANCHEZ	A.LORENZ

No.	Date	Revisions	By	Ckd
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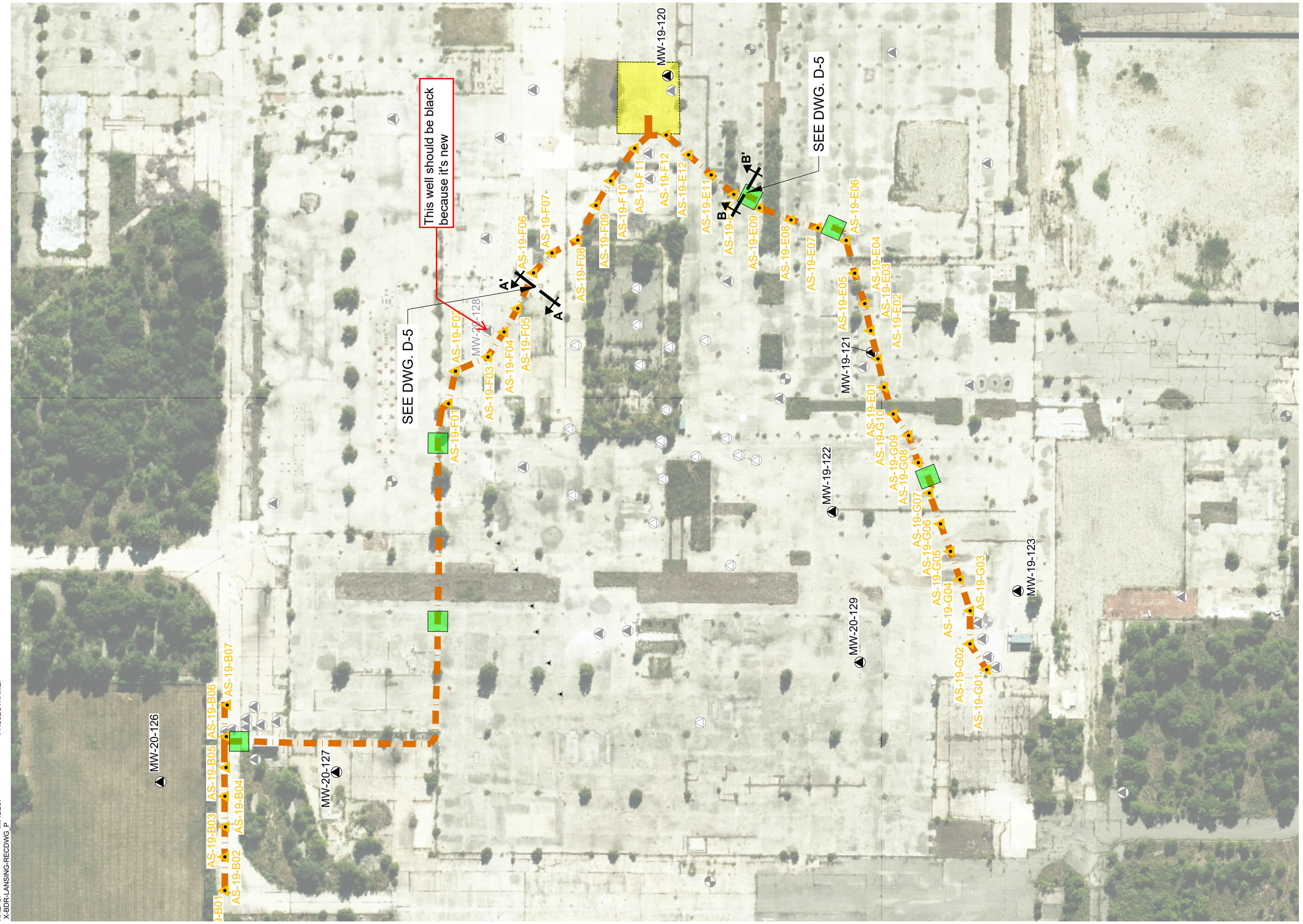

LEGEND:
- SPARGE POINT (INSTALLED BY OTHERS)
- 1-INCH Ø CONVEYANCE HOSE
- TRAFFIC CROSSING
- BUILDING AREA
- FENCE
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- BEDROCK OR WEATHERED BEDROCK MONITORING WELL
- UNCOMMISSIONED SPARGE POINT

NOTE:
TRAFFIC BARRELS ARE PLACED EVERY 30 FEET ALONG HOSE CORRIDOR.

0 50' 100'
APPROXIMATE SCALE IN FEET

SCALE(S) AS INDICATED

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Professional Engineer's No.:
Designed by: E.FEENSTRA | Drawn by: A.SANCHEZ | Checked by: A.LORENZ
Project Mgr: R.CHRISTENSEN | Date Signed | Stamp

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RECORD DRAWING

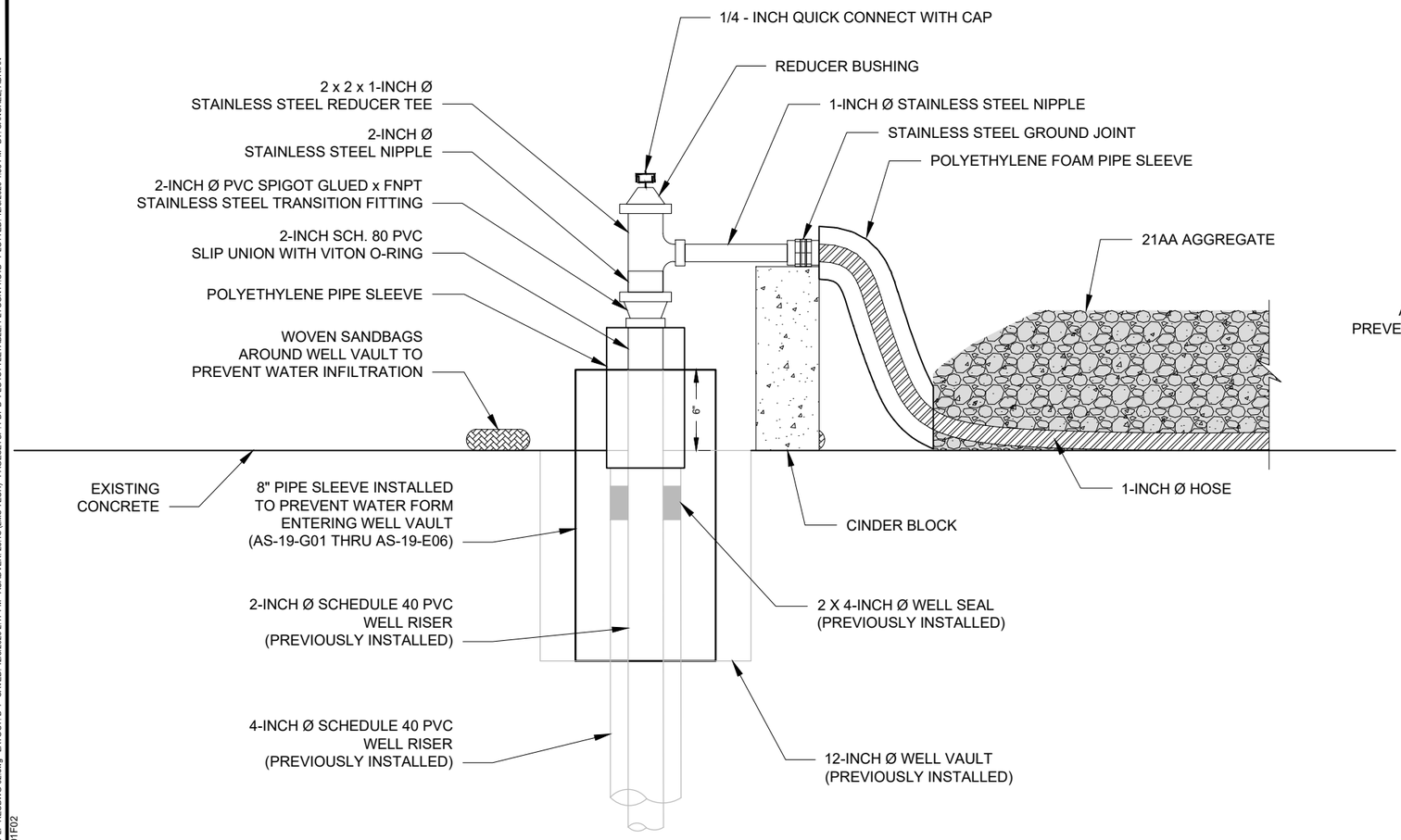
BIOSPARGE SYSTEM 1-INCH Ø HOSE LAYOUT

ARCADIS OF MICHIGAN, LLC.

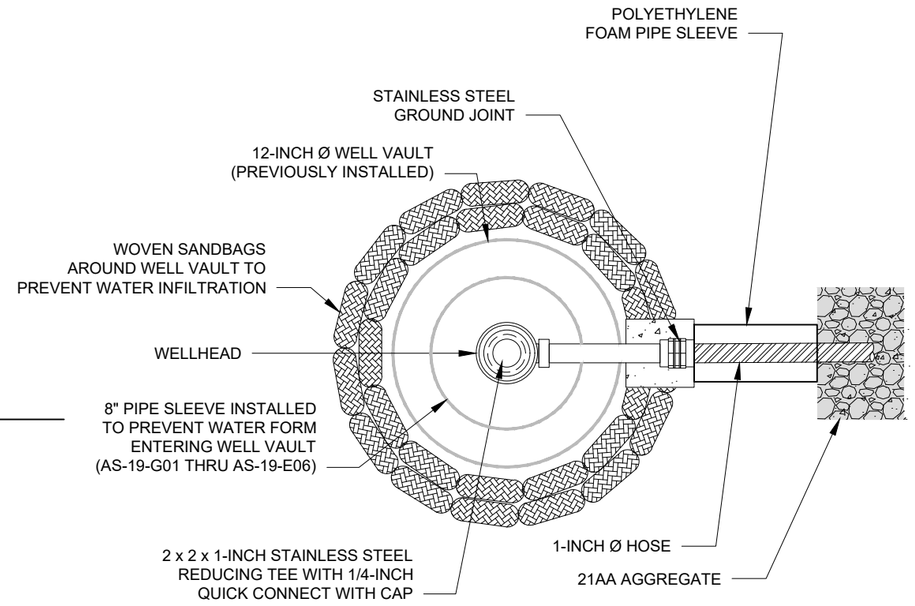
ARCADIS Project No.: 30006870.04500
Date: DECEMBER 2020

ARCADIS
28550 CABOT DRIVE
SUITE 500
NOVI, MICHIGAN 48377
TEL. 248.994.2240

D-3



PROFILE VIEW



PLAN VIEW

NOTES:

1. THREAD SEALANT APPLIED TO ALL THREADED CONNECTIONS.
2. STABILIZED 2-INCH Ø PVC WELL RISER WHEN CONNECTING WELL HEAD ASSEMBLY SUCH THAT WELL RISER DOES NOT TURN.

CITY: DIV/GROUP: DB: A.SANCHEZ LD: PIC: PM: R.CHRISTENSEN TM: LYR:ON=*;OFF=*REF*
C:\Users\alsanchez\BIM 360\Acadis\ANA - RACER TRUST\Project Files\RACER LANSING PLANTS 2,3,&6\2020\30006870\01-DWG\RT-LP-RECDWG-02.dwg LAYOUT: D-4 SAVED: 12/3/2020 2:17 PM ACADVER: 23.1S (LMS TECH) PAGESETUP: PDF B PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 12/3/2020 4:56 PM BY: SANCHEZ, ADRIAN
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Professional Engineer's Name: **J. SALING**
Professional Engineer's No.

State	Date Signed	Project Mgr.
MI		R.CHRISTENSEN
Designed by	Drawn by	Checked by
E.FEENSTRA	A.SANCHEZ	A.LORENZ

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RECORD DRAWING

BIOSPARGE SYSTEM WELLHEAD DETAILS

ARCADIS Project No.
30006870.04500

Date
DECEMBER 2020

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NOVI, MICHIGAN 48377
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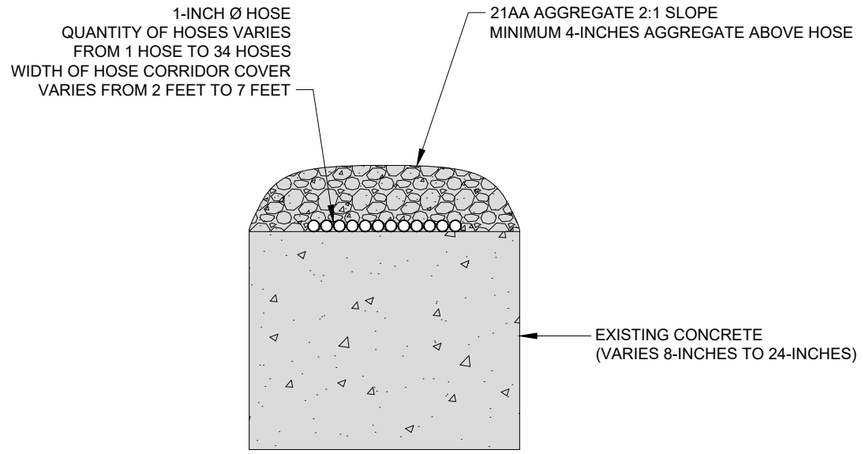
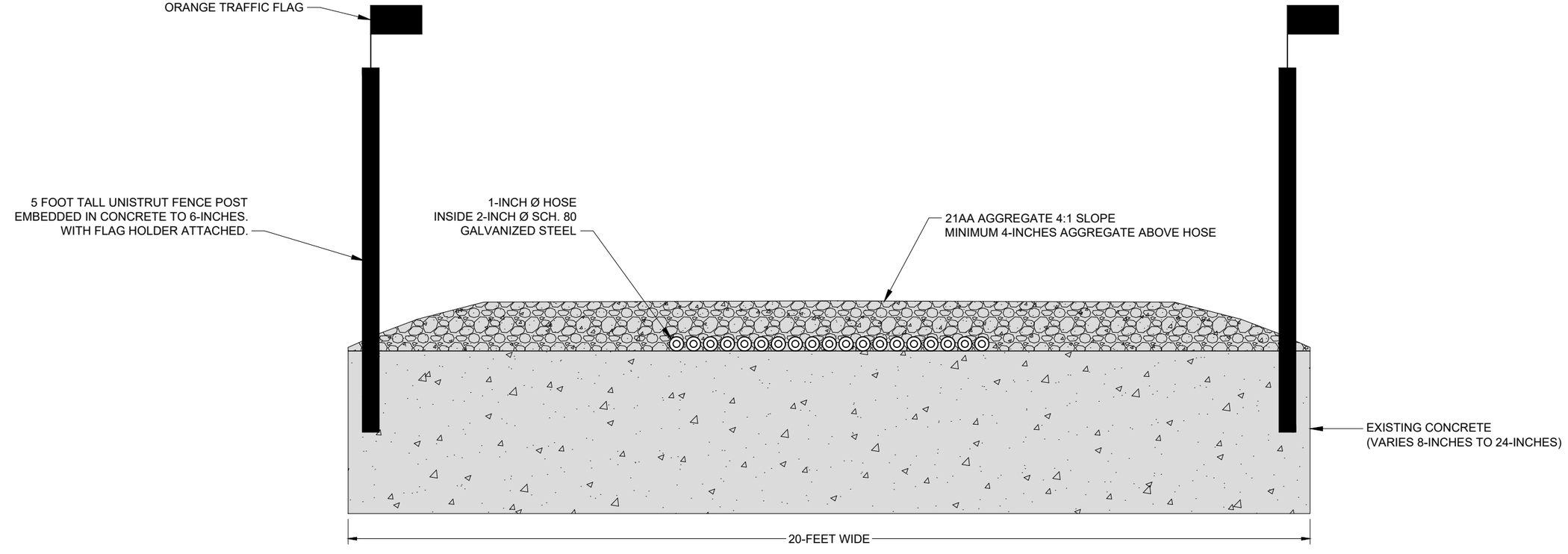
D-4



A-A' TYPICAL 1-INCH DIA ABOVE-GRADE HOSE CORRIDOR DETAIL



B-B' TYPICAL TRAFFIC CROSSING DETAIL

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HOSE CORRIDOR CROSS SECTIONS BIOSPARGE SYSTEM

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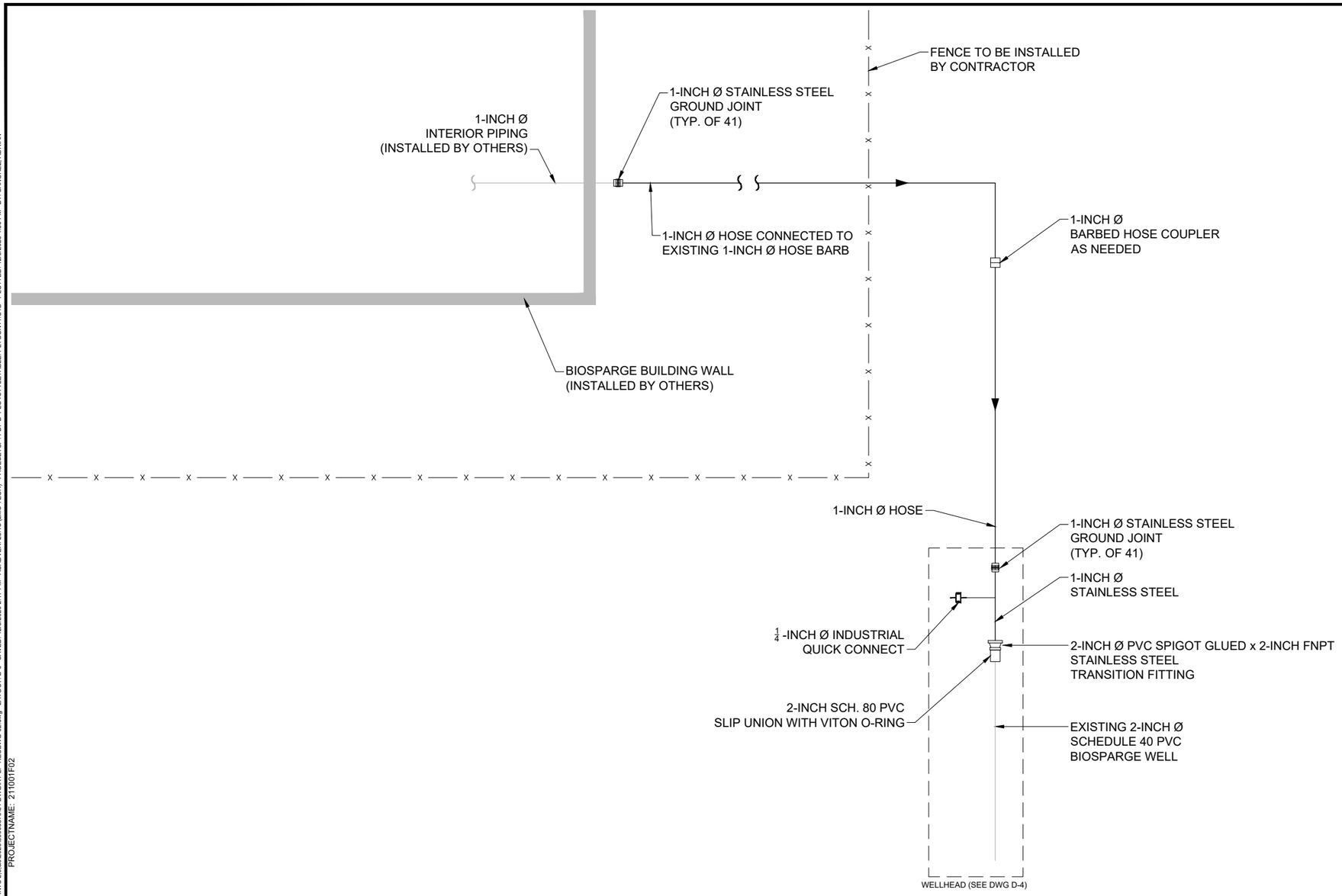

1-INCH Ø CONVEYANCE LINE DETAIL (TYP. OF 41)

NOTE:

1. SEE P&ID LEGEND AND ABBREVIATIONS ON DWG D-1.

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RECORD DRAWING

BIOSPARGE SYSTEM 1-INCH Ø HOSE LAYOUT P&ID

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D-6

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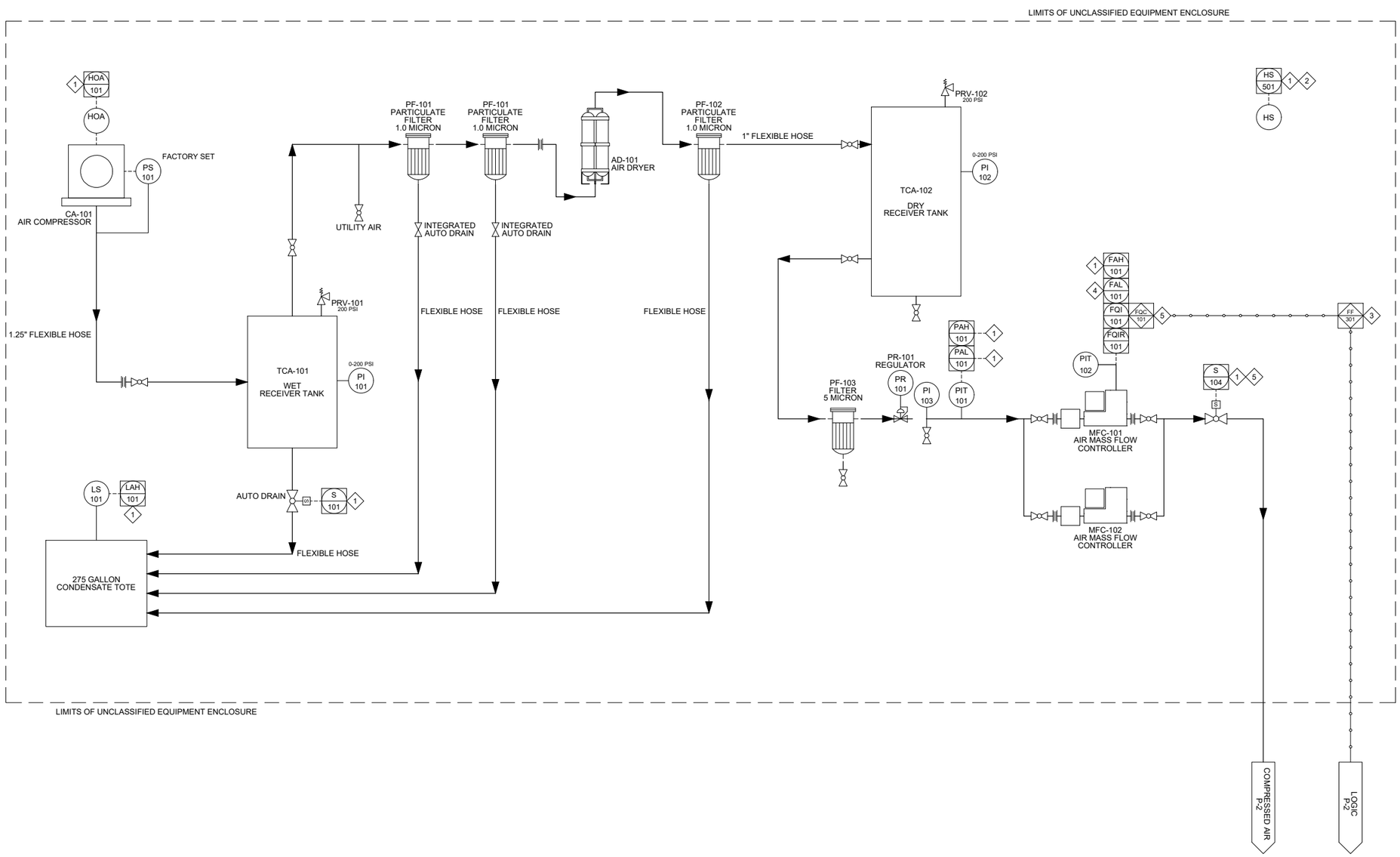

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COMPRESSED AIR PIPING & INSTRUMENTATION DIAGRAM BIOSPARGE SYSTEM

ARCADIS Project No.
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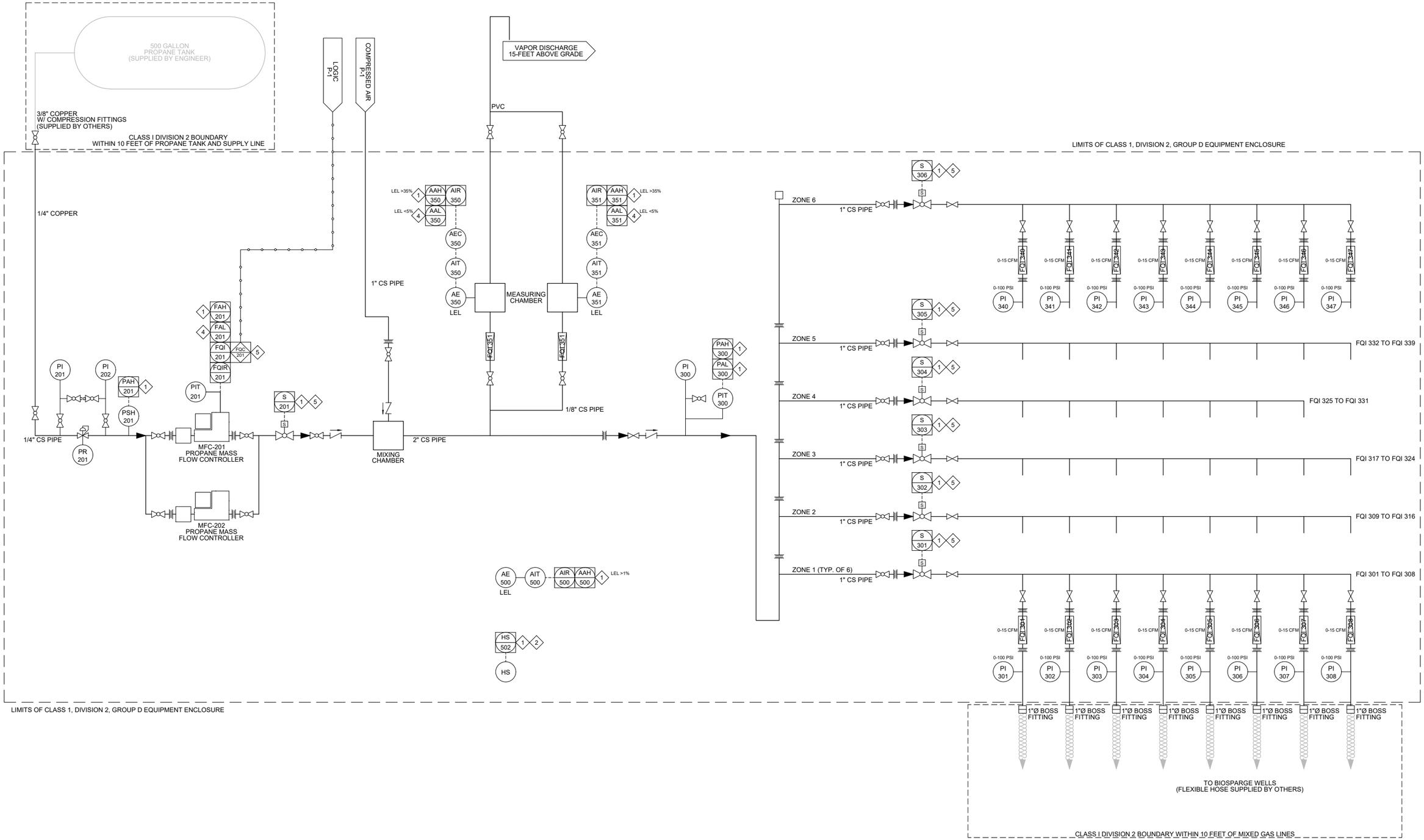
P-1



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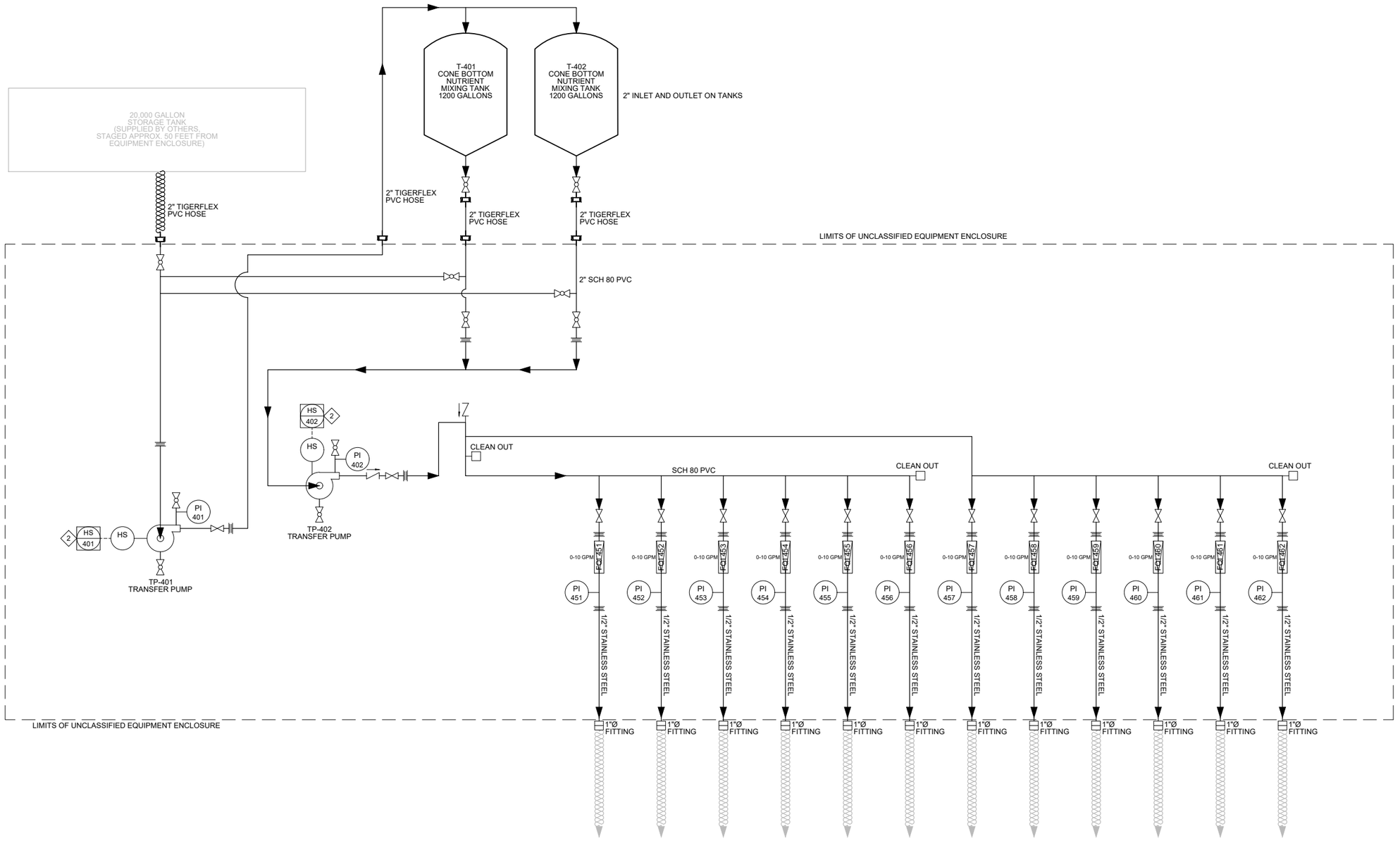

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P-3

LEGEND:

- PROCESS PIPING
- INSTRUMENT PIPING
- INSTRUMENT SIGNAL
- DATA/PLC LOGIC LINK
- ENCLOSURE LIMITS
- FLEXIBLE HOSE
- GATE VALVE
- OPEN BALL VALVE
- CHECK VALVE
- CAMLOC CONNECTION
- GROUND JOINT FITTING
- PRESSURE REGULATOR
- SOLENOID VALVE
- PRESSURE RELEASE VALVE
- UNION FITTING
- INTERLOCK (1)

ABBREVIATIONS:

"	INCHES
AAH	ANALYSIS ALARM HIGH
AAL	ANALYSIS ALARM LOW
AD	AIR DRYER
AE	ANALYSIS ELEMENT
AEC	ANALYSIS ELEMENT CONTROL
AIT	ANALYSIS INDICATOR TRANSMITTER
AIR	ANALYSIS INDICATOR RECORDER
CA	AIR COMPRESSOR
CF	COALESCING FILTER
CFM	CUBIC FEET PER MINUTE
CS	CARBON STEEL
FAH	FLOW ALARM HIGH
FAL	FLOW ALARM LOW
FF	FLOW RATIO
FQC	FLOW QUANTITY CONTROLLER
FQI	FLOW QUANTITY INDICATOR
FQIR	FLOW QUANTITY INDICATOR RECORDER
GPM	GALLONS PER MINUTE
GCS	GALVANIZED CARBON STEEL
HMI	HUMAN MACHINE INTERFACE
HOA	HAND OFF AUTO
HS	HAND SWITCH
LEL	LOWER EXPLOSIVE LIMIT
LS	LEVEL SWITCH
LSH	LEVEL SWITCH HIGH
M	MOTOR
MFC	MASS FLOW CONTROLLER
NPT	NATIONAL STANDARD PIPE THREAD
PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
PF	PARTICULATE FILTER
PI	PRESSURE INDICATOR
PIT	PRESSURE INDICATING TRANSMITTER
PR	PRESSURE REGULATOR
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH HIGH
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
SV	SOLENOID VALVE
SCH	SCHEDULE
TCA	TANK COMPRESSED AIR
T	TANK
TP	TRANSFER PUMP

INSTRUMENT SYMBOLS

	PRIMARY CONTROL PANEL NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	AUXILIARY PANEL OR RACK NORMALLY ACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS			
SHARED DISPLAY, SHARED CONTROL			
COMPUTER FUNCTION INCLUDING DISTRIB. CNTL. SYS.			
PROGRAMMABLE LOGIC CONTROLLER FUNCTION			

PROCESS LOCATION:

100 - AIR FEED LINE

200 - PROPANE FEED LINE

300 - MIXED GAS LINE

400 - NUTRIENT INJECTION LINE

500 - AUXILIARY CONTROLS

INTERLOCKS:

(1) BIOSPARGE SYSTEM ALARM CONDITION, DISABLE SV-XXX (ALL), HS-101, NOTIFY OPERATOR

(2) NUTRIENT INJECTION SYSTEM ALARM CONDITION, DISABLE TP-401, TP-402, NOTIFY OPERATOR

(3) FQC-201 TO INCREASE OR DECREASE TO MAINTAIN MIXED GAS FLOW RATIO BASED ON FQC-101 SIGNAL

(4) WARNING CONDITION, NOTIFY OPERATOR

(5) BIOSPARGING OPERATING FUNCTIONS, SEE ENCLOSED WRITE UP

GENERAL NOTES:

1. THESE DRAWINGS INDICATE THE GENERAL EXTENT OF THE WORK, NOT ALL REQUIRED FITTINGS AND VALVES ARE SHOWN. UNLESS SPECIFIED HEREIN, VENDOR SHALL DESIGN ALL PIPES SIZES, FITTINGS AND MATERIALS OF CONSTRUCTION FOR PROPER SYSTEM OPERATION AND MEDIA COMPATIBILITY.
2. PVC PIPING SHALL ONLY BE USED ON NUTRIENT INJECTION LINES. GALVANIZED STEEL SHALL NOT BE USED FOR COMPRESSED GAS LINES.
3. NPT BY HOSE BARB BOSS FITTINGS SHALL BE INSTALLED VERTICALLY, BARB DOWN, ON THE EXTERIOR OF THE ENCLOSURES TO FACILITATE HOSE CONNECTIONS INSTALLED BY OTHERS.
4. VENDOR SHALL FURNISH ALL MATERIALS AND LABOR TO CONNECT THE BIOSPARGE SYSTEM TO THE PROPANE TANK SUPPLIED BY THE ENGINEER.
5. NUTRIENT TANKS T-401 AND T-402 SHALL BE INSTALLED OUTSIDE THE CLASS 1, DIVISION 2 BOUNDARY AREA.
6. ALL ANALOG SETPOINTS SHALL BE FIELD ADJUSTABLE ON HMI.
7. ALL ALARM CONDITIONS SHALL REQUIRE A RESET BY THE OPERATOR ON THE HIM BEFORE EQUIPMENT WILL RESTART.
8. ALL ALARM SET POINTS SHALL PREVENT THE OPERATION OF ANY PART OF THE SYSTEM VIA HAND OPERATION IF ACTIVE.

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Professional Engineer's No.:

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Designed by: E.FEENSTRA	Drawn by: A.SANCHEZ	Checked by: A.LORENZ

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ARCADIS OF MICHIGAN, LLC.

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COMPRESSED AIR PIPING & INSTRUMENTATION DIAGRAM BIOSPARGE SYSTEM

ARCADIS Project No. 30006870.04500

Date FEBRUARY 2020

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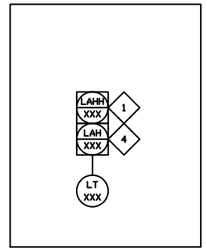
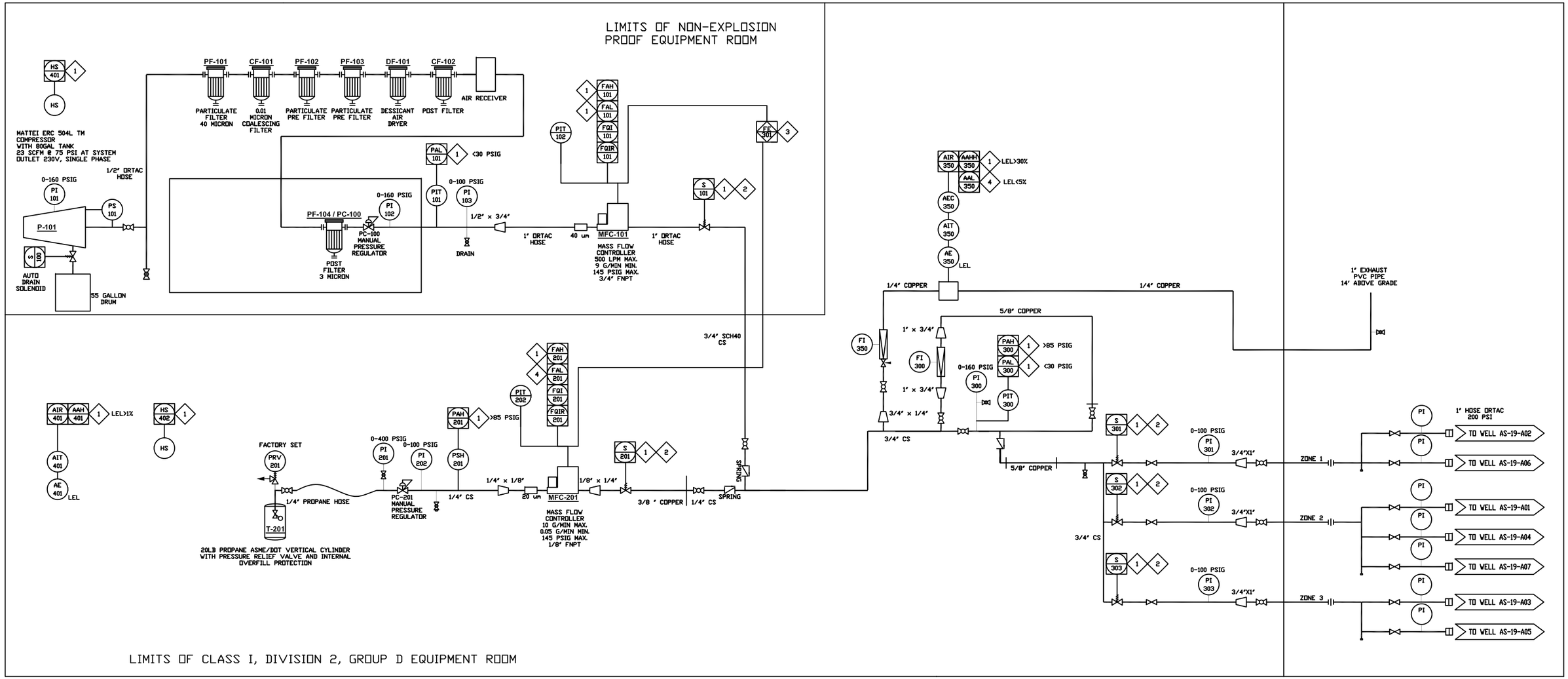
P-4

LIMITS OF
MONITORING WELL
(TYP. OF 2)



LIMITS OF NON-EXPLOSION
PROOF EQUIPMENT ROOM



LIMITS OF CLASS I, DIVISION 2, GROUP D EQUIPMENT ROOM

CLASS I DIVISION 2 BOUNDARY
WITHIN 15' OF MIXED GAS LINE

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DESIGNED:	EHT
CHECKED BY:	EHT
DRAWN BY:	EHT
DRAWN DATE:	8-5-2016

MK ENVIRONMENTAL INC.

PIPING AND INSTRUMENTATION DIAGRAM PROPANE INJECTION SYSTEM

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RACER SITE
28001 W. SAGINAW STREET
LANSING, MI 48917
MK PROJECT # 216527C

7	7/27/20	EHT	UPDATED, MATTEI
6	10/23/17	EHT	PHASE 2 DRAFT
5	10-3-2016	EHT	AS BUILT ON SITE
4	8-26-2016	EHT	300 SERIES INSTRUMENT NUMBER CHANGES
3	8-24-2016	EHT	FOR CONSTRUCTION
2	8-22-2016	EHT	SUBMITTAL
1	8-5-2016	EHT	DRAFT

FIGURE NUMBER

M-1

LEGEND:

- PROCESS PIPING
- INSTRUMENT PIPING
- INSTRUMENT SIGNAL
- DATA/PLC LOGIC LINK
- AREA LIMITS

- GATE VALVE
- OPEN BALL VALVE
- CLOSED BALL VALVE
- NEEDLE VALVE
- SWING CHECK VALVE
- CAMLOC CONNECTION
- REDUCER
- PRESSURE CONTROLLER
- FLEXIBLE HOSE
- INTERLOCK
- SOLENOID VALVE
- PRESSURE RELEASE VALVE
- UNION FITTING
- GROUND JOINT FITTING

MATERIAL:

CS - CARBON STEEL
GCS - GALVANIZED CARBON STEEL
HDPE- HIGH DENSITY POLYETHYLENE

ABBREVIATIONS:

'	FEET
"	INCHES
%	PERCENT
AAH	ANALYSIS ALARM HIGH
AAHH	ANALYSIS ALARM HIGH HIGH
AAL	ANALYSIS ALARM LOW
AE	ANALYSIS ELEMENT
AEC	ANALYSIS ELEMENT CONTROL
AIT	ANALYSIS INDICATOR TRANSMITTER
AIR	ANALYSIS INDICATOR RECORDER
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
CF	COALESCING FILTER
DF	DESICCANT FILTER
DOT	DEPARTMENT OF TRANSPORTATION
FAH	FLOW ALARM HIGH
FAL	FLOW ALARM LOW
FI	FLOW INDICATOR
FIT	FLOW INDICATING TRANSMITTER
FF	FLOW RATIO
FNPT	FEMALE NATIONAL PIPE THREAD
FQC	FLOW QUANTITY CONTROLLER
FQI	FLOW QUANTITY INDICATOR
FQIR	FLOW QUANTITY INDICATOR RECORDER
G	GRAM
GAL	GALLON(S)
HP	HORSEPOWER
HS	HAND SWITCH
LB	POUND(S)
LT	LEVEL TRANSMITTER
MAX	MAXIMUM
MCP	MAIN CONTROL PANEL
MFC	MASS FLOW CONTROLLER
MIN	MINIMUM
NA	NOT APPLICABLE
NPT	NATIONAL PIPE THREAD
PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
PC	PRESSURE CONTROLLER
PE	PRESSURE ELEMENT
PF	PARTICULATE FILTER
PI	PRESSURE INDICATOR
PIT	PRESSURE INDICATING TRANSMITTER
PRV	PRESSURE RELIEF VALVE
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH HIGH
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	PRESSURE TRANSMITTER
S	SOLENOID
SCFM	STANDARD CUBIC FEET PER MINUTE
SCH	SCHEDULE
T	TANK
V	VOLTS

INSTRUMENT SYMBOLS

	PRIMARY CONTROL PANEL NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	AUXILIARY PANEL OR RACK NORMALLY ACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS	⊖	○	⊖
SHARED DISPLAY, SHARED CONTROL	▭	▢	▭
COMPUTER FUNCTION INCLUDING DISTRIB. CNTL. SYS.	⬡	⬡	⬡
PROGRAMMABLE LOGIC CONTROLLER FUNCTION	◇	◇	◇

GENERAL NOTES:

1. ALL ANALOG SETPOINTS SHALL BE FIELD ADJUSTABLE ON OPERATOR INTERFACE SCREEN.
2. ALARMS THAT SHUT DOWN INJECTION WELLS AND TREATMENT EQUIPMENT MUST BE CLEARED BY OPERATOR BEFORE BEING RESTARTED.
3. THIS DRAWING IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY.
4. WHERE APPLICABLE, TEES AND REDUCERS SHALL BE INSTALLED IN LIEU OF PIPE TAPPING.
5. MCP TO BE INSTALLED WITHIN LIMITS OF NON-XP EQUIPMENT TRAILER.

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DESIGNED:	EHT
CHECKED BY:	EHT
DRAWN BY:	EHT
DRAWN DATE:	8-5-2016

MK ENVIRONMENTAL INC.

LEGEND

ARCADIS OF MICHIGAN
RACER SITE
28001 W. SAGINAW STREET
LANSING, MI 48917
MK PROJECT # 216527C

No.	DATE:	BY:	REVISION:
1	8-5-2016	EHT	DRAFT

FIGURE NUMBER

M-2

APPENDIX B

Construction Photo Log

Picture 1: Plant 2 System Building from Northeast

Picture 2: Plant 2 System Building from Southwest

Picture 3: Manifold Hose on South Side of Building

Picture 4: Manifold Hose on West Side of Building

Picture 5: Transect Gravel Height

Picture 6: Transect B Hose Corridor South

Picture 7: Transect B Hose Corridor Southeast

Picture 8: Transect B East

Picture 9: Northern Corridor Traffic Crossing

Picture 8: Transect F West from System Fence

Picture 9: Transect F East from Middle Traffic Crossing

Picture 10: Transect F East

Picture 11: Transect F Traffic Crossing

Picture 12: Transect G Corridor East

Picture 13: Transect E Corridor Northeast System Building

Picture 14: Transect E Corridor Southwest from System Building

Picture 15: Transect G Corridor Northeast

Picture 16: Transect E North Traffic Crossing

Picture 17: Transect E South Traffic Crossing

Picture 18: Transect G Traffic Crossing

Picture 19: Wellhead Construction

Picture 20: Transect A West

Picture 21: Transect A East

Picture 22: Plant 3 System Building from Southwest

Picture 1: Bedrock

Picture 2: Bedrock

Picture 3: Bedrock

Picture 4: Bedrock

Picture 5: Bedrock

Picture 6: Bedrock

Picture 7: Bedrock

Picture 8: Bedrock

Picture 9: Bedrock

Picture 8: Equipment Setup

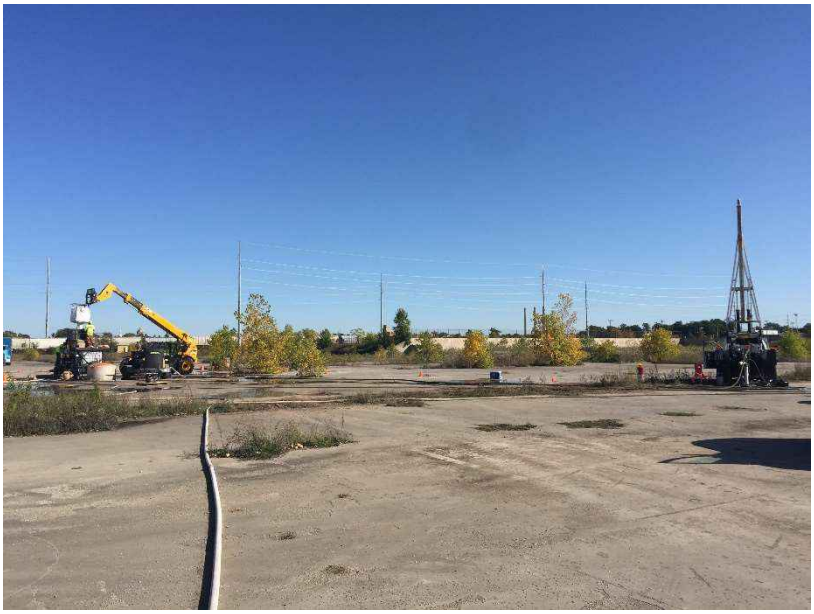
Picture 9: Equipment Setup

Picture 10: Equipment Setup

Picture 11: Equipment Setup

Picture 12: Equipment Setup

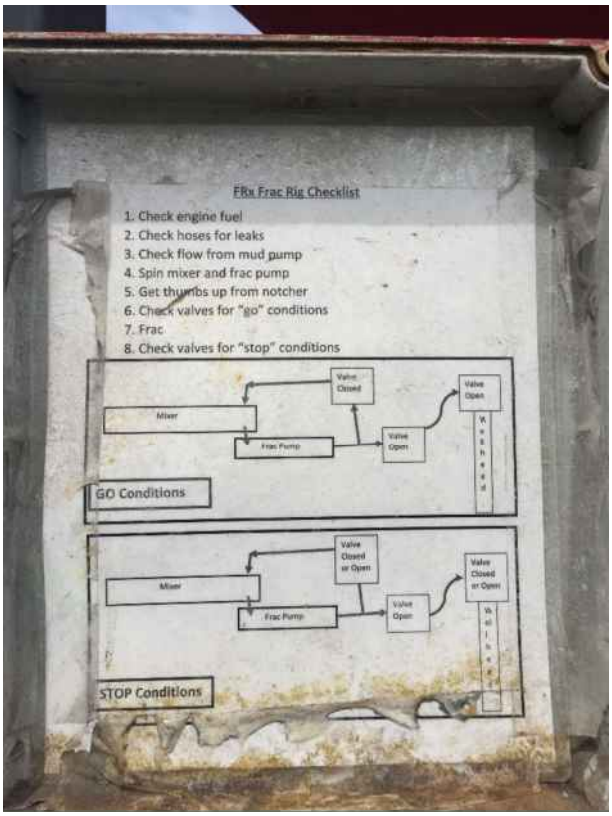
Picture 13: Equipment Setup



Picture 14: Injection Area

Picture 15: Injection Area Setup

Picture 16: Material



Picture 17: Injection Rig Setup

Picture 18: Injection Rig Setup

Picture 19: Wellhead Setup

Picture 20: Wellhead Setup

Picture 21: Equipment Setup

APPENDIX C

Installation Field Notes

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D

Weather(°F) : Rainy, 57
Prepared By: Marina Samp

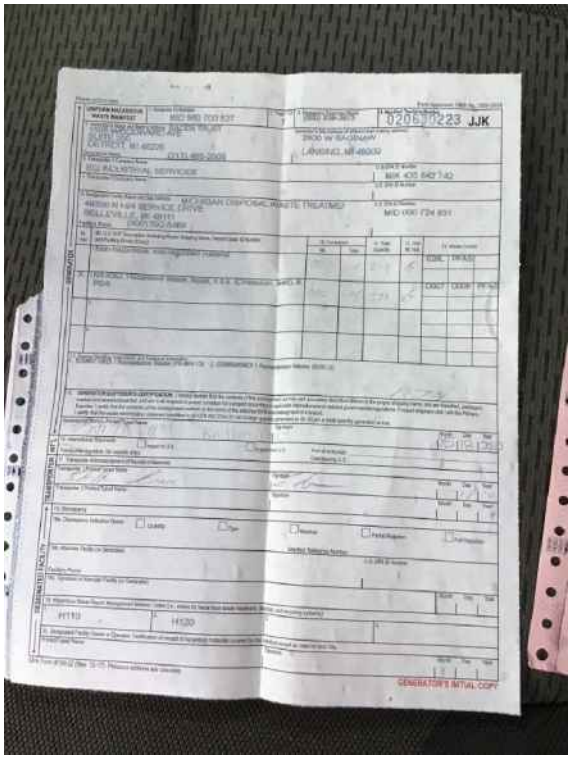
Date	Time	Description of Activities
5/18/2020	08:00	Onsite, Tailgate, Covid Questionnaire
5/18/2020	09:00	First shipment of hose onsite, USE onsite for drum pickup, clarify with T. Linder on waste characteration, coordinate RCRA trained staff to sign manifest
5/18/2020	10:00	K. Voet, A. Mandich onsite. K. Voet signs waste manifest for hazardous waste, second hose shipment onsite
5/18/2020	10:15	K. Voet offsite, walk down hose corridors and finalize hose corridor and traffic crossing locations
5/18/2020	11:00	Discuss hose connection to system, JSS receive third hose shipment, portable restroom
5/18/2020	12:00	JSS start fence deconstruction at old bioreactor location
5/18/2020	12:50	Pipe onsite
5/18/2020	13:00	JSS offsite for lunch
5/18/2020	13:15	Lightening/thunder
5/18/2020	13:30	JSS back from lunch
5/18/2020	14:00	JSS continues dismantling fence, placing pipe for traffic crossings
5/18/2020	16:00	Done placing pipe, wrap up for day
5/18/2020	16:15	Offsite (all)

Waste Management:

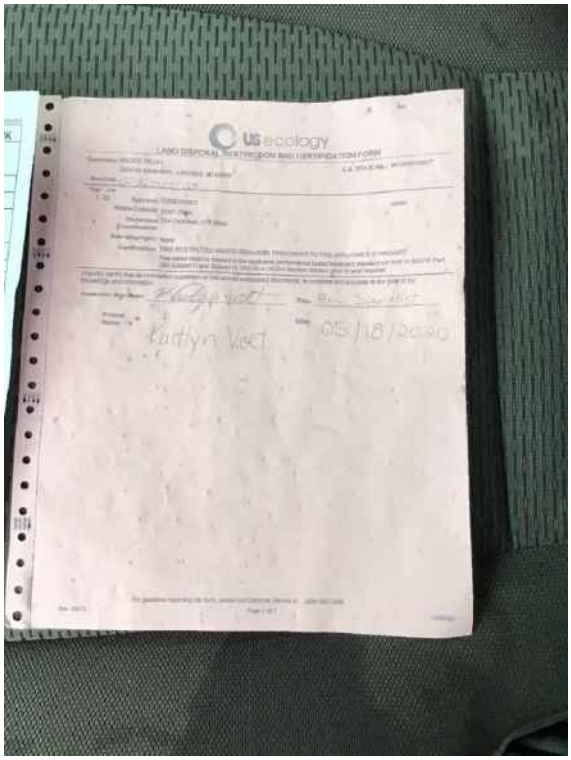
Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/18/2020					no				Drums onsite, see tracker, four P6-MH-13 drums and six ESC-2 drums picked up by US Ecology

Daily Log

Other Photos



Daily Log



Project Name :	RACER Lansing	**Weather(°F) :**	56, cloudy
Project Number :	30042872	**Prepared By:**	Marina Samp
Purpose :	Biosparge Civil Install		
PPE :	Level D		

Date	Time	Description of Activities
5/19/2020	07:30	Arcadis, JSS onsite, tailgate, prep for work today
5/19/2020	08:05	JSS starts rolling hose
5/19/2020	08:20	Begin brush hogging hose corridors where needed
5/19/2020	10:00	Begin clearing brush debris from corridors to transects D
5/19/2020	10:25	Begin sweeping transects D corridors
5/19/2020	11:20	JSS starts pulling hose for transect D
5/19/2020	12:05	JSS offsite for lunch
5/19/2020	12:25	JSS back onsite, M. Samp offsite to get parts from grainger
5/19/2020	13:00	M. Samp back onsite, JSS continues laying hose

Daily Log

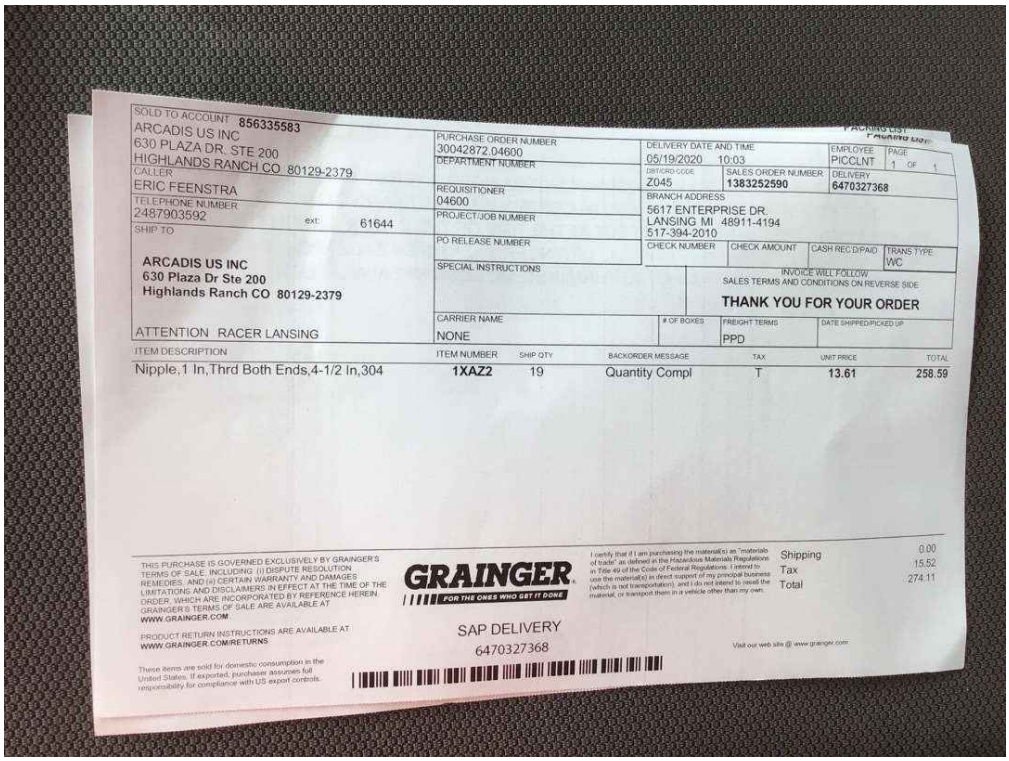
5/19/2020	14:00	Verify hose corridor placement with furthest hose, continue laying hose
5/19/2020	17:45	All offsite, transect B hose mostly complete

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/19/2020					no				

Other Photos

Daily Log



SOLD TO ACCOUNT 856335583
ARCADIS US INC
630 PLAZA DR. STE 200
HIGHLANDS RANCH CO 80129-2379
CALLER
ERIC FEENSTRA
TELEPHONE NUMBER
2487903592 ext: 61644
SHIP TO
ARCADIS US INC
630 Plaza Dr Ste 200
Highlands Ranch CO 80129-2379
ATTENTION RACER LANSING

PURCHASE ORDER NUMBER
30042872.04600
DEPARTMENT NUMBER
REQUISITIONER
04600
PROJECT/JOB NUMBER
PO RELEASE NUMBER
SPECIAL INSTRUCTIONS
CARRIER NAME
NONE

DELIVERY DATE AND TIME
05/19/2020 10:03
EMPLOYEE
PICCLNT
PAGE
1 OF 1
DIST/CRO CODE
Z045
SALES ORDER NUMBER
1383252590
DELIVERY
6470327368
BRANCH ADDRESS
5617 ENTERPRISE DR.
LANSING MI 48911-4194
517-394-2010
CHECK NUMBER
CHECK AMOUNT
CASH REC'D/PAID
TRANS TYPE
WC
INVOICE WILL FOLLOW
SALES TERMS AND CONDITIONS ON REVERSE SIDE
THANK YOU FOR YOUR ORDER
OF BOXES
FREIGHT TERMS
PPD
DATE SHIPPED/PICKED UP

ITEM DESCRIPTION	ITEM NUMBER	SHIP QTY	BACKORDER MESSAGE	TAX	UNIT PRICE	TOTAL
Nipple,1 In,Thrd Both Ends,4-1/2 In,304	1XAZ2	19	Quantity Compl	T	13.61	258.59

THIS PURCHASE IS GOVERNED EXCLUSIVELY BY GRAINGER'S TERMS OF SALE, INCLUDING (i) DISPUTE RESOLUTION REMEDIES, AND (ii) CERTAIN WARRANTY AND DAMAGES LIMITATIONS AND DISCLAIMERS IN EFFECT AT THE TIME OF THE ORDER, WHICH ARE INCORPORATED BY REFERENCE HEREIN. GRAINGER'S TERMS OF SALE ARE AVAILABLE AT WWW.GRAINGER.COM

PRODUCT RETURN INSTRUCTIONS ARE AVAILABLE AT WWW.GRAINGER.COM/RETURNS

These items are sold for domestic consumption in the United States. If exported, purchaser assumes full responsibility for compliance with US export controls.

GRAINGER
FOR THE ONES WHO GET IT DONE

I certify that if I am purchasing the material(s) as "materials of trade" as defined in the Hazardous Materials Regulations in Title 49 of the Code of Federal Regulations, I intend to use the material(s) in direct support of my principal business (which is not transportation), and I do not intend to resell the material, or transport them in a vehicle other than my own.

SAP DELIVERY
6470327368

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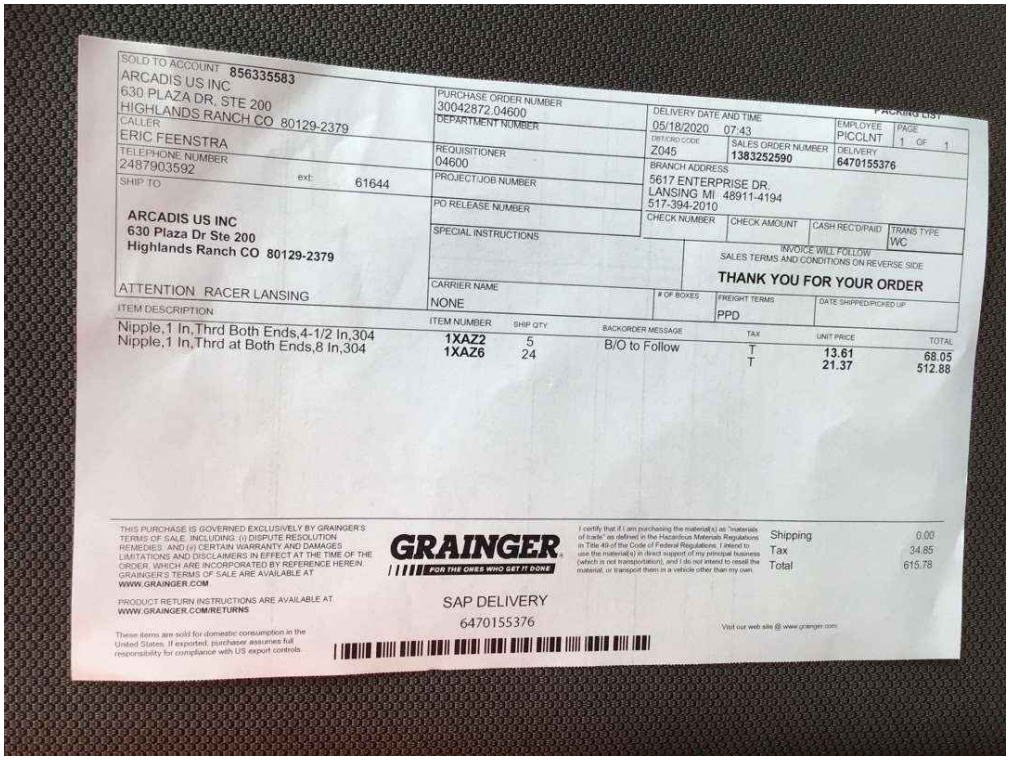
Shipping	0.00
Tax	15.52
Total	274.11

Daily Log



SOLD TO ACCOUNT 856335583
ARCADIS US INC
630 PLAZA DR, STE 200
HIGHLANDS RANCH CO 80129-2379
CALLER
ERIC FEENSTRA
TELEPHONE NUMBER
2487903592 ext: 61644
SHIP TO
ARCADIS US INC
630 Plaza Dr Ste 200
Highlands Ranch CO 80129-2379
ATTENTION RACER LANSING

PURCHASE ORDER NUMBER
30042872.04600
DEPARTMENT NUMBER
REQUISITIONER
04600
PROJECT/JOB NUMBER
PO RELEASE NUMBER
SPECIAL INSTRUCTIONS
CARRIER NAME
NONE

DELIVERY DATE AND TIME
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EMPLOYEE
PICCLNT
PAGE
1 OF 1
DIST/GRO CODE
Z045
SALES ORDER NUMBER
1383252590
DELIVERY
6470155376
BRANCH ADDRESS
5617 ENTERPRISE DR.
LANSING MI 48911-4194
517-394-2010
CHECK NUMBER
CHECK AMOUNT
CASH REC'D/PAID
TRANS TYPE
WC
INVOICE WILL FOLLOW
SALES TERMS AND CONDITIONS ON REVERSE SIDE
THANK YOU FOR YOUR ORDER
OF BOXES
FREIGHT TERMS
PPD
DATE SHIPPED/PICKED UP

ITEM DESCRIPTION	ITEM NUMBER	SHIP QTY	BACKORDER MESSAGE	TAX	UNIT PRICE	TOTAL
Nipple,1 In,Thrd Both Ends,4-1/2 In,304	1XAZ2	5	B/O to Follow	T	13.61	68.05
Nipple,1 In,Thrd at Both Ends,8 In,304	1XAZ6	24		T	21.37	512.88

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GRAINGER
FOR THE ONES WHO GET IT DONE

I certify that if I am purchasing the material(s) as "materials of trade" as defined in the Hazardous Materials Regulations in Title 49 of the Code of Federal Regulations, I intend to use the material(s) in direct support of my principal business (which is not transportation), and I do not intend to resell the material, or transport them in a vehicle other than my own.

Shipping	0.00
Tax	34.85
Total	615.78

SAP DELIVERY
6470155376

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Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D

Weather(°F) : 57, sunny
Prepared By: Marina Samp

Date	Time	Description of Activities
5/20/2020	07:30	Onsite, tailgate, prep for work day
5/20/2020	07:50	Gonzalo (JSS) onsite
5/20/2020	08:15	Start sweeping slab by system building
5/20/2020	08:55	Lay hose for last well on transect D
5/20/2020	09:45	Start brush hogging southern hose corridor
5/20/2020	10:50	Start sweeping southern corridor
5/20/2020	11:00	Grade inset in concrete with gravel
5/20/2020	12:05	JSS offsite for lunch
5/20/2020	12:25	JSS back onsite, JSS safety personnel onsite for safety inspection
5/20/2020	12:40	JSS start laying transect G hose
5/20/2020	15:10	JSS finds splice in hose 52 feet from end of 450 foot hose length, will require extra seam
5/20/2020	15:25	Gravel onsite, no odor, sheen, or wire/metal fragments noted
5/20/2020	16:40	Second load of gravel onsite, no odor, sheen, or wire/metal noted
5/20/2020	17:20	Complete transect G hose, clean up for day
5/20/2020	17:30	All offsite

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/20/2020					no				

Other Photos

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Bisparge Civil Install
PPE : Level D

Weather(°F) : 58, sunny
Prepared By: Marina Samp

Date	Time	Description of Activities
5/21/2020	07:30	Onsite, tailgate, prep for day
5/21/2020	07:40	Begin laying hose for day on transact E
5/21/2020	08:20	Call with E. Feenstra, discuss loose piping on outside of system, will follow up with D. Stockard when he arrives onsite
5/21/2020	08:45	D. Stockard onsite, discuss hand tight piping from system. JSS will tighten prior to attaching 4 inch and 8 inch segments.
5/21/2020	08:50	Cathey onsite to demonstrate hose clamp for seams
5/21/2020	09:00	Rick Hill, Cathey offsite to get supplies for JSS
5/21/2020	09:30	Propane onsite
5/21/2020	09:50	Slifco onsite, Rick Hill back onsite
5/21/2020	11:35	2 JSS take lunch
5/21/2020	11:45	2 JSS back onsite, 2 off for lunch
5/21/2020	12:00	Back onsite from lunch, continue laying hose, start tightening elbows on outside of building and attaching 4 and 8 inch nipples
5/21/2020	12:15	Arcadis start attaching well tags to building connections
5/21/2020	13:15	UPS onsite for poly tank deliver, JSS place tanks with skid, continue working on laying hose and attaching fittings
5/21/2020	15:00	JJS locates slice in last length of hose for a well. Discuss with E. Feenstra and decide to replace as rest of hose is layed and there is 900 feet left
5/21/2020	15:45	JSS indicates 23 splices are on the hoses
5/21/2020	17:10	JSS cleaning up for day. All hose layed for all transects. 4 and 8 inch nipples connected to 90 degree elbows from system. Tags added to system connection. Poly totes, roll off, and propane tank delivered and placed
5/21/2020	17:25	All offsite
5/21/2020	23:00	Offsite, roll off dropped off

Daily Log

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/21/2020					no				

Other Photos

Daily Log

Daily Log

Daily Log

Daily Log

Daily Log

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D

Weather(°F) : 75, sunny
Prepared By: Marina Samp

Date	Time	Description of Activities
5/26/2020	08:50	Onsite, tailgate, prep for day
5/26/2020	09:10	Start connecting hose segments
5/26/2020	09:30	JSS plans to continue with any seems left after Friday and start pressure testing/installing wellheads today. Due to heat/humidity projected for day, extra breaks anticipated
5/26/2020	09:45	Assemble pressure testing equipment to test hose and wellhead all at once
5/26/2020	11:10	Locate cam fittings for nutrient hoses
5/26/2020	11:20	R. Hill offsite to get more fittings for pressure testing
5/26/2020	11:45	R. Hill back onsite
5/26/2020	12:00	Attach wellhead end boss fittings to transect B and F hoses for pressure testing
5/26/2020	13:10	JSS offsite for lunch
5/26/2020	13:25	JSS back onsite
5/26/2020	14:00	Start leak testing, notice immediate pressure drops
5/26/2020	14:20	Call E. Feenstra, all clamps that came with boss fittings are failing. Discuss with A. Lorenz and D. Stockard. Plan to have Cathey take a look and give recommendations. Will use punch lok clamps if clamps in set are decided to not use. R. Hill offsite to get larger compressor.
5/26/2020	16:00	JSS clean up for today since no time left for full pressure test.
5/26/2020	16:10	JSS offsite, M. Samp touch base with D. Stockard, E. Feenstra, and finish field notes
5/26/2020	16:40	Arcadis offsite

[redacted]

Daily Log

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/26/2020					no				

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D
Weather(°F) : Mostly sunny, 70s
Prepared By: Daniel Stockard

Date	Time	Description of Activities
5/27/2020	07:56	D. Stockard arrived on site. E. Feenstra on site. Met with JSS. GPRS on site, clearing electrical and fence pole locations.
5/27/2020	08:15	Called Cathey to ask when they would be on site, indicated they are headed out soon.
5/27/2020	08:20	Checked boss clamp connected at the end of a hose. The clamp hooks do not appear to be long enough to clamp down on the barbed boss fitting, possibly defective. JSS also reports the bolts seized up and had to be cut off to remove the clamps
5/27/2020	08:45	Cathey (Trey) on site. He examined the leaking clamps and indicated he did not think there was an issue with how the clamps were installed. He said he had not seen this issue before and said he would follow up with Dixon. He said we would be able to return them. He brought out 150 punch lok clamps to use instead
5/27/2020	09:00	Talked with A. Lorenz a about the leaking fittings. Agreed double punch loks on the boss fitting hose would work, communicated this to JSS
5/27/2020	09:30	Verified utility locate positions. Moved western electrical pole over 20' to the east to avoid setting guy anchor in the pit (filled with debris according to a boring log). JSS pressure testing hoses.
5/27/2020	10:00	Update call
5/27/2020	11:05	Checked pressure tests for the 8 hoses being tested. B01 dropped 1PSI, asked them to check it again.
5/27/2020	12:30	Pressure testing continues. Realized the male boss stem for the nutrient injection hoses is NPT and not the wing nut thread. Called Cathey to get the wing nut spud ordered.
5/27/2020	13:00	Examined the pole placement and asked D. Oberle if we need additional support. He indicated we will need to guy the weatherhead mast
5/27/2020	13:15	F03 and F07 needed to be restarted due to leaks at the plugs
5/27/2020	14:14	Pressure testing continues

Daily Log

5/27/2020	14:30	Started getting nutrient hoses put together.
5/27/2020	15:30	Pressure testing continues. Headed off site to get hose clamps for nutrient hoses
5/27/2020	16:44	Finished last round of pressure testing. Finished putting together nutrient hoses. JSS started wrapping up
5/27/2020	17:15	D. Stockard, JSS, E. Feenstra off site

[redacted]

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/27/2020					no				

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D
Weather(°F) : 72, cloudy
Prepared By: Marina Samp

Date	Time	Description of Activities
5/28/2020	07:25	Onsite, tailgate, prep for day
5/28/2020	08:00	Start compressor for pressure testing, fill E03 to E10.
5/28/2020	08:10	JSS start assembling more wellheads for rest of tests
5/28/2020	10:50	Start second round of pressure testing, all passed first round except 2, will be retested after fixing wellheads
5/28/2020	11:20	3 JSS offsite to get block and replacement part for wellhead
5/28/2020	12:40	All JSS back onsite
5/28/2020	12:55	Finish second pressure test set, 1 failed, prep next set for testing
5/28/2020	14:00	M. Samp offsite to return Dixon clamps and pick up fittings for nutrient hoses
5/28/2020	14:45	M. Samp back onsite
5/28/2020	15:55	3rd set of testing complete, 2 failed, prep to retest

Daily Log

5/28/2020	16:40	Missing boss fitting (Cathey delivered 81 instead of 82), will pick up tomorrow due to business hours, JSS placing cinderblocks at wells
5/28/2020	18:30	Final two hoses pass pressure testing, JSS clean up for day
5/28/2020	18:40	All offsite

[redacted]

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/28/2020					no				

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D
Weather(°F) : 65, cloudy
Prepared By: Marina Samp

Date	Time	Description of Activities
5/29/2020	07:30	Onsite, tailgate, prep for day
5/29/2020	07:50	M. Samp offsite to get boss fitting from Cathey
5/29/2020	08:20	M. Samp back onsite, rain preventing electrical work
5/29/2020	09:05	After looking at weather radar, JSS decides to install boss fitting and stop work for the day as electrical work can't proceed
5/29/2020	09:20	All offsite

Daily Log

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/29/2020					no				

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D

Weather(°F) : Mostly sunny, 70s
Prepared By: Daniel Stockard

Date	Time	Description of Activities
5/27/2020	07:56	D. Stockard arrived on site. E. Feenstra on site. Met with JSS. GPRS on site, clearing electrical and fence pole locations.
5/27/2020	08:15	Called Cathey to ask when they would be on site, indicated they are headed out soon.
5/27/2020	08:20	Checked boss clamp connected at the end of a hose. The clamp hooks do not appear to be long enough to clamp down on the barbed boss fitting, possibly defective. JSS also reports the bolts seized up and had to be cut off to remove the clamps
5/27/2020	08:45	Cathey (Trey) on site. He examined the leaking clamps and indicated he did not think there was an issue with how the clamps were installed. He said he had not seen this issue before and said he would follow up with Dixon. He said we would be able to return them. He brought out 150 punch lok clamps to use instead
5/27/2020	09:00	Talked with A. Lorenz a about the leaking fittings. Agreed double punch loks on the boss fitting hose would work, communicated this to JSS
5/27/2020	09:30	Verified utility locate positions. Moved western electrical pole over 20' to the east to avoid setting guy anchor in the pit (filled with debris according to a boring log). JSS pressure testing hoses.
5/27/2020	10:00	Update call
5/27/2020	11:05	Checked pressure tests for the 8 hoses being tested. B01 dropped 1PSI, asked them to check it again.
5/27/2020	12:30	Pressure testing continues. Realized the male boss stem for the nutrient injection hoses is NPT and not the wing nut thread. Called Cathey to get the wing nut spud ordered.
5/27/2020	13:00	Examined the pole placement and asked D. Oberle if we need additional support. He indicated we will need to guy the weatherhead mast
5/27/2020	13:15	F03 and F07 needed to be restarted due to leaks at the plugs
5/27/2020	14:14	Pressure testing continues
5/27/2020	14:30	Started getting nutrient hoses put together.
5/27/2020	15:30	Pressure testing continues. Headed off site to get hose clamps for nutrient hoses
5/27/2020	16:44	Finished last round of pressure testing. Finished putting together nutrient hoses. JSS started wrapping up
5/27/2020	17:15	D. Stockard, JSS, E. Feenstra off site

Daily Log

[redacted]

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
5/27/2020					no				

2020-06-01, Biosparge Civil Install, Eric Feenstra

Created	2020-06-02 16:18:28 UTC by Eric Feenstra
Updated	2020-06-02 17:48:33 UTC by Eric Feenstra
Location	43.031088, -85.8411434
Status	In Progress

Basic Information

Project Name	RACER Lansing
Project Number	30042872
Client	RACER Trust
Date	2020-06-01
Completed By	Eric Feenstra
Purpose	Biosparge Civil Install
Weather	Mostly Sunny, 70s
PPE	Level D

Daily Log of Activities

19:30, E. Feenstra and JSS. Discuss work scope and H&S for the day.

Time	19:30
Description of Task	E. Feenstra and JSS. Discuss work scope and H&S for the day.

20:00, JSS begins their scope of work. Install well heads starting on Transect G working their way to E. Discussed plan for redoing the 3 pilot wells that will be reused.

Time	20:00
Description of Task	JSS begins their scope of work. Install well heads starting on Transect G working their way to E. Discussed plan for redoing the 3 pilot wells that will be reused.

21:00, Alex onsite to help locate new performance monitoring wells. Gave some insights to old well constructions. Went to locate and clear all 4 PMWs.

Time	21:00
Description of Task	Alex onsite to help locate new performance monitoring wells. Gave some insights to old well constructions. Went to locate and clear all 4 PMWs.

21:45, Discussed placement of cinder block with JSS. Some wells have a concrete lip around them that is not level for the cinder blocks to sit on. JSS to build level pads with concrete for the blocks to sit on and support pipe without tipping over.

Time	21:45
Description of Task	Discussed placement of cinder block with JSS. Some wells have a concrete lip around them that is not level for the cinder blocks to sit on. JSS to build level pads with concrete for the blocks to sit on and support pipe without tipping over.

23:00, JSS begins laying gravel on hoses placing traffic barrels and constructing the traffic crossings.

Time	23:00
Description of Task	JSS begins laying gravel on hoses placing traffic barrels and constructing the traffic crossings.

12:00, JSS breaks for lunch. Will continue with the scope of work after. Continue with wellhead construction and gravel.

Time	12:00
Description of Task	JSS breaks for lunch. Will continue with the scope of work after. Continue with wellhead construction and gravel.

13:00, JSS flagging for first traffic crossing. Directly on either side of piping 6 inches from the ends to aid with locating if needed to dig up.

Time	13:00
Description of Task	JSS flagging for first traffic crossing. Directly on either side of piping 6 inches from the ends to aid with locating if needed to dig up.

16:20, JSS preparing to finish for the day. Construct last wellhead for the day and begin cleanup.

Time	16:20
Description of Task	JSS preparing to finish for the day. Construct last wellhead for the day and begin cleanup.

17:00, Upon site cleanup on JSS crew member discover break in hose. Upon further inspection the hose looked like it was driven over. No idea who could have done it. JSS was in that area the entire day. Photos were taken. JSS will replica and test the line to make sure there are no leaks.

Time	17:00
Description of Task	Upon site cleanup on JSS crew member discover break in hose. Upon further inspection the hose looked like it was driven over. No idea who could have done it. JSS was in that area the entire day. Photos were taken. JSS will replica and test the line to make sure there are no leaks.

17:30, JSS and E. Feenstra offsite

Time	17:30
Description of Task	JSS and E. Feenstra offsite

Equipment & Calibration Information

Are you using equipment?	No

Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

Signature

Signed 2020-06-02 17:24:08 UTC

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Installation
PPE : Level D
Weather(°F) : Sunny, 63°
Prepared By: Anyssa Schember

Date	Time	Description of Activities
6/2/2020	07:25	Anyssa Mandich on site. JSS already on site.
6/2/2020	07:30	H&S tailgate. JSS stated fixing hose that was damaged will come at a later date as an add on.
6/2/2020	07:50	Pro Soil and K&H on site
6/2/2020	08:00	JSS continued placing gravel over transect G/E traffic crossing and transect G hoses. Also attached wellheads and insulation.
6/2/2020	08:30	Dan Stockard confirmed fence placement/gates
6/2/2020	09:15	Pro Soil finished marking out fence post locations and departed site.
6/2/2020	09:20	JSS continued placing gravel over transect G traffic crossing and hoses. Also attached wellheads and insulation
6/2/2020	10:30	Amerigas on site for propane delivery.
6/2/2020	10:50	Another K&H truck arrived on site to assist with coring
6/2/2020	12:00	JSS off site for lunch
6/2/2020	12:15	K&H finished coring for posts and went off site. Angering will be completed tomorrow in grassy/rocky portion on north side of system building.
6/2/2020	12:45	JSS began attaching wellheads on transect B and covering conveyance hose between transects B and F
6/2/2020	13:45	JSS covered transect B hoses with gravel
6/2/2020	14:00	Showed JSS Plant 3 wells
6/2/2020	14:25	JSS began attaching transect F wellheads
6/2/2020	15:45	Attached transect E wellheads
6/2/2020	16:00	JSS began covering transect F hoses with gravel.
6/2/2020	16:15	JSS hit MW-16-84 with their truck. No major damage other than to the cement patty at the bottom. They will replace this.
6/2/2020	17:10	JSS and Arcadis off site

[redacted]

Daily Log

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
6/2/2020									

Other Photos

Transect E/G traffic crossing completed

Coring for fence installation

Continuing coring for fence installation

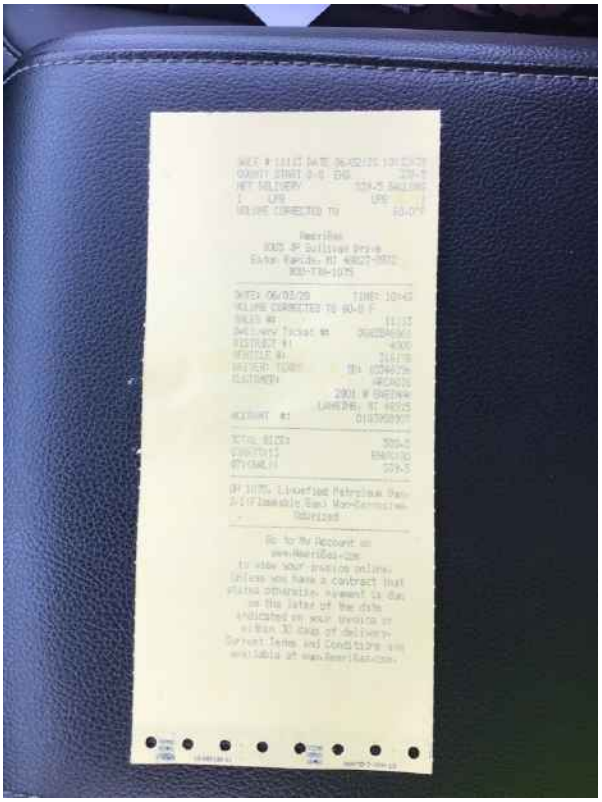
Hose coverings

Transect G traffic crossing installation

Propane delivery

Wellhead attachment

Daily Log



Daily Log

Covered hoses

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Installation
PPE : Level D
Weather(°F) : Hazy, 68°
Prepared By: Anyssa Schember

Date	Time	Description of Activities
6/3/2020	03:50	JSS and Arcadis off site
6/3/2020	07:25	Anyssa Mandich on site. JSS already on site.
6/3/2020	07:30	H&S tailgate
6/3/2020	07:45	JSS finished covering transect F hoses with gravel and put together wellhead assemblies for Plant 3 wells.
6/3/2020	09:15	JSS began installing new wellhead assemblies on Plant 3
6/3/2020	09:30	Pro Soil on site
6/3/2020	10:15	Pro Soil started augering northern fence barrier for posts. Began placing/anchoring posts
6/3/2020	11:00	JSS finished wellhead assemblies on Plant 3
6/3/2020	12:00	Pro Soil began placing and setting fence post corners and eastern posts
6/3/2020	12:15	JSS placed barrels that strong overnight winds knocked down and finished placing barrels on remainder of gravel-covered hoses
6/3/2020	13:30	JSS pressure tested the new section of hose repair
6/3/2020	13:35	Dave Favero on site. Walked the hose boundary and showed him the biosparge building.
6/3/2020	13:40	Pro Soil began placing and setting southern posts for fence
6/3/2020	14:00	Dave Favero off site.
6/3/2020	14:10	JSS fixed the broken concrete patty around the well they hit yesterday. They also began covering transect E hoses with gravel.
6/3/2020	14:25	Pro Soil began placing and setting the western fence posts
6/3/2020	15:00	Pro Soil finished placing posts and packed up for the day.
6/3/2020	15:25	Pro Soil off site

[redacted]

Daily Log

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
6/3/2020									

Other Photos

Wellhead assembly preparation on Plant 3

Completed wellhead assembly

Northern fence posts before setting

Repaired hose

Daily Log

MW-16-84 concrete patty restored

Fence posts installed

Project Name :	RACER Lansing	**Weather(°F) :**	Sunny, 64°
Project Number :	30042872	**Prepared By:**	Anyssa Schember
Purpose :	Biosparge Civil Installation		
PPE :	Level D		

Date	Time	Description of Activities
6/4/2020	07:20	Anyssa Mandich on site. JSS already on site
6/4/2020	07:25	H&S tailgate
6/4/2020	07:45	JSS placed pipes at traffic crossing between transect F and conveyance hose.
6/4/2020	07:55	JSS began installing the flag posts for transect E traffic crossing
6/4/2020	08:35	JSS began placing gravel near the transect F/conveyance hose traffic crossing
6/4/2020	09:45	JSS began installing flags for transect F/conveyance hose traffic crossing
6/4/2020	10:00	JSS placed gravel for transect E traffic crossing and finished covering transect E hoses with gravel

Daily Log

6/4/2020	10:50	Called Enterprise Roadside assistance after field vehicle had screw in the tire.
6/4/2020	11:20	Roadside assistance changed tire out
6/4/2020	11:45	JSS began installing flag posts for conveyance hose traffic crossing
6/4/2020	13:20	JSS finished placing gravel for the transect F/conveyance hose traffic crossing
6/4/2020	14:15	JSS began installing flag poles for transect B traffic crossing
6/4/2020	15:15	JSS began placing gravel over conveyance hose traffic crossing
6/4/2020	16:25	JSS began covering transect B traffic crossing with gravel.
6/4/2020	17:15	JSS and Arcadis off site

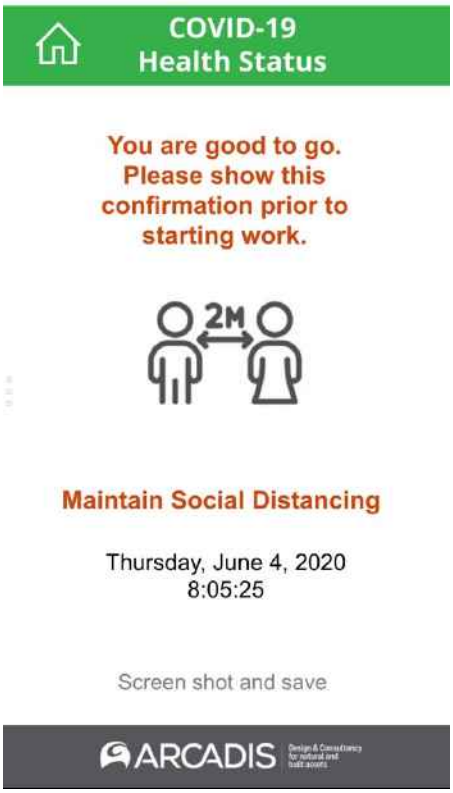
[redacted]

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
6/4/2020									

Daily Log

Other Photos



Transect E flag posts

Transect E traffic crossing

Completed transect F/conveyance hose traffic crossing

Completed conveyance hose traffic crossing

Daily Log

Transect B covering. Will get finished tomorrow

Project Name : RACER Lansing
Weather(°F) : Sunny, 64°
Project Number : 30042872
Prepared By: Anyssa Schember
Purpose : Biosparge Civil Installation
PPE : Level D

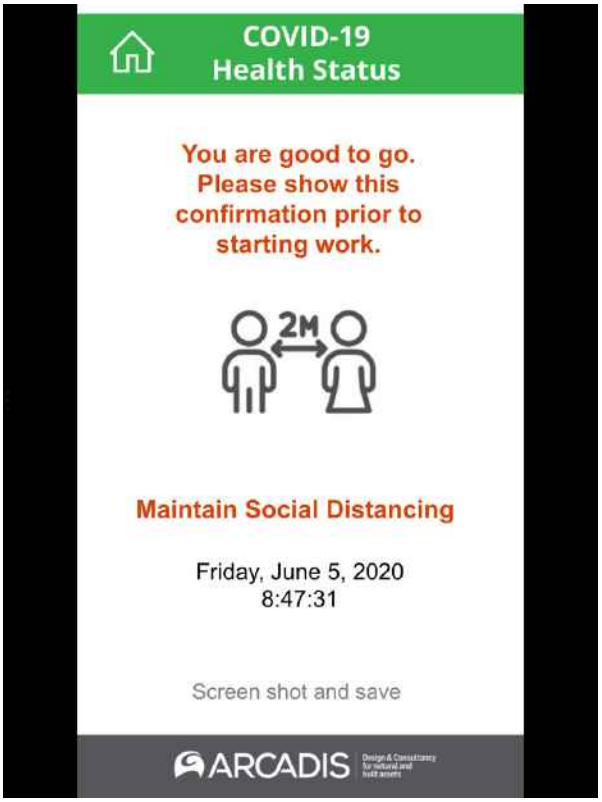
Date	Time	Description of Activities
6/5/2020	07:20	Anyssa Mandich on site
6/5/2020	07:30	JSS on site
6/5/2020	07:35	H&S tailgate
6/5/2020	07:50	JSS began continuing covering hoses with gravel
6/5/2020	08:05	JSS continued to build up gravel on the transect B traffic crossing
6/5/2020	08:25	JSS continued to build up conveyance hose traffic crossing with gravel
6/5/2020	08:45	Pro Soil on site
6/5/2020	09:45	Sam Solomon on site to look at holes in the fence
6/5/2020	09:50	Pro Soil marked and cut post tops
6/5/2020	11:00	Pro Soil left site get get more materials and take a lunch.
6/5/2020	11:45	ProSoil back on site. Began installing post frames
6/5/2020	14:50	JSS Arcadis and Pro Soil off site

[redacted]

Waste Management:

Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
6/5/2020									

Other Photos



Transect B traffic crossing and hose coverings

Completed corner framing for fence

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Installation
PPE : Level D

Weather(°F) : Sunny, 67°
Prepared By: Anyssa Schember

Date	Time	Description of Activities
6/8/2020	08:00	JSS and Pro Soil on site. H&S tailgate
6/8/2020	08:30	Pro soil began attaching fencing
6/8/2020	08:45	Gravel was delivered to site. Backed into MW-14-60 while leaving
6/8/2020	08:50	K&H arrived on site
6/8/2020	09:15	K&H began coring for electric pole. 8” concrete
6/8/2020	09:50	JSS augered into electric pole hole
6/8/2020	10:20	K&H cored second hole for electric pole. 9” concrete
6/8/2020	10:50	JSS augered into electric pole hole
6/8/2020	11:45	Pro Soil finished fence. Pro Soil off site
6/8/2020	12:30	Awaiting response for damaged well repairs
6/8/2020	12:45	Arcadis and JSS fixed one fence gate latch that was a pinch point hazard. Installed locks on both gates
6/8/2020	13:15	JSS off site
6/8/2020	13:30	Arcadis off site

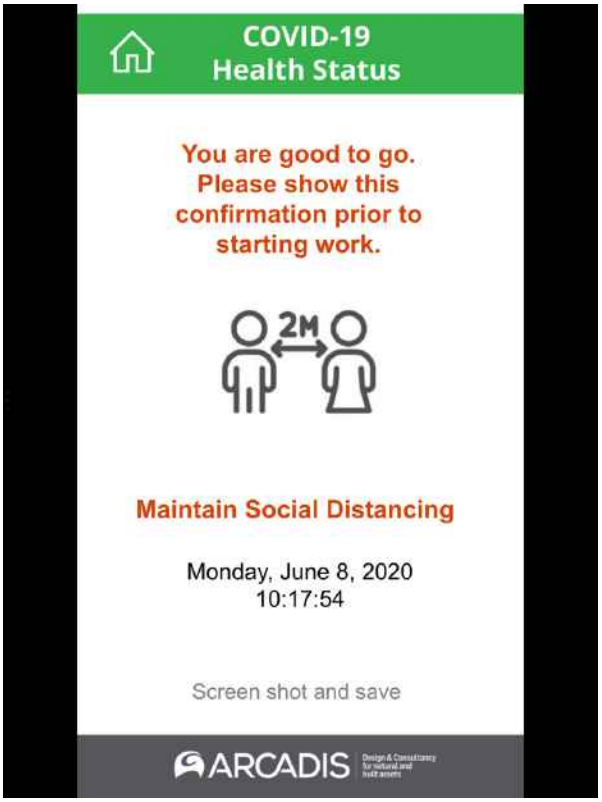
[redacted]

Waste Management:

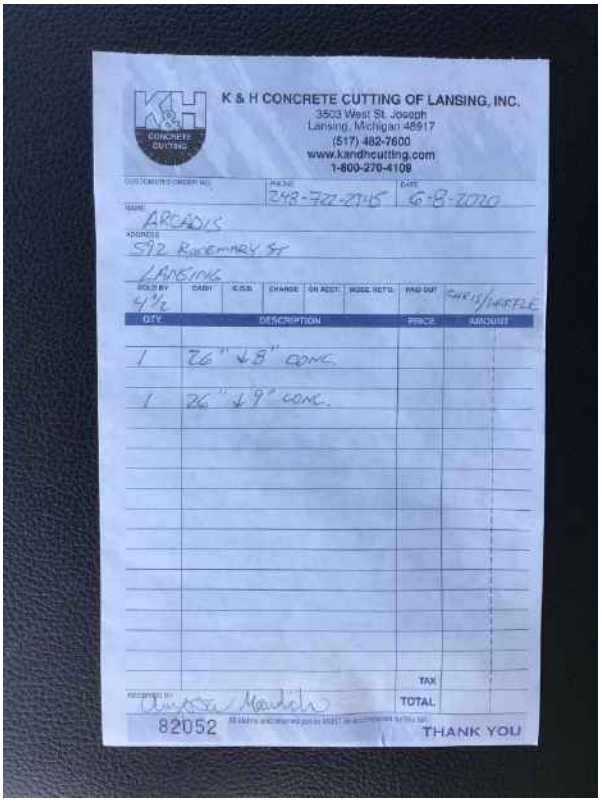
Drums On Site									
Date	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
6/8/2020									

Daily Log

Other Photos



Daily Log



K & H CONCRETE CUTTING OF LANSING, INC.
3503 West St. Joseph
Lansing, Michigan 48917
(517) 482-7600
www.kandhcutting.com
1-800-270-4109

PHONE: 248-372-2145 DATE: 6-8-2010

NAME: ARCADIS
ADDRESS: 592 ROSEMARY ST
LANSING

SOLD BY	CASH	C.O.D.	CHARGE	ON ACCT.	MDSE. RET'D.	PAID OUT	CHK # / MAPLE
4 1/2							

QTY.	DESCRIPTION	PRICE	AMOUNT
1	26" x 8" conc.		
1	26" x 9" conc.		

TAX
TOTAL

RECEIVED BY: [signature]
82052

THANK YOU

Concrete core for second electric pole

Augered pole hole

Finished fence

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Daily Log

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Civil Install
PPE : Level D

Weather(°F) : 62, sunny
Prepared By: Marina Samp

Date	Time	Description of Activities
6/9/2020	07:20	Onsite, tailgate
6/9/2020	07:45	JSS onsite, prep and start laying gravel
6/9/2020	08:40	R. Hill offsite to get well repair supplies
6/9/2020	09:45	MKE onsite, R. Hill back onsite, tailgate with MKE, JSS begin well repair and continue laying gravel
6/9/2020	11:45	Well repair complete, continue laying gravel/cleaning up concrete core waste
6/9/2020	12:00	JSS offsite for lunch
6/9/2020	12:30	JSS back onsite, begin wrapping up for day
6/9/2020	13:40	JSS move concrete barricades to block MW-119s/d
6/9/2020	14:35	JSS offsite, hose positioning within fence, gravel walk down, pole drilling to occur Thursday, well tags placed at wellheads for transects B and F
6/9/2020	15:00	M. Samp offsite

[redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
6/9/2020	no					no				

Daily Log

Other Photos

ARCADIS Design & Consultancy for natural and built assets

Daily Log

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Daily Log

Project No.: 30064479.2019 Page 1 of 1

Site Location: RACER- Lansing, MI (Area 2)

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/9/19	1200	Purpose: Biosparge drilling
	↓	Weather: 81°F, sunny
		Arcadis/Subcontractor: E. Feenstra, A. Villhauer / Trout
		Equipment: PID#5126, WLM# 711
		Arcadis on site. Meet w/ E. Feenstra, A. villhaver, discuss plan
	1250	Head to Merit Labs to pick up cooler and Geotech to pick up gloves / PID / WLM. A. Villhaver leaves.
	1350	Arcadis back on site. Wait for Trout to complete well repairs.
	1615	Trout arrives at ASP-G02. Begin setting up equipment, breaking through cement.
	1638	Probe to break up cement moves to PSP-G01, begins breaking up cement.
	1650	probe to break up cement moves to ASP-G01, begins breaking up cement.
	1702	Move rig into place, set up equipment
	1730	Arcadis and Trout off site.

Ellen R 7/9/19

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Daily Log

Project No.: B00644479.2019 Page 1 of 1

Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/10/19		Purpose: Biosparge Drilling
		Weather: 71°F, sunny
		Arcadis/Subcontractor: ~~D. Karlsen~~ ER, H. Woodrum, TROUT
		Equipment: PID# 5726, WLM# 711
	0730	Arcadis + Trout on site. Trout begins setting up equipment
	0750	Conduct tailgate. Go over plan.
	0830	Begin drilling ASP-G02.
	0945	complete drilling to 70', wait for Alex to arrive, go over borings
	1020	Begin drilling another 2'
	1045	complete drilling. Alex V. comes back, collecting VAP sample from 68-72'. B/C drillers end up using a little bit of water, it will be purged thoroughly before sampling.
	1100	Begin purging
	1220	Collect sample ASP-G02(68-72)(071019)
	1225	Drillers pull screen out.
	1240	Break for lunch
	1310	Back on site, resume drilling to 80'/mix up mud
	1340	Troubleshoot rig.
	1430	Coupling driving pump could be broken. Trout continues to troubleshoot, pulls pieces off, talk to tech. Drop off sample to Merit.
	1600	confirmed coupling ~~driving~~ and pump ER is broken. organize/find/ locate swap w/ part. prep pump.
	1640	start cleaning up. ~~Tonight~~ Tomorrow morning Trout will go and pick up parts, some of Trout will stay and continue to break up cement at future well locations. continue taking out/ prepping pump and rig for when pump is off so no fluids leak
	1845	Trout and Cascade off site.

7/10/19

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
		Purpose: Biosparge Drilling
		Weather: 72°F, sunny
		Arcadis/Subcontractor: Trout
		Equipment: —
7/11/19	0730	Meet w/ Trout, discuss plan, have tailgate
	0740	Trout begins cleaning up rig/area, take apart mud pump more in preperation
	1300	Driller arrives back (and Ty)
	1320	Driller and Ty run to get supplies. Nic jackhammers concrete
	1530	Ty and Driller return, continue working on rig.
	1737	DK and Tyler return, continue working on rig.
	1810	Arcadis off site

7/11/19

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Daily Log

Project No.: B006447 9.2019.04600 Page 1 of 1

Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
		Purpose: Biosparge Drilling
		Weather: 59° F, cloudy
		Arcadis/Subcontractor: Trout
		Equipment: WLM# 711 PID# 5726 Cal 102/100
7/12/19	0730	Meet w/ Trout @ site. Conduct tailgate. Nic starts jackhammering cement. Trout continues replacing part.
	1200	Trout heads to lunch. MW4 pump is in. Lines need to be hooked up DR estimates to be done around 3
	1455	Well repairs completed, Trout begins cleaning up
	1525	~~Resume drilling ASP-G02~~ ER Wash equipment on rig. (Jackhammering continues.)
	1550	Return from washing
	1555	Resume drilling ASP-G02
	1610	Complete drilling. Call Alex V. to confirm stopping @80', 10g soil, Trout begins pulling out drill pipe. (Jackhammering continues)
	1650	Trout preps rig to set casing tomorrow
	1800	Arcadis and Trout off site.

~~b/~~ ER
7/12/19

ARCADIS

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling : Dan Karasch, Tyler Neumann, Tyus Reinke, Nic Pachan

Weather: Partly Cloudy, ~90°F

Equipment: MiniRAE 3000 PID # 5726 and WLM # 711 (Geotech Rentals)

Date	Time	Description of Activities
7/13/19	0800	Arrive on-site. Review HASP and perform H_2S tailgate.
	0815	Traut prepares to install 4" casing at ASP-602. The bottom
		of the casing will be at 80 ft with centralizers at 77ft, 60ft,
		40ft, and 20 ft.
	1230	Traut finished installing 4" casing at ASP-602. Traut sets up
		at ASP-601 next. Calibrate MiniRAE 3000 PID #5726:
		Fresh Air: 0.0/0.0 ppm Isobutylene: 100.0/100.0 %.
	1320	Begin drilling at ASP-601.
	1600	Soils logged down to 67 ft bgs at ASP-601. Called Alex Villhauer
		to confirm what depth we should attempt to VAP sample. Alex
		confirms we will attempt to VAP sample the screened interval
		from 63-67 ft bgs. He also advises the total depth of this boring
		will be around 79-80 Ft for biosparge well construction. Traut
		prepares for VAP sampling.
	1615	Begin purging @ 2.0 GPM. VAP interval will be purged until water
		level stabilizes and the purge water clears up.
	1740	VAP groundwater sample ASP-601 (63-67)(071319) collected
		after purging ≈ 150 gallons. Water level stabilized around
		65 ft bgs. Purge water cleared up slightly. Finish logging bedrock
		down to 79/80 ft bgs as directed by Alex Villhauer.
	1845	Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Tyler Neumann, Tyus Reinke, Nic Pacheco

Weather: Sunny, ~90°F

Equipment: MiniRAE 3000 PID #5726 and ULM #711 (Geotech Rentals)

Date	Time	Description of Activities
7/14/19	0815	Arrive on-site. Review HASP and perform H_2S tailgate.
	0830	Traut is already set up at ASP-603 and begins drilling. Confirmed
		with Alex Villhauer that we will not log the first 50 ft of soil
		at ASP-603. Calibrate MiniRAE 3000 PID #5726:
		Fresh Air: 0.0/0.0 ppm Isobutylene: 100.0/100.0 ppm
	0940	Begin logging soils starting at 50 ft bgs at ASP-603.
	1015	Confirmed with Alex Villhauer we will attempt to collect a VAP sample
		at ASP-603 screened from 66-70 ft bgs. Traut begins purging
		at ≈2.0 GPM.
	1120	Collected VAP groundwater sample ASP-603(66-70)(071419). Purged
		≈120 gallons before sampling, allowing water level to stabilize and
		purge water to clear up. Traut stops drilling to perform some
		routine maintenance.
	1200	Traut breaks for lunch.
	1240	Traut continues advancing deeper at ASP-603 to the targeted
		total depth of 78 ft bgs as directed by Alex Villhauer.
	1345	Finished logging bedrock down to 78 ft bgs at ASP-603. Traut prepares
		to set up at PSP-601 next. Confirmed with Alex Villhauer that we will
		not log the first 50 ft of soil at PSP-601.
	1420	Begin drilling at PSP-601.
	1600	Soils logged starting at 50 ft down to 70 ft bgs at PSP-601. Competent
		sandstone encountered at 69 ft bgs. Alex Villhauer confirms the

ARCADIS

Daily Log

Project No.: B0064479.2019.04600

Page 2 of 2

Date	Time	Description of Activities
7/14/19		target total depth here will be 79 Ft bgs. Trout continues drilling
		deeper.
	1700	Finished logging soils down to 80ft bgs. Trout prepares to install
		the 8" outer steel casing
	1800	Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: B0064479.2019.04600

Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Emma Witherspoon

Subcontractor: Traut Drilling: Dan Karasch, Tyler Neumann, Tyus Reinke, Nic Pachan

Weather: Sunny, ≈90°F

Equipment: MiniRAE 3000 PID #5726 and WLM #711 (Geotech Rentals)

Date	Time	Description of Activities
7/15/19	0830	Arrive on-site after dropping off samples to Merit lab. Meet with Emma Witherspoon (Arcadis intern) who will be shadowing today. Discuss scope of work with Emma. Prepare H&S tailgate.
	0900	Perform H&S tailgate.
	0915	Traut continues installation of the 4" pvc casing at PSP-G01. Casing will be installed down to 79 ft bgs.
	1000	Traut finishes installing the 4" pvc casing at PSP-G01 and moves over to ASP-D03 next on transect D as advised by Andrew Lorenz.
	1040	Traut finishes setting up at ASP-D03 when Andrew Lorenz calls. Andrew asks to move to location ASP-F01 next.
	1130	Traut begins jack hammering concrete at ASP-F01.
	1420	Soils logged down to 70 ft bgs at ASP-F01. Weathered bedrock encountered at 64.0 ft bgs. Call Alex Villhauer to discuss. Alex confirms we will go another 5ft and see if the material looks good for collecting a VAP sample.
	1525	Drilled down to 75ft. Traut prepares for VAP sample collection, screening the 71-75 ft interval. Begin purging at ≈2.0 gpm
	1650	Collected VAP groundwater sample ASP-F01(71-75)(071519). Purged ≈160 gallons. Water level stabilizes around 65 ft bgs. Purge water cleared up nicely. Traut prepares to drill down to the target total depth of 82ft bgs.
	1700	Collected carbon drum waste characterization sample for

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Daily Log

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Date	Time	Description of Activities
7/15/19		Dan Stockard and Tiffany Linder. The carbon drum was located at Plant 2 near the former Biosparge treatment building staging area. Sample ID: Pro_Carbon_071519 to be analyzed for TCLP Metals, Total VOC Metals (8260/8270), and TCLP SVOCs.
	1735	Collected waste characterization soil sample from rolloff box located at Plant 3 near biosparge treatment building. Sample ID: Biospargerolloff-1_071519. to be analyzed for TCLP Metals, Total VOC Metals (8260/8270).
	1745	Traut finishes drilling the remainder of ASP-F01 down to 82ft as advised by Alex Villhauer. Move to PSP-F11 next.
	1915	Traut drilled down to 50 Ft at PSP-F11. Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Emma Witherspoon

Subcontractor: Traut Drilling: Dan Karasch, Tyler Neumann, Tyus Reinke, Nic Pachan

Weather: Sunny, ~90°F

Equipment: MiniRAE 3000 PID # 5726 and WLM #711 (Geotech Rentals)

Date	Time	Description of Activities
7/16/19	0845	Arrive on-site after dropping off samples at Merit lab. Traut is preparing for VAP groundwater sampling at PSP-F11. Traut drilled down to 75ft where some competent sandstone was encountered.
	0940	Collects VAP groundwater sample PSP-F11(69-73)(071619). This interval has been purging for about 1 hour @ 2.0 GPM. About 120 gallons purged with water level stabilizing at roughly 66 ft bgs. Purge water cleared up nicely. Traut continues drilling the remainder of the borehole down to 80 ft bgs as directed by Alex Villhauer.
	1020	Traut finished drilling down to 80 ft bgs at PSP-F11 and prepares to move to PSP-F10 next
	1040	Andrew Lorenz calls and confirms PSP-F10 will have the 4" pvc casing installed and is a confirmed sparge point. He indicates there is no need for VAP sampling at this location and the first 50 ft of soil does not need to be logged.
	1130	Traut finishes setting up at PSP-F10 and breaks for lunch.
	1215	Begin drilling at PSP-F10
	1255	Begin logging soils starting at 50 ft at PSP-F10.
	1415	PSP-F10 borehole logged down to 79ft bgs. Alex Villhauer confirms the target total depth here will be 84ft bgs.
	1635	Traut finishes installing casing down to 70ft and packs up to leave. They will finish down to 84ft next week.

1645 Depart Site

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Daily Log

Project No.: B006.4479.2019.04600 Page 1 of 2

Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/23/19		Purpose: BIOsparge Drilling
		Weather: 62°F, sunny
		Arcadis/Subcontractor: Traut
		Equipment: PID#5726, WLM# 711
	0730	Arcadis on site. PICK up / drop off equipment
	0745	conduct tailgate w/ Traut. Calibrate PID = 104/100 ppm
	0800	Traut begins jackhammering CSP-G02. Set up to continue drilling down 8" casing to 84' at PSP-F10.
	0820	Resume drilling. Call Alex V. confirm stabilizers being set @ 84', 77', 64', 44', 24', & ER 5'
	0856	Traut leaves to get more water (~80' down)
	0935	Traut returns, resume drilling. Drilled to 86'
	0955	Pull 6" casing out, TD tagged @ 84'.
	1025	Install/set 4" sch PVC casing w/ centralizers @ PSP-F10
	1115	Put weight sin (to keep casing from floating)
	1128	Begin mixing up grout.
	1140	Begin grouting
	1210	Finish grouting, will top of when return from lunch.
		Traut takes lunch
	1250	Traut returns, top off hole w/ grout
	1305	Move rig to CSP-G02, set up
	1400	Begin drilling CSP-G02. Noah goes to break up cement at ASP-F02
	1600	Finisn drilling to 70'. Alex V. looks at sample. Screen interval is 63-67'.
	1615	Start purging well.
	1700	Lightning is noted. Everyone gets in vehicles - will wait until storm passes to collect sample. (Water is still being purged)
	1735	Lightning has stopped for 30 min, go out to collect sample
	1740	collect VAP sample CSP-G02(63-67)(072319)
	1743	lightning occurs again, everyone back in vehicles
	1815	NO lightning for last 30 min. Traut pulls out pipe/pump, preps to drill last 5'.

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Daily Log

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Site Location: RACER Lansing, MI

Prepared By: E. Redner

Date	Time	Description of Activities
7/23/19	1822	Resume drilling CSP-602
	1850	complete drilling, pull out drill pipe, log soil, pack up
	1915	Arcadis and Trout off site

E. Redner 7/23/19

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Daily Log

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Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/24/19		Purpose: Biosparge Drilling
		Weather: 62°F, sunny
		Arcadis/Subcontractor: Traut (Dan, Ty, Tyler, Noah)
		Equipment: PID#5726, WLM#711
	0800	Arcadis on site. Traut has moved to ASP-F02, conduct tailgate. Traut continues to set up equipment
	0825	Meet John from Ment – drop off CSP-G02 samples
	0830	Traut begins drilling. Soil will be logged starting @ 50.0'.
		Calibrate PID = 106/100 ppm.
	0945	Traut leaves to get more water and dump water (in FracTank)
	1005	some of Traut returns, go over logs with Driller
	1012	Rest of Traut returns with water. Begin washing 6" casing over 4" drill pipe.
	1050	6" casing washed over. Last ~~sample~~ core (70-75') logged, call Alex V. to discuss where to collect VAP sample/where to set screen
	1100	screen to be set 67-71', drillers set screen, begin purging
	1255	Collect ASP-F02 (67-71) (072419), drillers pull out pump
	1360	Drop off samples to Ment courier
	1305	Resume drilling to 83'.
	1405	Complete drilling to 83'. Traut begins moving equipment and pulling up weights at grouted wells.
	1435	Set up rig at ASP-603 to set casing/well (hole has already been dry)
	1515	Begin re-drilling down 6" casing
	1535	Drill down 8" casing
	1602	Traut leaves to dump dirty water, get more water
	1640	Traut returns, resume drilling down 8" casing.
	1700	Traut begins putting in 4" PVC casing w/ centralizers. Hole is actually 1 foot deeper than thought, centralizers were supposed to be at 78, 71, 55, 35, 15, 5 but are now at 79, 72, 56, 36, 16, 6. (Total depth of hole is 79'.)
	1735	Begin grouting set up.
	1750	Begin grouting (pulling out 8" casing as they go)
ER	~~1800~~ 1820	Finish grouting, lay down 8" casing
	1825	Begin cleaning up area, dumping water
	1908	Traut and Arcadis off site. Ellen 7/24/19

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/25/19		Purpose: Biosparge Drilling
		Weather: 64° F, sunny
		Arcadis/Subcontractor: Traut
		Equipment: ~~PID~~ #5726, WLM#711
	0720	Arcadis on site
	0730	Traut on site, conduct tailgate, Traut tops off ASP-S03 with grout
	0735	Traut moves equipment to ~~ASP-S01~~, set up to cement hole (no sparge point @ this well - being abandoned)
	0840	Traut begins drilling down 6"
	0900	Traut goes to get water
	0935	Traut returns, resume drilling. confirm w/ Alex V. centralizer locations
	0955	set up to pump cement down/grout
	1005	Begin pumping cement. calibrate PID = 102/100
	1020	Finish pumping cement, move to ASP-F01, set up for well installation (hole already dug)
	1050	Begin drilling down 6" casing.
	1138	Finish drilling 6" casing, break for lunch
	1210	Resume drilling - 8" casing
	1305	Traut goes to get water. confirm w/ Alex V. upcoming centralizer locations
	1340	Traut returns, resume drilling 8" casing.
	1415	set up to grout/set well
	1425	Begin grouting/setting well. ~~start~~ ER centralizers set @ 82, 76, 61, 41, 21, 5
	1530	complete grouting/setting well, move to ASP-F03. Jack Hammer out hole
	1615	set up to drill at ASP-F03
	1650	Begin drilling ASP-F03
	1800	complete drilling to 70', log soils call Alex V., have them push another 5.0'.
	1915	complete drilling to 75'. log soils. Drillers begin cleaning up. - We will finish drilling + purge + take VAP sample tomorrow morning.
	1927	Traut off site, finish/wrap up notes/log
	1940	Arcadis off site

Ellen 7/25/19

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Daily Log

Project No.: B00644479.2019.04600 Page 1 of 1

Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/26/19		Purpose: Biosparge drilling / well installation
		Weather: 65°F, sunny
		Arcadis/Subcontractor: Traut
		Equipment: PID#5726, WLM#711
	0730	Arcadis and Traut on site, conduct tailgate, calibrate PID
	0740	Traut ~~begi~~ ER checks to make sure casing isn't stuck,
		begins purging well (ASP-F03). Confirm w/ P. Wuny
		VAP sample depth (71-75') and total drilling depth (82').
		Traut jack hammers out some future well locations.
	0840	Call, talk to E. Feenstra to confirm location of PSP-F09
	0905	collect ASP-F03(71-75)(072619)
	0910	Traut pulls out purging equipment, resumes drilling
		ASP-F03
	0940	Troubleshoot pump stroke issue.
	1000	Problem is found to be with oscillator. Traut continues
		troubleshooting to confirm.
	1150	Drop off sample ASP-F03(71-75)(072619) to Merit
	1300	Pump does not seem to be part of the problem, Traut
		talking w/ technicans, slowly going through each section
		to see what is wrong
	1500	Problem appears to be that one of the motors that
		turns rotation for head is using too much oil. Check
		over lines/hoses
	1540	Run test to confirm.
	1630	Run second test
	1725	Problem is fixed... Traut believes it's a check valve
		that got stuck and when they were moving around the
		lines and testing them that it got un-stuck.
	1730	Traut begins pulling up casing
	1735	Problem occurs ~~again~~ different ER. Continue trouble shooting
	1910	will check over rig in morning to see if can be fixed
	1930	Traut and Arcadis off site.
		Ellen 7/26/19

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Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/27/19		Purpose: BioSparge Drilling
		Weather: 70°F, partly sunny
		Arcadis/Subcontractor: Traut
		Equipment: ——
	0730	Meet with Traut on site, conduct tailgate,
		Traut tests rig, tries a couple things to see if it
		can get running, packs up equipment → drill rods
	0930	Traut begins ~~fitting in~~/topping off ASP-F01 ER
	1010	Traut completes topping off (to ~1 ft bgs) ASP-F01, move
		to PSP-F11, begin ~~topping~~ off
	1045	Traut completes topping off (to ~1 ft bgs) PSP-F11, moves
		to ASP-G03, begin ~~topping~~ off
	1125	Traut completes topping off (to ~1 ft bgs) ASP-G03,
		move to ASP-G02, begin ~~topping~~ off
	1135	Traut completes ~~topping~~ off (to ~1 ft bgs) ASP-G02,
		move to PSP-G01. Does not need topping off. move to
		ASP-G01, begin ~~topping~~ off
	1205	Traut leaves for lunch and to pick up supplies
		(ASP-G01 was topped off)
	1320	Trout returns, goes back to top off ASP-F01
		(cement had settled ~4')
	1420	complete topping off (to ~4 ft bgs) ASP-F01, move
		to PSP-F11, begin topping off again (cement had
		settled ~2 ft, cut down well to be flush w/ ground level
	1440	complete topping off (~1 ft bgs) ~~ASP-G03, MO~~ ER
		PSP-F11, move to ASP-G03, begin topping off
		(cement had settled ~0.5'), cut down well to be flush w/ ground level
	1447	complete topping off ASP-G03, move to ASP-G02, begin
		topping off (cement had settled ~0.5'), cut down well to be flush w/ ground level
	1455	complete topping off ASP-G02, move to ASP-G01, begin
		topping off (cement had settled ~0.5'), cut down well to be flush w/ ground level
	1510	Begin cleaning up site, organizing equipment, prepping rig
	1710	Traut and Arcadis off site.

Ellen 7/27/19

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkes, Dustin Harris, Joe Lary, Aaron Rusk, Clayton Smith

Weather: Isolated thunderstorms, ~80°F

Equipment: MiniRAE 3000 PID #8130 and WLM #6167 (Cortech Rentals)

Date	Time	Description of Activities
7/29/19	0810	Arrive on-site. Meet up with Eric Feenstra who has marked out the locations along transect B. Review HASP and prepare H&S tailgate.
	0900	Check in with the Cascade drilling crew that is mobilizing to the site this morning. They indicate they are running behind and will be on-site close to 10 am. Head to Merrill lab to pick up extra bottleware.
	1000	Cascade arrives on-site. Review HASP and perform H&S tailgate. Discuss scope of work. Set up at ASP-B03 and stage equipment and supplies.
	1030	Gauge nearby bedrock wells to get an idea of where the water table is at near bedrock: MW-13-44: DTW = 70.10 ft bgs MW-13-43: DTW = 62.83 ft bgs.
	1115	Cascade breaks for lunch
	1215	Begin coring on transect B at ASP-B03 using 14 inch core barrel. The other Cascade crew members prepare equipment and supplies and head out to obtain water.
	1645	Cascade finishes setting up at ASP-B03. They also cored concrete at locations ASP-B03, PSP-B01, PSP-B02, PSP-B03, and PSP-B04. Depart site.

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Daily Log

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Site Location: RACER Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
7/30/19		Purpose: Biosparge Drilling
		Weather: 85°F, sunny
		Arcadis/Subcontractor: Traut
		Equipment: ~~PID~~ #5726 WLM #711
1542	~~0342~~ ER	Arcadis on site. Mark holes to be filled w/ drilling mud
1550	~~0350~~ ER	to ER Traut on site. Conduct tailgate.
	1600	set up on CSP-602, begin pumping down drilling mud. complete pumping.
	1625	move to PSP-F11, begin pumping down drilling mud. complete pumping
	1640	move to ASP-F02, begin pumping down drilling mud. Complete pumping.
	1650	move to ASP-F03, set up to continue drilling (left off @ 75.0' - need to go to 82.0'), calibrate PID = 103/100
1715	~~1715~~ ER	Begin drilling
1755	~~1555~~ ER	complete drilling down 6" casing. Begin
	~~1835~~ ER	overdrilling 8" casing down.
	1835	Traut leaves to get water
	1905	Traut returns, resume drilling down 8" casing
	1940	Traut completes drilling down 8" casing, clean and pulling out 6" casing. Begin cleaning up.
	2000	Traut off site. Finish up notes. Put in shed for Severin.
	2015	Arcadis off site.

EMR 7/30/19

Scanned with CamScanner

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkes, Dustin Harris, Joe Lamy, Aaron Rusk, Clayton Smith

Weather: Partly Cloudy, chance of pop up thunderstorms, ~80°F

Equipment: MiniRAE 3000 #3130 and WLM #66167 (Geotech Rentals)

Date	Time	Description of Activities
7/30/19	0700	Arrive on-site. Review HASP and perform H&S tailgate with Cascade drilling crews.
	0815	Begin sonic drilling at ASP-B03
	1115	Soils logged down to 75ft bgs. Weathered sandstone encountered at 69.0ft bgs. Confirm with Patrick Curry where to set the screen for VAP sample collection. Cascade encountered a mechanical issue with the sonic head after drilling down to 75ft. It appears one of the two dog bones inside the head have bent, causing the transmission to malfunction. The sonic head no longer has any vibration and will need to be replaced or repaired.
	1200	Cascade breaks for lunch.
	1330	VAP screen set from 69-74ft bgs. Gauged casing: DTW = 66' bgs.
	1340	Begin purging VAP screen interval.
	1430	Collected VAP groundwater sample ASP-B03(69-74)(073019). Water level stabilized at 67ft bgs purging at 1.0 GPM. Head to Merit lab to drop off sample under rush 24-hour TAT.
	1545	Arrive back onsite. Cascade is wrapping up preparation for the sonic head swap tomorrow morning.
	1600	Cascade departs Site. Traut arrives back on-site from Indianapolis where they had their rig repaired. Ellen Redner onsite to oversee Traut. Catch up with scope of work with Ellen.

 1615 Depart Site

ARCADIS

Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkes, Dustin Harris, Aaron Rusk

Weather: Sunny, ~80°F

Equipment: MiniRAE 3000 #3130 and WLM #6167 (Geotech Rentals)

Date	Time	Description of Activities
7/31/19	0645	Arrive on-Site. Review HASP and prepare H&S tailgate.
	0700	Cascade arrives on-Site. Perform H&S tailgate.
	1045	Sonic head replacement complete on the drill rig. Cascade
		prepares to move over to location ASP-B04 next.
	1230	Begin drilling at ASP-B04.
	1500	Cascade finishes logging soils down to 75 ft bgs. Confirmed
		with Alex Villhauer we will VAP sample here, screened
		70-75 ft, 5 ft into the weathered bedrock.
	1515	Begin purging VAP interval 70-75 ft @ 1.0 LPM.
	1615	VAP interval purges dry. Wait for recharge before sampling.
	1655	Collected VAP groundwater sample ASP-B04(70-75)(073119).
		Cascade trips out rods.
	1730	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling - Scott Parkes, Dustin Harris, Aaron Rusk

Weather: Sunny, ~ 85 °F

Equipment: MiniRAE 3000 #3130 and WLM #6167 (Geotech Rentals)

Date	Time	Description of Activities
8/1/19	0650	Arrive on-Site. Review HASP and perform H&S tailgate.
	0700	Cascade arrives on-Site. Perform H&S tailgate.
	0720	Cascade prepares to move to location PSP-B02 next.
	0745	Head to Merit lab to drop off VAP sample collected yesterday.
	0945	Cascade begins drilling at PSP-B02. The soils from 0-50 ft bgs will not be logged at this location.
	1200	Cascade breaks for lunch. They will get water for drilling while they are out. Arcadis has logged soils at PSP-B02 so far from 47-67 ft bgs.
	1330	Cascade cores concrete at stepout location ASP-B02. VAP sample results came in for A-SP-B03 and indicated we will step out.
	1450	PSP-B02 logged down to 77 ft bgs with weathered sandstone starting at 70 ft and competent sandstone starting at 74 ft bgs. Alex Villhauer confirms the final depth of the hole should be 81-82 ft deep. Alex confirms centralizer depths with one at the bottom of the hole, 75 ft, 60 ft, 40 ft, 20 ft, and 5 ft.
	1650	Cascade has the 4" pvc and centralizers installed. They will grout first thing in the morning. Cascade packs up and cleans up.
	1715	Depart Site

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkes, Aaron Rusk

Weather: Sunny, ~85 °F

Equipment: MiniRAE 3000 #8130 and WLM #6167 (Geotech Rentals)

Date	Time	Description of Activities
8/2/19	0830	Arrive on-site. Review HASP and perform H&S tailgate.
	0845	Cascade continues grouting the 4" pvc casing at PSP-B02.
	1000	Cascade finishes grouting the 4" pvc at PSP-B02. 300 gallons of Portland Cement with 3-4% bentonite used.
	1110	Begin drilling at ASP-B02. No soils will be logged from 0-47 ft bgs.
	1400	Soils/bedrock logged down to 77ft bgs at ASP-B02. Screen set from 68-73ft for VAP sample collection. Begin purging at ~1.0 GPM.
	1455	Water level is stable at about 72ft bgs, purging nice clear water. Prepare sample containers.
	1515	Collected VAP groundwater sample ASP-B02(68-73)(080219). Pack up and clean up. Merit lab is closed for the day. Sample will be submitted Monday morning.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkis, Dustin Harris, Joel Hallawell

Weather: Sunny, ~85°F

Equipment: MiniRAE 3000 #3130 and WLM #6167 (Grotech Rentals)

Date	Time	Description of Activities
8/5/19	0945	Arrive on-Site after dropping off VAP sample at Merit Lab.
		Review HASP and prepare H&S tailgate.
	1025	Cascade arrives on-Site. Perform H&S tailgate.
	1045	Cascade prepares to move off location ASP-B02 to location
		ASP-B04. They will pull casing and grout the borehole at
		ASP-B04. This location had a VAP sample that was Non-Detect
		for 1,4-Dioxane. After abandoning ASP-B04 they will move to
		PSP-B05.
	1200	Cascade breaks for lunch.
	1230	Prepare to grout ASP-B04
	1345	ASP-B04 grouted with Portland Cement and 3-4% bentonite
		with tremie pipe from the bottom up. 6" outer casing pulled.
		Set up at PSP-B05 next.
	1430	An obstruction encountered at 5ft bgs while at PSP-B05.
		Step over 5ft West.
	1500	Cascade successfully gets past the obstruction. Continue drilling
		at PSP-B05.
	1535	Traut arrives on-Site. Perform H&S tailgate.
	1545	Traut prepares for 4" pvc installation at ASP-F03. Total depth 82 ft
		bgs with centralizers at 82', 75', 65', 45', 25', and 5'.
	1630	Cascade prepares for VAP sampling screened interval 70-75 ft bgs
		at PSP-B05.

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Date	Time	Description of Activities
8/5/19	1640	Begin purging VAP interval screened 70-75ft at PSP-B05. Purging at ~1.0 GPM. Wait for water level to stabilize and purge water to clear up before sampling.
	1715	VAP interval purged dry. Wait for recharge.
	1730	Purged VAP interval dry. Wait for recharge.
	1745	Collected VAP groundwater sample PSP-B05(70-75)(080519). Purge water clear. Purged about 40 gallons before sampling.
	1815	Depart Site

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkes, Dustin Harris, Joel Hallauer II

Weather: Cloudy, chance of thunderstorms, ~80°F

Equipment: MiniRAE 3000 #3130 and WLM #6167 (Geotech Rentals)

Date	Time	Description of Activities
8/6/19	0715	Arrive on-Site. Review HASP and perform H&S tailgate with Cascade crew.
	0730	Cascade prepares equipment and supplies. They will move back to ASP-B03 next for 4" pvc casing installation. The bedrock will be logged deeper to determine what the total depth of the 4" pvc casing will be. Traut arrives on-Site. Perform H&S tailgate with Traut.
	0745	Traut finishes topping off ASP-F03 with Portland Cement grout. Traut will move to the nearest location South to begin 4" pvc casing installation.
	0800	Severin Presswood arrives on-Site to oversee Traut. Perform H&S tailgate and get Severin up-to-speed on Trauts progress and next steps moving forward.
	0845	Head to Merit to drop off VAP sample collected yesterday at PSP-B05.
	0945	Arrive back on-site. Continue drilling oversight with Cascade.
	1215	Cascade has now drilled down to 82 ft bgs at ASP-B03. Confirmed with Alex Villhauer the total depth for the 4" pvc casing will be 82ft bgs with centralizers at 82', 76', 68', 48', 28', 5'. Cascade takes lunch
	1245	Prepare for 4" casing installation at ASP-B03
	1400	Cascade cannot get 4" pvc bottom caps to fit. They go to Valley Farms Supply for new caps.
	1445	Cascade back onsite. Cannot get new caps to fit.

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Daily Log

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Date	Time	Description of Activities
8/6/19	1500	Cascade uses one of Trautt's caps and cannot get it to fit. Cascade then realizes the 4" pvc pipe on-site is threaded wrong. They will need to get more Johnson pipe on-site that works with their caps.
	1515	Lead driller confirms Cascade is done for the day and that they will have the correct pipe on-site tomorrow.
	1545	Depart Site

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkes

Weather: Sunny, ≈ 80°F

Equipment: MiniRAE 3000 # 3130 and WLM # 6167 (Geotech Rentals)

Date	Time	Description of Activities
8/7/19	0800	Arrive on-Site. Review HASP and perform H&S tailgate with Cascade.
	0815	Cascade continues 4" pvc casing installation at ASP-B03
	1100	ASP-B03 4" pvc casing installation complete. Jeff Barrett and
		Randy Christensen arrived on-Site earlier in the morning for
		a Site visit. They depart Site.
	1115	Cascade cleans out their mud pan and begin coring concrete at
		ASP-B01 where we will be moving next.
	1200	Cascade takes lunch.
	1230	Cascade continues setting up at ASP-B01. They must clear
		old landscaping boulders and brush to make room for the rig
	1400	Cascade prepares to begin drilling when they notice the slide that allows
		the sonic head to move and center on the hole is not functioning.
	1630	Cascade crew unable to fix their mechanical issue. They will have
		their mechanic come out tomorrow morning. In the meantime
		they pack up and clean up. Severin Presswood leaves to drop off
		a VAP sample collected at CSP-F01 to Merit lab before they
		close. Head over to the Traut crew to take over for
		Severin.
	1700	Traut finishes drilling to 80ft bgs at CSP-F01 as advised by Alex
		Villhauer. They leave their 6" steel casing in the hole and move
		over to PSP-F09 next.
	1730	Begin drilling at PSP-F09. The first 50ft will be blind drilled

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Date	Time	Description of Activities
8/7/19		with no soils logged.
	1915	Trant finishes for the day drilled down to 70ft at PSP-F09.
		Pack up and clean up.
	1920	Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Scott Parkes, Dustin Harris, Joseph Bonnet

Weather: Cloudy, ~ 80°F

Equipment: MiniRAE 3000 #3130 and WLM #6167 (Geotech Rentals)

Date	Time	Description of Activities
8/8/19	0830	Arrive on-Site. Review HASP and perform H&S tailgate with Cascade. Cascade is currently still trying to fix the malfunction with the slide on the rig. Their main mechanic is here trying to make the repair.
	0845	Check on Severin Presswood over by the other sonic crew with Trant Drilling.
	1015	Cascade has their rig repaired. Begin drilling at ASP-B01. No soils will be logged from 0-47ft bgs here.
	1200	Soils/bedrock logged down to 77ft bgs. Cascade prepares for VAP sample collection, setting the screen from 68-73 ft bgs.
	1220	DTW before purging is 69.60 ft bgs. Begin purging at 1.0 GPM.
	1225	Water purges dry. Wait for recharge before purging again.
	1235	Continue purging at a lower rate, ~200 ml/min. Steady clear purge with water level stabilized @ 70.54' bgs.
	1335	Collected VAP sample ASP-B01 (68-73)(080819). Purged about 10 gallons total before sampling. Water level stabilized @ 70.50' bgs while purging for an hour at 200 ml/min. Clean up and move back to ASP-B03 to pull the rods that were used to hold the casing in place.
	1355	Andrew Lorenz calls and confirms we can go to ASP-B02 next and install the 4" pvc casing. Alex Willhaver confirms 82 ft bgs will likely be the total depth of the 4" casing. After we finish ASP-B02 Andrew would like us to drill and install 4" pvc casing at PSP-B01.

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Daily Log

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Date	Time	Description of Activities
8/8/19	1430	Cascade fuels up the rig and gets more water for installing the 4" pvc casing at ASP-B02.
	1515	Cascade begins the overdrilling at ASP-B02 using the 8" steel casing. They will finish drilling the remainder of the hole down to 82ft bgs
	1630	Alex Villhauer stops by and confirms centralizer depths at ASP-B02: 82ft, 75ft, 68ft, 48ft, 28ft, and 5ft.
	1715	Cascade wraps up for the day. Borehole ready for 4" pvc casing installation first thing in the morning.
	1730	Depart Site

ARCADIS

Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Joe Lany

Weather: Sunny, ≈ 80°F

Equipment: MiniRAE 3000 #3130 and WLM #6167 (Geotech Rentals)

Date	Time	Description of Activities
8/9/19	0715	Arrive on-Site. Review HASP and perform H2S tailgate with Cascade.
	0730	Continue where we left off yesterday at ASP-B02 with installation
		of the 4" pvc casing.
	1000	Cascade gets core barrel stuck at 82ft while cleaning out the hole.
		They will have to wash the 8" steel casing over the 7" core
		barrel to free it up. They stop to get water for washing casing
		and grouting.
	1300	Core barrel free. Begin installing 4" pvc.
	1530	4" pvc installation complete at ASP-B02. Cascade wraps
		up and cleans up.
	1545	Depart Site

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Daily Log

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Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-6-19	630	Mobilize to site
	730	Arcadis + Traut on-site
	745	H+S tailgate
	805	Site walk and overview with Austin
	910	Traut completes 4" pvc casing instal to Total
		depth of 82' bgs w/ centralizers at 82', 75',
		65', 45', 25', and 5' at ASP-F03
	920	Traut sets up at ASP-F02
	930	Heavy rain moving into area - stop work
	1050	Resume work at ASP-F02
	1200	Traut breaks for lunch
	1230	Traut back onsite
	1430	Traut completes 4" PVC casing instal to total
		depth of 83' bgs w/ centralizers at 83', 75',
		63', 43', 23' and 5' at ASP-F02
		a total of 17 bags of 92.6 lbs concrete with
		3-4% bentonite was used to bring level of
		concrete up to 5' bgs
	1445	Traut sets up at PSP-F11
	1735	Traut completes 4" PVC casing instal to total
		depth of 80' bgs w/ centralizers at 80', 73',
		63', 43', 23', 5' at PSP-F11

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Daily Log

Project No.: 30006870 Page 2 of 2

Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-6-19	1800	Trant sets up at CSP-602
|	1915	Trant drills to 35' bgs with 8" outer casing at
|		CSP-602, will leave tooling in ground and
|		end work for day
L	1930	Arcadis + Trant off-site

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Daily Log

Project No.: 30006870 Page 1 of 1

Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-7-19	545	Mobilize to site
	700	Arcadis + Traut on-site
	715	H+S tailgate
	730	Traut off-site for water
	805	Traut on-site
	830	continue drilling at CSP-602
	1010	4" PVC casing installation complete at CSP-602
		to total depth of 75' bgs with centralizers at
		75', 69', 55', 35', 15', and 5'
	1030	Traut breaking concrete at CSP-F01
	1145	Start drilling at CSP-F01
SMP 8-7-19	~~1155~~	Bedrock reached at CSP-F01 - call Alex to discuss
	1255	Weathered bedrock begins at 63.0' bgs with noted increase
		in competency at 68.0' bgs - Alex instructs to
		collect VAP sample at 64-69' interval then drill
	1400	to 80' bgs
8-7-19 SMP	~~1300~~	Begin purging water at CSP-F01 VAP interval
	1535	Collect CSP-F01 (65-69) (080719)
	1630	Austin will oversee Traut as they drill final
		10' at CSP-F01 while I drop off sample at Merit Labs
	1650	Relinquish samples to Meril
	1700	Mobilize back to Novi

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Daily Log

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Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-8-19	530	Mobilize to site / stop for gas + water
	700	Arcadis on-site / Traut on-site
	705	H+S tailgate
	730	Traut continues drilling at PSP-F09, they advanced to 70' bgs yesterday with Austin so first push of dy is the 70-80' interval
	815	Call Alex to discuss lithology, upon review total depth will be 83' with centralizers at 83', 76', 62', 42', 22', 5'
	845	Total depth of 83' reached. Traut begins casing instal at PSP-F09
	1155	4" pvc casing fully installed at PSP-F09 to total depth of 83' with centralizers as described above
	1200	Break for lunch
	1225	Back on-site
	1230	Setup at PSP-F08
	1300	Begin drilling at PSP-F08
	1530	Call Alex to discuss lithology - bedrock was encountered more shallow than expected - Alex mobilizes to site to view core
↓	1610	Alex on-site

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Daily Log

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Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-8-19	1620	Alex instructs to drill to 80' bgs
	1700	After reviewing 70-80' bgs interval with Alex,
		total depth of well will be 80' bgs
	1705	Traut begins well installation at PSP-F08
	1930	PSP-F08 4" PVC well fully installed with total
		depth of 80' bgs with centralizers at 80',
		73', 63', 43', 23', 5'
	1945	Arcadis + Traut off-site

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Daily Log

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Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-9-19	545	Mobilize to site
	655	Arcadis + Traut on-site
	705	H+S tailgate
	830	Traut pulls weights from PSP-F09
	900	Traut pulls weights from CSP-602
	915	Setup at PSP-F07
	940	Start drilling at PSP-F07
	1145	70' bgs reached at PSP-F07 - break
		for lunch
	1220	Back on-site
		Note: Over lunch Andrew sent message stating
		CSP-F01 will have casing installed and
		an additional CSP will be drilled and sampled
		at CSP-F02. After discussing with Traut
		we determine that the best course of action is
		to not drill CSP-F02 during this 10-day
		Traut shift because we would not get
		lab results back until Monday or Tuesday,
		and so Traut wouldn't be able to complete the
		well if it was needed as they are mobilizing
		home on Tuesday
	1300	Competent bedrock reached - call Alex to discuss

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Daily Log

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Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-9-19	1545	4" PVC casing fully installed at PSP-F07
		to total depth of 80' with centralizers at
		80', 73', 63', 43', 23', 5'
	1620	Setup at CSP-F01 to instal casing
	1900	4" pvc installed to 80' bgs with centralizers
		at 80', 74', 62', 42', 22', 5' bgs -well
		will be grouted tomorrow
	1920	Arcadis + Trust off-site

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Daily Log

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Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-10-19	545	Mobilize to site
	705	Arcadis + Trout on-site
	715	H+S tailgate
	720	Prep work for grouting at CSP-F01
	840	CSP-F01 grouted and weights pulled
	845	Setup at PSP-F06
	940	Begin drilling at PSP-F06
	1220	Competent bedrock reached - call Alex to discuss
	1310	Start casing install at PSP-F06
	1540	4" pvc casing installed at PSP-F06 to total
		depth of 79' bgs with centralizers at 79', 72',
		62', 42', 22', 5'
	1545	Setup at PSP-F05
	1610	Begin drilling at PSP-F05
	1830	Competent bedrock reached - will install pvc casing
		tomorrow
	1910	Arcadis + Trout off-site

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Daily Log

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Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-11-19	545	Mobilize to site
	705	Arcadis + Trant on-site
	715	H+S tailgate
	745	Begin PVC casing instal at PSP-F05
	1030	4" pvc well casing installed at PSP-F05
		to total depth of 80' with centralizers at
		80', 73', 63', 43', 23', 5'
	1040	Setup at PSP-E12
		~~Start drilling at PSP-E12~~ SMP 8-11-19
	1125	Setup complete at PSP-E12, break for lunch
	1200	Back on-site
	1220	Start drilling at PSP-E12
	1345	Bedrock reached - call Alex - UAP interval
		of 66-70' is decided on - begin purging
		UAP interval
	1500	Sample PSP-E12 (66-70) (081119)
	1515	Continue drilling at PSP-E12
	1545	Call Alex to discuss lithology
	1815	PSP-E12 4" pvc casing installed to 80' bgs
		with centralizers 80', 74', 64', 44', 24', 5'
	1840	Arcadis + Trant off-site

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Daily Log

Project No.: 30006870 Page 1 of 1

Site Location: Racer Lansing

Prepared By: Severin Presswood

Date	Time	Description of Activities
8-12-19	600	Mobilize to site
	710	Arcadis + Trout on-site
	720	H+S tailgate
	745	Continue drilling at PSP-E11
	1020	Consolidated bedrock reached - call Alex to discuss
	1230	PSP-E11 4" pvc casing installed with total depth of 80' bgs w/ centralizers at 80', 74', 63', 43', 23', 5'
	1300	Trout will not start a new well as they are mobilizing home tomorrow. Trout will grout all wells to 5' bgs and load up equipment the rest of today
	1430	Shantel will oversee Trout for remainder of day - S. Presswood off-site

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PREPARED BY S. JOHNSON

Daily Log

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Date	Time	Description of Activities
8/12/19	—	PURPOSE: DRILLING + VAP SAMPLING @ PSP-B04
	—	EQUIPMENT: MINIRAE 3000, WLM
	—	PERSONNEL: S. JOHNSON; S. PARKS (CASCADE)
	—	WEATHER: 78°, SUNNY
	0900	ARRIVE ON SITE
	0915	H+S TAILGATE W/A. VILHAUER, GO OVER TODAY'S
	—	AGENDA
	0945	S. PARKS (CASCADE ON SITE)
	1010	CLEANUP AND DE-MOB @ ASP-B02
		~~ABANDON PSP-B05~~
		~~BEGIN DRILLING @ PSP-B04~~
	1100	NOTIFIED THAT DRILLING HELPER HAD TO LEAVE DUE TO
	—	FAMILY EMERGENCY; CASCADE ALSO DOES NOT HAVE ENOUGH
	—	CEMENT TO GROUT PSP-B05 AND WILL GRAB MORE
	—	SUPPLIES AFTER FINISHED CLEANING ASP-B02
	1135	CUT PVC RISER AND PLACED CONE OVER ASP-B02
	1235	CASCADE OFFSITE TO PICK UP CEMENT
	1340	CASCADE ON SITE; BEGIN ~~GROUTING PSP-B05~~ MIXING GROUT
	1430	BEGIN GROUTING PSP-B05
	1530	FINISH GROUTING PSP-B05; CASCADE SETS UP RIG FOR
	—	NEXT LOCATION AND BEGINS DISPOSING OF WASTE
↓	1730	ARCADIS + CASCADE OFF SITE

ARCADIS

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight PSP-B04

Prepared By: ~~Austin Westhuis~~ S. JOHNSON

Staff On-Site: ~~Austin Westhuis~~ S. JOHNSON

Subcontractor: CASCADE; S. PARKES

Weather: 71°, CLOUDY

Equipment: MINIRAE 3000, ULM

Date	Time	Description of Activities
8/13/19	0730	ARCADIS ON SITE; CONDUCT H+S TAILGATE; REVIEW TODAY'S
	-	AGENDA
	0745	CASCADE SETS UP DRILLING AREA AT PSP-B04
	0820	BEGIN DRILLING @ PSP-B04; FIRST 47' WILL BE BLIND DRILLED
	1030	DRILLED DOWN TO 77'; RECEIVED CONFIRMATION FROM A. VILLHAUER
	-	TO TAKE VAP SAMPLE FROM 72-77' BGS
	1100	BEGIN PURGING @ PSP-B04, APPROXIMATELY 1 GPM
	1150	PUMPED WELL DRY; LET RECHARGE FOR 20 MINUTES
	~~1215~~ 1230	BEGIN PURGING AGAIN @ RATE OF 1 GPM
(SJ)	-	WATER IS CLEAR
	1237	~~SAMPLE VAP: PSP-B04 (72-77) (081319) @ 1237~~ (SJ)
	-	PUMPED WELL DRY; WILL LET WELL RECHARGE AND IMMEDIATELY
	-	TAKE SAMPLE
	1257	VAP SAMPLED: PSP-B04 (72-77) (081319) @ 1257; 50 GAL PUMPED
	1320	OFF SITE TO DROP OFF SAMPLE TO LAB
	1405	ARCADIS BACK ON SITE; CASCADE OFF SITE TO GET WATER
	1500	CASCADE BEGINS DRILLING @ PSP-B01
	1745	SOILS LOGGED TO 77' BGS (WILL LOG TO 84' TOMORROW MORNING)
		CASCADE WRAPS UP FOR THE DAY
	1800	ARCADIS AND CASCADE OFF SITE

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: ~~Austin Westhuis~~ S. JOHNSON

Staff On-Site: ~~Austin Westhuis~~ S. JOHNSON

Subcontractor: CASCADE — S. PARKES

Weather: 69°, CLOUDY

Equipment: MINIRAE 3000, WLM

Date	Time	Description of Activities
8/14/19	0730	ARRIVE ON SITE
	0740	H+S TAILGATE, GO OVER TODAY'S AGENDA
	0810	CASCADE RESUMES DRILLING @ PSP-B01
	0900	LOGGED SOILS DWN TO 77'; A VILLHAUER GIVES
	—	CENTRALIZER LOCATIONS FOR PSP-B01:
	—	82, 75, 68, 48, 28, AND 5'
	0915	DRILLERS DISPOSE OF WASTE FROM PSP-B01
	0940	CASCADE BEGINS SETTING WELL @ PSP-B01
	1150	CASCADE TREATS FOR LUNCH
	1210	CASCADE BEGINS GROUTING PSP-B01
~~1350~~	~~1315~~ 1350	CASCADE FINISHES GROUTING AND BEGINS POWERWASHING
	(M) —	TOOLING
	1400	T. GROSSMAN (CASCADE) OFF SITE
	1430	CASCADE FINISHES CLEANING TOOLING; BEGIN PREP FOR
	—	TOMORROW * (THEY WILL GET MORE CEMENT FOR TOMORROW
	—	AND BE OFFSITE @ APPROX. 1630)
	—	* DRILLER'S HELPER HAD TO LEAVE @ 1400; DRILLER DID
	—	NOT FEEL COMFORTABLE OPERATING RIG WITH ONLY 2
	—	PEOPLE
	1530	ARCADIS OFF SITE

ARCADIS

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: ~~Austin Westhuis~~ S. JOHNSON

Staff On-Site: ~~Austin Westhuis~~ S. JOHNSON

Subcontractor: CASCADE — S. PARKES

Weather: 61° CLOUDY

Equipment: MINIRAE 3000, WLM

Date	Time	Description of Activities
8/15/19	0730	ARCADIS ON SITE
	0745	H+S TAILGATE; DISCUSS TODAY'S AGENDA
	0800	CASCADE PREPS FOR DRILLING @ CSP-BØ1
	0850	BEGIN DRILLING @ CSP-BØ1
	1030	DRILLED DOWN TO 77' BGS
	1040	RECEIVED INSTRUCTION FROM A. VILLHAUER TO SET SCREEN
	—	FROM 70-75' BGS; VAP SAMPLE!
	—	CSP-BØ1 (70-75)(081519) @ 1220
	1100	CASCADE PREPARES FOR VAP SAMPLE COLLECTION
	1129	BEGIN PURGING @ CSP-BØ1; PRE-PURGE WATER LEVEL
	—	69.78 / 44.78 BELOW TOC (~62-78' BGS); PURGING @
	1215	(SB) STABILIZED DTW: 72.44 BELOW TOC (~65.44' BGS);
	—	WATER FLOWING CLEAR AND STEADY
	1220	SAMPLE CSP-BØ1 (70-75)(081519)
	1230	CASCADE OFF SITE TO GET MORE WATER
	1315	CASCADE BACK ON SITE, BEGIN CLEANUP @ CSP-BØ1;
	—	ARCADIS OFF SITE TO DROP OFF SAMPLES
(SB)	~~1400~~ 1345	CASCADE BEGINS OVERDRILLING @ ASP-BØ1
	1400	ARCADIS BACK ON SITE. CHECK DRUMS IN PLANT 2
	1700	CASCADE OVERDRILLS DOWN TO 77', WILL COMPLETE THE
	—	REMAINING 5' IN THE MORNING; ARCADIS + CASCADE
	—	OFF SITE

ARCADIS

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: ~~Austin Westhuis~~ S. JOHNSON

Staff On-Site: ~~Austin Westhuis~~ S. JOHNSON

Subcontractor: CASCADE, S. PARKES

Weather: 62°, CLOUDY

Equipment: MINIRAE 3000, WLM

Date	Time	Description of Activities
8/16/19	0730	ARCADIS ON SITE
	0745	H+S TAILGATE; DISCUSS TODAY'S AGENDA
	0800	CASCADE RESUMES OVERDRILLING @ ASP-B01 USING 8"
	—	TOOLING
	0820	LOG DOWN TO 82'
	0830	CASCADE BEGINS INSTALLING 4" PVC CASING; CENTRALIZER
	—	LOCATIONS RECEIVED FROM A. WILHAUER:
	—	82, 75, 68, 48, 28, AND 5'
	0940	CASCADE BEGINS MIXING GROUT FOR ASP-B01
	1015	CASCADE BEGINS GROUTING ASP-B01 FROM THE BOTTOM
	—	~~UP~~ UP USING A TREMIE PIPE
	1100	CASCADE FINISHES GROUTING @ ASP-B01
	1115	~~CASCADE SETS UP~~ RECEIVE CONFIRMATION FROM A. LORENZ
	—	THAT CASING WILL BE INSTALLED @ PSP-B04
	1130	CASCADE SETS UP RIG @ PSP-B04
	1150	CASCADE BREAKS FOR LUNCH
	1220	CASCADE DISPOSES OF WASTE
	1300	CASCADE BEGINS OVERDRILLING @ PSP-B04 USING 8"
	—	TOOLING
	1415	T. GROSSMAN OFF SITE
	1540	CASCADE WRAPS UP FOR THE DAY
	1600	ARCADIS OFF SITE

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Scott Parks, Joe Lamy, Aaron Harris

Weather: Partly Cloudy, ~80°F

Equipment: MiniRAE 3000 #3130 and UHM #711 (Geotech Rentals)

Date	Time	Description of Activities
8/19/19	0830	Arrive on-Site. Meet up with Kara Donahue (Arcadis) and the Cascade Drilling crew. Perform H&S tailgate and review HASP. Discuss scope of work.
	0900	Prepare to continue where we left off last week Friday at PSP-B04.
	1030	Cascade drilled down to 82ft. Log sandstone bedrock and discuss with Alex Villhauer who is also on-Site where to install the bottom of the 4" pvc casing. Alex confirms the total depth of the 4" pvc casing will be 84 ft bgs, with centralizers at 84ft, 77 ft, 71ft, 51ft, 31ft, and 5 ft bgs. Cascade prepares to drill another 2ft down to 84ft bgs
	1250	Cascade finally opens PSP-B04 borehole to 84ft bgs. They had difficulty removing the final 2ft and had to trip in and out a few different times to retrieve the sample. Cascade heads offsite to get more water and to take lunch.
	1615	Cascade finishes 4" pvc installation at PSP-B04. 210 gallons of neat cement used to grout casing in place. Cascade packs up and cleans up.
	1700	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Scott Parkes

Weather: Scattered thunderstorms, high 87°F

Equipment: MiniRAE 3000 #3130 and WLM #711 (Grotech Rentals)

Date	Time	Description of Activities
8/20/19	0830	Arrive on-Site. Perform H&S tailgate and review HASP. Cascade has finished topping off PSP-B04 with neat cement and has moved over to ASP-B01 to pull drill rods used as weights to keep the 4" pvc in place while the grout cures.
	0900	Cascade departs Site to swap out some crew members on-Site. They will be back soon after making some personnel changes. Check on drums for Tiffany Linder
	0930	STOP Work due to nearby lightning.
	1000	Cascade arrives back on-Site. Severe weather has passed. Begin pulling rods at ASP-B01.
	1030	Cascade prepares to abandon CSP-B01 by grouting the borehole with neat cement from the bottom up and then removing the 6" steel casing that was left in the hole.
	1145	CSP-B01 abandoned. Move to PSP-B03 next.
	1200	Cascade breaks for lunch.
	1245	Continue setting up at PSP-B03.
	1400	Begin drilling at PSP-B03. Fresh Air Cal of MiniRAE 3000 #3130 = 0.0/0.0 ppm. Need new canister of isobutylene for Span cal. Will get new can tomorrow.
	1700	Finished drilling for the day, Borehole at PSP-B03 logged down to 84 ft bgs. Send boring log to Alex Villhauer to review, Wait to hear back on how to finish this location. Cascade departs Site

ENFM009-DAILYLOG | 1730 Depart Site

Document #ENFM009, Revision 01

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue, Alex Villhauer, Eric Feenstra, Dan Stockard

Subcontractor: Cascade Drilling: Joe Lary, Dustin Harris, Aaron Rusk

Weather: Partly cloudy, chance of thunderstorms, high 84°F

Equipment: MiniRAE 3000 #3130 and WLM #711 (Geotech Rentals)

Date	Time	Description of Activities
8/21/19	0830	Arrive on-Site. Review HASP and perform H2S tailgate. Drillers are just getting back from grabbing more water this morning.
	0900	Cascade prepares to drill down to 89ft bgs at PSP-B03 as directed by Patrick Curry and Alex Villhauer. 89ft will be the total depth for the 4" pvc casing here with centralizers at 89ft, 83ft, 77ft, 57ft, 37ft, 17ft, 5ft. New Isobutylene Canister picked up this morning at Geotech for calibrating MiniRAE 3000 PID #3130. Geotech calibrated PID: 100.0/100.0ppm Isobutylene.
	1000	Holly Herner and Joe Molina arrive on-Site for their Site visit. Discuss the history of the Site, review HASP, perform H2S tailgate and discuss the progress of our Biosparge Well Installations.
	1030	Cascade has opened up the borehole at PSP-B03 down to 89ft bgs and prepares for 4" pvc installation
	1245	4" pvc installation complete. Cascade breaks for lunch.
	1330	Cascade prepares to move to transect C to drill the next location.
	1400	Dan Stockard informs us that Transect C has been modified once again. Dan begins marking new locations for Transect C. Cascade will abandon TW-14-03 while we wait for Transect C to be marked.
	1500	TW-14-03 abandonment complete. Cascade moves over to

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Date	Time	Description of Activities
8/21/19		Transect C at ASP-C02 as directed by Andrew Lorenz. Help
		Eric Feenstra line the new soil roll off box on-Site and the
		new sediment separator box.
	1700	Cascade is all set up at ASP-C02. Depart Site

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Joe Lamp, Dustin Harris, Aaron Rusk

Weather: Sunny to partly cloudy, high 76°F

Equipment: MiniRAE 3000 #3130 and WLM #711 (Geotech Rentals)

Date	Time	Description of Activities
8/22/19	0740	Arrive on-Site. Meet with Cascade and perform H&S tailgate.
		Cascade informs Arcadis that their trucks were broken into last
		night and two generators were stolen. Locks were cut on their
		doors.
	0830	Cascade noticed their concrete coring machine mounted to the
		Geoprobe track mounted rig has a hydraulic leak. Cascade cleans
		up the leak with absorbent pads.
	0835	Calibrate MiniRAE 3000 #3130:
		zero Cal: 0.0/0.0 ppm Fresh Air Span Cal: 100.0/100.0 ppm ~~Isobutylene~~
	1125	Soils/bedrock logged down to 73.5 ft bgs at ASP-L02. Cascade
		prepares to drill a little deeper for VAP sample collection.
		Lots of shale observed in the first bit of bedrock.
	1200	VAP screen installed from 72-77 ft, begin purging interval.
		Gauge DTW = 62.65 ft Toc. Cascade had to use some water
		to core the bedrock from 73.5-77 ft. Will purge until water
		level stabilizes.
	1215	Gauge casing, DTW = 74.00 ft Toc
	1230	Gauge casing, DTW = 78.00 ft Toc
	1245	Gauge casing, DTW = 80.40 ft Toc
	1300	Gauged DTW and borehole dry. Wait for recharge.
	1330	Gauged DTW = 81.00 ft Toc. Continue purge.
	1332	Well purges dry. Wait for recharge and then

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Date	Time	Description of Activities
8/22/19	1345	Collected VAP groundwater sample ASP-CO2(72-77)(082219).
		Lansing Twp Police on-Site. Cascade to file police report on what was
		stolen from them.
	1420	Cascade prepares to move to PSP-CO5 next. Head to Merit lab
		to drop off sample.
	1530	Arrive back on-Site. Also stopped by Geotech to pick up a
		new fresh PID as the other PID has been on-Site
		for awhile now. Cascade is swapping out equipment and
		will finish loading up trucks and supplies for the rest
		of the day. They will move over to PSP-CO5 and be
		ready to drill first thing in the morning.
	1600	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Mike Bond, Dustin Harris, Aaron Rusk

Weather: Sunny, high 75°F

Equipment: MiniRAE 3000 # 3249 and WLM#711 (Geotech Rentals)

Date	Time	Description of Activities
8/23/19	0730	Arrive on-Site. Review HASP and perform H&S tailgate with Cascade.
	0745	Cascade begins preparing equipment and supplies. We will begin drilling at PSP-C05 soon. Alex Villhauer confirmed we do not have to log the first 50ft of soils at this location.
	0800	Calibrate MiniRAE 3000 # 3249:
		Fresh Air: 0.0/0.0ppm Isobutylene: 100.0/100.0ppm
	1240	Soils and bedrock logged down to 77ft at PSP-C05. Alex Villhauer confirms the total depth of the 4" pvc casing will be 80ft with centralizers at 80ft, 73ft, 63ft, 43ft, 23ft, and 5ft.
		Cascade breaks for lunch.
	1315	Cascade begins drilling the final 3ft at PSP-C05.
	1400	PSP-C05 open to 80ft bgs. Cascade prepares for 4" pvc installation.
	1515	Cascade packs up and cleans up. They will grout the 4" pvc first thing Monday morning. The borehole is cased off with 8" outer casing until then. Cascade will be taking all of their trucks and their rig off-Site over the weekend.
	1550	Depart Site

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Justin Burroughs, Dean Varner, Jay Jackson, Michael Lathan, Jesse Lowe

Weather: 65° partly cloudy, windy, Rain at 3pm

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
8/26/19	7:50	Arrived on site. Lead FRx through front gate.
	8:00	H&S Tailgate. Began setting up equipment. Positioned rig
		at ASP-B01. Unloaded equipment and connected hose system.
		Prepared Jetstream equipment and arranged sand delivery.
	11:30	FRx leaves site for lunch.
	12:30	FRx arrived back on site.
	12:50	Sand delivered on site. 15 bags; 45,000lbs total
		Spoke to Doug Knight about sand usage. FRx uses 1,000lbs sand/track
	1:20	Conex box delivered on site for safe equipment storage.
	2:00	Loaded one bag of sand into hopper. Hung injection tool above
		the borehole - ASP-B01. Continued setting up other equipment.
	3:00	Started raining heavily. Took shelter for about 30 minutes.
	3:30	Moved important equipment into the Conex box.
	4:15	Set-up exclusion zone barriers around the work area.
		Continued preparing area and equipment for injections. The
		rain continued heavily, so no injections were attempted
		today.
	5:00	FRx departs site. I departed shortly after.

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Daily Log

Project No.: 30006870.04600 Page 1 of 3

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Justin Burroughs, Dean Varner, Jay Jackson, Michael Latham Jesse Lowe

Weather: Morning low 80°, cloudy with chance of rain. Afternoon high of 80°, Sunny.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
8/27/19	7:50	FRx arrives on-site.
	8:00	H&S Tailgate. Discussed slips, trips, and falls hazards;
		pinch points; highly pressurized hose hazards; Driving hazards.
		Discussed target injection depths with Dean Varner (72-75ft)
		for ASP-B01.
	9:00	FRx tested equipment. Part of the water blaster
		was broken and the team worked to fix the part.
	11:00	Dean Varner gave Austin and myself a tour of the
		equipment configuration starting at the hopper ~~where~~
		sand is loaded and ~~fed through mixer to create~~ 8/27/19 KD
		slime substance is created using guar gum and water.
		The Jetstream water blaster ~~used~~ uses 10,000 psi for frack.
		The borehole equipment consists of an injection tool with
		two packers, in-between the packers is where the injections
		occur. A water blaster hose and a sand injection
		hose are attached to the tool.
	11:30	One pallet of guar gum delivered to site.
	11:45	Began frack at 75 ft using water blaster. Went for
		about 10 minutes to create Notch through PVC
		and grout and Kerf in the formation. Monitored
		waste water at surface to determine if pieces of
		PVC, grout, and formation rocks/grains were present.

Daily Log

Project No.: 30006870.04600 Page 2 of 3

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Justin Burroughs, Dean Varner, Jay Jackson, Michael Latham, Jesse Lowe

Weather: 75° partly cloudy

Equipment: ~~No Arcadis Equipment~~

Date	Time	Description of Activities
8/27/19	12:00	Began Sand injection at 75 ft (1,000 lbs of Sand) to
		create horizontal fracture. The amount of Sand and
		overburden stress determines length of fracture into
		the formation, but there is no way to know for
		certain how long the fracture is. FRx expects ~~to~~ the
		frack to be about 15 ft from borehole based on
		their experience and the amount of sand used (1,000 lbs).
	12:22	Sand injection end time. Successful install.
	12:35	FRx departs site for lunch.
	1:20	FRx arrives back on site.
	1:37	Began frack at shallow target depth ASP-B01 (70.5 ft).
		No water returned to the surface. Stopped to replace O-ring.
8/27/19 KD	~~2:00~~	Still could not notch into the formation.
	2:00	Attempted notch at 71 ft. Still not working. Brought
		equipment to surface to check for problems with
		broken parts. Found the injector end piece clogged
		with sand. Worked to repair leak in inner
		water pipe and cleared parts.
	4:00	Wrapped up repairs, tested for leaks, then
		lowered tool back down hole.
	4:33	Began water blaster again at 71 ft.
	4:40	Still not working. Stopped water blaster. Having →

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Dustin Westhuis

Subcontractor: FRx:

Weather:

Equipment:

Date	Time	Description of Activities
8/27/19	4:40	issues with water flow. Brought up all equipment
		to surface and plan to check all parts tomorrow
		morning to find the problem.
	5:00	Site clean-up
	5:15	Arcadis and FRx depart site.

Kara Donahue

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Justin Burroughs, Dean Varner, Jay Jackson, Michael Latham, Jesse Lowe

Weather: Sunny, windy, high of 72°

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
8/29/19	7:45	FRx arrived on-site.
	7:50	Arcadis arrived on-site.
	8:00	H+S Tailgate.
	8:30	Cleaning and fixing parts.
	9:32	Began frack at 71 ft (ASP-B01) using waterblaster.
		Successfully made notch through PVC, grout, and formation
	10:00	Issues with sand injection equipment. FRx
		worked to fix equipment.
	11:15	Began sand lens injection (71 ft).
		Successful frack.
	11:38	FRx leaves site for lunch.
	12:12	FRx back on-site
	12:30	FRx moves rig and equipment over to ASP-B02.
		Emptied gel tank and prepared new gel mixture.
	1:05	Began frack at 75 ft (ASP-B02). Successful notch.
	1:15	Began sand injection at 75 ft. Successful frack.
	2:25	Began notches at 71 ft (ASP-B02). Successful notch
	2:35	Began sand injection at 71 ft.
	3:00	Successful frack at 71 ft. Moved rig and
		equipment over to ASP-B03. FRx prepared for
		for injections at new well.
	4:00	Lowered tool downhole.

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Daily Log

Project No.: 30006870.04600 Page 2 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Justin Burroughs, Dean Varner, Jay Jackson, Michael Latham, Jesse Lowe

Weather: Sunny, partly cloudy, windy, 72°

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
8/28/19	4:15	Began notch at 75 ft (ASP-B03). Successful notch.
	4:25	Began Sand lens injection at 75 ft. Successful frack.
	5:00	Cleaned out hoses. Site clean-up.
	5:20	Arcadis and FRx depart site.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis, Eric Feenstra

Subcontractor: FRx: Doug Knight, Justin Burroughs, Dean Varner, Jay Jackson, Michael Latham, Jesse Lowe

Weather: Sunny 75°-80°

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
8/29/19	7:45	Arcadis arrives on-site.
	7:55	FRx arrives onsite.
	8:00	H&S Tailgate.
	9:12	Water blaster start at 71 ft (PSP-B03). Successful note
	9:21	Sand injection start at 71 ft. Successful frack.
	10:00	Moved rig and equipment to PSP-B01.
	11:15	Water blaster start at 75 ft (PSP-B01). Success
	11:30	Sand injection start at 75 ft. Success
	12:00	FRx leaves site for lunch.
	12:40	FRx back on-site.
	12:50	Water blaster start at 72 ft (PSP-B01). Success
	1:00	Sand injection start at 72 ft. (end time = 1:29 success)
	1:45	Moved rig and equipment to PSP-B02.
	2:40	Water blaster start at 75ft (PSP-B02).
	2:45	Stopped blaster due to leak in a water hose.
		FRx worked to repair and replace parts.
	3:00	Started water blaster again (75ft PSP-B02).
	3:11	Sand injection start at 75ft. end time = 3:35. Success.
	3:55	Water Blaster start at 72 ft (PSP-B02). Success.
4:00	~~4:15~~ EO 8/29/19	Sand injection start at 72 ft. Success.
	4:15	Sand injection end time. Start site
		clean-up.

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Project No.: 30006870.04600 Page 2 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Justin Burroughs, Dean Varner, Jay Jaeton, Michael Latham, Jesse Lowe

Weather: Sunny 80°F

Equipment: No Arkadis Equipment

Date	Time	Description of Activities
8/29/19	4:30	moved rig over to PSP-B03.
	5:00	FRx and Arcadis depart site.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Jesse Lowe, Justin Burroughs, Dean Varner, Michael Latham, Jay Jackson

Weather: Sunny all day with high of 74° F.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
8/30/19	8:20	Arcadis arrives on-site.
	9:00	FRx arrives on-site
	9:15	H+S Tailgate.
	10:22	Started Water Blaster at 82 ft. (PSP-B03)
	10:28	Started sand injection at 82 ft. Successful frack.
	10:55	Raised tooling to 79 ft for the target shallow sand lens in PSP-B03.
		~~Started Water Blaster at 79 ft. (PSP-B03)~~ 8/30/19 KD
		~~Started sand injection at 79 ft. Successful frack~~ 8/30/19 KD
	11:30	FRx leave site for lunch.
	12:05	FRx back on-site.
	12:15	Started water blaster at 79 ft. (PSP-B03)
	12:26	Started sand injection, the rock was too hard to create a fracture in the formation. No sand lens at shallow target 79 ft (PSP-B03).
	12:35	Began moving rig and equipment set-up at PSP-B04
	1:57	Started Water Blaster at 77 ft. (PSP-B04).
KD 8/30/19	~~2:10~~ 2:04	Started Sand injection at 77 ft.
	3:00	Started Water Blaster at 74 ft. (PSP-B04)
	3:10	Started Sand injection at 74 ft. Successful frack.
	3:30	Began cleaning up area and moved equipment over to Transect G. Plan to frack PSP-G01 next.

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Jesse Lowe, Dean Varner, Justin Burroughs, Michael Latham, Jay Jackson

Weather: Sunny 72°

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
8/30/19	4:00	Arcadis (Kara) departed site.

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Joe Lary, Aaron Rusk, Joel Hallowell

Weather: Partly cloudy in the morning, Cloudy with rain in the afternoon, high 74°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
8/26/19	0800	Arrive on-Site. Meet up with Kara Donahue and the FRx crew. Discuss FRx scope of work, review HASP, and perform H&S tailgate. Check in with Alex Villhauer and discuss scope of work with the FRx sand lens installations. Confirm with Alex the required field note documentation for FRx oversight. Kara Donahue will be performing oversight on FRx.
	0945	Cascade arrives on-Site. Perform H&S tailgate with Cascade.
	1000	Cascade heads over to PSP-B03 to pull the drilling rods used to weight the 4" pvc casing down while grouting.
	1040	Cascade finished pulling rods at PSP-B03. They move back to PSP-C05 to finish grouting the 4" pvc casing.
	1145	Cascade breaks for lunch. They will get more water while off-Site.
	1330	Cascade begins grouting 4" casing at PSP-C05.
	1515	Cascade finishes grouting PSP-C05. About gallons of neat cement used to grout casing. Cascade cleans up and moves to PSP-C01 next.
	1700	Cascade is set up and ready to drill at PSP-C01. Cascade departs Site.
	1715	Arcadis off-Site.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue,

Subcontractor: Cascade Drilling: Joe Lang, Aaron Rusk, Joel Hallowell

Weather: Few showers early with sunny skies in the afternoon, high 81°F

Equipment: MiniRAE 3000 #3249 and WLM# 711

Date	Time	Description of Activities
8/27/19	0700	Arrive on-Site. Review HASP and perform H&S tailgate with
		the Cascade drilling crew.
	0715	Cascade continues setting up at PSP-C01.
	0800	Cascade breaks for their weekly company H&S stand down.
	0815	Cascade begins drilling at PSP-C01. The first 47ft of
		soil will not be logged here. Calibrate MiniRAE 3000 #3249:
		Zero Cal: 0.0/0.0 ppm (Fresh Air) Span Cal: 100.0/100.0 ppm (Isobutylene)
	1100	PSP-C01 logged down to 73.5ft bgs. It appears at 73.5ft bgs
		the weathered shale transitions to a weathered sandstone and
		shale. Called Alex Villhauer to discuss and he confirms
		we will target this sandstone and shale for our VAP sample.
		Cascade drills a little deeper here before VAP sample set up
	1130	PSP-C01 logged down to 82ft bgs. Cascade prepares for VAP
		sample collection, setting the screened interval from 73.5-78.5ft
		bgs. No water used to drill the borehole before.
	1215	Temporary stainless steel 5ft well screen in place, screened
		73.5-78.5 ft bgs. Gauge well: DTW = 70 ft bgs, begin purging
		@ = 1.0 GPM.
	1220	Well purges dry. Wait for recharge.
	1238	Gauge well: DTW = 75.63' bgs
	1248	Gauge well: DTW = 75.46' bgs. Purge well again.
	1250	Well purges dry a second time. Wait for recharge.

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Project No.: B0064479.2019.04600

Date	Time	Description of Activities
8/27/19	1313	Purged well dry again. Wait for recharge.
	1340	Collected VAP groundwater Sample PSP-C01(73.5-78.5)(082719).
	1355	Depart Site to drop off groundwater sample collected from
		PSP-C01. Cascade cleans up and prepares to move to PSP-C06
		next as advised by Andrew Lorenz.
	1645	Cascade finishes drilling for the day. They have drilled down to
		37ft bgs at PSP-C06. Pack up and clean up.
	1730	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Joe Lang, Aaron Rusk, Joel Hallowell

Weather: Mix of clouds and sunshine with gusty winds this afternoon, high 73°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
8/28/19	0745	Arrive on-Site. Prepare H2S tailgate. Cascade is on-Site
		wrapping up a couple repairs they needed to make. The water
		truck needed its air breaks fixed and the skid steer needed
		a tire replaced.
	0800	Perform H2S tailgate with FRx.
	0815	Perform H2S tailgate with Cascade.
	0830	Cascade continues drilling where we left off at PSP-C06. Juli
		Ryan (Arcadis) arrives on-Site for some training. Meet up with
		Juli to escort her around the Site. Perform H2S tailgate.
	1115	Logged PSP-C06 down to 77ft bgs. Called Alex Villhauer to
		discuss what the total depth for the 4" pvc casing needs
		to be here. Alex confirms he would like to go a little deeper
		and that the total depth should be somewhere between
		80-82 ft. Cascade breaks for a quick lunch and will get
		more water.
	1230	Cascade arrives back on-Site.
	1300	Cascade drills successfully down to 82 ft bgs at PSP-C06.
		The total depth here will be 82 ft bgs with centralizers
		at 82', 75', 62', 42', 22', and 5' as confirmed with Alex Villhauer.
	1500	Cascade wraps up 4" pvc casing installation at PSP-C06. Roughly
		210 gallons of neat cement grout used. Cascade cleans up and
		will move to PSP-C05 to pull the rods used to weight down

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Date	Time	Description of Activities
8/28/19		the 4" pvc casing while grout cured.
	1615	Spoke to Andrew Lorenz who advised the VAP groundwater
		sample collected at PSP-C01 came back non-detect. Andrew
		asks that we move to PSP-C02 next.
	1720	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue, Eric Feenstra

Subcontractor: Cascade Drilling: Joe Lary, Aaron Rusk, Joel Hallowell

Weather: Sunshine and a few clouds, stray shower or thunderstorm possible, high 82°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
8/29/19	0730	Arrive on-Site. Prepare H&S tailgate.
	0800	Perform H&S tailgate with FRx and Cascade Drilling. Discuss today's scope of work and review HASP.
	0815	Cascade prepares to begin drilling at PSP-CO2.
	0830	Calibrate MiniRAE 3000 #3249:
		Zero Cal: 0.0/0.0 ppm (Fresh Air) Span Cal: 100.0/100.0 ppm (Isobutylene)
	1115	Cascade has drilled down to 83 ft at PSP-CO2. The sample would not stay in the core barrel after three attempts to
		retrieve it. Cascade had to drill a little deeper each attempt
		in hopes that the sample would stay in the barrel. Poor recovery
		from 74-83 ft bgs.
	1130	Begin purging the VAP interval from 72-77 ft bgs at PSP-CO2.
		Begin purging at a higher rate and continuously monitor the
		water level to see if and what depth it will stabilize.
	1213	VAP interval purges dry. Unable to get the water level to stabilize
		at the lowest purge rate the pump would allow.
	1215	Gauge temp VAP well: DTW = 84.00' TOC
	1220	Gauge temp VAP well: DTW = 83.76' TOC. Water level climbing slowly
	1226	Gauge temp VAP well: DTW = 83.52
	1248	Gauge temp VAP well: DTW = 82.85. Water level still slowly
		climbing. Alex Villhaver confirmed we will purge this VAP
		interval dry once more, wait for recharge, and collect sample.

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Date	Time	Description of Activities
8/29/19	1252	Purged VAP interval dry again. Wait for recharge.
	1253	Gauge temp VAP well: 84.15' TOC
	1322	Gauge temp VAP well: 83.42' TOC
	1330	Collected VAP sample PSP-C02(72-77)(082919). Head to Merit lab to drop off sample. Cascade cleans up and prepares to move to PSP-C07 next.
	1600	Cascade begins drilling at PSP-C07
	1645	Pack up and clean up. Cascade drilled down to 17ft at PSP-C07.
	1715	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Joe Lang, Aaron Rusk, Joel Hallowell

Weather: Sunny, high near 75°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
8/30/19	0730	Arrive on-Site. Review HASP and perform H&S tailgate with Cascade.
	0745	Cascade heads out to purchase a couple of supplies and
		to get water.
	0830	Cascade arrives back on-Site and prepares to continue drilling
		where we left off at PSP-C07.
	1135	PSP-C07 logged down to 78.5 ft bgs. Call Alex Villhauer to
		discuss. Alex confirms the total depth here will be 82 ft.
	1200	Cascade gets core barrel stuck while advancing to 82 ft.
	1330	Cascade is able to free the core barrel by overdrilling with the
		outer casing. Final borehole depth 83 ft. Borehole has some
		material collapse in and the final 4" pvc depth is 82 ft bgs
		Confirmed centralizer depths with Alex Villhauer: 82', 76', 65',
		45', 25', and 5'. Cascade prepares to install 4" pvc
	1615	Cascade departs Site. 4" pvc casing installed at PSP-C07.
		Packed up and cleaned up. Kara Donahue also offsite. FR's
		packing up and moving to transect G next.
	1700	Depart Site

ENFM009-DAILYLOG

Document #ENFM009, Revision 01

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Jesse Lowe, Dean Varner, Justin Burroughs, Jay Jackson, Michael Latham

Weather: Cloudy with Chance of Thunderstorms later in the day. 65-79°F.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
9/3/19	7:50	Arcadis and FRx arrive on-site.
	8:00	H&S Tailgate.
	8:10	FRx began cleaning the work area along Transect B and moving all equipment and materials to new work area at Transect G.
	12:00	Started water blaster at 73 ft (PSP-G01).
	12:10	Started sand injection at 73 ft.
	12:45	Raised tooling to 68 ft for shallow target.
	1:59	Started water blaster at 68 ft. (PSP-G01)
	2:08	Started sand injection at 68 ft.
	2:45	Began depressurizing hoses, cleaning out sand mixture, moving equipment, and preparing for the next hole.
	4:40	Positioned rig at ASP-G01.
	5:05	Arcadis and FRx depart the site.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Dean Varner, Jesse Lowe, Justin Burroughs, Jay Jackson, Michael Latham

Weather: Sunny with high of 70°F, partly cloudy and windy

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
9/4/19	7:50	Arcadis and FRx arrive on-site.
	8:30	Noticed the Well ID names on the Sand lens depth
		table did not match those on the Transect G map.
		Contacted Alex to confirm correct Well ID names and depths.
	8:55	Started Water blaster at 73 ft (ASP-G02).
	9:02	Started sand injection at 73 ft.
	9:45	Prepared for work at 68 ft in ASP-602. Raised tooling
		and made sand mixture.
KD 9/4/19	~~9:45~~	9:49 Started Water blaster at 68 ft (ASP-G02).
	9:58	Started Sand injection at 68 ft.
	11:00	Rig and equipment set-up at ASP-G03.
	11:50	I left the site for lunch.
	12:10	Started water blaster at 71 ft (ASP-G03).
	12:20	Started Sand injection at 71 ft.
	12:45	I returned back on-site.
	1:00	FRx leaves site for lunch.
	2:00	FRx returned back on-site.
	2:20	Started water blaster at 66 ft (ASP-G03).
	2:35	Started Sand injection at 66 ft.
	3:30	moved equipment to CSP-G02.
	4:08	Started water blaster at 68 ft (CSP-G02).
	4:18	Started Sand injection at 68 ft.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 2 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By:

Staff On-Site:

Subcontractor: FRx:

Weather:

Equipment:

Date	Time	Description of Activities
9/4/19	4:38	Fracture complete. Began cleaning up for the day.
	5:00	Arcadis and FRx departs site

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Doug Knight, Jesse Lowe, Justin Burroughs, Michael Latham, Spencer Hallstrom

Weather: Cold morning in 50°F – 55°F, Sunny afternoon high of 72°F Dean/Ka Jay/Jack

Equipment: No Arcadis equipment

Date	Time	Description of Activities
9/5/19	7:50	Arcadis and FRx arrive on-site.
	8:00	H+S Tailgate.
	8:15	Raised tooling to 65 ft in # CSP-G02.
	8:30	Working on making gel and sand mixture.
	9:00	Started Water blaster at 65 ft (CSP-G02).
	9:12	Started Sand injection at 65 ft.
	9:30	Injection complete. FRx begins depressurizing and
		cleaning hoses. Packing up equipment to move
		over to Transect F.
	11:45	Began Lowering tooling in CSP-F01 to 73 ft bgs.
	12:10	Loaded 3000 lbs of Sand into hopper.
	1:00	FRx departs site for lunch. 3 FRx crew
		members left project to go work a job in
		Denver, CO. Will return to project site in
		a few weeks. Members leaving: Michael Latham,
		Justin Burroughs, and Doug Knight.
	2:00	FRx returns back on-site.
	2:28	Started Water blaster at 73 ft (CSP-F01).
	2:40	Started Sand injection at 73 ft.
	2:52	Injection complete.
	3:32	Started Water blaster at 68 ft. (CSP-F01).
		The jets blew out and FRx removed all the

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Date	Time	Description of Activities
9/5/19		loading from the hole to repair parts.
	4:00	Fixing jet nozzles and replacing packers. Plan
		to complete San lens at 68ft (CSP-F01) tomorrow
		morning.
	5:10	Arcadis and FRx depart site.

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Dowhue

Staff On-Site: Austin Westhuis

Subcontractor: FRx: Jesse Lowe, Dean Varner, Jay Jackson, Spencer Hallstrom

Weather: Cloudy with high of 69°F. Chance of morning rain.

Equipment: No Arcadis equipment

Date	Time	Description of Activities
9/6/19	7:50	Arcadis and FRx arrive on-site.
	8:00	Sand delivered on-site. 15 bags; 45,000 lbs total.
	8:20	FRx left site to get supplies.
	8:40	FRx back on-site. H+S Tailgate.
	9:00	Team prepared equipment for next blast and injection.
	9:45	Started Water blaster at 68ft. (CSP-F01)
	9:50	Started Sand injection at 68ft.
	10:10	Injection complete.
	10:45	Setting up at ASP-F03.
	11:09	Started Water blaster at 74ft (ASP-F03).
	11:20	Started Sand injection at 74ft.
	11:45	Injection complete. Prepared gel for next fracture.
	12:15	FRx left site for lunch.
	1:20	FRx returned back on-site.
	1:32	Started water blaster at 69ft (ASP-F03).
	1:40	Started sand injection at 69ft.
	2:00	Injection complete.
	2:30	Set-up at ASP-F02.
	2:47	Started Water blaster at 74ft (ASP-F02).
	2:57	Started Sand injection at 74ft.
	3:20	Injection complete.
	3:45	Started Water blaster at 69ft. (ASP-F02).

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Date	Time	Description of Activities
	3:52	Started Sand injection at 609 ft (ASP-F02).
	4:12	Injection complete. Cleaning up work site.
	4:30	Arcadis and FRx leave site.

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Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donohue

Subcontractor: Cascade Drilling: Joe Lary, Joel Hallowell, Aaron Rusk

Weather: Windy with thunderstorms, especially during the morning hours, high 78°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/3/19	0730	Arrive on-Site. Review HASP and perform H2S tailgate with Cascade. Cascade is set up at PSP-C07 and will pull rods used to weight down the 4" casing before setting up at PSP-C03
	0845	Confirmed with Eric Feenstra and Jackie Saling the we will be collecting a VAP sample at PSP-C03.
	0900	Calibrate MiniRAE 3000 #3249: Zero Cal: 0.0/0.0 ppm (fresh Air) Span Cal: 100.0/100.0 ppm (Isobutylene)
	0905	Cascade begins drilling at PSP-C03.
	1110	PSP-C03 logged down to 76 ft bgs. Called Alex Villhauer to discuss. Alex confirms we will VAP sample from 71-76 ft bgs. Prepare for VAP sampling.
	1130	Begin purging VAP interval. Static water level before purging 63.85' TOC. Continuously gauge water level while purging, waiting to see if water level will stabilize.
	1145	DTW = 73.00' TOC, water level still dropping.
	1220	VAP interval finally purges dry. Unable to get the water level to stabilize while purging at the lowest flow rate the pump would allow. Wait for recharge.
	1230	Water level slowly climbing, purge dry again.
	1250	Purge dry a third time. Wait for recharge before sampling.
	1300	Collected VAP groundwater sample PSP-C03(71-76)(090319). Purge water fairly clear. Cascade prepares to move to PSP-C08 next.

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Date	Time	Description of Activities
9/3/19	1355	Begin using coring machine at PSP-C08.
	1435	A. Westhuis off-Site to drop of VAP sample to Merit.
	1515	Arrive back on-Site. ~~Trent~~ Cascade on 9/3/19 indicates the concrete is too
		thick for their concrete coring barrel and they made
		it 16 inches into the concrete, maxing out their barrel.
		They will use the drill rig to bust out the cored concrete
	1700	Cascade departs Site after drilling to 17ft at PSP-C08.
		Check out with Kara Donahue who is overseeing FR
	1715	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Joe Lary, Joel Hallowell, Aaron Rusk

Weather: Partly to mostly cloudy, high 71°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/4/19	0730	Arrive on-Site. Review HASP and perform H&S tailgate with Cascade.
	0745	Cascade continues drilling at PSP-C08
	0950	PSP-C08 logged down to 76 ft bgs. Contact Alex Villhauer to confirm the total depth and centralizer depths at this location.
	1000	Alex Villhauer confirms the total depth at PSP-C08 will be 82ft with centralizers at 82ft, 76ft, 68ft, 48ft, 28ft, and 5ft. Cascade prepares to drill the remainder of the borehole down to 82ft and then they will begin installing the 4" pvc casing.
	1240	Cascade leaves the Site to take lunch and grab more supplies. The final depth at PSP-C08, is 83ft bgs, with centralizers at 83ft, 76ft, 68ft, 48ft, 28ft, and 5ft. Cascade had to drill one foot deeper than originally planned as material was collapsing in the borehole and it was difficult to retrieve the rock sample. Alex Villhauer confirmed the 83ft final depth was OK
	1350	Cascade arrives back on-Site with more grout supplies. Prepare to grout the 4" pvc casing in place with neat cement.
	1600	4" casing installation complete. Cascade packs up and cleans up.
	1715	Depart Site.

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Joe Lary, Joel Hallowell, Aaron Rusk

Weather: Sunny, ~75°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/5/19	0700	Arrive on-Site. Review HASP and perform H_2S tailgate with Cascade
	0715	Cascade pulls the rods used to weight down the 4" pvc casing
		installed at PSP-C08 yesterday. They also clean out the mud
		pan and retrieve water for drilling.
	0750	Cascade sets up the rig over the 4" pvc casing installed at
		PSP-C06 to pull the rods used the weight down the pvc casing
		while the grout cured.
	0830	Eric Feenstra calls and confirms we will move to PSP-C04 next
		and drill with the 4" and 6" tooling and then collect a VAP sample.
	0930	Cascade begins drilling at PSP-C04. Calibrate MiniRAE 3000 #3249:
		Fresh Air: 0.0/0.0 ppm Isobutylene: 100.0/100.0 ppm
	1200	PSP-C04 logged down to 74 ft bgs. Called Alex Villhauer to
		confirm our VAP sample interval here. Alex asks to screen
		the VAP interval from 72-77 ft bgs. Cascade proposes to drill
		a few more feet.
	1300	Begin purging PSP-C04 VAP screened from 72-77 ft bgs. Cascade
		had to use a little water to get the remaining three feet.
		Be sure to purge VAP interval dry if possible.
	1315	PSP-C04 VAP interval purges dry. Wait for recharge.
	1333	DTW = 79.44' TOC
	1343	DTW = 79.04' TOC
	1356	DTW = 78.72' TOC. Water level clearly rising. Continue to

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Date	Time	Description of Activities
9/5/19		monitor the water level. It appears the water level is rising
		roughly three inches every 10 minutes.
	1410	Purge VAP interval dry. Wait for recharge before sampling
	1440	Gauge DTW = 78.81' Toc
	1445	Collected VAP sample PSP-C04(72-77)(090519). Cascade
		breaks down and prepares to move to PSP-C09 next.
	1545	Head to Merit to drop off VAP sample.
	1640	Arrive back on-Site. Cascade is set up at PSP-C09 and
		preparing to core concrete.
	1730	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue

Subcontractor: Cascade Drilling: Joe Lang, Joel Hallowell, Aaron Rusk

Weather: Overcast, slight chance of rain shower, high 71°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/6/19	0700	Arrive on-Site. Review HASP and perform H&S tailgate with Cascade.
	0715	Calibrate MiniRAE 3000 #3249:
		Zero Cal: 0.0/0.0 ppm (Fresh air) Span Cal: 100.0/100.0 ppm (Isobutylene)
	0740	Begin drilling at PSP-C09
	1100	PSP-C09 logged down to 77ft bgs. Confirm with Alex Villhauer
		the total depth of the 4" pvc casing and the centralizer
		depths. Alex confirms the 4" pvc casing should be installed at
		79 feet at a minimum, but 80 feet would be fine, with
		centralizers at the bottom, 73ft, 63ft, 43ft, 23ft and 5ft.
	1300	Cascade finished installing the 4" pvc casing at PSP-C09, final
		total depth 79.5 ft with centralizers at 79.5ft, 73ft, 63ft,
		43ft, 23ft, and 5 ft. Cascade packs up and cleans up
		for the day.
	1400	Cascade off-Site. Check in with Shantel Johnson (Arcadis)
		who will be overseeing Cascade next week. Order her
		equipment and head to the Lansing office to gather her
		paperwork.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Shantel Johnson

Subcontractor: FRx: Jesse Lowe, Dean Varner, Jay Jackson, Spencer Hallstrom

Weather: Cloudy with high of 68°F

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
9/9/19	7:45	Arcadis arrives on-site.
	7:50	FRx arrives on-site.
	8:00	H+S Tailgate. Began setting up rig at ASP-F01.
	9:35	Started Water blaster at 75 ft (ASP-F01).
	9:45	Started Sand injection at 75 ft.
	10:14	Started Water blaster at 69 ft (ASP-F01).
	10:30	Started Sand injection at 69 ft.
	11:00	Moved rig over to PSP-F11.
	11:45	Started Water blaster at 73 ft. (PSP-F11).
	11:55	Started Sand injection at 73 ft.
	12:15	Loaded hopper with new bag of Sand (3,000 lbs).
	12:23	Started water blaster at 68 ft. (PSP-F11)
	12:29	Started Sand injection at 68 ft. Completed
	12:45	FRx leaves site for lunch.
	1:55	FRx returns on-site.
	2:10	Raising equipment out of PSP-F11 and
		preparing to move over to PSP-F10.
	2:30	Lowering tooling down PSP-F10 to 75 ft.
	2:50	Started Water blaster at 75 ft (PSP-F10).
	2:58	Started sand injection at 75 ft.
	3:18	Injection complete.
	3:53	Started Water blaster at 69 ft. (PSP-F10).

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Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
9/9/19	3:57	Started Sand injection at 609 ft. (PSP-F10).
	4:14	~~S~~ Injection complete.
	4:45	Setting up at PSP-F09. Plan to continue work tomorrow morning.
	5:00	fixing a broken part.
	5:15	Arcadis and FRx depart site.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Chantel Johnson, Eric Feenstra, Austin Westhuis

Subcontractor: FRx: Jesse Lowe, Dean Varner, Jay Jackson, Spencer Hallstrom

Weather: Cloudy with small chance of T-storm in afternoon, high of 83°F.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
9/10/19	7:45	Arcadis arrives on-site.
	7:55	FRx arrive on-site.
	8:00	H+S Tailgate.
	9:05	FRx team member departs site. Not expected back
		on-site. (Jay Jackson)
	9:20	Preparing gel mixture.
	9:37	Started Water blaster at 76ft (PSP-F09).
	9:47	Started Sand injection at 76ft.
	10:05	Injection Complete.
	10:25	Testing equipment for leaks
	11:10	Arcadis and FRx leave site for lunch.
	12:00	Arcadis and FRx arrive back from lunch.
		Heavy rain, lightning/T-storm, All teams Stand
		down until conditions are safe to continue
		working.
	12:37	Started ~~sa~~ KD 9/10/19 Water blaster at 109 ft. (PSP-F09).
	12:47	Started Sand injection at 109 ft. ~~Unsuccessful~~ KD 9/10/19
		Could not get fracture. FRx attempted
		water blaster and sand injection a
		second time at 109 ft. Still could not get a
		fracture.
	1:15	FRx raised tooling to fix an equipment problem

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Date	Time	Description of Activities
9/10/19	1:30	~~Lowered tooling back downhole~~ KD 9/10/19
		Tested jets to look for leaks. FRx worked
		to fix equipment.
	2:20	Started Water blaster at 67.5 ft (PSP-F09).
	2:28	Started Sand injection at 67.5 ft.
	2:45	Injection complete. FRx begins moving equipment
		over to PSP-F08.
	3:43	Started Water blaster at 73ft (PSP-F08).
	3:53	Started Sand injection at 73ft.
	4:15	Injection Complete. Packing up equipment and
		cleaning site for the day.
	4:50	FRx departs site for the day
	5:00	Arcadis depart site for the day.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis, Shantel Johnson

Subcontractor: FRx: Jesse Lowe, Dean Varner, Spencer Hallstrom

Weather: 70-80°F with chance of T-storms in afternoon, partly cloudy.

Equipment: No Arcadis equipment

Date	Time	Description of Activities
9/11/19	7:45	Arcadis arrives on-site.
	7:50	FRx arrives on-site.
	8:00	H&S Tailgate.
	8:20	Preparing gel mixture.
	8:45	Started water blaster and FRx noticed the jets
		were clogged. Raised tooling out of PSP-F08 to
		clean parts.
	9:28	Started water blaster at 68 ft in PSP-F08.
	9:38	Started Sand injection at 68 ft.
	10:00	Injection complete. FRx began move equipment
		and rig over to PSP-F07. Majority of set-up time
		involved moving and adding hoses to reach the frac tank.
	11:12	Started Water blaster at 73 ft in PSP-F07.
	11:22	Started Sand injection at 73 ft.
	11:48	Injection Complete.
	12:08	Started Water blaster at 68 ft in PSP-F07.
	12:19	Started Sand injection at 68 ft.
	12:40	Injection complete.
	1:00	Arcadis and FRx leave site for lunch.
	1:30	Arcadis and FRx arrive back on-site.
	2:21	Started Water blaster at 73 ft in PSP-F06
	2:33	Started Sand injection at 73 ft.

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Date	Time	Description of Activities
9/11/19	3:15	Started Water blaster at 68ft in PSP-F06.
	3:22	Started Sand injection at 68 ft.
	4:00	FRx working on moving equipment to next hole (PSP-F05).
	5:15	Arcadis and FRx depart site.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis, Shantel Johnson

Subcontractor: FRx: ~~Jesse~~ Lowe, Dean Varner, Spencer Hallstrom

Weather: Cloudy with high of 68°F

Equipment: No Arcadis equipment

Date	Time	Description of Activities
9/12/19	7:50	FRx arrived on-site.
	8:15	Arcadis arrived on-site.
	8:20	H&S Tailgate.
	8:30	Preparing gel mixture.
	8:50	Started water blaster at 73ft in PSP-F05.
	9:00	Started Sand injection at 73ft.
	1000	Started water blaster at 68ft in PSP-F05
	1100	Sand Lens injection complete at 68ft in PSP-F05. FRx performs some maintenance on their equipment and prepares to move to PSP-E12 next.
	1225	Started water blasting at 73ft in PSP-E12
	~~at~~ 1330	Sand injection complete at 73ft. Used 800lbs of sand. FRx begins pumping sand and gel mixture out of the hoses.
	1355	FRx departs site to get lunch.
	1430	FRx arrives back on-site. FRx inspects parts on the frac rig and notice an important part is broken and unrepairable. New part will be in place when FRx returns to the project after a 2 week break. FRx begins packing up equipment and cleaning the work site.
	1530	FRx departs the site for the day. Will return on 9/30.

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Date	Time	Description of Activities
9/12/19	1645	Arcadis departs site for the day.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Shantel Johnson, Kara Donahue

Subcontractor: Traut Drilling: Dan Karasch, Noah Schmidt, Tyus Reinke, Nick Pachan

Weather: Scattered thunderstorms, high 86° F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/10/19	0830	Arrive on-Site. Review HASP and prepare H₂S tailgate.
	0900	Traut Drilling arrives on-Site. Discuss remaining scope of work
		and perform H₂S tailgate. Traut will set up on Transect G
		at location PSP-G02.
	0915	Head over to the Cascade Drilling crew to discuss the plan
		for them for the remainder of Transect C. They are pulling
		6" casing and grouting at ASP-C02. The Arcadis team leads are
		set to have a meeting this morning to confirm a plan moving
		forward for Transect C. Meet with Shantel Johnson to discuss deta
	1000	Check in with Kara Donahue and the FRx crew to see where
		they are at with the sand lens installations.
	1115	Andrew Lorenz calls and confirms Cascade will move to PSP-C11
		next where they will log soils and bedrock and then collect
		a VAP sample. After VAP sampling they will then pull 6" casing
		and grout locations PSP-C01, PSP-C02, PSP-C03, and PSP-C04.
		After this is complete they will move North of PSP-C05 and
		PSP-C06 and drill and VAP sample. This location may also be
		finished as a permanent 2" monitoring well, pending VAP results
	1140	Traut heads off-Site to take lunch and purchase some supplies.
		Thunderstorm rolls in with lightning, stand down until storm
		passes.
	1400	Traut begins drilling at PSP-G02. Calibrate MiniRAE 3000 # 3249:

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Date	Time	Description of Activities
9/10/19		Zero Cal: 0.0/0.0ppm (fresh Air) Span Cal: 100.0/100.0ppm (Isobutylene)
	1750	Trant has now drilled down to 70ft bgs at PSP-602. We
		will wait for confirmation from the technical leads Alex
		Willhauer and Patrick Curry on a total depth for the 4"
		pvc casing first thing in the morning. Trant packs up
		and cleans up for the day
	1815	Depart Site

ARCADIS for natural and built assets

Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Shantel Johnson, Kara Donahue

Subcontractor: Trant Drilling: Dan Karasch, Noah Schmidt, Tyus Reinke, Nick Pachan

Weather: Mixed clouds and sun in the morning, scattered thunderstorms in the afternoon, high 84°

Equipment: MiniRAE 3000 #3249 and WLM13 711.

Date	Time	Description of Activities
9/11/19	0700	Arrive on-Site. Check in with Cascade crew at location PSP-C11
		where they are preparing to VAP sample first thing this morning.
		Gauge casing/borehole at PSP-C11: BTW = 51.47' bgs. Will
		call Alex Villhauer to confirm VAP screen interval here.
	0740	Spoke with Alex Villhauer and confirmed he wants the VAP screen
		interval at 62-67 ft bgs at PSP-C11. Shantel Johnson
		now on-Site to oversee the Cascade crews.
	0745	Perform H&S tailgate with Trant Drilling
	0820	Alex Villhauer confirms the total depth of the 4" pvc casing
		at PSP-602 needs to be 75ft bgs at a minimum. He
		explains if it is easier for Trant to drill a little deeper
		than 75ft that will be alright. Also confirmed with Andrew
		Iverenz after PSP-602 we will move to PSP-603
	0830	Calibrate MiniRAE 3000 #3249:
		Zero Cal: 0.0/0.0 ppm (Fresh Air) Span Cal: 100.0/100.0 ppm (Isobutylene)
	0845	Trant begins drilling deeper at PSP-602.
	0945	Confirmed with Alex Villhauer centralizer depths of 77ft, 68ft,
		58ft, 38ft, 18ft, and 5ft.
	1100	Trant breaks for lunch.
	1120	Shantel Johnson departs Site to drop off VAP sample collected
		at PSP-C11. Spoke to Patrick Curry and he advises Cascade
		to abandon the boreholes at PSP-C02, PSP-C03, and PSP-C04

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Date	Time	Description of Activities
9/11/19		next. Then he would like Cascade to drill and VAP sample
		at a location roughly in the middle of PSP-C05 and PSP-C06
		and 40 feet North of these. Upon completion of this recent
		added drilling/VAP location Cascade will install a 2"
		permanent monitoring well at the already drilled PSP-C01.
		Confirmed with Patrick for the 2" monitoring wells Cascade will bring
		the filterpack sand 2ft above the top of the screen, followed by
		1 foot of choker sand, followed by 1 foot of bentonite chips, and
		then bentonite slurry (bentonite quickgrout) to roughly 1-2 ft
		below grade
	1200	Head over to mark the new location added recently to drill
		and VAP sample 40ft North of PSP-C05 and PSP-C06.
		Check for underground utilities and pop all nearby manholes
	1345	4" pvc casing installation complete at PSP-602. final depth
		76 ft bgs with centralizers at 76ft, 68ft, 58 ft, 38 ft, 18ft, and
		5 ft. Trant sets up at PSP-603 next.
	1630	Soils and bedrock logged down to 70 ft bgs at PSP-603. Alex
		Villhauer confirms he would like the total depth of the 4" pvc
		casing here to be 79 or 80 ft bgs. Trant prepares to run their
		8" casing now to open up the borehole.
1845	~~1815~~ aw 9/11/19	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Shantel Johnson, Kara Donahue

Subcontractor: Traut Drilling: Dan Kovarsch, Noah Schmidt, Tyus Reinke, Nick Pachan

Weather: light morning rain, then remaining cloudy, high 71°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/12/19	0730	Arrive on-Site, review HASP and perform H&S tailgate with Traut.
	0745	Confirmed centralizer depths for the 4" pvc casing at PSP-603 with Alex Villhauer: Bottom, 73ft, 57ft, 37ft, 17ft, 5ft. Alex asked for a total depth of 79-80 ft bgs.
	0915	PSP-603 4" pvc casing installed with a total depth of 80 ft. Traut moves to PSP-604 next. Kara Donahue will log soils and bedrock here.
	10:00	Began drilling at PSP-604.
	11:35	Soils and bedrock logged down to 70ft in PSP-604.
		Traut sets up for VAP sampling, installing the VAP screen from 66-70ft as confirmed with Alex Vilhauer.
		Traut departs to take lunch, allowing time for the water level inside the casing to stabilize before purging.
	1245	Traut begins purging on VAP interval at PSP-604. Continue to monitor water level in casing while purging.
	1425	Collected VAP sample PSP-604(66-70)(091219). Water level remained stable at 63ft bgs while purging at 1.0 GPM for 45 minutes. Waited for water to clear up before sampling.
		Traut prepares to drill deeper and finish the borehole with a 4" pvc casing. Alex Villhauer confirmed 80ft total depth.
		Check in with Shantel Johnson with the Cascade drilling crews. Also check in with Kara Donahue who is overseeing

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Date	Time	Description of Activities
9/12/19	1530	Alex Villhauer confirms centralizer depths of 80ft, 75ft, 60ft, 40ft, 20ft, and 5 ft at PSP-604 after finishing logging the borehole to 80 ft.
	1745	Trant finishing up grouting PSP-604. They will be packing up soon. Depart Site

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Shantel Johnson, Kara Donahue

Subcontractor: Trant Drilling: Don Karasch, Noah Schmidt, Tyus Reinke, Nick Pachan

Weather: Thunderstorms likely this morning, scattered thunderstorms in the afternoon, high 78°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/13/19	0730	Arrive on-Site. Meet up with Shantel Johnson and discuss where her Cascade Drilling crew will move next. Prepare H&S tailgate.
	0800	Perform H&S tailgate with the Trant Drilling crew. Trant is ready to begin drilling at PSP-E01
	1000	Soils and bedrock logged down to 70 ft bgs at PSP-E01. Alex Villhauer reviewed the soil boring log and confirms the 4" pvc casing needs a total depth of at least 75ft bgs, but up to 80 Ft would be preferred. Trant prepares to drill deeper.
	1145	Alex Villhauer confirms centralizers at PSP-E01: Bottom of borehole, 73ft, 60ft, 40ft, 20ft, and 5ft.
	1400	Trant finishes installation/grouting of the 4" pvc at PSP-E01. Prepare to move to PSP-E02 next.
	1515	Begin drilling at PSP-E02.
	1830	Trant will finish installing the 4" pvc casing at PSP-E02 first thing tomorrow morning. Alex Villhauer confirmed a total depth of 80ft with centralizers at 80ft, 73ft, 61ft, 41ft, 21ft, and 5ft. Depart site

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Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Noah Schmidt, Tyus Reinke, Nick Pachan

Weather: Mainly Sunny, ~75°F

Equipment: MiniRAE 3000 #3249, WLM #711

Date	Time	Description of Activities
9/14/19	0800	Arrive on-Site. Perform H&S tailgate
	0815	Traut continues 4" pvc casing install at PSP-E02.
		Alex Villhauer confirmed total depth 80 ft bgs and
		centralizers at 80ft, 73ft, 61ft, 41ft, 21ft, and 5ft.
	0945	Casing installed, move to PSP-E03. Calibrate PID #3249:
		Fresh Air: 0.0/0.0 ppm Isobutylene: 100.0/100.0 ppm
	1330	Soils logged down to 70ft at PSP-E03. Prepare for VAP.
	1340	Begin purging at 2.0 GPM. VAP screen 66-70 ft.
	1355	Water level stabilized at 61.0 ft bgs while purging
		at 1.5-2.0 GPM. Wait for purge water to clear up
		before sampling.
	1510	Collected VAP sample PSP-E03 (66-70) (091419). Purge
		water very clear. Drill down to 80ft as instructed by
		Alex Villhauer.
	1615	Alex Villhauer confirms 80ft total depth and
		centralizers at 80ft, 74ft, 62ft, 42ft, 22ft, and 5ft.
	1730	Traut still finishing 4" pvc casing install at PSP-E03.
		Pack up and clean up.
	1745	Depart Site

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Noah Schmidt, Tyler Reinke, Nick Pachan

Weather: A few showers this morning, isolated thunderstorms this afternoon, high 74°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/15/19	0830	Arrive on-Site. Perform H&S tailgate with Traut
	0845	Traut continues drilling at PSP-E04
	1200	Confirmed with Alex Villhauer the total depth for the 4" pvc casing at PSP-E04 will be 80 ft with centralizers at 80 ft, 74 ft, 62 ft, 42 ft, 22 ft, and 5 ft. Traut breaks for lunch and heads out to get more water.
	1515	Traut finishes the 4" pvc casing installation at PSP-E04 and prepares to move to PSP-E05 next.
	1605	Begin drilling at PSP-E05
	1845	Traut has drilled down to 76 ft bgs at PSP-E05 and wraps up for the night.
	1900	Depart Site

ENFM009-DAILYLOG

Document #ENFM009, Revision 01

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling: J. LARY

Weather: 55 F, RAIN

Equipment: PID, WLM

Date	Time	Description of Activities
9/9/19	0745	ARCADIS ON SITE
	0755	H_2S TAILGATE, REVIEW AGENDA
	0810	CASCADE BEGINS MOBILIZING TO PSP-C10; WILL BLIND DRILL
	—	FROM 0-47' BGS
	0900	CASCADE BEGINS CORING ~~CORE~~ CONCRETE @ PSP-C10
	0950	CASCADE BEGINS DRILLING @ PSP-C10
	1235	LOGGED SOILS DOWN TO 74' BGS; RECEIVED CENTRALIZER
	—	LOCATIONS FROM A. VILLHAUER: 83', 77', 63', 43', 23', AND 5'
	1355	CASCADE BEGINS INSTALLING 4" PVC CASING
	1450	CASCADE BEGINS GROUTING PSP-C10 FROM THE BOTTOM UP
	—	USING A TREMIE PIPE
	1625	CASCADE FINISHES GROUTING PSP-C10, USED 3.5 BATCHES OF CEMENT
	1635	ARCADIS AND CASCADE OFFSITE

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling: J. LARY

Weather: 66 F, CLOUDY

Equipment: PID, WLM

Date	Time	Description of Activities
9/10/19	0745	ARRIVE ON SITE
	—	NOTIFIED BY CASCADE CREW AND K. DUNAWAY THAT AN
	—	UNKNOWN LOCK WAS REMOVED FROM THE GATE
	0830	REMAINING CASCADE CREW RETURN AFTER GETTING LATER
	0840	H+S TAILGATE, REVIEW AGENDA:
	—	CASCADE WILL ABANDON ASP-C02 ~~+ PSP-C11~~ (SP) BEFORE DRILLING @
	—	PSP-C11 (THEY DID NOT HAVE ENOUGH 6" TOOLING TO PROCEED)
	0850	CASCADE BEGINS REMOVING 8" TOOLING FROM PSP-C16
	0915	CASCADE BEGINS ABANDONING ASP-C02
	1115	CASCADE FINISHES GROUTING ASP-C02 AND MOBILIZES TO
	—	CSP-C11
	1130	CREW ON STANDBY DUE TO LIGHTNING
	1250	CASCADE RESUMES SETTING UP @ PSP-C11; VAP SAMPLE TO BE
	—	COLLECTED
	1310	CASCADE BEGINS CORING CONCRETE
	1350	CASCADE BEGINS DRILLING @ PSP-C11
	1440	LOGGED SOILS DOWN TO 77' BGS. BORING LOGS SENT TO A. VILLHAUER
	—	FOR SAMPLE INTERVAL; VAP SAMPLE TO BE COLLECTED TOMORROW MORNING.
	—	CASCADE BEGINS WRAPPING UP FOR THE DAY.
	1715	ARCADIS OFF SITE

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling: J. LARY

Weather:

Equipment: PID, WLM

Date	Time	Description of Activities
9/11/19	0730	ARCADIS ON SITE
	0750	H+S TAILGATE, REVIEW AGENDA
	0800	RECEIVED SCREEN INTERVAL FROM A. VILLHAUER: 62-67' BGS
	-	@ CSP-C11
	-	DTW BEFORE PURGING: 51.47' BGS
	0809	PURGE START
	0824	PURGED WELL DRY; WILL LET RECHARGE FOR 20 MINUTES
	0848	RESUMED PURGING, BUT WELL RAN DRY SHORTLY AFTER
	0949	RESUMED PURGING; UNABLE TO MEASURE DTW (WATER LEVEL BELOW
	-	SUBMERSIBLE PUMP)
	0956	PURGED WELL DRY; WILL LET RECHARGE FOR 45 MINUTES
	1035	INSTRUCTED BY A. VILLHAUER TO COLLECT SAMPLE FROM PSP-C11
	-	DUE TO LOW RECHARGE RATE
	1048	SAMPLE PSP-C11 (62-67) @ 1048
	1110	CASCADE MOVES TO PSP-C02 FOR ABANDONMENT
	1120	GET SITE TO TAKE GW SAMPLES TO LAB
	1200	ARCADIS ON SITE
	1520	CASCADE FINISHES ABANDONING PSP-C03 + PSP-C04
	1535	CASCADE SETS UP @ NF-06 TO PREPARE FOR DRILLING OFFSITE
	1600	ARCADIS OFF SITE

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling: JOE LARY

Weather: 66F, RAIN

Equipment: PID, WLM

Date	Time	Description of Activities
~~9/13~~ 9/12 aw 9/15/19	0745	ARCADIS ON SITE.
	0755	H+S TAILGATE, REVIEW AGENDA
	0805	CASCADE BEGINS ~~DRILL~~ DRILLING @ VAP-P2-NF97
	0815	ENCOUNTERED OBSTRUCTION @ 5' BGS; STEPPED 5' TO THE EAST,
	—	NOW IN GRID NE-97. LOCATION NOW VAP-P2-NF97.
	~~0825~~ 0835	CASCADE ATTEMPTS TO CORE THROUGH CONCRETE, BUT
	—	ENCOUNTERS OBSTRUCTION AFTER REMOVING 45" OF CONCRETE;
	—	STEPPED 5' TO THE EAST AND 3' TO THE SOUTH.
	1025	CASCADE BEGINS DRILLING @ NEW STEPOUT LOCATION
	1220	LOGGED SOILS DOWN TO 67' BGS
	1245	RECEIVED VAP INTERVAL FROM A VILLHAUER: 64-69' BGS
	—	PRE-PURGE DTW: 44' BGS
	1335	PURGE START
	~~1530~~ 1430	SAMPLE VAP-P2-NF97(62-67)(091219) @ 1530
	1600	CASCADE SETS UP @ PSP-C01 FOR MONITORING WELL INSTALLATION
	1610	TOTAL DEPTH DECREASED FROM 80' BGS TO 75' BGS; CASCADE
	—	WILL REMOVE EXCESS SEDIMENT WITH WATER AND SET WELL
	—	TOMORROW MORNING
	1630	ARCADIS OFFSITE; WILL TAKE SAMPLES TO MERIT

ARCADIS Design & Consultancy for natural and built assets

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling:

Weather: 66F, CLOUDY

Equipment: PID, WLM

Date	Time	Description of Activities
9/13/19	0730	ARCADIS ON SITE
	0740	REVIEW AGENDA WITH A. WESTHUIS
	0750	H+S TAILGATE W/ CASCADE
	0805	CASCADE SETS UP @ PSP-C01 FOR MONITORING WELL INSTALLATION
	—	MW ~~-NORTH-CLATSKE~~ ID IS: MW-19-115
	1030	CASCADE FINISHES INSTALLING MW-19-115
	1050	CASCADE SETS UP @ ~~PSP-F12~~ PSP-F12
	1130	CASCADE FINISHES CORING @ ~~MW-19-115~~ PSP-F12
	1150	CASCADE BEGINS DRILLING @ ~~MW-19-115~~ PSP-F12
	1325	LOGGED DOWN TO 70' BGS; RECEIVED VAP INTERVAL FROM A.
	—	VILLHAUER: 64-69' BGS
	—	PRE-PURGE DTW: 49.4' BGS
	1342 ~~1442~~	PURGE START
	1358 ~~1458~~	PURGED WELL DRY; WILL LET RECHARGE
	1424	RESUMED PURGING, DTW: 65.75
	1426	WELL PURGED DRY; WILL LET RECHARGE FOR 30 MINUTES
	1505	RESUME PURGING, DTW: 65.15
	1510	WELL PURGED DRY; WILL LET WELL RECHARGE OVER THE WEEKEND
	—	(AUTHORIZED BY A. VILLHAUER.
	1520	RETURN EQUIPMENT AND NOTES TO A. WESTHUIS
	1530	ARCADIS OFF SITE

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Daily Log

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Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/16/19		Purpose: Biosparge drilling
		Weather: 70° F, cloudy
		Arcadis/Subcontractor: Cascade
		Equipment: PID# 3623, WLM # 5995
	0650	Arcadis on site.
	0715	conduct tailgate w/ cascade
	0729	Cascade begins purging PSP-F12
	0730	Well runs dry, wait for recharge, go over plan/details w/ A. Westhaus
	0830	sample PSP-F12 only get 1 vial worth, well runs dry
	0831	wait For well to re-charge
	0905	collect another sample vial
	0906	wait For well to re-charge
	0936	collect last sample vial, well runs dry
	0937	Cascade pulls out rods, move 8" casing, moves rig to PSP-E10 calibrate PID = 105.100 ppm
	1010	Drop off samples @ lab (Merit)
	1030	Begin drilling PSP-E10 (20" of concrete @ top)
	1335	Dog bone breaks on drilling head - Cascade checks in w/ office, see if they have another one @ their shop
	1350	Lunch
	1420	Cascade returns, begin taking apart head, get water
	1630	Cascade begins cleaning up site/ securing area/trucks.
	1700	Cascade off site, oversee Traut well installation
	1705	Begin drilling down 8" casing.
		complete drilling down 8" casing, Cascade begins cleaning up
	1845	Cascade and Arcadis off site
		9/16/19

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: ~~Shantel Johnson~~ ER E. Redner

Staff On-Site: ~~Shantel Johnson~~ ER E. Redner

Subcontractor: Cascade Drilling:

Weather: 62°F, Foggy

Equipment: PID #3623, WLM# 5995

Date	Time	Description of Activities
9/17/19	0720	Arcadis on site
	0730	Cascade on site, go over tailgate, Cascade preps equipment
	0750	Remove rotating head
	0830	unload cement
	0840	Head over to transect C, prep coring machine
	0915	Begin overdrilling PSP-C06
	1010	Parts for rotating head arrive, move back to rig to complete repairs
	1200	Repairs completed, take Lunch
	1240	Resume drilling. Calibrate PID = 105/100 ppm
	1330	Complete drilling, confirm w/ A. Villhauer centralizer depths.
	1410	Begin well installation, centralizers placed @: 80', 74', 66', 46', 26', 5'
	1438	4" PVC casing hitting obtrusion @ 71.0', won't go any further. Cascade pulls PVC well out, drills back down to try and remove blockage
	1505	~~Driller~~ ER Drill pipe is stuck. ~~prep to~~ ER run casing back downhole to get unstuck
	1540	Run 4" PVC casing downhole
	1610	prep to grout.

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Project No.: 30006870.04600

Date	Time	Description of Activities
9/17/19	1620	Begin grouting
	1725	Finish grouting. clean up area, put away grouting Material.
	1740	Arcadis and Cascade off site.

9/17/19

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Daily Log

Project No.: 30006870 - 04600 Page 1 of 1

Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/18/19		Purpose: Biosparge drilling/well installation
		Weather: 60° F, sunny
		Arcadis/Subcontractor: Cascade
		Equipment: WLN#5995, PID#3623
	0710	Arcadis on site, start paperwork
	0725	Cascade on site. Conduct tailgate, move to PSP-E09
	0825	Begin drilling PSP-E09. Calibrate PID = 104/100 ppm
	0900	Make contact w/ steel, can't drill any further. step off, ~~try again~~ ER
	0925	Resume drilling
	1220	complete drilling to 68', prep to purge.
	1225	Pick up equipment from Merit
	1235	Begin purging, drillers take lunch
	1255	well runs dry wait for it to recharge
	1350	Purge well again
	1410	well runs dry wait for it to recharge.
	1440	collect sample PSP-E09(63-68)(091819), well runs dry after 1.5 vials, Wait for well to recharge
	1515	collect last two vials of sample PSP-E09(63-68)(091819)
	1525	Resume drilling (pulling out water purging equipment first)
	1610	complete drilling 6" casing down Note: no recovery 72.5-77.0' due to it falling out of casing
	1620	Drill down 8" casing
	1715	complete drilling down 8" casing. clean up area, lock up equipment.
	1730	Cascade off ~~shit~~ ER site. Finish up notes
	1740	Arcadis off site

9/18/19

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870 - 04700 Page 1 of 1

Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/19/19		Purpose: Well installation / Biosparge drilling
		Weather: 65°F, sunny
		Arcadis/Subcontractor: Cascade
		Equipment: PID #3623 WLN# 5995
	0730	Arcadis and Cascade on site. Conduct tailgate.
	0740	Begin installing well. Centralizers @ 78, 71, 61, 41, 21, 5.
	0840	Begin grouting. Calibrate PID = 103/100 ppm
	0930	Complete grouting, back up and move rig to VAP-P2-NC103
	1100	Set up at VAP-P2-NC103
	1136	Begin drilling VAP-P2-NC103
	1150	Drilled 7' down, still in concrete, call Alex Villhaver
	1155	Step a couple feet off to the west per A. Villhaver
	1210	Lunch
	1235	~~Continue/resume drilling~~ ER Finish setting up rig
	1315	Begin drilling VAP-P2-NC103
	1325	Hit resistance @ 4.0' down, call A. Villhaver to make sure it's okay to keep drilling
	1330	Continue drilling
1520	~~1320~~ ER	Talk to Alex Villhaver about samples, VAP location (will drill another 2')
1530	~~1330~~ ER	~~Drill~~ ER Cascade checks over rotating head - something is not right
	1545	Some flange bolts in rotating head are broken, Cascade begins taking them out, making calls to get the parts
	1550	Attempt to take broken flang bolts off, get supplies/parts
	1640	Succeed in taking out flanges. Will replace them tomorrow. Cascade begins cleaning up/securing site.
	1655	Cascade and Arcadis off site.
		Ellen 9/19/19

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Daily Log

Project No.: 30061870-04600 Page 1 of 1

Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/20/19		Purpose: Biosparge Drilling
		Weather: 65°F, partly cloudy
		Arcadis/Subcontractor: Cascade
		Equipment: WLN# 5915, PID# 3623
	0730	Arcadis on site, Cascade picking up parts
	0800	Cascade on site, conduct tailgate
	0810	Cascade begins repairs / setting up equipment
	0850	Resume drilling. Calibrate PID= 103/100
	0929	complete drilling to 68.0'. set up to purge well
	0933	Begin purging VAP-P2-NC103
	0947	Well dries up, let it recharge
	1035	Purge well again
	1037	well runs dry, let recharge
	1115	sample VAP-P2-NC103
	1120	Cascade pulls out pump, moves to VAP-P2-NL100.
	1125	Arcadis drop off sample @ Merit.
	1225	Begin drilling VAP-P2-NL100
	1400	complete drilling to 63.0'. Talk to A. Villhauer about sample depths
	1410	Drill another 5.0'
	1440	Cascade works to get un-stuck. End up having to drill to 70.0' to get unstuck.
	1510	Prep to purge, set up pump
	1525	Begin purging VAP-P2-NL100
	1537	Well runs dry. Wait for it to recharge
	1625	Purge again. → 2.2 gallons were purged and then well ran dry.
	1630	Cascade begins cleaning up / securing site, Arcadis off site
1715	~~1700~~ ER	Cascade off site

9/20/19

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Trant Drilling: Dan Kerasch, Noah Schmidt, Tyus Reinke, Nick Pachan

Weather: Cloudy, ~ 75°F

Equipment: MiniRAE 3000 #3249 and WLM# 711

Date	Time	Description of Activities
9/16/19	0715	Arrive on-Site. Check in with Ellen Redner who will be overseeing the Cascade Drilling crew this week. Hand off paperwork and supplies to Ellen and make sure she is up-to-speed with Cascade's next tasks.
	0800	Check in with the Trant Drilling crew. Perform H&S tailgate.
	0815	Trant continues drilling deeper at PSP-E05.
	0820	Alex Villhauer confirms 80ft total depth for the 4" pvc casing at PSP-E05 with centralizer depths at 80ft, 76ft, 64ft, 44ft, 24ft, and 5ft.
	0910	Eric Feenstra calls and confirms we will pump down the dewatering box into the frac tank, leaving the top portion of the water column in the dewatering box because it shows some sheen. The last little bit of water with the sheen in the dewatering box will be pumped into drums where a waste characterization sample will be collected. All of this was confirmed with Andrew Lorenz. The drilling crews can pump directly into the frac tank until a new, clean dewatering box can be delivered to the Site, as directed by Eric Feenstra.
	1145	4" pvc casing installation complete at PSP-E05. Trant takes lunch.
	1215	Trant prepares to move to PSP-E06 next. Calibrate MiniRAE 3000; Fresh Air: 0.0/0.0 ppm Isobutylene: 100.0/100.0 ppm
	1420	Drilled and logged down to 70 ft bgs at PSP-E06. Call Alex

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Daily Log

Project No.: B0064479.2019.04600

Date	Time	Description of Activities
9/16/19		Villhauer to confirm VAP screen interval, as well as the total
		depth for the 4" pvc casing.
	1425	Begin purging VAP interval screened from 64-68 ft bgs at PSP-E06
	1525	Collected VAP sample PSP-E06 (64-68)(091619) after purging
		for one hour at 1.06pm. Water level stabilized at 63ft bgs.
		Purge water very clear. Traut prepares to drill another 10ft
		down to 80ft bgs as directed by Alex Villhauer.
	1650	PSP-E06 logged down to 80 ft bgs. Alex Villhauer confirms the
		4" pvc total depth at 80ft, with centralizers at 80ft, 74ft,
		62ft, 42ft, 22ft, and 5ft. Traut prepares for 4" pvc casing
		installation. First they will run their 8" casing to open up the
		hole.
	1730	Depart Site

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Daily Log

Project No.: B0064479.2019.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Trant Drilling: Dan Karasch, Tyus Reinke, Nick Pachan, Noah Schmidt

Weather: Cloudy, ~ high 77°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/17/19	0800	Arrive on-Site. Perform H's S tailgate with Trant.
	0815	Trant continues wrapping up the 4" pvc casing installation at PSP-EC6.
	0900	Trant finishes the 4" pvc casing installation and will now top off some of the previously completed 4" pvc casing installs with grout.
		Trant also performs some general cleanup.
	1055	Head to Merit to drop off the VAP sample collected yesterday at PSP-EC6.
	1200	Trant breaks for lunch.
	1230	Trant continues cleanup.
	1515	Trant wrapped up. They are set up on PSP-E07 and will be ready to drill first thing next Tuesday morning. Depart Site

Subcontractor: Trant Drilling: Dan Karasch, Noah Schmidt, Nick Pachan, Tyus Reinke
Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation
Purpose: Drilling oversight
Prepared By: A. Westhuis

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.04600

Project No.: ~~B0064479.2019.04600~~ Page 1 of 1

Equipment: MiniRAE 3000 #3249 and WLM #711 Weather: Sunny, ~75°F

Date	Time	Description of Activities
9/24/19	0800	Arrive on-Site. Meet up with Trant over by PSP-E07 where they are setting up. Perform H&S tailgate.
	0815	Trant begins drilling at PSP-E07. Calibrate MiniRAE 3000 #3249
		Fresh Air: 0.0/0.0ppm ~~Isobutylene~~: 100.0/100.0ppm
	1145	Trant breaks for lunch. Soils logged down to 80 ft bgs at
		PSP-E07. Bedrock first encountered at 60ft bgs. Discuss with
		Alex Villhauer what the total depth will be here for the 4inch
		pvc casing. Alex confirms 83ft at a minimum.
	1230	Trant prepares to drill deeper at PSP-E07.
	1330	Trant has drilled down to 84ft bgs at PSP-E07. Confirm
		with Alex Villhauer the centralizer depths. Trant prepares
		to advance their larger 8" casing to depth.
	1545	Trant finishes installing 4" pvc casing at PSP-E07. Confirmed
		centralizer depths with Alex Villhauer: 84ft, 77ft, 60ft, 40ft, 20ft,
		and 5ft. Total depth = 84ft bgs. Trant prepares to move
		to PSP-E08 next.
	1900	Trant finishes drilling to 80ft at PSP-E08 and packs up
		for the day.
	1910	Depart Site

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation
Purpose: Drilling Oversight
Prepared By: A. Westhuis
Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pacham, Noah Schmidt
Equipment: MiniRAE 3000 # 3249 and WLM # 711

ARCADIS Design & Consultancy for natural and built assets

Daily Log

30006870.04600

Project No.: ~~B0064479.2019.04600~~ Weather: Cloudy, chance of rain, ~70°F Page 1 of 1

Date	Time	Description of Activities
9/25/19	0715	Arrive on-Site. Perform H&S tailgate with Traut
	0740	Traut continues where they left off at PSP-E08. Alex Villhauer confirmed a total depth of 83-84 ft bgs. Traut prepares to drill down to 84 ft. Calibrate MiniRAE 3000 # 3249. Fresh air: 0.0/0.0ppm Isobutylene: 100.0/100.0ppm
	0845	PSP-E08 drilled down to 84 ft bgs. Alex Villhauer confirms centralizer depths of 84 ft, 78ft, 63ft, 43 ft, 23 ft, and 5ft.
	1130	Traut finishes installation of the 4" pvc casing at PSP-E08. Traut breaks for lunch and heads out to get some supplies.
	1230	Traut begins some general clean up of the Site and maintenance of their equipment. They have supplies being delivered today for the biosparge inner 2" well construction. They will prepare for the inner 2" well construction. They also will pull rods used as weights at a couple 4" pvc casing locations.
	1615	Depart Site.

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Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pacham, Noah Schmidt

Weather: Sunny, ~70°F

Equipment: MiniRAE 3000 #3249 and WLM# 711

Date	Time	Description of Activities
9/26/19	0830	Arrive on-Site. Perform H&S tailgate with Traut.
	0845	Traut continues preparation for the biosparge point 2 inch inner well installations. They organize and prepare supplies, and cut the 4" pvc casings down 6 inches bgs. They also begin some assembly of the 2" well construction and clean up around each sparge point.
	1200	Traut breaks for lunch.
	1245	Traut continues 2" inner well installation preparation
	1310	Confirmed 2" centralizers will be placed on the bottom of the screen, just above the top of the screen on the pvc riser, then every 20ft with the final centralizer at 7ft bgs. This was confirmed with Alex Villhauer and Andrew Lorenz.
	1545	Traut still preparing for 2" inner installations. They will be picking up the 10ft stainless steel screens first thing tomorrow morning in Grand Rapids. They will be ready to start the 2" inner well installations tomorrow morning when they are back from picking up the screens. Depart Site.

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan, Noah Schmidt

Weather: Cloudy, scattered thunderstorms, high 73°F

Equipment: MiniRAE 3000 # 3249 and WLM # 711

Date	Time	Description of Activities
9/27/19	0830	Arrive on-Site. Prepare H&S tailgate.
	0845	Traut arrives on-Site with the stainless steel screens they picked up this morning in Grand Rapids. Perform H&S tailgate.
	0900	Begin 2" inner well installations. Traut starts at CSP-F01. They plan to get the 2" inner wells and the filter pack and choker sand set at a handful of locations, then they will add the 20 ft of portland cement to these. Confirmed with Alex Villhauer and Andrew Lorenz that the 2" centralizers will be placed at the bottom of the screen, at the top of the screen just onto the pvc riser, then every 20 ft with the final 2" centralizer placed at 7 ft bgs. For the filter pack Traut is using a K&E #00 equivalent and a choker sand Global #8 equivalent. The choker sand is much finer than the filter pack. Ensured with Traut all joints are threaded. A. Westhuis will verify that all material depths match the Table 1 Biosparge Well Construction details provided by Andrew Lorenz.
	1200	Traut breaks for lunch. So far they have installed the filter pack and choker sand at three locations: CSP-F01, ASP-F03, and ASP-F02. Sand depths routinely checked using a tape measure and sticks of tremie pipe for precise depths.
	1230	Traut arrives back on-Site and sets up at ASP-F01 for 2" well installation and the filter pack and choker sand placement.

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Project No.: ~~B0064479.2019.04600~~

Date	Time	Description of Activities
9/27/19	1425	Traut has now finished installing the filter pack and choker sand pack at six locations: CSP-F01, ASP-F03, ASP-F02, ASP-F01, PSP-F11, and PSP-F10. They now prepare to install the 20 ft (8.44 gallons) of Portland cement at these six locations.
	1530	Traut finishes installing the Portland cement at the six locations mentioned above. Severe thunderstorms roll in with heavy rain and lightning. Traut packs up for the day. Meet up with Ellen Redner to take equipment, supplies, and field notes from her for Shantel Johnson who will be taking over the oversight duties with Cascade next week.
	1645	Depart Site

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan, Noah Schmidt

Weather: Cloudy, scattered showers, ≈ 70 °F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/28/19	0745	Arrive on-Site. Perform H&S tailgate with Traut.
	0800	Traut continues where they left off yesterday with the 2" inner well installations. First they will check the depth of the portland cement again that was added to six locations, then they will continue constructing more of the 2" inner wells.
	0830	Traut begins installation of 2" inner well at PSP-F09, carefully measuring in the filterpack sand and the choker sand. Please note, cement 6" higher at CSP-F01 and ASP-F01.
	1130	Traut breaks for lunch. So far today they have set the filter sand pack and choker sand at another six locations: PSP-F09, PSP-F08, PSP-F07, PSP-F06, PSP-F05, and CSP-602.
	1215	Traut arrives back on-Site and continues installing 2" inner wells.
	1500	Traut finishes installing the filterpack sand and choker sand at another three wells: ASP-603, ASP-602, and PSP-601. Traut now prepares to add portland cement to the nine locations finished with filterpack sand and choker sand today. They will precisely add 8.44 gallons of cement which will be 20 ft of cement. Once cured they will re-measure the cement to ensure the accuracy of their measurements before adding bentonite grout.
	1700	Traut finishes tremie grouting the 20ft of Portland cement

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Daily Log

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Date	Time	Description of Activities
9/28/19		at locations PSP-F09, PSP-F08, PSP-F07, PSP-F06, PSP-F05, CSP-602, ASP-603, ASP-602, and PSP-601. Trant now packs up and cleans up. They will be ready to install bentonite grout at the almost completed 15 2" inner well installations first thing tomorrow morning. Depart Site.

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Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Noah Schmidt, Nick Pachan, Tyus Reinke

Weather: Cloudy, scattered showers, ~60°F

Equipment: MiniRAE 3000 # 3249 and WLM # 711

Date	Time	Description of Activities
9/29/19	0745	Arrive onsite. Perform H&S tailgate with Traut.
	0800	Traut begins tremie grouting the bentonite grout at the 2" inner wells they have started constructing. They will re-measure the portland cement depth at each location to ensure there is 20 ft of cement at each location before adding the bentonite grout.
	1115	Traut finishes installing the bentonite grout at the 15 sparge point locations where they started 2" inner well installations. Portland cement depths were good and measured 20ft at all locations. Only two locations had grout measuring 6 inches higher, CSP-F01 and ASP-F01. Traut decides to call it a day due to heavy rains. The rain looks to persist the rest of the day. Depart Site

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Daily Log

Project No.: 30006870 - 04700

Site Location: LANSING, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/23/19		Purpose: Biosparge Drilling
		Weather: 65°F, cloudy
		Arcadis/Subcontractor: Cascade
		Equipment: PID# 3265 3623, WLM# 5995
	0730	Arcadis and Cascade on site. Conduct tailgate, Cascade begins setting up equipment, troubleshoot rig
	0821	Begin purging. Purge 4.5 gallons
	0826	Well runs dry, wait for it to recharge.
	0905	Collect VAP-P2-NI100(65-70)(092319)
	0910	Pull out pump, tubing, ~~pull out casing~~ set up to abandon well - will cement grout from bottom (70') to surface EK
	0925	Begin grouting, pulling up casing as they grout
	1000	Complete grouting. Prep to move rig
	1010	move rig to VAP-P2-NI108, set up equipment, Arcadis head to Merit to drop off samples
	1130	Begin drilling VAP-P2-NI108. calibrate PID = 102/100 ppm
	1310	Complete drilling to 67.5'. Finish logging, confirm w/ A. Villhauer VAP sample interval
	1315	Drillers take lunch
	1345	Drillers return, prep to purge well
	1405	Begin purging VAP-P2-NI108. 1.5 gallons purged. Note: returns (water) from this hole while drilling.
	1407	Well runs dry, wait for recharge. (Well screen @ 61-66' due to partial collapse @ bottom of hole)
	1505	Begin purging again
	1505	Well runs dry, 0.25 gallons purged, wait for well to recharge
	1506	Talk to A. Villhauer about low purging returns - its decided to wait until tomorrow to purge again/ sample! Cascade needs to pick up more casing before we can keep drilling, because of this it will be an early end time today

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Daily Log

Project No.: 30006870-04700 Page 2 of 2

Site Location: Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/23/19	1510	Cascade begins cleaning up/securing site.
cont.	1540	Cascade and Arcadis off site.

9/23/19

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Daily Log

Project No.: 30006870-04700 Page 1 of 1

Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/24/19		Purpose: Biosparge Drilling
		Weather: 63°F, sunny
		Arcadis/Subcontractor: Cascade
		Equipment: PID#3623, WLM# 5995
	0915	Arcadis and Cascade on site. Conduct tailgate,
		Cascade sets up equipment, move casing
	0942	Begin purging VAP-P2-NI108
	0943	Well dries up. Call A. Villhaver about sampling, wait
		for well to recharge. Only 1 gallon of water was in
		well.
	1040	Sample VAP-P2-NI108. only able to obtain 1 vial
		of sample, wait for well to recharge
	1140	sample VAP-P2-NI08. only able to obtain 1 more
		vial of sample, wait for well to recharge.
	1240	collect last vial of VAP-P2-NI08.
	1245	Cascade takes out pump, preps (take out drill rod) to move.
		Arcadis drops off samples @ Merit
	1315	move and begin setting up on VAP-P2-NX100
	1345	Lunch
	1415	Cascade returns, finish setting up equipment, begin drilling, calibrate
		PID = 109/100 ppm
	1600	complete drilling to 64.0', finish logging core
	1615	Talk to A. Villhaver about sample interval 59-64'
	1630	Cascade preps pump / purging equipment. Screen set ~~61-66'~~ ER.
	1645	cascade clean up site
	1700	Cascade off site. Arcadis finish up notes
	1715	Arcadis off site.
		9/24/19

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Daily Log

Project No.: 30006870 - 04700 Page 1 of 1

Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/25/19		Purpose: Biosparge Drilling
		Weather: 65°F, partly cloudy
		Arcadis/Subcontractor: Cascade
		Equipment: PID#3623, WLM#5995
	0725	Arcadis and Cascade. Conduct tailgate. Cascade sets up equipment. Hook up pump.
	0748	Begin purging VAP-P2-NX100
	0815	Well dries up. 8 gallons purged. Wait for well to recharge.
	0845	Begin purging
	0846	Well dries up. 1/2 gallon purged. Wait for well to recharge.
	0945	Begin purging
	0946	Well dries up. .75 gallons purged. Wait for well to recharge
	1045	Sample VAP-P2-NX100
	1050	Cascade pulls pump equipment out, ~~fasting~~ drill pipe out preps to begin grouting
	1100	Begin grouting, pulling up casing as they go.
	1135	Finish grouting, pack up equipment, prep to move rig to ASP-D01.
	1200	Move rig to ASP-D01. Drop sample off at Merit.
	1225	Lunch
	1255	Continue setting up to drill
	1325	Begin drilling ASP-D01. Calibrate PID=104/100ppm
	1445	Complete drilling to 69.5' bgs. Finish logging
	1452	Talk to A. Villhaver about sample interval
	1457	Cascade preps to purge
	1509	Begin purging ASP-D01. 56 gallons purged total.
	1610	collect sample ASP-D01(62-67)(092919)
	1615	Drillers remove pump/well sampling/purging equipment, drill rod from hole, clean up site, drop off samples to Merit
	1645	Cascade and Arcadis off site
		9/25/19

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Daily Log

Project No.: 30060870-04700 Page 1 of 2

Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/26/19		Purpose: Biosparge Drilling
		Weather: 64° F, sunny
		Arcadis/Subcontractor: Cascade
		Equipment: PID# 3623, WLM#5995
	0730	Arcadis and Cascade on site. conduct tailgate
	0740	Cascade moves rig to PSP-D02
	0835	Begin drilling PSP-D02. calibrate PID = 105/100 ppm
	1015	Complete drilling to 64.0' bgs. Finish logging.
	1022	Talk to A. Villhaver about screen depth
	1027	Cascade preps for sampling/purging, sets screen 59-64' bgs.
	1040	Begin purging PSP-D02
	1042	Well dries up. 4 gallons purged. Let recharge. cascade gets more water.
	1140	Troubleshoot pump/control box
	1155	Begin purging PSP-D02. inital depth to water from TOC = 36.0 ~~(bgs)~~ ER
	1215	Water from TOC = 49.5'. Pump rate = 1 gal/minute
	1230	Well dried up. 35 gallons pumped/purged out. Let it recharge.
	1305	Not enough water to pump. Water level from TOC: 63.0'
	1340	Not enough water to pump. Water level from TOC: 61.5', call and discuss w/ A. Villhaver. Will wait for recharge and then collect sample.
	1450	Call A. Villhaver about additional sampling plan, take measurements at NC103, NI108, talk to A. Villhaver again
	1530	DTW of PSP-D02 = 60.35'. Attempt to sample
	1545	unable to get sample. Pull pump, move to VAP-P2-NC103 to collect sample. Set up to sample.
	1600	Sample VAP-P2-NC103(56-61)(092619)
	1605	move to VAP-P2-NI108. Set up to sample
	1615	collect sample VAP-P2-NI108(53-58)(092619)
	1620	search for MW-15-72

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Daily Log

Project No.: 30006870-04700 Page 2 of 2

Site Location: Lansing, MI

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/26/19	1625	move to MW-15-72, set up to sample
cont.	1635	Collect sample MW-15-72-092619
	1640	Cascade packs up equipment, cleans up site, secures rig
	1700	Cascade off site. Finish notes.
	1725	Check in w/ Trout
	1745	Arcadis and Trout off site

EHR 9/26/19

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Daily Log

Project No.: 30006870-04700 Page 1 of 1

Site Location: Lansing, MI (RACER)

Prepared By: Ellen Redner

Date	Time	Description of Activities
9/27/19		Purpose: Biosparge Drilling
		Weather: 70°F, cloudy
		Arcadis/Subcontractor: Cascade
		Equipment: PID#3623, WLM#5995
	0720	Arcadis on site
	0730	Cascade on site, conduct tailgate. Cascade preps equipment (@ PSP-D02)
	0750	Collect sample PSP-D02(59-64)(092719)
	0755	Cascade pulls out pump/equipment. Preps rig to move. Arcadis drops samples off @ Merit.
	0805	Move rig to ASP-D04
	0825	Begin drilling. Calibrate PID = 106/100 ppm
	1020	complete drilling to 65'. Last 4.0' of core falls out of barrel, drillers attempt to go back down and retrieve it (w/o drilling further). They do not succeed. Call A. Villhaver
	1030	Drillers prep to purge/sample. We will drill an additional 5' to hopefully retrieve lost core after we collect sample. Pull up casing to 56.0'.
	1040	Drillers tag line was messed up, hole is clear to 66.0'.
	1041	Talk to A. Villhaver about how to log short section
	1042	Begin purging ASP-D04.
	1050	Well runs dry, 8 gallons purged. Wait for well to recharge
	1150	Purge ASP-D04.
	1151	Well runs dry. 0.25 gallons purged. Wait for well to recharge
	1250	Purge ASP-D04.
	1250	Well runs dry. 0.10 gallons purged. Call A. Villhaver about next steps.
	1300	Cascade begins cleaning up site.
	1325	Cascade packs up equipment/secures site.
	1340	Cascade off site. Arcadis complete paperwork, organize material for next week, talk to A. Villhaver about plan. Give Arcadis equipment.
EP 14 1620	~~1545~~	Arcadis off site.

Ellen 9/27/19

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Daily Log

Project No.: 30006870.04600

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan, Noah Schmidt

Weather: Cloudy, chance of thunderstorms, ~82°F

Equipment: MiniRAE 3000 #3249 and WLM #711

Date	Time	Description of Activities
9/30/19	0730	Arrive on-Site. Check in with Shantel Johnson who will be overseeing Cascade this week. Make sure Shantel knows the plan for Cascade this week.
	0800	Check in with Kara Donahue who will be overseeing FRx this week. Make sure Kara knows the plan for FRx this week.
	0820	Meet with Traut and perform H&S tailgate.
	0830	Traut will continue finishing sparge point constructions while we wait to hear of any additional locations that can be drilled. Alex Villhauer is working on identifying one or two of the 2" performance monitoring bedrock wells that can be installed while Traut is here through the end of tomorrow.
	1130	Traut breaks for lunch and will get more supplies for installing the flush mount covers at the sparge point locations. Eric Feenstra indicates the mechanical seals will arrive at the Lansing office tomorrow.
	1300	Traut arrives back on-Site and continues installing flush mount covers.
	1740	Traut packs up for the night and will continue setting flush mount covers in the morning. Depart Site

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Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan, Noah Schmidt

Weather: Mostly cloudy, chance of thunderstorms, high 83°F

Equipment: MiniRAE 3000 # 3249 and WLM # 711

Date	Time	Description of Activities
10/1/19	0830	Arrive on-Site. Perform H&S tailgate with Traut.
	0845	Traut continues flushmount cover installations.
	1200	Traut breaks for lunch.
	1230	Traut continues installing flush mounts and now the mechanical seals that have come in.
	1600	Traut finished installing covers and seals. Traut departs Site.
	1615	Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling: J. LARY

Weather: 60°, CLOUDY

Equipment: PID, WLM

Date	Time	Description of Activities
9/30/16	0730	ARCADIS ON SITE
	0745	REVIEW AGENDA WITH A. WESTHUIS
	0815	H+S TAILGATE WITH CASCADE
	0830	SAMPLE ASP-D04(56-61)(093016) @ 0830; PRE-PURGE DTW: 55.4' BGS
	0840	CASCADE BEGINS DRILLING 5' DEEPER @ ASP-D04
	1020	CASCADE BEGINS CORING PSP-C06
	1055	CASCADE BEGINS CORING PSP-C06
	1130	CASCADE BEGINS CORING ABANDONED MONITORING WELL
	1215	CASCADE BREAKS FOR LUNCH; ARCADIS OFFSITE TO DELIVER GW SAMPLES
	—	TO LAB
	1300	ARCADIS ON SITE
	1330	SUPPLIES ARRIVE FOR 2" WELL BIOSPARGE INSTALLATIONS
	1350	CASCADE ~~PREPARED~~ PREPS EQUIPMENT SO THAT BIOSPARGE WELLS
	—	ALONG TRANSECT B CAN BE INSTALLED TOMORROW
	1600	ARCADIS AND CASCADE OFF SITE

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Project No.: 30006870.04600 Page 1 of

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling: J. LARY

Weather: 65°, PARTLY CLOUDY

Equipment: PID, WLM

Date	Time	Description of Activities
10/1/19	0730	ARCADIS ON SITE
	0746	H+S TAILGATE WITH CASCADE; REVIEW AGENDA
	0820	CASCADE BEGINS INSTALLING INNER 2" PVC @ PSP-B04
	0940	CASCADE FINISHES INSTALLING FILTER PACK (1.5 BAGS) AND CHOKER SAND (3/4 BAG)
	0950	BEGIN INSTALLING INNER 2" PVC CASING @ PSP-B03
	1100	FINISH INSTALLING FILTER PACK AND CHOKER SAND @ PSP-B03
	1110	FINISH INSTALLING SAND @ PSP-B02
	1140	FINISH INSTALLING SAND @ PSP-B01
	1205	FINISH INSTALLING SAND @ ASP-B03
	1230	FINISH INSTALLING SAND @ ASP-B02
	1305	FINISH INSTALLING SAND @ ASP-B01; CASCADE BREAKS FOR LUNCH
		~~FINISH INSTALLING SAND @~~
	1355	CASCADE BEGINS GROUTING BIOSPARGE WELLS WITH CEMENT
	1650	CASCADE FINISHES GROUTING BIOSPARGE WELLS WITH CEMENT
	1730	ARCADIS AND CASCADE OFF SITE

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling:

Weather: 68°, RAIN

Equipment: PID, WLM

Date	Time	Description of Activities
~~10/31/19~~ 11/2/19	0730	ARCADIS ON SITE
	0745	H+S TAILGATE W/ CASCADE; REVIEW AGENDA
	0810	CREW ON STANDBY DUE TO THUNDER
	0855	CASCADE MEASURES DEPTHS OF SURFACE CEMENT GROUT; ALL LOCATIONS
	—	MEASURED 20' OF CEMENT
	0910	CASCADE BEGINS GROUTING ASP-B01 W/BENTONITE GROUT
	925	CASCADE BEGINS GROUTING ASP-B02 W/BENTONITE GROUT
	940	CASCADE BEGINS GROUTING ASP-B03 W/BENTONITE GROUT
	1000	CASCADE BEGINS GROUTING PSP-B01 W/BENTONITE GROUT
	~~1000~~ 1020	CASCADE BEGINS GROUTING PSP-B02 W/BENTONITE GROUT
	1035	CASCADE BEGINS GROUTING PSP-B03 W/BENTONITE GROUT
	1050	CASCADE BEGINS GROUTING PSP-BOH FROM BOTTOM UP W/ BENTONITE;
	—	20 GALLONS OF BENTONITE USED @ EACH LOCATION
	1130	CASCADE CLEANS UP TRANSECT B; CASCADE OFF SITE
	~~1200~~	~~CASCADE~~
	1200	A. VILLHAUER ON SITE FOR UTILITY LOCATE
	1230	ARCADIS OFF SITE

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Daily Log

Project No.: 30006870.04600 Page 1 of

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Shantel Johnson

Staff On-Site: Shantel Johnson

Subcontractor: Cascade Drilling: J. LARY

Weather: RAIN, 60's F

Equipment: PID, WLM

Date	Time	Description of Activities
10/3/19	0730	ARCADIS ON SITE
	0745	H+S TAILGATE; REVIEW AGENDA
	0830	CASCADE SETS UP @ ASP-D04 TO ABANDON WELL
	1045	CASCADE FINISHES ASP-D04 AND MOVES TO
	1130	CASCADE FINISHES ABANDONING AND SETS UP @
	—	CSP-D01 FOR DRILLING AND VAP COLLECTION:
	—	CSP-D01 BLIND DRILL TO 55' BGS, CONFIRMED BY A. VILLHAUER
	1145	CASCADE BREAKS FOR LUNCH
	1240	CASCADE BEGINS DRILLING @ CSP-D01
	1530	LOGGED SOILS DOWN TO 72' BGS; VAP LOCATION FROM A. VILLHAUER:
	—	64-66' BGS
	1555	BEGIN PURGING CSP-D01; PRE PURGE DTW: 55.80' BGS
	1618	WELL RAN DRY; WILL REATTEMPT PURGING AFTER 20 MINUTES
	1639	WELL RAN DRY; WILL LET WELL RECHARGE OVERNIGHT AND COLLECT
	—	SAMPLE TOMORROW MORNING
	1650	ARCADIS OFF SITE

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Daily Log

Project No.: 30006870.04600 RACER LANSING PLANT 2 Page 1 of 1

PREPARED BY S. JOHNSON

Date	Time	Description of Activities
10/4/19	0730	ARCADIS ON SITE
	0800	H+S TAILGATE; REVIEW AGENDA
	0847	SAMPLED CSP-D01(64-69)(100419) @ 0847 ; PRE-PURGE
	—	DTW: 53.45' BGS
	0910	CASCADE CLEANS UP @ CSP-D01 AND MOVES TO VAP-PZ-MW71
	—	FOR DRILLING
	940	CASCADE BEGINS DRILLING @ VAP-PZ-MW71
	1200	LOGGED SOILS DOWN TO 77' BGS; SCREEN INTERVAL FROM A. VILLHAUER:
	—	68-73' BGS
	1216	BEGIN PURGING
	1238	WELL RAN DRY; WILL REATTEMPT PURGING AFTER LUNCH
	1324	BEGIN PURGING
	1329	WELL RAN DRY; WILL REATTEMPT PURGING AFTER 30 MINUTES
	1359	BEGIN PURGING
	1402	WELL RAN DRY; WILL REATTEMPT PURGING ON MONDAY
	1423	SAMPLED MW-15-72(100419) @ 1423
	1445	ARCADIS OFF SITE TO DELIVER SAMPLES TO LAB

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis, Shantel Johnson

Subcontractor: FRx: Jesse Lowe, Dean Varner, and Michael Latham

Weather: Chance of morning rain, Partly cloudy in afternoon with high of 77°F.

Equipment: No Arcadis equipment

Date	Time	Description of Activities
9/30/19	7:35	Arcadis arrives on-site.
	7:50	FRx arrives on-site.
	8:00	H+S Tailgate. FRx spends time repairing equipment.
	8:45	FRx departs site to refill two air tanks.
	9:30	FRx arrives back on-site. They continue repairing and setting up equipment. Moved frac rig and Jetstream to new location to be able to reach the next set of wells along Transect E.
	12:00	FRx departs site for lunch and to pick up supplies.
	2:00	FRx arrives back on-site. They work to replace the broken part on the frac rig that is necessary for making the sand and gel mixture.
	3:30	Lowered tooling downhole to 68ft bgs in PSP-E12.
	4:12	Started water blaster at 68ft (PSP-E12). Stopped at 4:20pm.
	4:33	Started sand injection at 68ft (PSP-E12). Stopped at 5:07pm. Successful fracture. FRx begins cleaning up site for the day.
	5:20	FRx departs site.
	5:40	Arcadis departs site.

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Austin Westhuis, Stantel Johnson

Subcontractor: FRx: Jesse Lowe, Dean Varner, and Michael Latham

Weather: Partly cloudy with high of 81°F.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/1/19	8:00	FRx and Arcadis arrive on-site. H+S Tailgate.
	8:15	FRx begins bringing up tooling from PSP-E12 and
		moving equipment to set up at PSP-E11.
	8:40	Crane rig now set-up at PSP-E11.
	9:15	Lowering tooling downhole to 73 ft bgs.
	9:35	Started Water blaster at 73 ft (PSP-E11). Stopped
		at 9:43.
	10:13	Started Sand Injection at 73 ft (PSP-E11). Also,
		loaded one bag of sand (3,000 lbs) into the hopper.
		Injection completed at 10:31pm. FRx raised
		tooling to 68 ft bgs.
	10:39	Started Water blaster at 68ft (PSP-E11).
	10:46	Started Sand Injection at 68ft (PSP-E11).
		Injection completed at 11:17pm. FRx begins removing
		tooling and setting up crane at PSP-E10.
	12:00	FRx departs site for lunch.
13:45	~~1:45~~	FRx arrives back on-site. Adds fuel to the frac
		rig and begins making new gel mixture.
	14:00	Started Water blaster at 73 ft bgs (PSP-E10).
	14:08	Started Sand Injection at 73 ft (PSP-E10).
		Injection completed at 14:25.
	14:40	Jesse Lowe went to re-fill fuel tanks.

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Daily Log

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Date	Time	Description of Activities
10/1/19	15:04	Started Water blaster at 69 ft bgs (PSP-E10).
	15:15	Started Sand Injection at 69 ft (PSP-E10).
	15:50	Injection complete. FRx begins raising tooling out of well.
	16:15	FRx sets up crane and equipment PSP-E08.
		We are skipping PSP-E09 for now due to a weighted rod still present in the hole. We will come back to this location after Cascade Drilling removes the weight.
	16:30	FRx lowers tooling downhole to 76 ft bgs in PSP-E08.
	16:40	Started Water blaster at 76 ft (PSP-E08).
	16:48	Started Sand Injection at 76 ft (PSP-E08).
	17:00	Cascade removes the weighted rod from PSP-E09.
	17:16	Injection complete at 76 ft (PSP-E08). FRx cleans up the work area for the day.
	~~5~~ 17:30	Arcadis and FRx depart the site.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Shantel Johnson

Subcontractor: FRx: Jesse Lowe, Dean Varner, and Michael Latham

Weather: Raining with high of 65°F. Chance of T-storms all day.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/2/19	8:00	Arcadis and FRx arrive on-site. H+S Tailgate.
		FRx gathers gear and prepares the work-site.
	8:30	FRx raises tooling to 69 ft bgs in PSP-E08.
	8:45	Called Alex Vilhauer to confirm the sand lens injection
		depths in PSP-E09, PSP-E08, and PSP-E07.
	9:11	Started Water blaster at 69 ft (PSP-E08).
	9:17	Started Sand Injection at 69 ft (PSP-E08)
	9:50	Injection completed. FRx begins moving hoses and
		other equipment to PSP-E09.
	10:25	Adds fuel to the Water blaster.
	10:45	Lowers tooling down PSP-E09 to 71 ft bgs.
	11:32	Started Water blaster at 71 ft (PSP-E09).
	11:39	Started Sand Injection at 71 ft (PSP-E09).
	12:41	Injection completed. Note: loaded one bag of Sand
		(3,000 lbs) into the hopper at 11:35am.
	12:50	FRx departs site for lunch.
	13:25	FRx arrives back on-site. Raises tooling to 65 ft bgs.
	13:43	Started Water blaster at 65 ft (PSP-E09).
	13:51	Started Sand Injection at 65 ft (PSP-E09).
	14:30	Injection ~~completed~~ KD 10/24/19 Stopped due to malfunctioning
		part on the frac rig. FRx works to ~~replace the~~ find the problem
		~~part~~ KD 10/24/19 They ordered new parts which will be

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Daily Log

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Date	Time	Description of Activities
10/2/19		delivered on Friday 10/4/19. PSP-E09 Sand lens
		at 665 ft is not complete and FRx will inject
		more sand once the frac rig is working again.
	15:05	FRx cleans up the site.
	15:15	FRx departs the site for the day.
	15:40	Arcadis departs the site.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Shantel Johnson

Subcontractor: FRx: Jesse Lowe, Dean Varner, and Michael Latham

Weather: Sunny, partly cloudy, high of 54°F

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/4/19	7:55	Arcadis arrives on-site. FRx will be on-site later this morning. They are waiting for a new rotor to be delivered, then they will arrive and repair the frac rig.
	9:30	One of FRx's parts was delivered, but they are still waiting for a second part to be delivered. Not sure what time it will arrive.
	11:20	The part still has not arrived. Could not get a tracking number for the package.
	11:30	Called Andrew Lorenz to give an update on FRx's progress. Still waiting to fix the frac rig.
	12:15	Received call from Andrew L. about EGLE rescheduling their on-site visit for a day next week when FRx's equipment is repaired and working properly.
	12:20	Called Jesse Lowe (FRx) to inform him about the visitors rescheduling. The part is still not delivered.
	14:25	Received call from Jesse Lowe (FRx) informing the part has been delivered and they are on their way to the site. Called Andrew L. to update him.
	15:00	FRx arrives on-site. H+S Tailgate.
	15:10	FRx begins replacing the broken parts on the frac rig.
	16:02	Started Sand injection again at 605ft (PSP-E09).

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Daily Log

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Date	Time	Description of Activities
10/4/19		250 lbs of Sand were injected on Wednesday 10/2/19
		before the frac rig broke. Today 750 lbs of Sand
		were injected to complete the Sand lens installation
		at this location and depth.
	16:30	Injection complete (105' in PSP-E09). FRx begins
		moving and setting up equipment at PSP-E07.
	17:00	FRx went to get fuel for ~~the crane truck~~. KD 10/4/19
		machinery. Back at 17:15.
	17:30	Crane truck is positioned at PSP-E07. Begins
		lowering tooling down to 74 ft bgs.
	17:50	FRx cleans up work site.
	18:05	FRx departs site.
	18:20	Arcadis departs site.

KD

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Staff On-site: ——

Subcontractor: Jesse Lowe, Dean Varner, and Michael Latham

Weather: Partly cloudy, high of 56°F

Equipment: No Arcadis Equipment

ARCADIS Design & Consultancy for natural and built assets

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Date	Time	Description of Activities
10/5/19	8:50	Arcadis and FRx arrive on-site.
	9:00	H&S Tailgate. FRx prepares gel mixture and gets ready for a new sand injection.
	9:32	Started Water blaster at 74ft in PSP-E07.
	9:41	Started Sand Injection at 74ft (PSP-E07).
	10:00	Loaded one bag of sand (3,000lbs) into the hopper.
	10:05	Injection completed (74ft in PSP-E07).
	10:30	FRx is waiting for pressure to die out in the hole.
	11:30	FRx departs site to purchase supplies from Home Depot.
	12:15	FRx returns back on-site.
12:55	~~13:00~~ KD 10/5/19	Raises tooling to 68ft bgs to install the shallow sand lens.
	13:01	Started Water blaster at 68ft (PSP-E07). End @1309.
	13:10	Started Sand Injection at 68ft (PSP-E07).
	13:30	Injection completed. FRx begins moving equipment and
	~~13~~ KD	tooling over to PSP-E06.
	14:05	Tooling lowered to 72 ft bgs in PSP-E06.
	14:09	Started Water blaster at 72 ft (PSP-E06).
	14:16	Started Sand Injection at 72 ft (PSP-E06).
	14:37	Injection completed.
	14:53	Raised tooling to 67 ft bgs (PSP-E06)
	14:57	Started Water blaster at 67 ft (PSP-E06). End @ 1504.
	15:09	Started Sand Injection at 67 ft (PSP-E06).

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Date	Time	Description of Activities
10/5/19	15:30	Injection completed.
	16:00	Positioned crane truck at PSP-E05 and lowered
		tooling down to ~~77ft~~ KP 10/5/19 72 ft bgs.
	16:15	Started water blaster at 72 ft (PSP-E05) End @ 1624
	16:25	Started Sand Injection at 72 ft (PSP-E05).
	16:39	Injection Completed. FRx starts cleaning up
		work area for the day.
	16:55	FRx departs site.
	17:00	Arcadis departs site.

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Daily Log

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Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Kara Donahue, Austin Westhuis

Subcontractor: FRx: Jesse Lowe, Dean Varner, and Michael Latham

Weather: Sunny with high of 65°F in late afternoon.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/7/19	8:00	Arcadis and FRx arrive on-site. H+S Tailgate.
	8:30	FRx spends time looking for the keys to the crane truck.
		They also begin preparing equipment and hoses.
	9:30	Raises tooling to 68 ft bgs in PSP-E05 to intall
		the shallow sand lens at this location.
	9:49	Started Water blaster at 68 ft (PSP-E05). Ended @ 9:57.
	9:58	Started Sand Injection at 68ft (PSP-E05).
	10:16	Injection complete. Began removing tooling out
		of the hole.
	10:30	Moved crane truck over to PSP-E04.
	10:45	Lowing tooling down hole to 72 ft bgs.
	10:54	Started Water blaster at 72 ft (PSP-E04).
	11:03	Started Sand Injection at 72ft (PSP-E04)
11:31	~~11:37~~ KD 10/7/19	Injection Complete.
	11:35	Loaded one bag of Sand (3,000lbs) into hopper.
		Note: Called Alex ~~Vitol~~ KD Vilhauer to confirm the next
		few depths in the Sand Lens Injection depth table.
	11:50	Started Water blaster at 66 ft (PSP-E04).
	11:57	Started Sand Injection at 66 ft (PSP-E04).
	12:16	Injection Complete.
	12:20	FRx departs the site for lunch.

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Date	Time	Description of Activities
10/7/19	12:45	FRx arrives back onsite. Begins raising tooling out
		of hole and moving equipment over to PSP-E03.
	1:00	Positions crane truck at PSP-E03. And lowers
		tooling down to 70 ft bgs.
	1:20	Started water blaster at 70 ft (PSP-E03). Ended at 1:27
	1:28	Started Sand Injection at 70 ft (PSP-E03).
	1:58	~~Injo~~ KD Injection Complete.
		Note: Andrew and Marina arrive on-site for EGLE
		visit.
	2:00	FRx raises tooling to 65 ft bgs.
	2:12	~~loaded~~ KD 10/7/19 Christine from EGLE arrives on-site.
		FRx starts tour of their equipment and processes.
	2:20	Started water blaster at 65 ft (PSP-E03). Ended at 2:28
	2:29	Started Sand Injection at 65ft (PSP-E03).
	2:49	Injection complete.
		Note: loaded one bag of Sand (3,000lbs) into the hopper.
	3:00	Moved crane truck and equipment over to PSP-E02.
	3:22	Started water blaster at 73 ft in PSP-E02. Ended at 3:30
	3:31	Started Sand Injection at 73 ft (PSP-E02).
	3:45	Injection complete.
	4:00	Raised tooling to 68 ft bgs.
	4:12	Started water blaster at 68 ft (PSP-E02). Ended at 4:20

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Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
10/7/19	4:23	Could not get the frac at 68 ft. Raised tooling
		to try at 67 ft (PSP-E02). Sand Injection 4:21-4:23
	4:29	Started Water blaster at 67 ft (PSP-E02). Ended at 4:39
	4:40	Started Sand injection at 67 ft (PSP-E02).
	4:51	Stopped Sand injection. It did not go. Will
		continue trying tomorrow.
	5:00	FRx departed the site.
	5:10	Arcadis departed the site.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Kara Donahue

Subcontractor: FRx: Jesse Lowe, Dean Varner, and Michael Latham

Weather: Sunny with high of 67°F.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/8/19	7:45	Arcadis arrives on-site.
	7:55	FRx arrives on-site.
	8:00	H+S Tailgate. FRx prepares equipement.
	8:15	Raising tooling in PSP-E02 to 66 ft bgs due to difficulties getting the frac to go at 68Ft + 67ft yesterday.
	8:33	Started Water blaster at 66 ft (PSP-E02). Ended at 8:45
	8:48	Started Sand Injection at 66 ft (PSP-E02).
	9:15	Injection complete. Began moving equipment to PSP-E01, making new gel mixture, and waiting for well pressure to die.
	9:45	Raising tooling out of PSP-E02.
	10:00	Moved crane truck to PSP-E01. Began lowering tooling down to 73 ft bgs.
	10:27	Started Water blaster at 73 ft (PSP-E01). Ended at 10:39
	10:40	Started Sand Injection at 73 ft (PSP-E01).
	11:06	Injection complete. Note: loaded Sand bag (3,000lbs) at 11:00am.
	11:23	Started Water blaster at 66 ft (PSP-E01).
	11:30	Started Sand Injection at 66 ft (PSP-E01).
	11:50	Injection Complete.
	12:00	FRx departs site for lunch.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
	1:00	FRx arrives back on-site.
	1:15	Raising tooling and moving equipment over
		to PSP-G04.
	2:03	Started Water blaster at 72 ft (PSP-G04). Ended at 2:16.
	2:16	Started Sand Injection at 72 ft (PSP-G04).
	3:09	Injection Complete. Took longer amount of time due
		to complications with the sand-gel mixing.
	3:25	Started Water blaster at 60 ft (PSP-G04). Ended at 3:34.
	3:35	Started Sand Injection at 60ft (PSP-G04).
	4:00	Loaded one bag of sand (3,000lbs) into the hopper.
	4:04	Injection Complete. Began removing tooling from hole.
	4:20	Positioned crane truck at PSP-G03.
	4:30	Lowering tooling down to 73 ft bgs.
	4:45	Cleaning up work area.
	5:00	FRx departs site.
	5:10	Arcadis departs site.

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Kara Donahue

Subcontractor: FRx: Jesse Lowe, Dean Varner, Michael Latham

Weather: Sunny with high of 66°F

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/9/18	7:50	Arcadis arrives on-site.
	8:00	FRx arrives on-site. H+S Tailgate.
	8:15	FRx is unloading equipment from the Conex box and laying
		out hoses.
	8:30	FRx refuels machinery and makes new gel mixture.
	8:52	Started water blaster at 73 ft (PSP-G03). Ended at 9:04.
	9:05	Started Sand Injection at 73 ft (PSP-G03).
	9:26	Injection complete. Waited for well pressure to die out,
		then raised tooling to 60 ft bgs.
	9:59	Started water blaster at 60ft (PSP-G03).
	10:07	Started Sand Injection at 60ft (PSP-G03).
	10:35	Injection complete. Began moving equipment to PSP-G02.
	10:50	Lowered tooling down to 69 ft bgs.
	11:11	Started Water blaster at 69 ft (PSP-G02). Ended at 11:19.
	11:20	Started Sand Injection at 69 ft (PSP-G02).
	11:43	Injection complete. Note: loaded one bag of Sand at 11:40.
	11:55	FRx departs site for lunch.
	13:00	FRx arrives back on-site. Well pressure is still
		present, so FRx begins cleaning up various materials,
		putting wood pallettes in dumpster, and re-fueling
		machinery.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
10/9/18	14:00	Well still is not dead (PSP-G02).
	15:00	Well still is not dead. FRx leaves to pick-up another crew member from the airport.
	15:45	FRx back on-site. The well is still not dead. FRx decides to leave it overnight and continue in the morning.
	16:00	FRx departs the site for the day.
	16:30	Arcadis departs the site for the day.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: FRx Sand Lens Installations

Prepared By: Kara Donahue

Staff On-Site: Kara Donahue

Subcontractor: FRx: Jesse Lowe, Dean Varner, Michael Latham, and Justin Burroughs

Weather: Partly cloudy with high of 69°F.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/10/19	7:55	Arcadis and FRx arrive on-site.
	8:00	H+S Tailgate.
	8:15	Raises tooling in PSP-G02 to 62 ft bgs
	8:30	Works to make new gel mixture and cleaning out
		hoses.
	8:44	Started Water blaster at 62 ft (PSP-G02).
	8:57	Started Sand Injection at 62 ft (PSP-G02).
	9:26	Injection complete. FRx begins rolling up
		hoses and moving equipment to set-up again
		over at Transect F where they will work on
		PSP-F12.
	9:40	Raising tooling out of PSP-G02.
	10:10	Hauling Jetstream to new location.
	10:25	Hauling frac rig to new location.
	10:45	Positioned crane rig at PSP-F12. Crew is working
		on setting up various parts of operation. Making
		new gel mixture and lowering tooling downhole.
		Note: I ~~called~~ KD 10/10/19 texted Alex V. at 10:30 to confirm the
		target sand lens depths for PSP-F12.
	11:15	Started Water blaster at 73 ft (PSP-F12). Ended at 11:23.
	11:25	Started Sand Injection at 73 ft (PSP-F12).

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Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
10/10/19	11:50	Injection Complete.
	12:00	FRx departs site for lunch.
	13:25	FRx arrives back on-site. Raises tooling to 68ft bgs.
	13:39	Started Water blaster at 68ft (PSP-F12).
		Graded at 13:47.
	13:48	Started Sand Injection at 68ft. (PSP-F12).
	14:05	Injection Complete. FRx begins packing up
		equipment and supplies. Performing site clean-up.
	14:50	Raising tooling out of the well.
	15:00	Disposing of their gel tank into dumpster.
	15:10	Covering 5 sand bags (3,000lbs) to leave behind
		at the site. Arcadis may use the extra sand
		however seen fit. (covered by black tarp).
	16:00	FRx take Jetstream to a storage unit.
	16:45	FRx tows frac rig to safe location to store
		overnight on-site. Plan to pick it up to take home
		tomorrow.
	17:10	FRx departs site.
	17:15	Arcadis departs site.

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling; Joe Lary, Joel Hallowell, Trevor Reiman

Weather: Sunny, high 67°F

Equipment: MiniRAE 3000 #3623 and WLM # 5995

Date	Time	Description of Activities
10/7/19	0800	Arrive on-Site, check in with Cascade and perform H&S tailgate. Discuss remaining scope of work.
	0830	Prepare to collect VAP sample at location VAP-P2-MX71 Cascade and Shantel Johnson (Arcadis) left off here last week Friday. The VAP interval was purged dry three times and was not recharging very fast.
	0855	Collected VAP sample VAP-P2-MX71(68-73)(100719). Allowed purge water to clear up before collecting sample. Two sample sets collected, one to be submitted to Merit, and the other will be placed on "Hold" and submitted to Test America after Merit results come in. Cascade moves over to PSP-F12 next and we will be installing a 4" pvc casing. This location has previously been drilled down to 70 ft and VAP sampled. Alex Villhauer confirms the total depth will be 82ft here. Cascade will need to drill another 12 ft.
	1000	Calibrate MiniRAE 3000 #3623 from Geotech: Zero Cal: 0.0/0.0 ppm (Fresh Air) Span Cal: 100.0/100.0 ppm (Isobutylene).
	1200	Cascade breaks for lunch. They drilled down to 77 ft bgs at PSP-F12 and got stuck. They will let things sit over lunch and might have to wash casing to free up the core barrel.
	1500	Cascade has gotten their 8" casing stuck at 79ft bgs

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.04600
Project No.: ~~B0064479.2019.04600~~ Page 2 of 2

Date	Time	Description of Activities
		and will need to get 9" casing on-Site to get un stuck
		The Cascade helpers head out to get more water and
		the crew leader Joe Lang leaves to head back to
		their shop to get the 9" casing. We will continue tomorrow
		morning. Check out with the other staff on-Site.
	1525	Depart Site to drop off the MW-15-72 (100410)
		sample collected last week by Shantel Johnson
		to the Grand Rapids Test America Service Center, as
		Patrick Curry directed.

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Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Joe Lang, Joel Hallowell, Trevor Reiman

Weather: Sunny, high 66°F

Equipment: MiniRAE 3000 #3623 and WLM #5995

Date	Time	Description of Activities
10/8/19	0915	Arrive on-Site. Cascade is overdrilling with 9 inch casing at PSP-F12
		to help get unstuck. Their 8" casing got stuck at 79 ft-bgs
		yesterday. Perform H2S tailgate with Cascade
	1130	Andrew Lorenz confirms the borehole at PSP-C11 can be
		abandoned when Cascade has the time.
	1145	Cascade now has PSP-F12 open down to 80 ft bgs.
		Alex Villhauer confirms a total depth of 80 ft bgs
		is ok, with centralizer depths at 80 ft, 74 ft, 63 ft,
		43 ft, 23 ft, and 5 ft. Cascade works on getting the casing
		set.
	1245	Cascade breaks for lunch.
	1315	Cascade begins tremie grouting the 4" casing with
		Portland Cement.
	1500	The 4" casing at PSP-F12 has been set. 300 gallons of
		Portland cement used. Cascade cleans up and prepares
		to install flush mount covers at Transect B.
	1725	Cascade finishes installing mechanical seals and flush
		mount covers at the Transect B Sparge points.
		Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling; Joe Lang, Joel Hallowell, Trevor Reiman

Weather: Sunny, high 68°F

Equipment: MiniRAE 3000 #3623 and WLM # 5995

Date	Time	Description of Activities
10/9/19	0735	Arrive on-Site, perform H&S tailgate with Cascade.
	0745	Cascade helpers head out to get more water. Joe Lang prepares for 2" monitoring well installation at location VAP-P2-NF97.
	0930	Alex Villhauer on-Site to help clear the four additional VAP locations at MJ125, MQ114, ME106, and MT92. He will also clear the 5 recently confirmed performance monitoring well locations at ~~PE104~~ PG104, OM112, OQ129, OB136, and NW156. 10/9/19
	1100	Cascade finishes installing MW-19-116 at location VAP-P2-NF97. Cascade moves over to PSP-F12 to pull the weights holding the 4" pvc casing in place while the Portland Cement cured. They will then move over to location VAP-P2-NE108 and install 2" monitoring well MW-19-117.
	1500	Cascade finishes installing MW-19-117 at location VAP-P2-NE108. Cascade moves to location PSP-C11 to abandon the borehole as confirmed with Andrew Lorenz. Patch some old boreholes while Cascade abandons PSP-C11
	1615	Cascade moves to location VAP-P2-NC103 to abandon the borehole
	1710	Cascade finished abandoning previously completed soil boring VAP-P2-NC103. Both PSP-C11 and VAP-P2-NC103 were abandoned by tremie grouting from the bottom up with Portland Cement.
	1725	Depart Site

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Joe Lany, Joel Hallowell, Trevor Reiman

Weather: Sunny, ~ 78° F

Equipment: MiniRAE 3000 #3623 and WLM #5995 (Geotech Rentals)

Date	Time	Description of Activities
10/10/19	0830	Arrive on-Site. Cascade is just wrapping up setting up at VAP-P2-MJ125. Perform H&S tailgate.
	0845	Calibrate MiniRAE 3000 # 3623 from Geotech: Zero Cal: 0.0/0.0ppm (Fresh Air) Span Cal: 100.0/100.0ppm (Isobutylene)
	0900	Begin drilling at VAP-P2-MJ125.
	1115	Soils and bedrock logged down to 70 ft bgs at VAP-P2-MJ125. Called Alex Villhauer to confirm the VAP screen interval. Alex advises to set the screen from 65-70 ft bgs. Cascade prepares to install the VAP screen.
	1133	Begin purging using pump with no flow control. This pump purges at about 1.0 GPM. Pump deconed with TSP prior to using.
	1155	VAP interval purges dry. Turn pump off and gauge DTW @ 69.62'. Wait for recharge.
	1218	Gauge DTW after allowing time for recharge: DTW = 69.24'
	1230	Purge VAP interval dry a second time after very slow recharge. Less than 6 inches of recharge after letting it sit 35 minutes. Alex Villhauer confirms we will let this VAP screened interval from 65-70 ft bgs sit overnight and then grab a sample first thing tomorrow morning. In the meantime, Cascade will move over to the next proposed VAP location, VAP-P2-MQ114. Head to Home Depot to purchase more TSP for decon.

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.04600
Project No.: ~~B0064479.2019.04600~~ Page 2 of 2

Date	Time	Description of Activities
10/10/19	1340	Begin drilling at VAP-P2-MQ114. Cascade hits refusal at
		6.5ft, possible subfloor or utility. Stop work and decide to
		step over to the West about 10 ft. There is no indication of
		underground utilities in the area after previously reviewing utility
		drawings and performing a Site inspection. Stepping over to be safe.
	1415	Cascade hits refusal for a second time at 6.5 ft again. Called
		Patrick Curry to discuss. Patrick Curry pulls another utility
		figure showing our location and there is a nearby sewer
		line running East/West, though the two spots we have
		tried drilling should be plenty far away from any sewers.
		We decide to step off 10 ft South of the originally drilled/
		marked location. Stepping to the South should ensure we
		are clear of any known Utilities.
	1700	VAP-P2-MQ114 logged down to 71.5ft bgs. VAP interval
		from 66-71ft bgs screened.
	1740	VAP-P2-MQ114 (66-71) purged dry twice. This VAP interval isn't
		recharging fast. Will collect a sample tomorrow morning.
		~~Report~~ Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Seth Turner

Subcontractor: Cascade Drilling: Joe Lary, Joel Hallowell, Trevor Reiman

Weather: Cloudy, scattered showers, ~65°F

Equipment: MiniRAE 3000 #3623 and WLM #5995

Date	Time	Description of Activities
10/11/19	0730	Arrive on-Site. Meet with Seth Turner (Arcadis) and Cascade.
		Perform H&S tailgate.
	0745	Cascade continues preparing equipment and supplies. Give Seth Turner
		a tour of the RACER Lansing Site. Seth will be helping oversee
		Traut next week with some additional drilling tasks. Discuss
		the upcoming scope of work.
	0840	Collected VAP sample VAP-P2-MQ114(66-71)(101119). This VAP interval
		was purged dry twice yesterday and allowed to stabilize overnight.
		Cascade prepares to abandon boring VAP-P2-MQ114 per ~~Patrick~~ Cunny.
		They will tremie grout from the bottom up with Portland cement while
		removing their 6" steel casing.
	0900	Heavy rains move in. Cascade stops work to allow rain to pass
		through.
	1015	Cascade continues abandoning VAP-P2-MQ114.
	1120	VAP-P2-MQ114 abandoned. Cascade explains that their grout pump
		quit working after grouting to 15 ft bgs. They will top off the
		remainder of the hole and will have to fix the pump soon or
		get another pump on-Site to abandon any other holes moving
		forward. Cascade moves back to VAP-P2-MJ125 to collect VAP
		sample. We drilled this location yesterday and purged the VAP
		interval dry twice, letting it stabilize overnight for sample
		collection today.

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.04600
Project No.: ~~B0064479.2019.04600~~

Date	Time	Description of Activities
10/11/19	1225	Collected VAP sample VAP-P2-MJ125(65-70)(101119). Cascade pulls inner rods and VAP screen from this location and prepares to move to the next proposed VAP location, located at VAP-P2-ME106.
	1315	Set up complete at VAP-P2-ME106. Cascade breaks for lunch
		Calibrate MiniRAE 3000 #3623 from Geotech:
		Zero Cal: 0.0/0.0ppm (Fresh air) Span Cal: 100.0/100.0ppm (Isobutylene)
	1650	VAP-P2-ME106 drilled down to 77 ft bgs. Confirmed VAP screen interval of 71-76 ft bgs with Alex Villhauer. Begin purging VAP interval.
	1717	VAP-P2-ME106 (71-76) purges dry. Monitored water level with water level meter and it slowly fell while purging between 0.5 and 1.0 GPM until dry. We will let this sit over the weekend and purge again first thing Monday morning. Pack up and clean up.
		Depart Site

ENFM009-DAILYLOG Page 2

Document #ENFM009, Revision 01

2019-10-15, 2in well installation, Seth Turner

Created	2019-10-15 11:33:52 UTC by Seth Turner
Updated	2019-10-18 18:50:43 UTC by Seth Turner
Location	42.7383987, -84.5848286
Status	QC Complete

Basic Information

Project Name	RACER Lansing
Project Number	30006870.04600
Date	2019-10-15
Completed By	Seth Turner
Purpose	2in well installation
Weather	39ºF, cloudy
PPE	Level D

Daily Log of Activities

07:17, Onsite

Time	07:17
Description of Task	Onsite

07:30, Meet Austin and Traut drilling crew.

Time	07:30
Description of Task	Meet Austin and Traut drilling crew.

11:55, Well installation crew onsite.

Time	11:55
Description of Task	Well installation crew onsite.

12:10, Unloading installation equipment.

Time	12:10
Description of Task	Unloading installation equipment.

12:33, Tailgate with installation crew.

Time	12:33
Description of Task	Tailgate with installation crew.

13:00, Setting up for well vault installations.

Time	13:00
Description of Task	Setting up for well vault installations.

13:34, Conduct well vault installations.

Time	13:34
Description of Task	Conduct well vault installations.

14:30, Offsite to get bailers, twine, and gloves from geotech.

Time	14:30
Description of Task	Offsite to get bailers, twine, and gloves from geotech.

15:30, Onsite

Time	15:30
Description of Task	Onsite

17:46, Complete vault installation activities for today. Begin organizing materials to continue tomorrow.

Time	17:46
Description of Task	Complete vault installation activities for today. Begin organizing materials to continue tomorrow.

18:10, Offsite.

Time	18:10
Description of Task	Offsite.

Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

Signature

Signed 2019-10-15 11:41:16 UTC

2019-10-16, 2in well installation, Seth Turner

Created	2019-10-16 11:29:22 UTC by Seth Turner
Updated	2019-10-18 18:50:40 UTC by Seth Turner
Location	42.7383987, -84.5848286
Status	QC Complete

Basic Information

Project Name	RACER Lansing
Project Number	30006870.04600
Date	2019-10-16
Completed By	Seth Turner
Purpose	2in well installation
Weather	39ºF, cloudy
PPE	Level D

Daily Log of Activities

07:11, Onsite

Time	07:11
Description of Task	Onsite

07:20, Cascade and Traut onsite

Time	07:20
Description of Task	Cascade and Traut onsite

07:25, Conduct tailgate.

Time	07:25
Description of Task	Conduct tailgate.

07:32, Traut sets up for cementing in well vaults.

Time	07:32
Description of Task	Traut sets up for cementing in well vaults.

07:59, Traut begins cementing in well vaults.

Time	07:59
Description of Task	Traut begins cementing in well vaults.

12:40, Traut offsite for lunch.

Time	12:40
Description of Task	Traut offsite for lunch.

13:30, Traut onsite

Time	13:30
Description of Task	Traut onsite

15:30, Finish installing well vaults.

Time	15:30
Description of Task	Finish installing well vaults.

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16:00, Gauging well depths for sandpack.

Time	16:00
Description of Task	Gauging well depths for sandpack.

05:00, Finish gauging well depths.

Time	05:00
Description of Task	Finish gauging well depths.

05:12, Offsite

Time	05:12
Description of Task	Offsite

Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

Signature

Signed 2019-10-16 11:34:14 UTC

2019-10-17, 2in well installation, Seth Turner

Created	2019-10-17 11:13:45 UTC by Seth Turner
Updated	2019-10-18 18:50:37 UTC by Seth Turner
Location	42.7383987, -84.5848286
Status	QC Complete

Basic Information

Project Name	RACER Lansing
Project Number	30006870.04600
Date	2019-10-17
Completed By	Seth Turner
Purpose	2in well installation
Weather	39ºF, cloudy
PPE	Level D

Daily Log of Activities

07:11, Onsite

Time	07:11
Description of Task	Onsite

07:40, Traut onsite.

Time	07:40
Description of Task	Traut onsite.

07:48, Tailgate meeting conducted.

Time	07:48
Description of Task	Tailgate meeting conducted.

08:00, Begin setting up pvc for 2in well installations. Centralizers set at bottom of screened interval, top of screened interval (on riser), every 20ft afterwards, with the shallowest centralizer set 7ft bgs.

Time	08:00
Description of Task	Begin setting up pvc for 2in well installations. Centralizers set at bottom of screened interval, top of screened interval (on riser), every 20ft afterwards, with the shallowest centralizer set 7ft bgs.

12:10, Traut offsite for lunch.

Time	12:10
Description of Task	Traut offsite for lunch.

12:35, Traut onsite.

Time	12:35
Description of Task	Traut onsite.

15:35, Begin setting PSP-E12.

Time	15:35
Description of Task	Begin setting PSP-E12.

15:40, Installing filter pack to 1.5ft about screened interval.

Time	15:40
Description of Task	Installing filter pack to 1.5ft about screened interval.

16:10, Filterpack measured at the correct depth by drillers.

Time	16:10
Description of Task	Filterpack measured at the correct depth by drillers.

16:12, Well surged.

Time	16:12
Description of Task	Well surged.

16:24, Filter pack re-measured correctly.

Time	16:24
Description of Task	Filter pack re-measured correctly.

16:34, Begin PSP-E11 pipe installation.

Time	16:34
Description of Task	Begin PSP-E11 pipe installation.

17:19, Filter pack measured at the correct depth. Will surge well and re-measure.

Time	17:19
Description of Task	Filter pack measured at the correct depth. Will surge well and re-measure.

17:27, Filterpack re-measured at correct depth.

Time	17:27
Description of Task	Filterpack re-measured at correct depth.

17:35, Begin installing PSP-E08

Time	17:35
Description of Task	Begin installing PSP-E08

18:00, Filterpack measured at correct depth. Will surge well and re-measure.

Time	18:00
Description of Task	Filterpack measured at correct depth. Will surge well and re-measure.

18:21, Filterpack re-measured at correct depth.

Time	18:21
Description of Task	Filterpack re-measured at correct depth.

18:30, Start PSP-E06

Time	18:30
Description of Task	Start PSP-E06

18:41, Filterpack measured correctly. Will surge well and re-measure

Time	18:41
Description of Task	Filterpack measured correctly. Will surge well and re-measure

18:57, Re-measured, filterpack is at the correct depth.

Time	18:57
Description of Task	Re-measured, filterpack is at the correct depth.

19:10, Offsite

Time	19:10
Description of Task	Offsite

Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

Signature

Signed 2019-10-17 11:14:00 UTC

2019-10-18, 2in well installation, Seth Turner

Created	2019-10-18 11:25:45 UTC by Seth Turner
Updated	2019-10-18 21:33:03 UTC by Seth Turner
Location	42.7383987, -84.5848286
Status	In Progress

Basic Information

Project Name	RACER Lansing
Project Number	30006870.04600
Date	2019-10-18
Completed By	Seth Turner
Purpose	2in well installation
Weather	39ºF, cloudy
PPE	Level D

Daily Log of Activities

07:25, Onsite

Time	07:25
Description of Task	Onsite

07:45, Traut onsite. Conduct HS tailgate.

Time	07:45
Description of Task	Traut onsite. Conduct HS tailgate.

08:01, Begin PSP-E07 sandpack installation.

Time	08:01
Description of Task	Begin PSP-E07 sandpack installation.

08:55, Filterpack measured at correct depth. Will surge and re-measure.

Time	08:55
Description of Task	Filterpack measured at correct depth. Will surge and re-measure.

09:05, Filterpack re-measured at correct depth.

Time	09:05
Description of Task	Filterpack re-measured at correct depth.

09:08, 2 ft of choker sand installed

Time	09:08
Description of Task	2 ft of choker sand installed

09:15, Choker sand installed at PSP-E08

Time	09:15
Description of Task	Choker sand installed at PSP-E08

09:25, Choker sand installed at PSP-E06

Time	09:25
Description of Task	Choker sand installed at PSP-E06

09:35, PSP-E05 filterpack installation begins.

Time	09:35
Description of Task	PSP-E05 filterpack installation begins.

10:00, Measured correct depth. Will surge and re-measure

Time	10:00
Description of Task	Measured correct depth. Will surge and re-measure

10:15, Re-measured at correct depth

Time	10:15
Description of Task	Re-measured at correct depth

10:46, PSP-E04 filter pack installation begins.

Time	10:46
Description of Task	PSP-E04 filter pack installation begins.

11:05, Filterpack measured correctly, will surge and re-measure.

Time	11:05
Description of Task	Filterpack measured correctly, will surge and re-measure.

11:15, Re-measured at correct depth

Time	11:15
Description of Task	Re-measured at correct depth

11:25, Installation begins at PSP-E03.

Time	11:25
Description of Task	Installation begins at PSP-E03.

11:45, Measured filterpack, at correct depth. Will surge and re-measure.

Time	11:45
Description of Task	Measured filterpack, at correct depth. Will surge and re-measure.

11:59, Remeasured at the correct depth.

Time	11:59
Description of Task	Remeasured at the correct depth.

12:25, Offsite for lunch

Time	12:25
Description of Task	Offsite for lunch

12:55, Onsite, begin filterpack installation at PSP-E01

Time	12:55
Description of Task	Onsite, begin filterpack installation at PSP-E01

13:25, Measure filterpack, at correct depth

Time	13:25
Description of Task	Measure filterpack, at correct depth

13:39, Surged and remeasured, at correct depth.

Time	13:39
Description of Task	Surged and remeasured, at correct depth.

13:43, Choker sand installed.

Time	13:43
Description of Task	Choker sand installed.

14:03, Begin PSP-G04 filterpack installation

Time	14:03
Description of Task	Begin PSP-G04 filterpack installation

14:30, Measure filterpack. At correct depth, will surge and re-measure.

Time	14:30
Description of Task	Measure filterpack. At correct depth, will surge and re-measure.

14:46, Remeasured, at correct depth. Installing choker sand.

Time	14:46
Description of Task	Remeasured, at correct depth. Installing choker sand.

14:50, PSP-G03 filterpack installation begins.

Time	14:50
Description of Task	PSP-G03 filterpack installation begins.

15:30, Filterpack measured, at correct depth. Will surge and remeasure.

Time	15:30
Description of Task	Filterpack measured, at correct depth. Will surge and remeasure.

15:45, Remeasured, at correct depth.

Time	15:45
Description of Task	Remeasured, at correct depth.

15:51, PSP-G02 installation begins.

Time	15:51
Description of Task	PSP-G02 installation begins.

16:15, Measured filterpack, at correct depth. Will surge and re-measure.

Time	16:15
Description of Task	Measured filterpack, at correct depth. Will surge and re-measure.

16:29, Remeasured, at correct depth. Installing choker sand.

Time	16:29
Description of Task	Remeasured, at correct depth. Installing choker sand.

16:45, PSP-E02 installation begins.

Time	16:45
Description of Task	PSP-E02 installation begins.

17:10, Filterpack measured at correct depth. Will surge and re-measure.

Time	17:10
Description of Task	Filterpack measured at correct depth. Will surge and re-measure.

17:26, Remeasured at correct depth. Choker sand added.

Time	17:26
Description of Task	Remeasured at correct depth. Choker sand added.

17:32, Offsite

Time	17:32
Description of Task	Offsite

Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

Signature

Signed 2019-10-18 11:26:49 UTC

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling; Joe Lary, Trevor Reiman, Joel Hallowell

Weather: Cloudy, high 49°F

Equipment: MiniRAE 3000 #3623 and ULIM #5995

Date	Time	Description of Activities
10/14/19	0725	Arrive on-Site. Perform H&S tailgate with Cascade.
	0745	Prepare for VAP sample collection at VAP-P2-ME106. VAP screen
		installed last Friday from 71-76 ft bgs. This VAP interval was purged
		dry and allowed time to stabilize over the weekend.
	0815	Collected VAP-P2-ME106(71-76)(101419). Cascade prepares to
		abandon the borehole by tremie grouting from the bottom up using
		Portland cement, as directed by Patrick Curry.
	0930	VAP-P2-ME106 abandoned. Cascade moves to the next proposed soil
		boring/VAP location, VAP-P2-MT92. Calibrate MiniRAE #3623:
		Zero Cal: 0.0/0.0ppm (Fresh air) Span Cal: 100.0/100.0ppm (Isobutylene).
	1020	Begin drilling at VAP-P2-MT92
	1215	VAP-P2-MT92 logged down to 77ft bgs. Cascade prepares for
		VAP sampling. They will screen interval from 71-76ft bgs.
	1280	Begin purging VAP interval 71-76ft bgs. Monitor water level inside
		Casing as we purge at about 1.0 GPM.
	1255	VAP interval purges dry. Turn pump off and allow time for recharge.
		DTW = 79.78' Toc @ 1255
	1306	DTW = 78.95' Toc
	1321	DTW = 78.19' Toc
	1345	DTW = 77.35' Toc
	1402	DTW = 76.95' Toc. Purge VAP interval dry again and
		wait for recharge once more before collecting samples.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 ~~B0064479.2019.04600~~

Date	Time	Description of Activities
10/14/19	1430	Collected VAP sample VAP-P2-MT92(71-76)(101419) after
		waiting for recharge. Cascade prepares to abandon the borehole
		via tremie grout from the bottom up with Portland cement
	1510	Head to Merit to drop off samples.
	1540	Arrive back on-Site.
	1615	Cascade finishes abandoning VAP-P2-MT92 and sets up
		at the next VAP for abandonment. Pack up and clean
		up.
	1630	Depart Site

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: ~~FRx Sand Lens Installations~~ Cascade Oversight

Prepared By: Kara Donahue

Staff On-Site: Kara Donahue, Austin Westhuis, Seth Turner

Subcontractor: Cascade Drilling: Joe Lary, Trevor Reiman, Joel Hallowell

Weather: Partly cloudy, high of 60°F

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/15/19	9:30	Arcadis arrives on-site. Performed H+S Tailgate
		with Austin (his tablet). Austin provided me
		with Cascade's Scope of work expected for
		the next two days. We walked the site to
		identify the well locations Cascade plans to
		work on today.
	11:30	Cascade arrives on-site with additional
		materials necessary for performing today's work.
		Performed H+S Tailgate for Cascade with Austin.
	11:45	Cascade unloads equipment and casing materials
		from their trailer.
	12:15	Cascade sets up and prepares equipment at CSP-D01.
	12:33	Mixing Quik-Gel bentonite. Begin pulling the
		6" steel casing out of CSP-D01
	13:10	Done pulling casing. Moving equipment over to
		ASP-D01, and getting more water from the
		frac tank.
	13:40	Cascade departs site for lunch.
	14:10	Cascade arrives back on-site. They finish
		setting up their drilling rig at ASP-D01 and
		begin making bentonite mixture for grouting.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
10/15/19	14:30	Begin pulling the 6" steel casing out of ASP-D01.
	15:25	Done pulling casing. Moving equipment over to VAP-P2-MX71.
	15:45	Mixing bentonite grout and begins pulling the 6" steel casing out of VAP-P2-MX71.
	16:25	Done pulling casing. Washing out grout hose.
	16:45	Cleaning rig and putting equipment away.
	17:30	Cascade and Arcadis depart the site.

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 3

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: ~~ERx Sand Lens Installations~~ Cascade Oversight

Prepared By: Kara Donahue

Staff On-Site: Kara Donahue, Austin Westhuis, and Seth Turner

Subcontractor: Cascade Drilling: Joe Lary, Joel Halbwell, and Trevor Reiman

Weather: Cloudy with high of 49°F, windy and chance of rain.

Equipment: No Arcadis Equipment

Date	Time	Description of Activities
10/16/19	7:20	Arcadis arrives on-site. Two crew members of
		Cascade arrives on-site.
	8:00	Final crew member of Cascade arrives on-site with
		additional materials. Team discusses their work
		plan for the day. H+S Tailgate. Plan to sign Austin's tablet later.
	8:30	Cascade begins preparing equipment and moving
		materials.
	9:00	Cascade positions rig at PSP-E09 and begins
		completing the 2" inner well construction.
		Note: The 2" Centralizer depths at this well ~~is~~ ED ~~are~~
		at the ~~bo~~ttom of the well screen, the top of the well
		screen, then 20' apart until the shallowest one at 7' bgs.
		73', 62', 42', 22', and 7'.
	10:30	Cascade finishes installing the Sand Pack around the
		well screen and up to 1.5' above the top of the screen.
		Surged the well and checked the depth to filter pack.
		Cascade added the choker sand.
	10:50	Cascade begins completing the 2" inner well construction
		at PSP-E10. The Centralizer depths (2") are at
		76', 65', 45', 25', and 7'.
	11:15	Cascade finishes installing the Sand Pack around the well

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
10/16/19		screen and up to 1.5' above the top of the screen.
		Surged the well and checked the depth to filter pack.
		Cascade then added the choker sand.
	11:30	Cascade moves rig to PSP-F12 and begins installing
		the 2" inner casing. The 2" Centralizer depths for
		this well are 75', 64', 44', 24', and 7' bgs.
	11:45	Cascade had to flush out some sand left by FRx
		sand installations. While setting the 2" well they
		couldn't get it to the correct total depth then it
		became locked along with the smaller tremie pipe
		needed for filter pack installation.
	12:40	Cascade departs site for lunch and will continue
		working to get the casings unlocked and to the
		correct depth when they return.
	13:20	Cascade arrives back on-site. Re-fills water supply
		at the frac tank.
	14:00	Flushes out sand again to attempt to
		unlock the casings. Frees ~~PT~~ KD casing using the
		rig to pull out the tremie pipe. Tagged the total
		depth of the hole at 80' bgs. Will ~~reset~~ KD 10/16
		reset the well again.
	14:45	Cascade finishes installing the sand pack. Surged

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600

Date	Time	Description of Activities
10/16/19		the well and checked the depth to filter pack, then
		Cascade added the choker sand.
	15:00	Cascade begins mixing the cement grout and adding
		it downhole. (Portand Cement).
15:15	~~15:30~~	Begins cement grouting PSP-E10
	15:30	Begins cement grouting PSP-E09
	15:45	Grouting completed.
	15:50	Cascade ~~installs~~ ED 10/16 installs protective stick-up cover at
		MW-19-117. (VAP-P2-NI108)
	16:10	Cascade installs protective stick-up cover at
		MW-19-116. (VAP-P2-NF97).
	16:30	Cascade performs site clean-up. I added
		blue locks to the two new stick-up covers.
	16:45	Cascade departs site.
	17:30	Arcadis departs site.

ARCADIS

Daily Log

Project No.: ~~30006870.04600~~ 30006870.04600 and 30006870.04100

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Cascade Drilling: Joe Lary and Trevor Reiman

Weather: Cloudy, ~ 45° F

Equipment: None

Date	Time	Description of Activities
10/25/19	0900	Arrive on-Site. Meet with Young's Environmental who is on-Site to pick up the general debris/trash roll off. Sign off on the Bill of Lading.
	0930	Young's off-Site to dump roll off at Lansing landfill. They will be back with another empty roll off later today. Once the empty roll off is on-Site Arcadis will transfer a large pile of debris/trash into it that has been temporarily staged on-Site. Cascade will also be on-Site later today with more equipment and supplies for the air rotary drilling. Continue with some general Site clean up. Top off any open boreholes with bentonite chips where the grout from abandonment has settled.
	1030	Young's back on-Site to drop off the empty general debris/trash roll off. Once dropped A. Westhuis will fill it up with the general debris/trash pile that has been temporarily staged on-Site.
	1130	Trash pile taken care of. Head to Geotech to drop off rental equipment and to place another equipment order for some groundwater sampling at Plant 2 next week. Also, stop by Home Depot to purchase more sand bags to secure the completed sparge points.
	1230	Arrive back on-Site. Cascade on-Site preparing equipment and supplies for the air rotary drilling. Drop off sand bags at the

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.04600 and 30006870.04100

Project No.: ~~B0064479.2019.04600~~

Date	Time	Description of Activities
		remaining sparge points that still need sand bags.
	1300	Set up for air rotary oversight with Cascade over in Plant 3
		at MW-19-119. Perform H&S tailgate with Cascade. Cascade
		has quite a bit of equipment and supplies to prepare for air rotary.
	1445	Cascade confirms they will finish setup for the air
		rotary today and they will be ready for air rotary drilling
		first thing Monday morning. Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Trautt Drilling: Dan Karausch, Tyus Reinke, Nick Pachan, Tammy Wahl, Jen Fogel

Weather: Cloudy, scattered showers and thunderstorms in the afternoon, ~ 64 °F

Equipment: MiniRAE 3000 # 3623 and WLM # 5995

Date	Time	Description of Activities
10/21/19	0800	Arrive on-Site. Perform H&S tailgate with Trautt.
	0815	Trautt is set up at VAP-P2-OA135. We are waiting for VAP results to come in for this location to help confirm if Trautt will be installing a well here. Trautt continues cleanup of the Site.
	0925	Andrew Lorenz consulted with Jackie Saling and they confirmed Trautt will install a 2" performance monitoring well at VAP-P2-OA135. Alex Villhauer confirms this well will be screened from 65-70 ftbg. The well will be named MW-19-124. Trautt prepares for well installation. Head out to take an inventory of all of the PFAS impacted soil and groundwater drums on-Site. Tomorrow morning we have a drum pick up scheduled.
	1115	MW-19-124 installation complete. Trautt begins packing up so they can head home. Secure sparge points with sand bags and orange cones. Help with cleanup.
	1415	Depart Site for the day. Sent email summary to the Arcadis team and checked out with Caitlin O'Neill who is on-Site overseeing Cascade with the deep bedrock well installations. Head to Home Depot to purchase some decon supplies for well development tomorrow.

ARCADIS

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue, Seth Turner

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan, Tammy Wahl, Jen Foged

Weather: Partly Cloudy, high 61°F

Equipment: MiniRAE 3000 #3623 and WLM #5995

Date	Time	Description of Activities
10/15/19	0715	Arrive on-Site. Perform H&S tailgate with Traut. Discuss scope
		of work for the two Traut crews that will be on-Site during this
		shift. Traut warming up equipment.
	0800	Traut begins jackhammering out the five confirmed proposed
		well locations, starting with location VAP-P2-NW156 first. These
		five locations will first be VAP sampled, and then we will wait
		to decide if each location will get a performance monitoring well
		based on the VAP results. Traut also begins cutting down the 4"
		pvc casings where they still have to complete the 2" inner well
		constructions.
	0900	Kara Donahue (Arcadis) arrives on-Site to oversee the Cascade
		crew through Wednesday. Kara will help Cascade wrap up some
		tasks before they start the air rotary drilling.
	1130	Cascade arrives on-Site. They had to spend some extra time at
		their shop this morning gathering and loading supplies for the air
		rotary drilling. Perform H&S tailgate with Cascade.
	1200	The second Traut crew arrives on-Site. Perform H&S tailgate with
		Tammy Wahl and Jen Foged. The other Traut crew takes lunch
	1245	Begin drilling at proposed performance monitoring well location
		VAP-P2-NW156. Traut stops soon after to fix a switch.
	1300	Begin drilling again
	1520	VAP-P2-NW156 logged down to 70 ft bgs. Prepare for VAP sampling.

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.04600
Project No.: ~~B0064479.2019.04600~~ Page 2 of 2

Date	Time	Description of Activities
10/15/19	1530	Begin purging VAP-P2-NU156 screened 66-70 ft bgs as confirmed with Alex Villhauer, purging at = 1.5-2.0 GPM
	1550	Water level stabilizes at about 64 ft bgs. Continue purging until water clears up.
	1700	Collected VAP-P2-NU156 (66-70)(101519) after purging for = 1.5 hours at = 1.5-2.0 GPM. Water level stabilized at about 64 ft bgs and the purge water cleared up nicely. Trant leaves their 6" steel casing sealing this location and proceeds to move to the next location.
	1810	Begin drilling at VAP-P2-OB136
	1830	Trant unable to get through the concrete. They have drilled 4 ft into the concrete floor and still have not gotten through it. They could be on a footing and they will move over to proposed location VAP-P2-OQ129 while one crew member uses the jackhammer and skid steer to clear a different location for VAP-P2-OB136.
	1900	Begin drilling at VAP-P2-OQ129.
	1920	Soils logged to 20 ft at VAP-P2-OQ129. Depart Site

ARCADIS

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Kara Donahue, Seth Turner

Subcontractor: Traut Drilling: Dan Kurasch, Tyler Reinke, Nick Pachan,

Weather: Cloudy, light rain, ~50°F

Equipment: MiniRAE 3000 #3623 and ULM #5995

Date	Time	Description of Activities
10/16/19	0915	Arrive on-Site after dropping off groundwater samples at the
		Test America Grand Rapids Service Center. US ecology on-Site to
		take one of the full soil roll offs off Site. Escort US ecology
		on-Site over to the soil roll off and sign off on the Waste
		Manifest paperwork.
	0930	Meet up with the Traut drilling crew over at VAP-P2-OQ129.
		Perform H&S tailgate.
	1000	VAP-P2-OQ129 now logged down to 70 ft bgs. Traut prepares
		to install the VAP sampling screen/tooling. Screened interval
		here will be from 66-70 ft bgs.
	1015	Begin purging VAP-P2-OQ129 (66-70).
	1115	Collected VAP-P2-OQ129 (66-70) (101619). Water level stabilized
		at about 63 ft while purging at about 1.5 GPM. Purge
		water very clear. Head to Merit to drop off samples
		while Traut moves over to VAP-P2-OM112
	1225	Arrive back on-Site. Traut still setting up at VAP-P2-OM112.
	1440	VAP-P2-OM112 logged down to 65 ft bgs. Traut prepares for
		VAP sampling, screening interval from 58-62 ft bgs.
	1450	Begin purging VAP-P2-OM112 (58-62).
	1510	VAP interval purges dry. Wait for recharge.
	1530	Begin purging again, lowering the flow rate to try to allow
		the water level to stabilize.

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.04600
Project No.: ~~B0064479.2019.04600~~ Page 2 of 2

Date	Time	Description of Activities
10/16/19	1550	VAP interval purges dry for a second time. Allow time for recharge
	1610	Begin purging again.
	1615	VAP interval purges dry. Wait for recharge before sampling
	1630	Collected VAP-P2-OM112(58-62)(101619). Trant prepares to
		move back to VAP-P2-OB136.
	1745	Trant unable to break through the concrete slab at the
		second cleared location at VAP-P2-OB136. They could still be
		on a potential concrete footing. We will have to step off to
		a third location here. They will go set up at VAP-P2-P6104
		next while one of their crew members jackhammers out the
		third spot at VAP-P2-OB136.
	1915	VAP-P2-P6104 logged down to 60ft bgs. Will continue drilling
		here tomorrow morning. Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 3

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Seth Turner, Eric Feenstra, Caitlin O'Neill, Alex Villhauer

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan.

Weather: Partly Cloudy, high 50°F

Equipment: MiniRAE 3000 #3623 and WLM # 5795

Date	Time	Description of Activities
10/17/19	0745	Arrive on-Site. Perform H&S tailgate with Traut.
	0800	Traut continues drilling at VAP-P2-PG104.
	0830	VAP-P2-PG104 logged down to 70ft bgs. Traut prepares for VAP sampling.
	0840	Sign off on the Waste Manifest form for Young's Environmental over by Eric Feenstra who is helping empty our dirty water frac tank
	0845	Begin purging at VAP-P2-PG104 (66-70). Check in with the Cascade drilling crew. They are finishing up some sparge point 2", inner well constructions, completing flush mount cover installs, and finishing some general clean up of the Site before setting up for the air rotary drilling with Caitlin O'Neill and Alex Villhauer.
	0905	VAP interval purges dry. It appears that this interval is very slow to recharge. Allow time for recharge. We will continue to allow time for recharge and then purge dry at least a couple more times to ensure we collect a good sample. Monitor the recharge with water level meter.
	1033	Purged dry for a third time. DTW after purging dry = 70.75' TOC.
	1105	DTW = 69.55' TOC. Attempt to collect sample. Let pump purge for a bit to allow sample to clear up.
	1120	VAP interval purged for almost 15 minutes before collecting.

ARCADIS Design & Consultancy for natural and built assets

Daily Log 30006870.041600

Project No.: ~~B0064479.2019.04600~~

Date	Time	Description of Activities
10/17/19		Collected VAP-P2-PG104 (66-70)(101719) @ ~~1115~~ aw 10/17/19 1120.
		Trant prepares to move back over to VAP-P2-OB136 for
		drilling and VAP sampling.
	1245	Begin trying to get through the concrete slab at a third location at
		VAP-P2-OB136.
	1315	Still unable to get through the slab at VAP-P2-OB136. Call Alex
		Villhauer to discuss. Alex helps identify a fourth location nearby
		to re-attempt to get through the slab.
	1520	Trant finally able to get through the slab. The new grid location
		here for this proposed performance monitoring well is. OA135.
		Trant sets up and prepares to drill. Slight sheen observed on the
		material below the bottom concrete slab at 6-ft bgs. We are
		close to the LNAPL plume at this location. Discussed with Patrick
		Curry how to proceed and he confirms we should first log soils down
		to 20-30 ft and try to confirm the presence of LNAPL
		through obvious visual observations as well as the PID. After
		logging the first 20-30 ft we will stop and ask the Arcadis
		office team how to proceed. If we do not see any signs of
		LNAPL we may continue with the planned VAP sampling and
		performance monitoring well installation. Will confirm with
		the team.
	1625	Alex Villhauer and Andrew Lorenz confirm we will install

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: ~~B0064479.2019.04600~~ 30006870.041600

Date	Time	Description of Activities
10/17/19		performance monitoring wells at VAP-P2-NW156 and
		VAP-P2-OQ129, both screened from 66-71' bgs.
	1720	Soils logged down to 30ft at VAP-P2-OA135. Confirmed there's
		no sign of LNAPL. No more sheen observed and no PID readings.
		All PID readings below 0.3ppm. There was only a very little sheen
		right at 60 ft below the second concrete slab. Discussed with Alex
		Villbrauer and we will proceed deeper as planned.
	1845	VAP-P2-OA135 logged down to 69ft bgs. Confirmed with Alex Villbrauer
		we will set up for VAP sampling with a screened interval from 65-69ft
		Trant will begin purging soon, trying to purge the interval dry and
		then allow it to recharge overnight.
	1915	Purged VAP interval for about 15 minutes, it appears the static
		water level is close to 62.0 ft bgs. We will check static
		first thing tomorrow morning and continue purging.
	1920	Depart Site

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Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis, Seth Turner, Caitlin O'Neill

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan

Weather: Mostly Sunny, high 55°F

Equipment: MiniRAE 3000 #3623 and WLM #5995

Date	Time	Description of Activities
10/18/19	0800	Arrive on-Site. Perform H&S tailgate with Traut.
	0815	Traut checked the static water level at VAP-P2-OA135 at 0730 this morning and it was 61.90' bgs. They started purging at 0745 at about 0.5 GPM and the water level is stable at about 61.95' bgs. Continue purging to allow water to clear up before sampling.
	0845	Collected VAP-P2-OA135 (65-69)(101819). Traut prepares to move back over to VAP-P2-NW156 for installation of MW-19-120.
	0910	Depart Site to drop off VAP-P2-OA135 groundwater sample to Merit.
	0940	Arrive back on-Site. USecology truck on-Site to drop off soil rolloff box and to pick up another full soil rolloff box.
	1200	Traut finishes installing MW-19-120 at VAP-P2-NW156. Well screened from 66-71 ft bgs as advised by Alex Villhauer. Traut breaks for lunch and heads out to gather some additional supplies.
	1330	Traut sets up at VAP-P2-OQ129 for installation of MW-19-121.
	1600	Traut finishes installing MW-19-121 at VAP-P2-OQ129. Two Traut crew members head out to get more Portland cement for the 2" inner well installations while the other crew member stays behind to clean up.
	1735	Seth Turner (Arcadis) offsite. His crew has finished the filter pack and choker sand installation at all of the remaining sparge points. Traut prepares to install the 20ft of cement now. Precisely

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: ~~B0064479.2019.04600~~ 30006870.04600

Date	Time	Description of Activities
10/18/19		8.44 gallons of Portland cement grout will be added.
	1045	Trust wrapping up tremie grouting the Portland cement.
		We will check cement depths First thing tomorrow
		morning. Depart Site

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: 30006870.04600 Page 1 of 2

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Traut Drilling: Dan Karasch, Tyus Reinke, Nick Pachan, Tammy Wahl, Jen Fogel

Weather: Sunny, high 62°F

Equipment: MiniRAE 3000 #3623 and WL17741 5995

Date	Time	Description of Activities
10/19/19	0815	Arrive on-Site. Perform H&S tailgate with Traut.
	0830	Tammy Wahl and Jen Fogel prepare for installing bentonite grout at
		the remaining 2" inner wells that still need completion. Measure
		depth to Portland cement at all sparge points with Traut to ensure
		accurate depths. The other three Traut crew members set back
		up at VAP-P2-OM112 and prepare to drill another 5ft as directed
		by Alex Villhauer.
	0915	Portland cement depths re-measured and they all look accurate.
		Traut crew prepares to install bentonite grout.
	0920	Continue drilling at VAP-P2-OM112
	1030	Traut's cone barrel bit breaks off in the hole at 69ft bgs.
		The sample also fell out of the barrel. They used another bit to
		attempt to drive past the bit at 69ft while retrieving sample
		and the 2nd bit snapped off at about 68ft bgs. Alex Villhauer
		confirms we will set this 2" well here screened 59-64ft
		bgs. No need to drill deeper at this point. He also confirms
		Traut will install a 2" well at VAP-P2-PG104, screened
		66-71ft bgs.
	1145	MW-19-122 installation complete at VAP-P2-OM112. Traut
		breaks for lunch and grabs more fuel. Begin installing
		mechanical seals and cleaning up flush mounts while Traut breaks.
	1300	Traut drilling crew back on-Site. They prepare to move to

ARCADIS Design & Consultancy for natural and built assets

Daily Log

Project No.: ~~B0064479.2019.04600~~ 30006870.041600

Date	Time	Description of Activities
10/19/19		VAP-P2-PG104 for installation of MW-19-123 as confirmed
		with Andrew Lorenz and Alex Villhauer.
	1430	Setup at MW-19-120 for development. Static = 64.20' TOC.
		Surge and purge with submersible pump. Purging at 1.5 GPM.
	1500	Begin purging after surging for 10 minutes with pump.
	1630	Development complete at MW-19-120. Repeated surge and
		purge until final purge water nice and clear. Set up at
		MW-19-121 for development next. Thoroughly decon pump
		with TSP.
	1635	MW-19-121 Static = 63.30' TOC
	1645	Begin purging after surging with submersible pump for 10 minutes
	1650	Well purges dry. Wait for recharge and surge again.
	1710	Continue purging.
	1745	Development complete at MW-19-121. Continued surging and
		purging, turning the pump off at times to allow for recharge.
		Final purge water very clear
	1755	Depart Site

ARCADIS

Daily Log

Project No.: 30006870.04600 Page 1 of 1

Site Location: RACER Lansing Plant 2 Full Scale Biosparge Well Installation

Purpose: Drilling Oversight

Prepared By: Austin Westhuis

Staff On-Site: Austin Westhuis

Subcontractor: Trant Drilling: Don Karasch, Tyus Reinke, Nick Pachan, Tammy Wuhl, Jen Fogel

Weather: Partly Cloudy, high 66°F

Equipment: MiniRAE 3000 #3628 and WLM #5995

Date	Time	Description of Activities
10/20/19	0820	Arrive on-Site. Perform H&S tailgate with Trant
	0830	Gauge static water level at MW-19-122 before developing: 63.03' Toc
	0840	Begin surging MW-19-122
	0845	Begin purging MW-19-122. Well purges dry after 3 minutes. We will wait for recharge, surge, and purge until final purge water clears up nicely.
	1045	Finished developing MW-19-122 after repeated surging and purging. Final purge water very clear. Removed about 60 gallons
	1050	Gauge static water level at MW-19-123 before developing: 59.98' Toc
	1100	Begin purging after surging for 10 minutes.
	1200	Finished developing MW-19-123 following many cycles of surging and purging. Development purge water very clear at the end. Trant continues cleaning up and loading up.
	1210	Depart Site.

2019-10-30, Well development, Austin Westhuis

Created	2019-10-30 13:57:15 UTC by Austin Westhuis
Updated	2019-10-30 19:37:11 UTC by Austin Westhuis
Location	42.7377324225779, -84.5853990969105

Basic Information

Project Name	RACER Lansing
Project Number	30006870
Date	2019-10-30
Completed By	Austin Westhuis
Purpose	Well development
Weather	Cloudy, rain/snow mix, 35 degrees Fahrenheit
PPE	Level D

Daily Log of Activities

09:15, Arrive on-Site. Perform H&S tailgate.

Time	09:15
Description of Task	Arrive on-Site. Perform H&S tailgate.

09:25, Check in with Caitlin O'Neill and the Cascade Drilling crew over in Plant 3. Gather well development equipment and supplies from Cascade.

Time	09:25
Description of Task	Check in with Caitlin O'Neill and the Cascade Drilling crew over in Plant 3. Gather well development equipment and supplies from Cascade.

09:45, Set up at MW-19-124 in Plant 2 for well development.

Time	09:45
Description of Task	Set up at MW-19-124 in Plant 2 for well development.

10:15, Gauge MW-19-124 before developing: DTW = 64.44' TOC, TD = 72.22' TOC. Water column = 7.78ft, well volume = 1.25 gallons.

Time	10:15
Description of Task	Gauge MW-19-124 before developing: DTW = 64.44' TOC, TD = 72.22' TOC. Water column = 7.78ft, well volume = 1.25 gallons.

10:25, Begin surging well with submersible pump provided by Cascade. Pump decontaminated prior to using.

Time	10:25
Description of Task	Begin surging well with submersible pump provided by Cascade. Pump decontaminated prior to using.

10:35, Begin purging well at about 0.75 GPM. Pump only has one speed and does not have a flow controller. Will continuously monitor flow rate to see if it improves over time.

Time	10:35
Description of Task	Begin purging well at about 0.75 GPM. Pump only has one speed and does not have a flow controller. Will continuously monitor flow rate to see if it improves over time.

11:00, Surge well again for 10 minutes while purging continues.

Time	11:00
Description of Task	Surge well again for 10 minutes while purging continues.

11:30, Surge well again for 10 minutes while purging continues.

Time	11:30
Description of Task	Surge well again for 10 minutes while purging continues.

11:55, Well development complete at MW-19-124. Purged about 67.5 gallons. The final purge water was very clear after development was complete. Decon equipment and move to MW-19-115 next for development.

Time	11:55
Description of Task	Well development complete at MW-19-124. Purged about 67.5 gallons. The final purge water was very clear after development was complete. Decon equipment and move to MW-19-115 next for development.

12:15, Gauge MW-19-115 before developing: DTW = 58.80' TOC, TD = 79.36' TOC. Water column = 20.56ft, well volume = 3.29 gallons.

Time	12:15
Description of Task	Gauge MW-19-115 before developing: DTW = 58.80' TOC, TD = 79.36' TOC. Water column = 20.56ft, well volume = 3.29 gallons.

12:20, Begin surging well with submersible pump.

Time	12:20
Description of Task	Begin surging well with submersible pump.

12:25, Begin purging well at about 0.75 GPM.

Time	12:25
Description of Task	Begin purging well at about 0.75 GPM.

12:45, MW-19-115 quits purging. Water level drops to around 76ft TOC. Purge water remained cloudy/gray the entire time. Add 5 gallons of clean water to the well to help give the pump the head it needs to continue purging and to help free the pump from fines/sediment buildup. Pump begins to purge at 0.75 GPM again after adding 5 gallons. Surge well again while continuing to purge.

Time	12:45
Description of Task	MW-19-115 quits purging. Water level drops to around 76ft TOC. Purge water remained cloudy/gray the entire time. Add 5 gallons of clean water to the well to help give the pump the head it needs to continue purging and to help free the pump from fines/sediment buildup. Pump begins to purge at 0.75 GPM again after adding 5 gallons. Surge well again while continuing to purge.

13:05, Pump quits purging again. Add another 3 gallons of clean water to the well and begin surging with the pump off.

Time	13:05
Description of Task	Pump quits purging again. Add another 3 gallons of clean water to the well and begin surging with the pump off.

13:15, Begin purging again at MW-19-115.

Time	13:15
Description of Task	Begin purging again at MW-19-115.

13:45, Pump quits purging again. Allow time for the well to recharge. DTW after turning the pump off is 69.50' TOC.

Time	13:45
Description of Task	Pump quits purging again. Allow time for the well to recharge. DTW after turning the pump off is 69.50' TOC.

14:10, DTW = 63.65' TOC at MW-19-115. Well recharged 5.85ft in 28 minutes. Surge well again.

Time	14:10
Description of Task	DTW = 63.65' TOC at MW-19-115. Well recharged 5.85ft in 28 minutes. Surge well again.

14:15, Continue purging.

Time	14:15
Description of Task	Continue purging.

15:00, Finished developing MW-19-115. Purged about 30 gallons total. Water level in well never stabilized while purging at about 0.5 GPM. Routinely had to stop purging and allow for recharge before continuing to purge. Final purge water cleared up nicely after development complete. Purge water generated today dumped in the on-Site franc tank for disposal. Pack up and clean up. Decontaminate pump and water level meter.

Time	15:00
Description of Task	Finished developing MW-19-115. Purged about 30 gallons total. Water level in well never stabilized while purging at about 0.5 GPM. Routinely had to stop purging and allow for recharge before continuing to purge. Final purge water cleared up nicely after development complete. Purge water generated today dumped in the on-Site franc tank for disposal. Pack up and clean up. Decontaminate pump and water level meter.

15:40, Depart Site. Will continue developing at two other newly installed 2" monitoring wells tomorrow.

Time	15:40
Description of Task	Depart Site. Will continue developing at two other newly installed 2" monitoring wells tomorrow.

Signature

Signed 2019-10-30 14:00:28 UTC

2019-10-31, Well development, Austin Westhuis

Created	2019-10-31 12:55:35 UTC by Austin Westhuis
Updated	2019-10-31 12:58:30 UTC by Austin Westhuis
Location	42.7380645554911, -84.5857629553271

Basic Information

Project Name	RACER Lansing
Project Number	30006870
Date	2019-10-31
Completed By	Austin Westhuis
Purpose	Well development
Weather	Cloudy, rain, 45 degrees Fahrenheit
PPE	Level D

Daily Log of Activities

08:50, Arrive on-Site. Perform H&S tailgate. Prepare for well development at MW-19-116 and MW-19-117.

Time	08:50
Description of Task	Arrive on-Site. Perform H&S tailgate. Prepare for well development at MW-19-116 and MW-19-117.

09:00, Gauge MW-19-116 before developing:

Time	09:00
Description of Task	Gauge MW-19-116 before developing:

Signature

Signed 2019-10-31 12:58:25 UTC

2020-07-14, Biosparge Performance Monitoring Well Installation, Austin Westhuis

Created	2020-07-14 11:18:10 UTC by Austin Westhuis
Updated	2020-07-17 19:25:59 UTC by Austin Westhuis
Location	42.7391561307411, -84.5826162212385
Status	QC Complete

Basic Information

Project Name	RACER Lansing
Project Number	30042872
Client	RACER Trust
Date	2020-07-14
Completed By	Austin Westhuis
Purpose	Biosparge Performance Monitoring Well Installation
Weather	Sunny, 80F
PPE	Level D

Daily Log of Activities

07:00, Arrive on site. Review scope of work and prepare H&S tailgate.

Time	07:00
Description of Task	Arrive on site. Review scope of work and prepare H&S tailgate.

07:45, Alex Villhauer arrives on site to drop off SGS Accutest PFAS sample bottles. Alex will also help mark the soil boring location for the proposed PFAS deep VAP/well location. Perform H&S tailgate.

Time	07:45
Description of Task	Alex Villhauer arrives on site to drop off SGS Accutest PFAS sample bottles. Alex will also help mark the soil boring location for the proposed PFAS deep VAP/well location. Perform H&S tailgate.

08:10, Alex Villhauer off site.

Time	08:10
Description of Task	Alex Villhauer off site.

09:00, Traut arrives on site. Perform H&S tailgate, complete the COVID-19 Health Screening Self-Assessment, and review HASP.

Time	09:00
Description of Task	Traut arrives on site. Perform H&S tailgate, complete the COVID-19 Health Screening Self-Assessment, and review HASP.

09:25, Discuss scope of work and drive to all of the proposed drilling locations with the drillers. Show the drillers where the dewatering box, frac tank, soil roll off, and trash roll off are located.

Time	09:25
Description of Task	Discuss scope of work and drive to all of the proposed drilling locations with the drillers. Show the drillers where the dewatering box, frac tank, soil roll off, and trash roll off are located.

09:45, Traut prepares to begin jackhammering at the proposed well locations with the skid steer jackhammer attachment. They also head out to get water for drilling.

Time	09:45

Description of Task	Traut prepares to begin jackhammering at the proposed well locations with the skid steer jackhammer attachment. They also head out to get water for drilling.

10:20, A representative from SGS North America Inc called to confirm that the 250ml HDPE bottles sent for PFAS water samples can also be used for PFAS soil samples. They explained that they only need 2 grams of soil to run the analysis so filling one of the bottles half way would be plenty.

Time	10:20
Description of Task	A representative from SGS North America Inc called to confirm that the 250ml HDPE bottles sent for PFAS water samples can also be used for PFAS soil samples. They explained that they only need 2 grams of soil to run the analysis so filling one of the bottles half way would be plenty.

11:30, Traut heads off site to grab lunch and cement.

Time	11:30
Description of Task	Traut heads off site to grab lunch and cement.

12:45, Traut arrives back on site and begins setting up at SB-P2-OM185. We will drill down to about 31-33ft bags where an 8" internal diameter permanent steel casing will be cemented in.

Time	12:45
Description of Task	Traut arrives back on site and begins setting up at SB-P2-OM185. We will drill down to about 31-33ft bags where an 8" internal diameter permanent steel casing will be cemented in.

13:45, Begin drilling at SB-P2-OM185.

Time	13:45
Description of Task	Begin drilling at SB-P2-OM185.

14:10, Soils logged down to 30ft bgs. Confirmed with Alex Villhauer where to collect soil samples. Alex asks to go another few feet to get back into a clay where we will cement the outer 8" permanent steel casing.

Time	14:10
Description of Task	Soils logged down to 30ft bgs. Confirmed with Alex Villhauer where to collect soil samples. Alex asks to go another few feet to get back into a clay where we will cement the outer 8" permanent steel casing.

14:40, Traut drills down to 35ft bgs. Clay encountered again at 31.5ft bgs. Alex Villhauer confirms we will cement the permanent 8" steel casing at 35ft bgs.

Time	14:40
Description of Task	Traut drills down to 35ft bgs. Clay encountered again at 31.5ft bgs. Alex Villhauer confirms we will cement the permanent 8" steel casing at 35ft bgs.

17:15, 8" permanent steel casing installation complete. 8" casing installed at 36ft bgs. Neat cement grout used to cement the casing in place. Traut cleans up and continues jack hammering at the next drilling locations.

Time	17:15
Description of Task	8" permanent steel casing installation complete. 8" casing installed at 36ft bgs. Neat cement grout used to cement the casing in place. Traut cleans up and continues jack hammering at the next drilling locations.

18:15, Depart site.

Time	18:15
Description of Task	Depart site.

Equipment & Calibration Information

Are you using equipment?	Yes

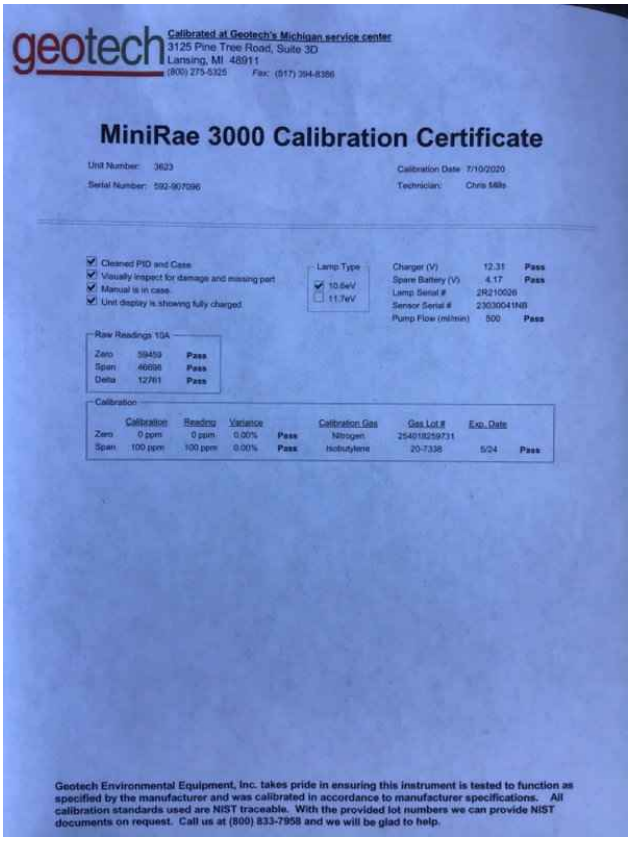
Photoionization Detector (PID), MiniRAE 3000, Geotech

Supplier	Geotech
Type of Equipment	Photoionization Detector (PID)
Model	MiniRAE 3000
Rental Number	3623
Serial Number	592-907096
Calibrated?	Yes
Bump checked?	Yes
Bump checked or calibrated	Yes
Calibration/bump check time	07:15

Photoionization Detector Calibration Information

Geotech, Isobutylene, 100

Manufacturer of Calibration Gas	Geotech
Type of Calibration Gas	Isobutylene
Value of Standard (ppm)	100
Lot Number	18-6426
Expiration Date	2021-08-02
Initial PID Reading	100
Final PID Reading	100
Bump Check PID Reading	100
Calibration Documents present from supplier?	Yes

Calibration Documents	

Calibration Passed?	Yes

Water Level Meter (WLM), Geotech, Geotech

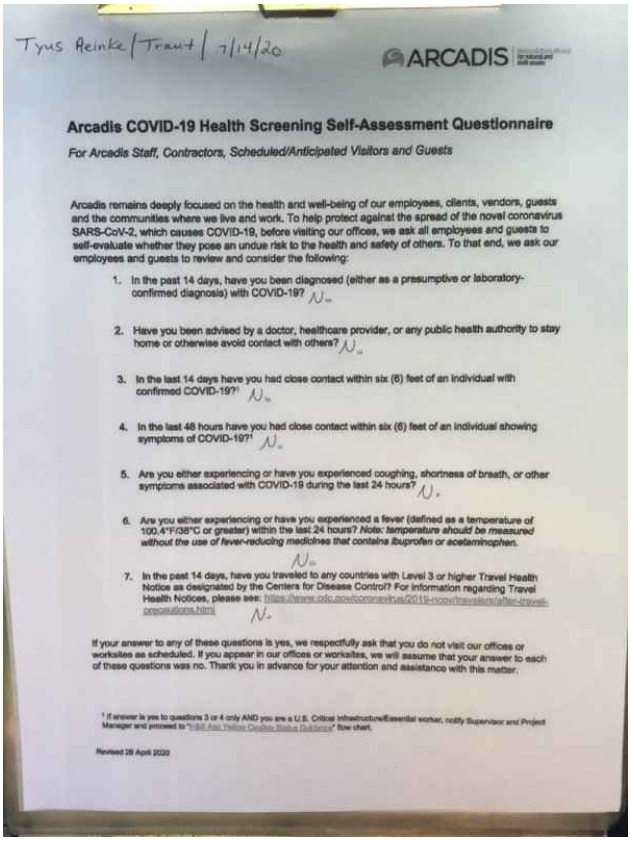
Supplier	Geotech
Type of Equipment	Water Level Meter (WLM)
Model	Geotech
Rental Number	6167
Serial Number	6380
Bump checked or calibrated	No

Waste Management

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

Photos

Other Photos



Tyus Reinke/Trant/ 7/14/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

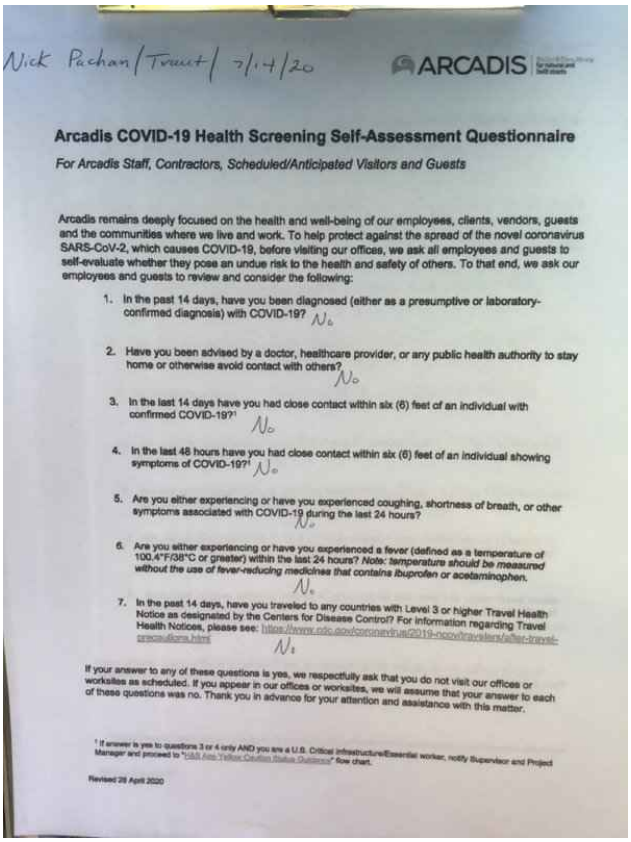
Arcadis remains deeply focused on the health and well-being of our employees, clients, vendors, guests and the communities where we live and work. To help protect against the spread of the novel coronavirus SARS-CoV-2, which causes COVID-19, before visiting our offices, we ask all employees and guests to self-evaluate whether they pose an undue risk to the health and safety of others. To that end, we ask our employees and guests to review and consider the following:

1. In the past 14 days, have you been diagnosed (either as a presumptive or laboratory-confirmed diagnosis) with COVID-19? No.
2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No.
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19?[1] No.
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19?[1] No.
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No.
6. Are you either experiencing or have you experienced a fever (defined as a temperature of 100.4°F/38°C or greater) within the last 24 hours? *Note: temperature should be measured without the use of fever-reducing medicines that contains ibuprofen or acetaminophen.* No.
7. In the past 14 days, have you traveled to any countries with Level 3 or higher Travel Health Notice as designated by the Centers for Disease Control? For information regarding Travel Health Notices, please see: https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html No.

If your answer to any of these questions is yes, we respectfully ask that you do not visit our offices or worksites as scheduled. If you appear in our offices or worksites, we will assume that your answer to each of these questions was no. Thank you in advance for your attention and assistance with this matter.

[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "R&B Are Yellow Cautious Status Guidance" flow chart.

Revised 28 April 2020



Nick Pachan/Trant/ 7/14/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

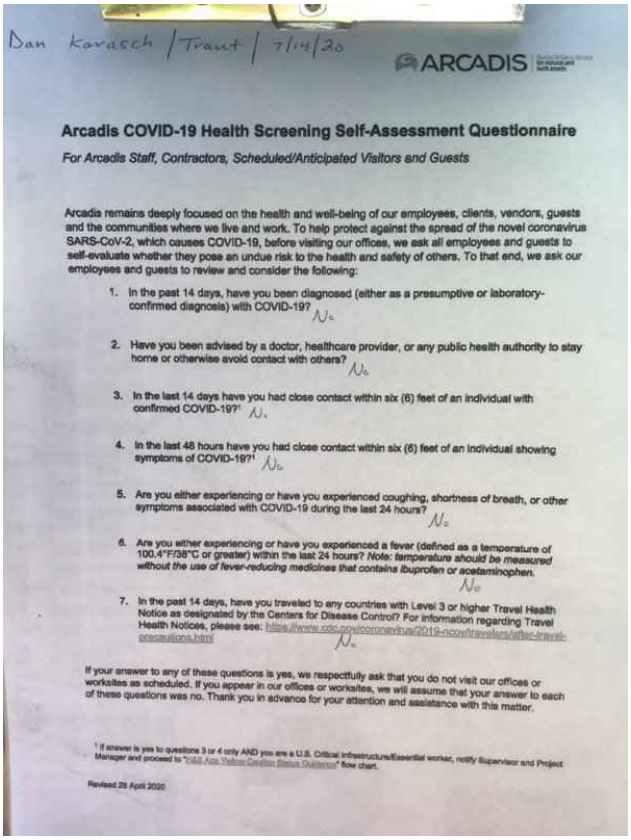
Arcadis remains deeply focused on the health and well-being of our employees, clients, vendors, guests and the communities where we live and work. To help protect against the spread of the novel coronavirus SARS-CoV-2, which causes COVID-19, before visiting our offices, we ask all employees and guests to self-evaluate whether they pose an undue risk to the health and safety of others. To that end, we ask our employees and guests to review and consider the following:

1. In the past 14 days, have you been diagnosed (either as a presumptive or laboratory-confirmed diagnosis) with COVID-19? No
2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19?[1] No
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19?[1] No
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No
6. Are you either experiencing or have you experienced a fever (defined as a temperature of 100.4°F/38°C or greater) within the last 24 hours? *Note: temperature should be measured without the use of fever-reducing medicines that contains ibuprofen or acetaminophen.* No
7. In the past 14 days, have you traveled to any countries with Level 3 or higher Travel Health Notice as designated by the Centers for Disease Control? For information regarding Travel Health Notices, please see: https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html No

If your answer to any of these questions is yes, we respectfully ask that you do not visit our offices or worksites as scheduled. If you appear in our offices or worksites, we will assume that your answer to each of these questions was no. Thank you in advance for your attention and assistance with this matter.

[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "R&B Are Yellow Cautious Status Guidance" flow chart.

Revised 28 April 2020



Dan Karasch / Traut / 7/14/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

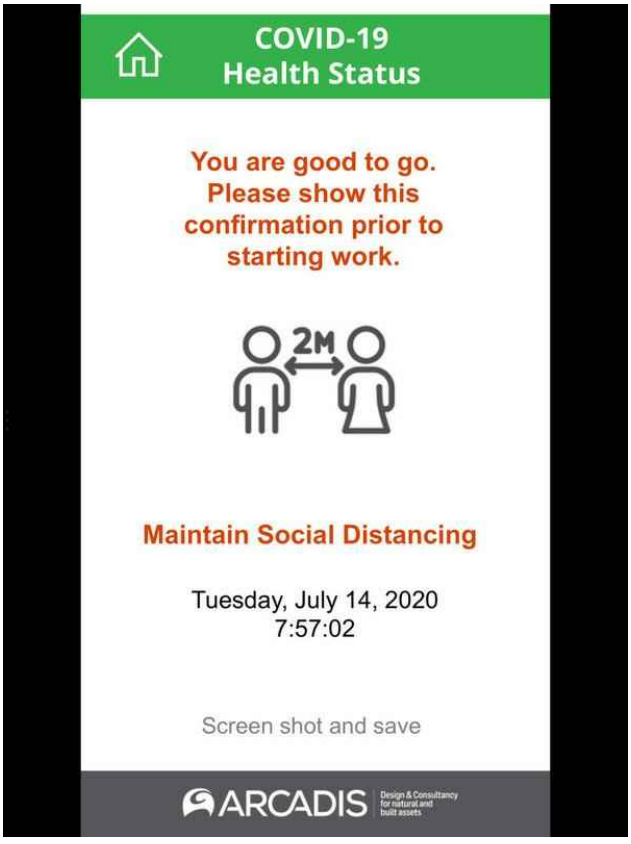
Arcadis remains deeply focused on the health and well-being of our employees, clients, vendors, guests and the communities where we live and work. To help protect against the spread of the novel coronavirus SARS-CoV-2, which causes COVID-19, before visiting our offices, we ask all employees and guests to self-evaluate whether they pose an undue risk to the health and safety of others. To that end, we ask our employees and guests to review and consider the following:

1. In the past 14 days, have you been diagnosed (either as a presumptive or laboratory-confirmed diagnosis) with COVID-19? No
2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19?[1] No
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19?[1] No
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No
6. Are you either experiencing or have you experienced a fever (defined as a temperature of 100.4°F/38°C or greater) within the last 24 hours? *Note: temperature should be measured without the use of fever-reducing medicines that contains ibuprofen or acetaminophen.* No
7. In the past 14 days, have you traveled to any countries with Level 3 or higher Travel Health Notice as designated by the Centers for Disease Control? For information regarding Travel Health Notices, please see: https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html No

If your answer to any of these questions is yes, we respectfully ask that you do not visit our offices or worksites as scheduled. If you appear in our offices or worksites, we will assume that your answer to each of these questions was no. Thank you in advance for your attention and assistance with this matter.

[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "H&S App Yellow Caution Status Guidance" flow chart.

Revised 28 April 2020



Signature

Signed 2020-07-14 11:24:27 UTC

2020-07-15, Biosparge Performance Monitoring Well Installation, Austin Westhuis

Created	2020-07-15 11:25:57 UTC by Austin Westhuis
Updated	2020-07-17 19:26:03 UTC by Austin Westhuis
Location	42.7391561307411, -84.5826162212385
Status	QC Complete

Basic Information

Project Name	RACER Lansing
Project Number	30042872
Client	RACER Trust
Date	2020-07-15
Completed By	Austin Westhuis
Purpose	Biosparge Performance Monitoring Well Installation
Weather	Sunny, 80F
PPE	Level D

Daily Log of Activities

07:20, Arrive on site. Review COVID-19 Health Screening Self Assessment Questionnaire. Discuss today's scope of work and perform H&S tailgate.

Time	07:20
Description of Task	Arrive on site. Review COVID-19 Health Screening Self Assessment Questionnaire. Discuss today's scope of work and perform H&S tailgate.

07:35, Traut continues setting up at proposed performance monitoring well location VAP-P2-LW84.

Time	07:35
Description of Task	Traut continues setting up at proposed performance monitoring well location VAP-P2-LW84.

08:00, Begin drilling at VAP-P2-LW84.

Time	08:00
Description of Task	Begin drilling at VAP-P2-LW84.

09:25, Traut has drilled down to 70ft bgs at VAP-P2-LW84. Weathered sandstone encountered at 65ft bgs. Discuss with Alex Villhauer and Eric Feenstra where to collect the deep VAP sample at this location.

Time	09:25
Description of Task	Traut has drilled down to 70ft bgs at VAP-P2-LW84. Weathered sandstone encountered at 65ft bgs. Discuss with Alex Villhauer and Eric Feenstra where to collect the deep VAP sample at this location.

09:35, Alex Villhauer and Eric Feenstra confirm that we can drill down to 74ft bgs for collection of our VAP sample. Traut prepares to drill four more feet.

Time	09:35
Description of Task	Alex Villhauer and Eric Feenstra confirm that we can drill down to 74ft bgs for collection of our VAP sample. Traut prepares to drill four more feet.

09:55, Traut has drilled to 74ft and prepares to VAP sample. The will deploy their 4ft stainless steel screen from 70-74ft bgs and attempt to purge this screened interval.

Time	09:55
Description of Task	Traut has drilled to 74ft and prepares to VAP sample. The will deploy their 4ft stainless steel screen from 70-74ft bgs and attempt to purge this screened interval.

10:05, Traut begins purging the 70-74ft interval using a submersible pump. The purge rate was measured at 2.5 gallons per minute. The initial purge water is very dark gray. Monitor the water level with a water level meter. Wait for the water level to stabilize and the purge water to clear up before sampling.

Time	10:05
Description of Task	Traut begins purging the 70-74ft interval using a submersible pump. The purge rate was measured at 2.5 gallons per minute. The initial purge water is very dark gray. Monitor the water level with a water level meter. Wait for the water level to stabilize and the purge water to clear up before sampling.

11:05, He water level has stabilized at 64ft bgs while purging at 2.5 gallons per minute. Purge water has cleared up nicely. Allow the purge water to clear up a little more before sampling.

Time	11:05
Description of Task	He water level has stabilized at 64ft bgs while purging at 2.5 gallons per minute. Purge water has cleared up nicely. Allow the purge water to clear up a little more before sampling.

11:30, Collected groundwater sample VAP-P2-LW84(70-74)(071520). Traut prepares to move to the next proposed performance monitoring well location. They will leave the 6" steel casing in the ground at VAP-P2-LW84 while we wait for results from the groundwater sample. Move to VAP-P2-MM85 next.

Time	11:30
Description of Task	Collected groundwater sample VAP-P2-LW84(70-74)(071520). Traut prepares to move to the next proposed performance monitoring well location. They will leave the 6" steel casing in the ground at VAP-P2-LW84 while we wait for results from the groundwater sample. Move to VAP-P2-MM85 next.

12:00, Head to Merit Lab to drop of sample.

Time	12:00
Description of Task	Head to Merit Lab to drop of sample.

13:30, Traut begins drilling at VAP-P2-MM85.

Time	13:30
Description of Task	Traut begins drilling at VAP-P2-MM85.

14:15, Traut has drilled to 60ft and stops to get more water.

Time	14:15
Description of Task	Traut has drilled to 60ft and stops to get more water.

15:10, Traut has finished drilling to 70ft at VAP-P2-MM85. Discuss with Eric Feenstra and Alex Villhauer how deep we should go here and where we should target the deep VAP sample.

Time	15:10
Description of Task	Traut has finished drilling to 70ft at VAP-P2-MM85. Discuss with Eric Feenstra and Alex Villhauer how deep we should go here and where we should target the deep VAP sample.

16:00, Traut finishes drilling to 77ft at VAP-P2-MM85. We encountered weathered sandstone from 74-

77ft bgs. Prepare for VAP sampling at screened interval from 73-77ft bgs.

Time	16:00
Description of Task	Traut finishes drilling to 77ft at VAP-P2-MM85. We encountered weathered sandstone from 74-77ft bgs. Prepare for VAP sampling at screened interval from 73-77ft bgs.

16:10, Begin purging 73-77ft interval at VAP-P2-MM85. Water level dropping rapidly while purging at 2.5 gallons per minute. Slow down the flow rate and attempt to get the water level to stabilize. Initial purge water very cloudy gray.

Time	16:10
Description of Task	Begin purging 73-77ft interval at VAP-P2-MM85. Water level dropping rapidly while purging at 2.5 gallons per minute. Slow down the flow rate and attempt to get the water level to stabilize. Initial purge water very cloudy gray.

17:25, The water level has stabilized at 74ft bgs while purging at about 0.25 gallons per minute. Purge water has cleared up slightly. Prepare to collect a sample.

Time	17:25
Description of Task	The water level has stabilized at 74ft bgs while purging at about 0.25 gallons per minute. Purge water has cleared up slightly. Prepare to collect a sample.

17:40, Water level still stabilized at 74ft bgs. The temp well still has not gone dry after purging for 1 hour 40 minutes. Collect groundwater sample VAP-P2-MM85(73-77)(071520). Traut pulls the temp well assembly, deacons, and prepares to move to the next location. Head to Merit Lab to drop off the sample in the drop box.

Time	17:40
Description of Task	Water level still stabilized at 74ft bgs. The temp well still has not gone dry after purging for 1 hour 40 minutes. Collect groundwater sample VAP-P2-MM85(73-77)(071520). Traut pulls the temp well assembly, deacons, and prepares to move to the next location. Head to Merit Lab to drop off the sample in the drop box.

19:30, Traut finishes drilling down to 70ft bgs at VAP-P2-ND131. Weathered sandstone encountered at 62ft bgs. We will let this borehole with overnight and check the static water level inside the casing first thing in the morning. Finish logging the borehole and send the log to the Arcadis team for review. Will confirm where to collect a VAP sample here tomorrow morning.

Time	19:30
Description of Task	Traut finishes drilling down to 70ft bgs at VAP-P2-ND131. Weathered sandstone encountered at 62ft bgs. We will let this borehole with overnight and check the static water level inside the casing first thing in the morning. Finish logging the borehole and send the log to the Arcadis team for review. Will confirm where to collect a VAP sample here tomorrow morning.

20:00, Depart Site.

Time	20:00
Description of Task	Depart Site.

Equipment & Calibration Information

Are you using equipment?	Yes

Photoionization Detector (PID), MiniRAE 3000, Geotech

Supplier	Geotech
Type of Equipment	Photoionization Detector (PID)

Model	MiniRAE 3000
Rental Number	3623
Serial Number	592-907096
Calibrated?	Yes
Bump checked?	Yes
Bump checked or calibrated	Yes
Calibration/bump check time	07:35

Photoionization Detector Calibration Information

Geotech, Isobutylene, 100

Manufacturer of Calibration Gas	Geotech
Type of Calibration Gas	Isobutylene
Value of Standard (ppm)	100
Lot Number	18-6426
Expiration Date	2021-08-02
Initial PID Reading	100
Final PID Reading	100
Bump Check PID Reading	100
Calibration Documents present from supplier?	Yes
Calibration Documents	
Calibration Passed?	Yes

Water Level Meter (WLM), Geotech, Geotech

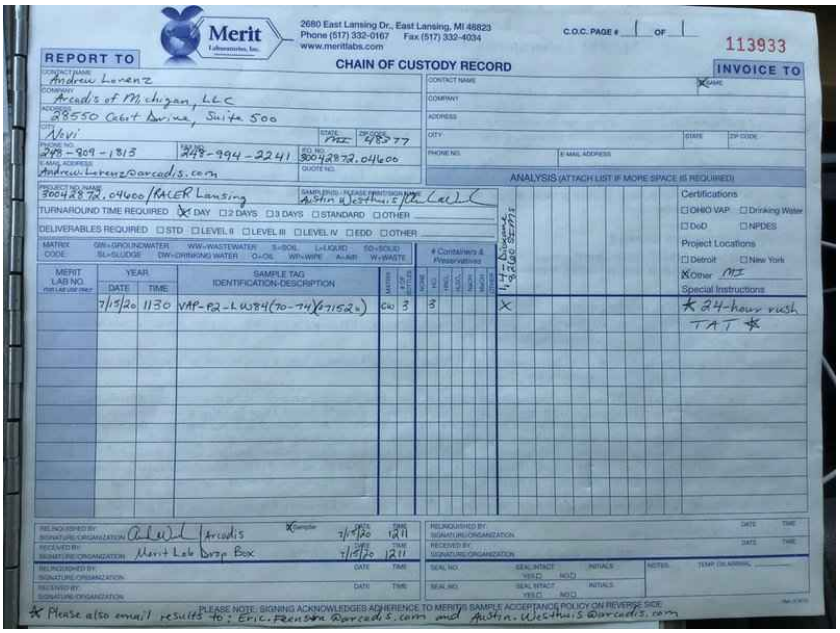
Supplier	Geotech

Type of Equipment	Water Level Meter (WLM)
Model	Geotech
Rental Number	6167
Serial Number	6380
Bump checked or calibrated	No

Waste Management

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

COC Photos



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 — 113933

CHAIN OF CUSTODY RECORD

REPORT TO: Andrew Lorenz; Arcadis of Michigan, LLC; 28550 Cabot Drive, Suite 500; Novi; MI 48377; 248-909-1813; 248-994-2241; Andrew.Lorenz@arcadis.com; PO NO. 30042872.04600

INVOICE TO: SAME

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME: 30042872.04600/RACER Lansing; SAMPLERS - PLEASE PRINT/SIGN NAME: Austin Westhuis

TURNAROUND TIME REQUIRED: X 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

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF CONT.	# Containers & Preservatives: SOME	NO	HNO3	NaOH	H2SO4	OTHER	1,4-Dioxane 8260 SIM
	7/15/20	1130	VAP-BR-LW84(70-74)(071520)	GW	3		3					X

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES

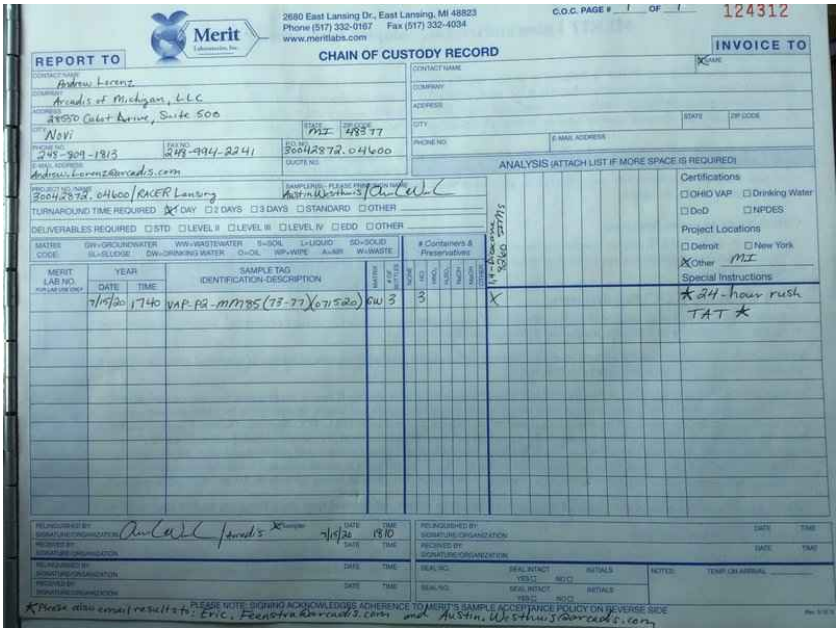
Project Locations: ☐ Detroit ☐ New York X Other MI

Special Instructions: ★24-hour rush TAT★

RELINQUISHED BY: Arcadis — DATE 7/15/20 TIME 1211 — RECEIVED BY: Merit Lab Drop Box — DATE 7/15/20 TIME 1211

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

★Please also email results to: Eric.Reustra@arcadis.com and Austin.Westhuis@arcadis.com



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C.O.C. PAGE # 1 OF 1 — 124312

CHAIN OF CUSTODY RECORD

REPORT TO: Andrew Lorenz; Arcadis of Michigan, LLC; 28550 Cabot Drive, Suite 500; Novi; MI 48377; 248-909-1813; 248-994-2241; Andrew.Lorenz@arcadis.com; PO NO. 30042872.04600

INVOICE TO: SAME

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME: 30042872.04600/RACER Lansing; SAMPLERS - PLEASE PRINT/SIGN NAME: Austin Westhuis

TURNAROUND TIME REQUIRED: X 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

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF CONT.	# Containers & Preservatives: SOME	NO	HNO3	NaOH	H2SO4	OTHER	1,4-Dioxane 8260 SIM
	7/15/20	1740	VAP-BR-MW85(73-77)(071520)	GW	3		3					X

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES

Project Locations: ☐ Detroit ☐ New York X Other MI

Special Instructions: ★24-hour rush TAT★

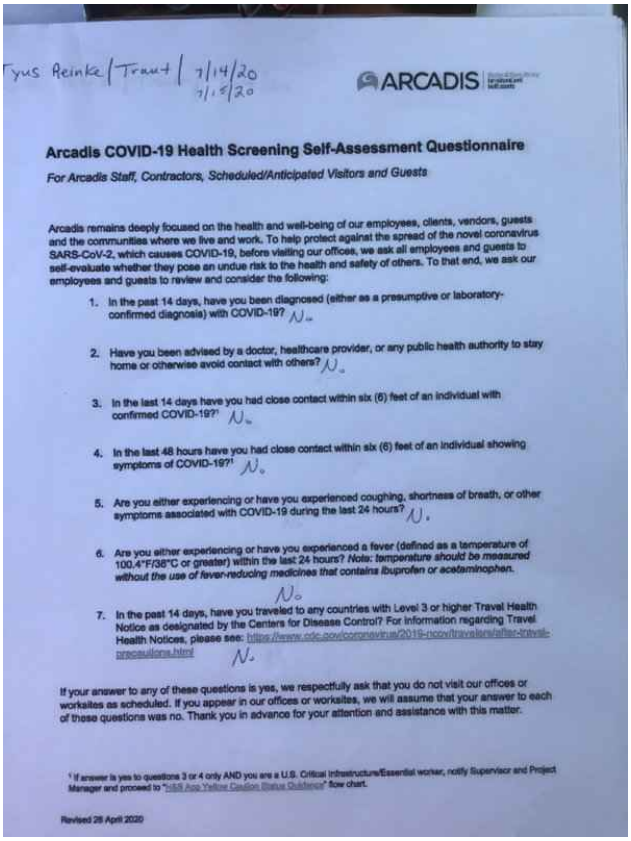
RELINQUISHED BY: Arcadis — DATE 7/15/20 TIME 1810

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

★Please also email results to: Eric.Reustra@arcadis.com and Austin.Westhuis@arcadis.com

Photos

Other Photos



Tyus Reinke/Trant/ 7/14/20
7/15/20

ARCADIS

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For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

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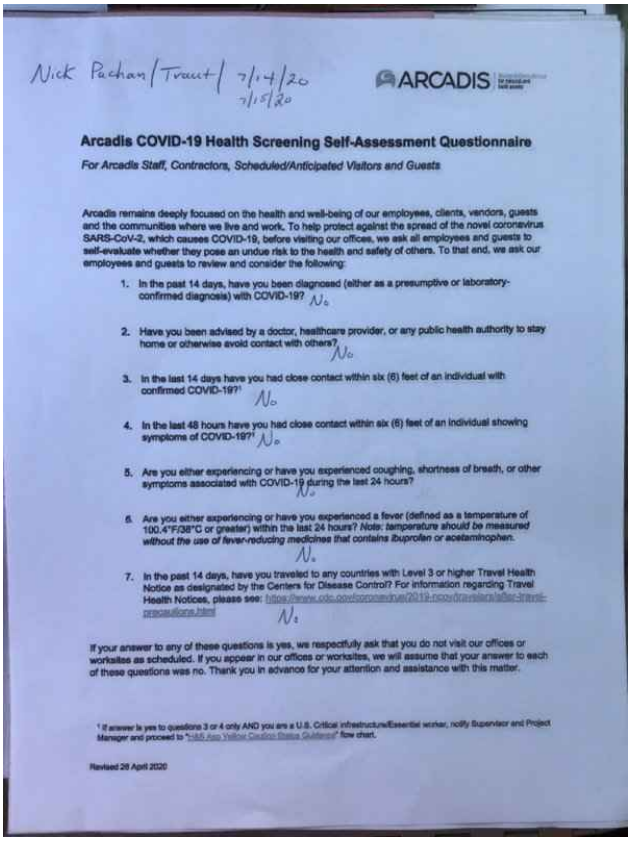
1. In the past 14 days, have you been diagnosed (either as a presumptive or laboratory-confirmed diagnosis) with COVID-19? No.
2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No.
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19? [1] No.
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19? [1] No.
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No.
6. Are you either experiencing or have you experienced a fever (defined as a temperature of 100.4°F/38°C or greater) within the last 24 hours? *Note: temperature should be measured without the use of fever-reducing medicines that contains ibuprofen or acetaminophen.*
   No.
7. In the past 14 days, have you traveled to any countries with Level 3 or higher Travel Health Notice as designated by the Centers for Disease Control? For information regarding Travel Health Notices, please see: https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html No.

If your answer to any of these questions is yes, we respectfully ask that you do not visit our offices or worksites as scheduled. If you appear in our offices or worksites, we will assume that your answer to each of these questions was no. Thank you in advance for your attention and assistance with this matter.

[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "HSE App Yellow Caution Status Guidance" flow chart.

Revised 28 April 2020



Nick Pachan/Trant/ 7/14/20
7/15/20

ARCADIS

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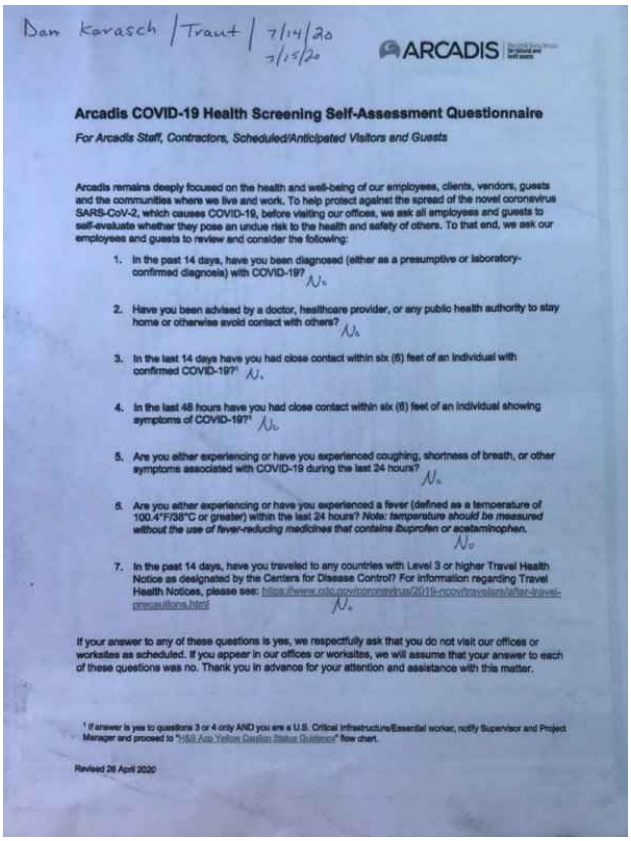
Revised 28 April 2020



Dan Karasch / Traut / 7/14/20 7/15/20

ARCADIS

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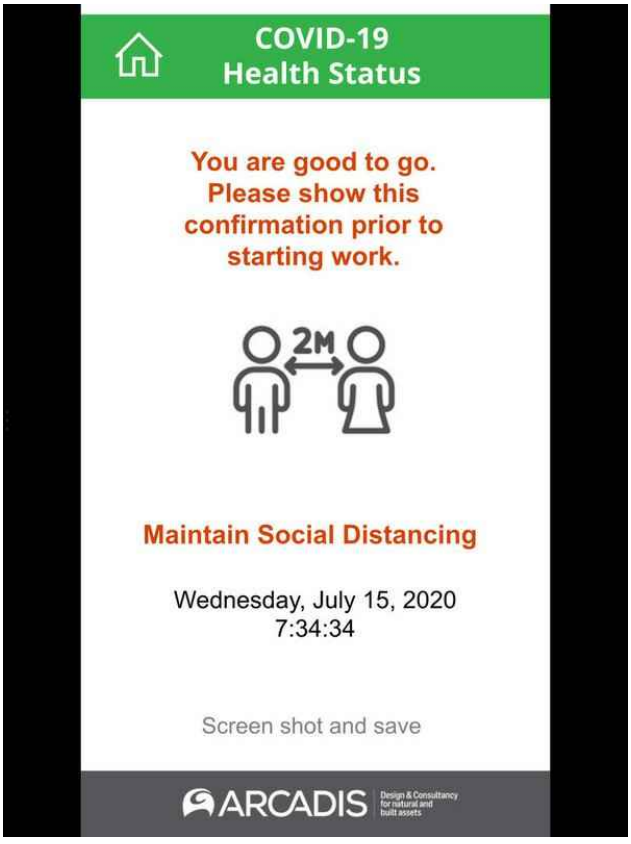
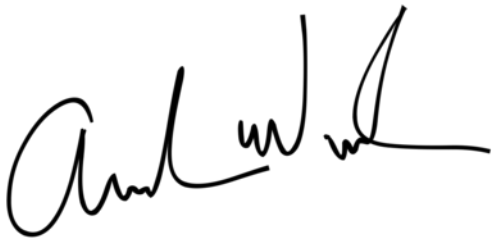
Revised 28 April 2020



Signature



Signed 2020-07-15 11:33:39 UTC

2020-07-16, Biosparge Performance Monitoring Well Installation, Austin Westhuis

Created	2020-07-16 11:24:03 UTC by Austin Westhuis
Updated	2020-07-17 19:26:06 UTC by Austin Westhuis
Location	42.7391561307411, -84.5826162212385
Status	QC Complete

Basic Information

Project Name	RACER Lansing
Project Number	30042872
Client	RACER Trust
Date	2020-07-16
Completed By	Austin Westhuis
Purpose	Biosparge Performance Monitoring Well Installation
Weather	Cloudy, 80F
PPE	Level D

Daily Log of Activities

07:20, Arrive on site. Review COVID-19 Health Screening Self Assessment Questionnaire. Discuss today's scope of work and perform H&S tailgate.

Time	07:20
Description of Task	Arrive on site. Review COVID-19 Health Screening Self Assessment Questionnaire. Discuss today's scope of work and perform H&S tailgate.

07:35, Gauge the static water level inside the 6" casing at VAP-P2-ND131. Depth to water = 55ft bgs. Traut prepares to VAP sample the screened interval from 66-70ft bgs. Confirmed with Eric Feenstra that this screened interval is good. Eric reviewed the previsouly completed nearby biosparge borings, including the VAP sample and sand lens installation depths at each location. Bump check Geotech PID rental.

Time	07:35
Description of Task	Gauge the static water level inside the 6" casing at VAP-P2-ND131. Depth to water = 55ft bgs. Traut prepares to VAP sample the screened interval from 66-70ft bgs. Confirmed with Eric Feenstra that this screened interval is good. Eric reviewed the previsouly completed nearby biosparge borings, including the VAP sample and sand lens installation depths at each location. Bump check Geotech PID rental.

07:50, Begin purging the 66-70ft screened interval. Initial purge rate 2.0 gallons per minute. Initial purge water cloudy gray. Continuously monitor the water level within the temp well and wait for the water level to stabilize and the purge water to clear up before sampling.

Time	07:50
Description of Task	Begin purging the 66-70ft screened interval. Initial purge rate 2.0 gallons per minute. Initial purge water cloudy gray. Continuously monitor the water level within the temp well and wait for the water level to stabilize and the purge water to clear up before sampling.

08:20, Purge rate slowed down to 0.5 gallons per minute to allow water level to stabilize. Water level stabilized at 66ft bgs. Continue purging, making sure the water level stays stabilized. Wait until the purge water clears up before sampling.

Time	08:20

Description of Task	Purge rate slowed down to 0.5 gallons per minute to allow water level to stabilize. Water level stabilized at 66ft bgs. Continue purging, making sure the water level stays stabilized. Wait until the purge water clears up before sampling.

09:25, Collected groundwater sample VAP-P2-ND131(66-70)(071620). Head to Merit lab to drop off sample. Traut pulls temp well assembly, decons, and prepares to move to the next location.

Time	09:25
Description of Task	Collected groundwater sample VAP-P2-ND131(66-70)(071620). Head to Merit lab to drop off sample. Traut pulls temp well assembly, decons, and prepares to move to the next location.

10:40, Begin drilling at VAP-P2-OP97.

Time	10:40
Description of Task	Begin drilling at VAP-P2-OP97.

12:30, Drilled down to 69ft bgs at. VAP-P2-OP97. Discuss with Eric a Feenstra and Alex Villhauer what interval to attempt to VAP sample.

Time	12:30
Description of Task	Drilled down to 69ft bgs at. VAP-P2-OP97. Discuss with Eric a Feenstra and Alex Villhauer what interval to attempt to VAP sample.

12:45, Begin purging the 65-69ft interval per confirmation with Eric Feenstra.

Time	12:45
Description of Task	Begin purging the 65-69ft interval per confirmation with Eric Feenstra.

13:25, VAP-P2-OP97(65-69) purges dry. We slowed the flow rate down as low as it would allow and the VAP interval still went dry. Wait 15 minutes to see how quickly the temp well will recharge.

Time	13:25
Description of Task	VAP-P2-OP97(65-69) purges dry. We slowed the flow rate down as low as it would allow and the VAP interval still went dry. Wait 15 minutes to see how quickly the temp well will recharge.

13:38, DTW = 70.20’ TOC.

Time	13:38
Description of Task	DTW = 70.20’ TOC.

13:48, DTW = 68.90’ TOC. The water level has come up 1.3ft in 10 minutes. Traut purges the temp well dry again.

Time	13:48
Description of Task	DTW = 68.90’ TOC. The water level has come up 1.3ft in 10 minutes. Traut purges the temp well dry again.

13:50, VAP interval purged dry.

Time	13:50
Description of Task	VAP interval purged dry.

13:51, DTW below pump. Cannot measure. Wait for recharge.

Time	13:51
Description of Task	DTW below pump. Cannot measure. Wait for recharge.

14:07, DTW = 72.63’ TOC.

Time	14:07
Description of Task	DTW = 72.63’ TOC.

14:18, DTW = 71.95’ TOC.

Time	14:18
Description of Task	DTW = 71.95’ TOC.

14:30, DTW = 71.40’ TOC.

Time	14:30
Description of Task	DTW = 71.40’ TOC.

14:40, Collected groundwater sample VAP-P2-OP97(65-69)(071620). Traut pulls the temp well assembly, decons, and prepares to move back to VAP-P2-LW84. We are waiting on results from the VAP samples to determine if we will set permanent performance monitoring wells. Head to Merit to drop off the sample just collected.

Time	14:40
Description of Task	Collected groundwater sample VAP-P2-OP97(65-69)(071620). Traut pulls the temp well assembly, decons, and prepares to move back to VAP-P2-LW84. We are waiting on results from the VAP samples to determine if we will set permanent performance monitoring wells. Head to Merit to drop off the sample just collected.

16:05, Traut moves equipment to proposed performance monitoring well MW-20-127. The groundwater sample collected here, VAP-P2-MM85(73-77)(071520) had a 1,4-Dioxane detection of 32 ug/L. Eric Feenstra confirmed we will install the performance monitoring well here, screened from 72-77ft bgs. Traut will begin this installation first thing in the morning. Depart site.

Time	16:05
Description of Task	Traut moves equipment to proposed performance monitoring well MW-20-127. The groundwater sample collected here, VAP-P2-MM85(73-77)(071520) had a 1,4-Dioxane detection of 32 ug/L. Eric Feenstra confirmed we will install the performance monitoring well here, screened from 72-77ft bgs. Traut will begin this installation first thing in the morning. Depart site.

Equipment & Calibration Information

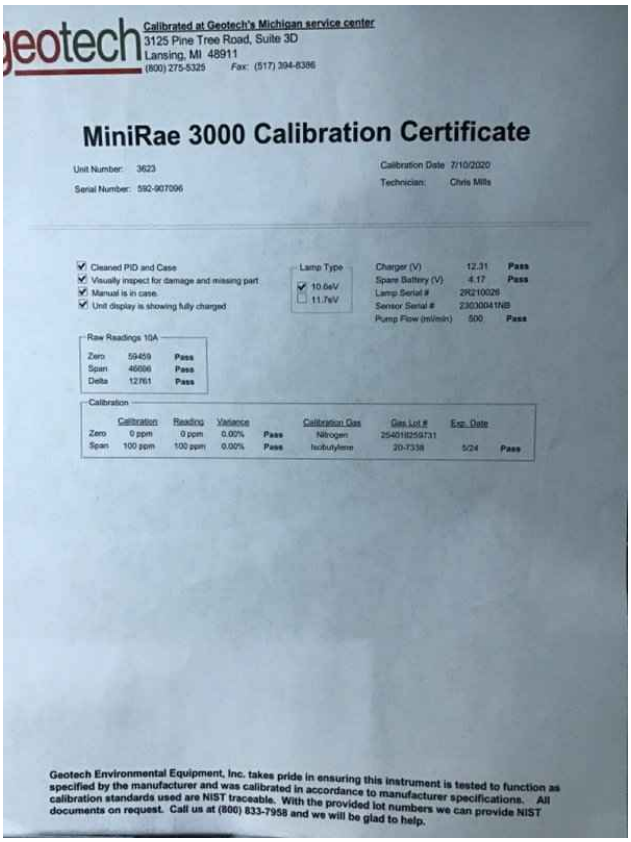
Are you using equipment?	Yes

Photoionization Detector (PID), MiniRAE 3000, Geotech

Supplier	Geotech
Type of Equipment	Photoionization Detector (PID)
Model	MiniRAE 3000
Rental Number	3623
Serial Number	592-907096
Calibrated?	Yes
Bump checked?	Yes
Bump checked or calibrated	Yes
Calibration/bump check time	07:35

Photoionization Detector Calibration Information

Geotech, Isobutylene, 100

Manufacturer of Calibration Gas	Geotech
Type of Calibration Gas	Isobutylene
Value of Standard (ppm)	100
Lot Number	18-6426
Expiration Date	2021-08-02
Initial PID Reading	100
Final PID Reading	100
Bump Check PID Reading	100
Calibration Documents present from supplier?	Yes
Calibration Documents	
Calibration Passed?	Yes

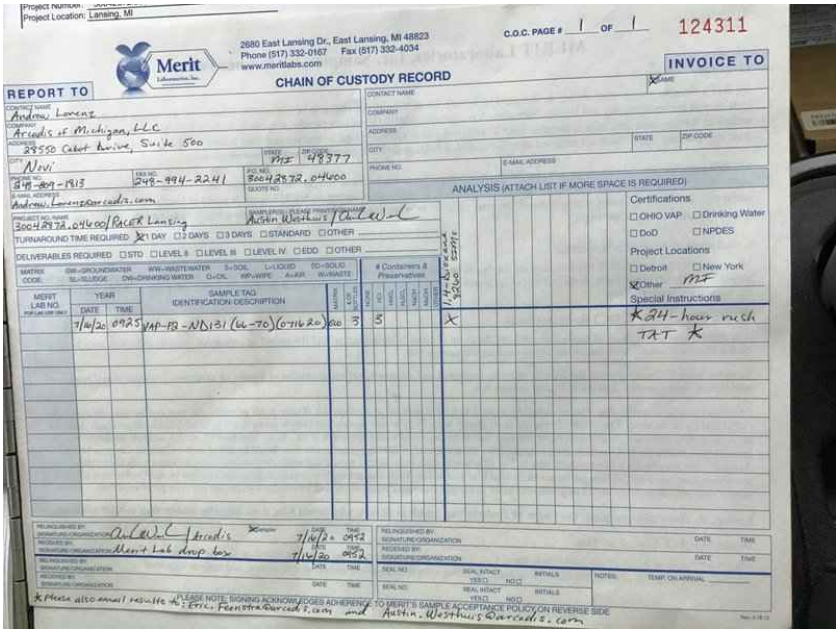
Water Level Meter (WLM), Geotech, Geotech

Supplier	Geotech
Type of Equipment	Water Level Meter (WLM)
Model	Geotech
Rental Number	6167
Serial Number	6380
Bump checked or calibrated	No

Waste Management

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

COC Photos



Project Location: Lansing, MI

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 124311

CHAIN OF CUSTODY RECORD

REPORT TO
Andrew Lorenz
Arcadis of Michigan, LLC
28550 Cabot Drive, Suite 500
Novi MI 48377
248-809-1813 248-994-2241
Andrew.Lorenz@arcadis.com
PO NO. 30042872.04600
QUOTE NO.

INVOICE TO
NAME
CONTACT NAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

30042872.04600 / 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

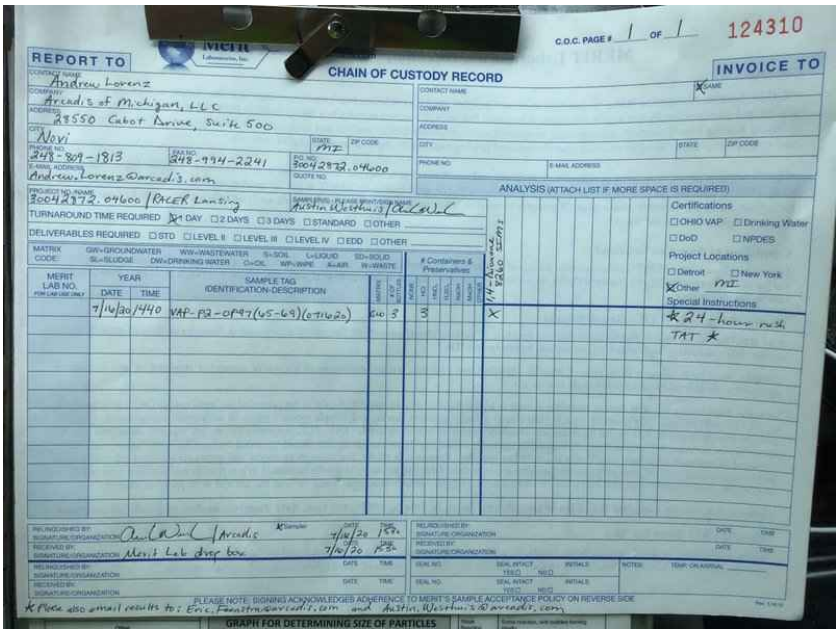
MERIT LAB NO.	YEAR DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF CONT.	# Containers & Preservatives: HCl	H2SO4	HNO3	NaOH	OTHER	1,4-Dioxane 8260 SCAN
	7/16/20	0925	VAP-P3-ND131(66-70)(071620)	GW	3	5					X

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☐NPDES
Project Locations: ☐Detroit ☐New York ☒Other MI
Special Instructions: ★24-hour rush TAT ★

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ★Sampler DATE 7/16/20 TIME 0932
RECEIVED BY: SIGNATURE/ORGANIZATION: Merit Lab drop box DATE 7/16/20 TIME 0932
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME
SEAL NO. SEAL INTACT YES NO INITIALS NOTES: TEMP. ON ARRIVAL
SEAL NO. SEAL INTACT YES NO INITIALS

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

★Please also email results to: Eric.Feustra@arcadis.com and Austin.Westhuis@arcadis.com



Merit Laboratories, Inc.

C.O.C. PAGE # 1 OF 1 124310

CHAIN OF CUSTODY RECORD

REPORT TO
Andrew Lorenz
Arcadis of Michigan, LLC
28550 Cabot Drive, Suite 500
Novi MI 48377
248-809-1813 248-994-2241
Andrew.Lorenz@arcadis.com
PO NO. 30042872.04600
QUOTE NO.

INVOICE TO
NAME
CONTACT NAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

30042872.04600 / 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

MERIT LAB NO.	YEAR DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF CONT.	# Containers & Preservatives: HCl	H2SO4	HNO3	NaOH	OTHER	1,4-Dioxane 8260 SCAN
	7/16/20	1440	VAP-P3-DP97(65-69)(071620)	GW	3	5					X

Certifications: ☐OHIO VAP ☐Drinking Water ☐DoD ☐NPDES
Project Locations: ☐Detroit ☐New York ☒Other MI
Special Instructions: ★24-hour rush TAT ★

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Arcadis ★Sampler DATE 7/16/20 TIME 1520
RECEIVED BY: SIGNATURE/ORGANIZATION: Merit Lab drop box DATE 7/16/20 TIME 1520
RELINQUISHED BY: SIGNATURE/ORGANIZATION DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION DATE TIME
SEAL NO. SEAL INTACT YES NO INITIALS NOTES: TEMP. ON ARRIVAL
SEAL NO. SEAL INTACT YES NO INITIALS

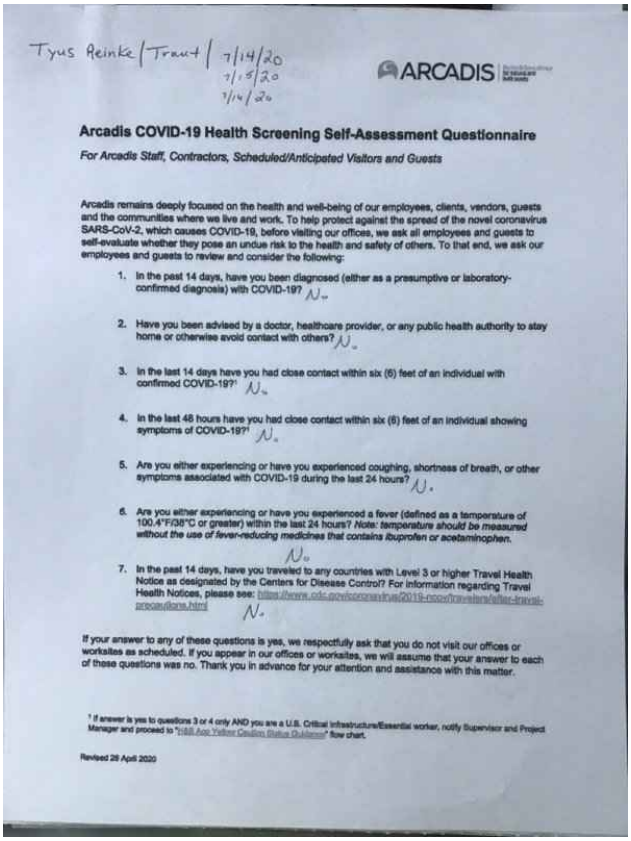
PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

★Please also email results to: Eric.Feustra@arcadis.com and Austin.Westhuis@arcadis.com

GRAPH FOR DETERMINING SIZE OF PARTICLES

Photos

Other Photos



Tyus Reinke / Trout / 7/14/20
7/15/20
7/14/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

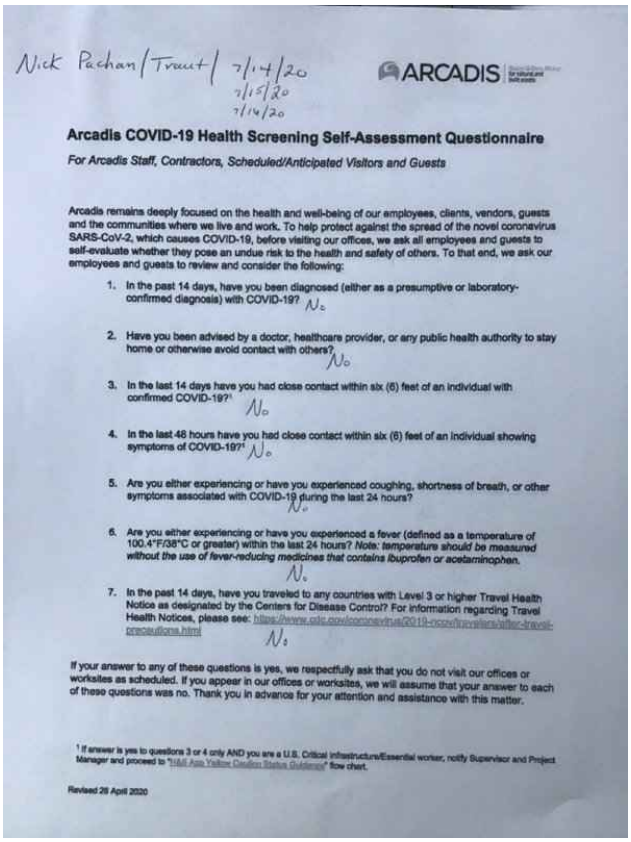
Arcadis remains deeply focused on the health and well-being of our employees, clients, vendors, guests and the communities where we live and work. To help protect against the spread of the novel coronavirus SARS-CoV-2, which causes COVID-19, before visiting our offices, we ask all employees and guests to self-evaluate whether they pose an undue risk to the health and safety of others. To that end, we ask our employees and guests to review and consider the following:

1. In the past 14 days, have you been diagnosed (either as a presumptive or laboratory-confirmed diagnosis) with COVID-19? No.
2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No.
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19?[1] No.
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19?[1] No.
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No.
6. Are you either experiencing or have you experienced a fever (defined as a temperature of 100.4°F/38°C or greater) within the last 24 hours? *Note: temperature should be measured without the use of fever-reducing medicines that contains ibuprofen or acetaminophen.* No.
7. In the past 14 days, have you traveled to any countries with Level 3 or higher Travel Health Notice as designated by the Centers for Disease Control? For information regarding Travel Health Notices, please see: https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html No.

If your answer to any of these questions is yes, we respectfully ask that you do not visit our offices or worksites as scheduled. If you appear in our offices or worksites, we will assume that your answer to each of these questions was no. Thank you in advance for your attention and assistance with this matter.

[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "H&S App Yellow Caution Status Guidance" flow chart.

Revised 28 April 2020



Nick Pacham / Trout / 7/14/20
7/15/20
7/14/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

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2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19?[1] No
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19?[1] No
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No
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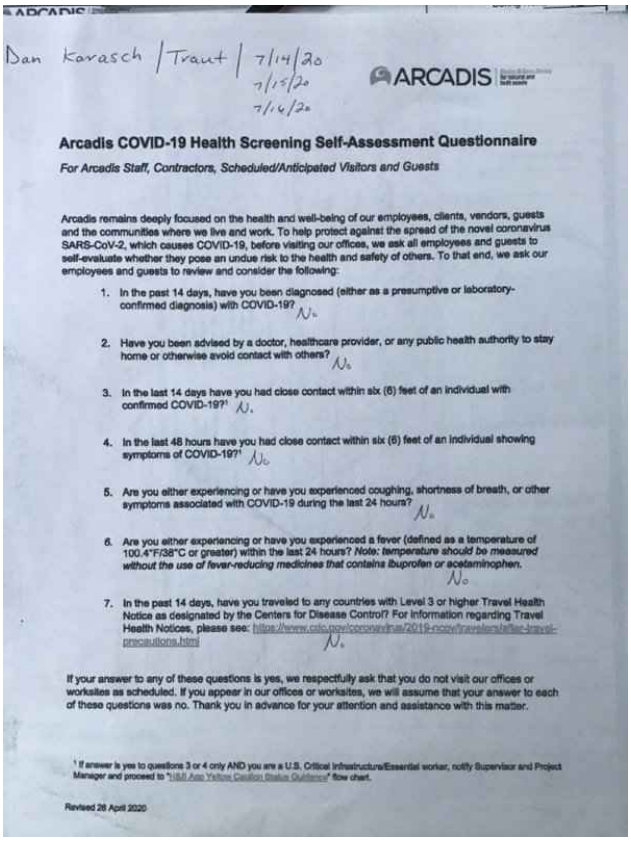
Revised 28 April 2020



Dan Karasch / Traut / 7/14/20 7/15/20 7/16/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

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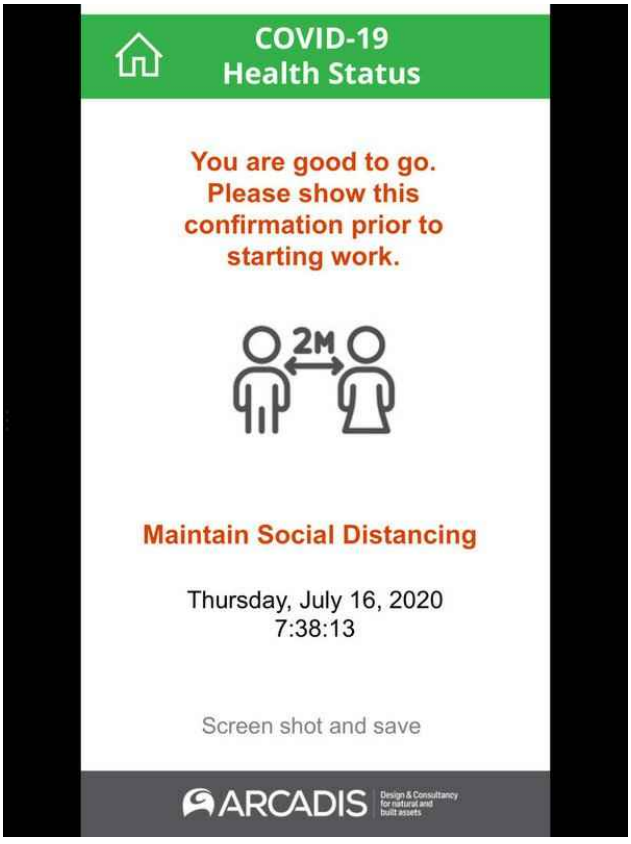
2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19?[1] No
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19?[1] No
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No
6. Are you either experiencing or have you experienced a fever (defined as a temperature of 100.4°F/38°C or greater) within the last 24 hours? *Note: temperature should be measured without the use of fever-reducing medicines that contains ibuprofen or acetaminophen.* No
7. In the past 14 days, have you traveled to any countries with Level 3 or higher Travel Health Notice as designated by the Centers for Disease Control? For information regarding Travel Health Notices, please see: https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html No

If your answer to any of these questions is yes, we respectfully ask that you do not visit our offices or worksites as scheduled. If you appear in our offices or worksites, we will assume that your answer to each of these questions was no. Thank you in advance for your attention and assistance with this matter.

[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "USII App Yellow Caution Status Guidance" flow chart.

Revised 26 April 2020



Signature

Signed 2020-07-16 11:40:45 UTC

2020-07-17, Biosparge Performance Monitoring Well Installation, Austin Westhuis

Created	2020-07-17 12:10:48 UTC by Austin Westhuis
Updated	2020-07-19 17:16:35 UTC by Austin Westhuis
Location	42.7391561307411, -84.5826162212385
Status	QC Complete

Basic Information

Project Name	RACER Lansing
Project Number	30042872
Client	RACER Trust
Date	2020-07-17
Completed By	Austin Westhuis
Purpose	Biosparge Performance Monitoring Well Installation
Weather	Cloudy, 80F
PPE	Level D

Daily Log of Activities

08:00, Arrive on site. Review COVID-19 Health Screening Self Assessment Questionnaire. Discuss today's scope of work and perform H&S tailgate.

Time	08:00
Description of Task	Arrive on site. Review COVID-19 Health Screening Self Assessment Questionnaire. Discuss today's scope of work and perform H&S tailgate.

08:15, Traut prepares for installation of performance monitoring well MW-20-127 at VAP-P2-MM85. The VAP sample results came in yesterday for this location and the Arcadis project team confirmed the well will be installed.

Time	08:15
Description of Task	Traut prepares for installation of performance monitoring well MW-20-127 at VAP-P2-MM85. The VAP sample results came in yesterday for this location and the Arcadis project team confirmed the well will be installed.

09:20, Well installation complete. Traut moves to proposed performance monitoring well location MW-20-26 for well installation. Confirmed with the Arcadis project team that a well will be installed here at VAP-P2-LW84 screened from 69-74ft bgs.

Time	09:20
Description of Task	Well installation complete. Traut moves to proposed performance monitoring well location MW-20-26 for well installation. Confirmed with the Arcadis project team that a well will be installed here at VAP-P2-LW84 screened from 69-74ft bgs.

11:20, MW-20-126 installation complete. Traut prepares to move to proposed MW-20-128 next for well installation. Confirmed with the Arcadis project team that MW-20-128 will be screened from 65-70ft bgs.

Time	11:20
Description of Task	MW-20-126 installation complete. Traut prepares to move to proposed MW-20-128 next for well installation. Confirmed with the Arcadis project team that MW-20-128 will be screened from 65-70ft bgs.

13:05, MW-20-128 well installation complete. Waiting to hear back from the Arcadis project team on if

we will move to VAP-P2-ND131 next for installation of performance monitoring well MW-20-129.

Time	13:05
Description of Task	MW-20-128 well installation complete. Waiting to hear back from the Arcadis project team on if we will move to VAP-P2-ND131 next for installation of performance monitoring well MW-20-129.

13:15, The Arcadis project team all agree that we will move forward with installation of performance monitoring well MW-20-129 at location VAP-P2-OP97. The well will be screened from 64-69ft bgs. In the meantime, Traut heads back over to SB-P2-OM185 where we installed the permanent 8" steel casing Tuesday to finish drilling the borehole deeper.

Time	13:15
Description of Task	The Arcadis project team all agree that we will move forward with installation of performance monitoring well MW-20-129 at location VAP-P2-OP97. The well will be screened from 64-69ft bgs. In the meantime, Traut heads back over to SB-P2-OM185 where we installed the permanent 8" steel casing Tuesday to finish drilling the borehole deeper.

14:48, Drilled down to 70ft bgs at SB-P2-OM85. Depth to water = 60.5' bgs. Wait 10 minutes and gauge the borehole again to get an idea of where the static water level is at.

Time	14:48
Description of Task	Drilled down to 70ft bgs at SB-P2-OM85. Depth to water = 60.5' bgs. Wait 10 minutes and gauge the borehole again to get an idea of where the static water level is at.

14:58, Depth to water = 60.6' bgs. Water level has gone down 0.10ft in 10 minutes. The water level appears stable around 60.6ft bgs. Call Alex Villhauer to discuss. Alex confirms we will install the well here with a screened interval of 63-68ft bgs. Traut prepares to install the well.

Time	14:58
Description of Task	Depth to water = 60.6' bgs. Water level has gone down 0.10ft in 10 minutes. The water level appears stable around 60.6ft bgs. Call Alex Villhauer to discuss. Alex confirms we will install the well here with a screened interval of 63-68ft bgs. Traut prepares to install the well.

16:05, MW-20-130 well installation complete. Traut prepares to move to VAP-P2-OP97 for installation of MW-20-129. This well will be screened from 64-69ft bgs as confirmed with the Arcadis project team.

Time	16:05
Description of Task	MW-20-130 well installation complete. Traut prepares to move to VAP-P2-OP97 for installation of MW-20-129. This well will be screened from 64-69ft bgs as confirmed with the Arcadis project team.

16:45, Checked in with Alex Villhauer. Will leave supplies and samples in the Plant 2 Biosparge shed for next week's sampling activities. Depart site.

Time	16:45
Description of Task	Checked in with Alex Villhauer. Will leave supplies and samples in the Plant 2 Biosparge shed for next week's sampling activities. Depart site.

Equipment & Calibration Information

Are you using equipment?	Yes

Photoionization Detector (PID), MiniRAE 3000, Geotech

Supplier	Geotech
Type of Equipment	Photoionization Detector (PID)

Model	MiniRAE 3000
Rental Number	3623
Serial Number	592-907096
Calibrated?	Yes
Bump checked?	Yes
Bump checked or calibrated	Yes
Calibration/bump check time	07:35

Photoionization Detector Calibration Information

Geotech, Isobutylene, 100

Manufacturer of Calibration Gas	Geotech
Type of Calibration Gas	Isobutylene
Value of Standard (ppm)	100
Lot Number	18-6426
Expiration Date	2021-08-02
Initial PID Reading	100
Final PID Reading	100
Bump Check PID Reading	100
Calibration Documents present from supplier?	Yes
Calibration Documents	
Calibration Passed?	Yes

Water Level Meter (WLM), Geotech, Geotech

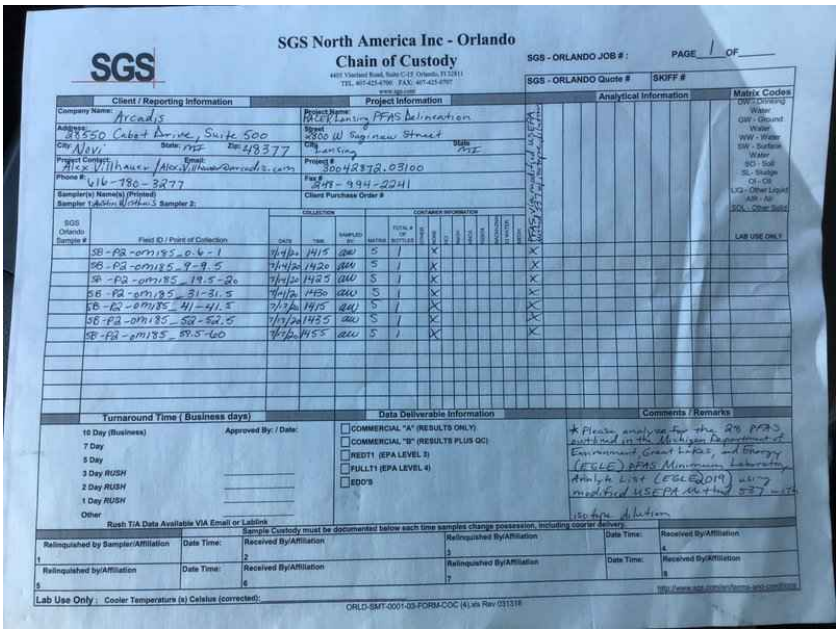
Supplier	Geotech

Type of Equipment	Water Level Meter (WLM)
Model	Geotech
Rental Number	6167
Serial Number	6380
Bump checked or calibrated	No

Waste Management

For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)

COC Photos



SGS North America Inc - Orlando

Chain of Custody

SGS - ORLANDO JOB # : PAGE 1 OF

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information | Project Information | Analytical Information | Matrix Codes

Company Name: Arcadis

Address: 28550 Cabot Drive, Suite 500

City: Novi State: MI Zip: 48377

Project Contact: Alex Villhauer Email: Alex.Villhauer@arcadis.com

Phone #: 616-780-3277

Sampler(s) Name(s) (Printed): Sampler 1: Sampler 2:

Project Name: MLEX Lansing PFAS Delineation

Street: 300 W Saginaw Street

City: Lansing State: MI

Project #: 30048378.03100

Fax #: 248-994-2241

Client Purchase Order #

SGS Orlando Sample #	Field ID / Point of Collection	Date	Time	Sampled By	Matrix	Total # of Bottles
	SB-P2-071185_0.6-1	7/11/24	1415	AW	S	1
	SB-P2-071185_9-9.5	7/11/24	1420	AW	S	1
	SB-P2-071185_19.5-20	7/11/24	1425	AW	S	1
	SB-P2-071185_31-31.5	7/11/24	1430	AW	S	1
	SB-P2-071185_41-41.5	7/11/24	1415	AW	S	1
	SB-P2-071185_52-52.5	7/11/24	1425	AW	S	1
	SB-P2-071185_59.5-60	7/11/24	1455	AW	S	1

Turnaround Time (Business days): 10 Day (Business) | 7 Day | 5 Day | 3 Day RUSH | 2 Day RUSH | 1 Day RUSH | Other | Approved By: / Date:

Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information: COMMERCIAL "A" (RESULTS ONLY) | COMMERCIAL "B" (RESULTS PLUS QC) | FULL1 (EPA LEVEL 3) | FULL1 (EPA LEVEL 4) | EDD'S

Comments / Remarks: * Please analyze for the 24 PFAS outlined in the Michigan Department of Environment, Great Lakes, and Energy (EGLE) PFAS Minimum Laboratory Analyte List (EGLE 2019) using modified USEPA Method 537.1 - 14 isotope dilution

Sample Custody must be documented below each time samples change possession, including courier delivery.

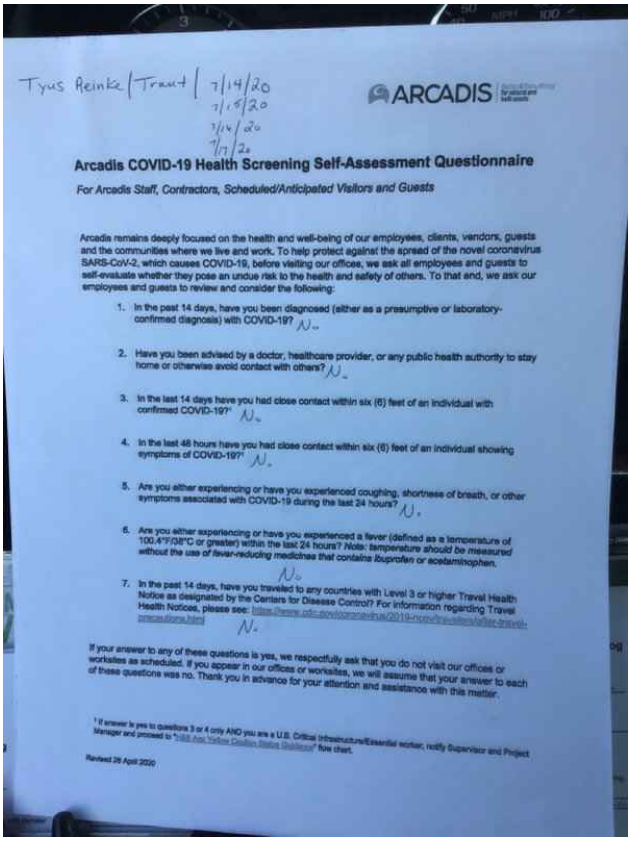
Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1		2	3		4
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only: Cooler Temperature (s) Celsius (corrected):

ORLD-SMT-0001-03-FORM-COC (4).xls Rev 031318

Photos

Other Photos



Tyus Reinke | Trant | 7/14/20
7/15/20
7/16/20
7/17/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

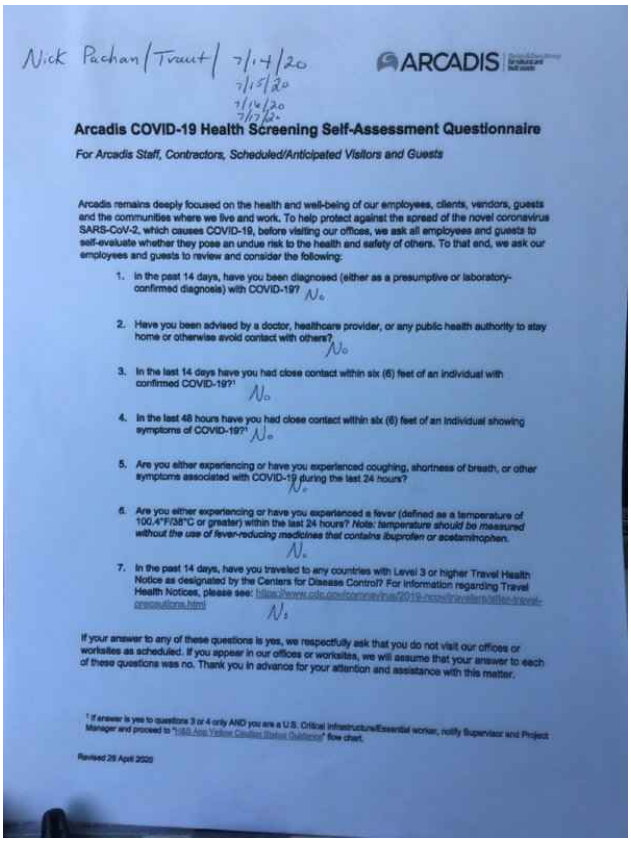
Arcadis remains deeply focused on the health and well-being of our employees, clients, vendors, guests and the communities where we live and work. To help protect against the spread of the novel coronavirus SARS-CoV-2, which causes COVID-19, before visiting our offices, we ask all employees and guests to self-evaluate whether they pose an undue risk to the health and safety of others. To that end, we ask our employees and guests to review and consider the following:

1. In the past 14 days, have you been diagnosed (either as a presumptive or laboratory-confirmed diagnosis) with COVID-19? No
2. Have you been advised by a doctor, healthcare provider, or any public health authority to stay home or otherwise avoid contact with others? No
3. In the last 14 days have you had close contact within six (6) feet of an individual with confirmed COVID-19[1] No
4. In the last 48 hours have you had close contact within six (6) feet of an individual showing symptoms of COVID-19[1] No
5. Are you either experiencing or have you experienced coughing, shortness of breath, or other symptoms associated with COVID-19 during the last 24 hours? No
6. Are you either experiencing or have you experienced a fever (defined as a temperature of 100.4°F/38°C or greater) within the last 24 hours? *Note: temperature should be measured without the use of fever-reducing medicines that contains ibuprofen or acetaminophen.*
   No
7. In the past 14 days, have you traveled to any countries with Level 3 or higher Travel Health Notice as designated by the Centers for Disease Control? For information regarding Travel Health Notices, please see: https://www.cdc.gov/coronavirus/2019-ncov/travelers/after-travel-precautions.html
   No

If your answer to any of these questions is yes, we respectfully ask that you do not visit our offices or worksites as scheduled. If you appear in our offices or worksites, we will assume that your answer to each of these questions was no. Thank you in advance for your attention and assistance with this matter.

[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "[redacted]" flow chart.

Revised 28 April 2020



Nick Pachan | Trant | 7/14/20
7/15/20
7/16/20
7/17/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

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   No

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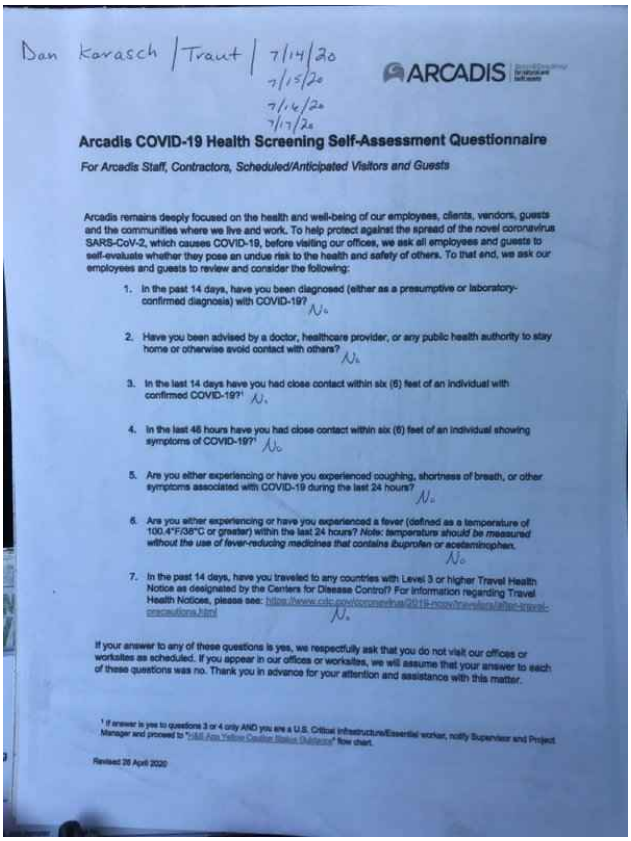
Revised 28 April 2020



Dan Karasch | Traut | 7/14/20
7/15/20
7/16/20
7/17/20

ARCADIS

Arcadis COVID-19 Health Screening Self-Assessment Questionnaire

For Arcadis Staff, Contractors, Scheduled/Anticipated Visitors and Guests

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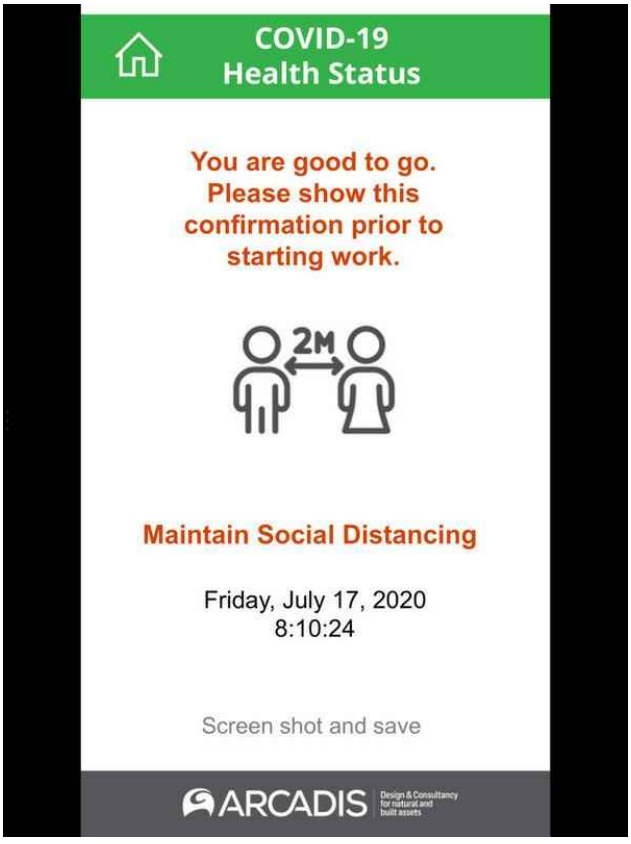
[1] If answer is yes to questions 3 or 4 only AND you are a U.S. Critical Infrastructure/Essential worker, notify Supervisor and Project Manager and proceed to "Add App Yellow Caution Status Guidance" flow chart.

Revised 28 April 2020



Signature

Signed 2020-07-17 12:13:10 UTC

Daily Log

Project Name :	RACER Lansing	**Weather(°F) :**	Cloudy 80 Deg F
Project Number :	30042872	**Prepared By:**	Eric Feenstra
Purpose :	Plant 2 Biosparge LBWL Install		
PPE :	Level D		
Equipment:	--		

Date	Time	Description of Activities
07/22/2020	07:40	Eric Feenstra onsite, talk with Kara about different scopes onsite, discuss Plant 3 compressor with Dan
07/22/2020	07:50	LBWL onsite, begin work on southern most pole
07/22/2020	08:00	Check on Plant 3 system compressor, ran through the night. Call Ed later to reset some parameter on VFD
07/22/2020	08:30	Check on LBWL working on southern pole, check in with drilling crew near Plant 2 system about water delivery later
07/22/2020	09:00	Waterboy onsite for water deliver to plant 2 system
07/22/2020	09:45	Waterboy offsite, call Ed Tung about new Plant 3 compressor VFD parameters. Our menu on screen is different than what Ed is looking at. Need to look up and find a couple more.
07/22/2020	10:45	Check in with team and discuss work done today. LBWL on 3rd pole out of 5 total
07/22/2020	14:00	LBWL finishes final pole on north Plant 2. Discuss schedule with Justin, they will be back onsite next Monday, done for this week.
07/22/2020	14:30	Finish parameters on VFD with Ed. Leave system running for the night again.
07/22/2020	15:00	EF offsite for the day

Signature: [redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/22/2020	no					no				

Daily Log

Project Name :	RACER Lansing	**Weather(°F) :**	Partly cloudy, 66°
Project Number :	30042872	**Prepared By:**	Anyssa Mandich
Purpose :	Baseline Sampling		
PPE :	Level D		
Equipment:	Turbidity Meter		

Date	Time	Description of Activities
07/23/2020	07:40	Anyssa Mandich on site. Gather equipment from P3
07/23/2020	08:00	Amber Brannick on site
07/23/2020	08:15	H&S tailgate
07/23/2020	09:20	Begin purging MW-20-126
07/23/2020	10:20	Sampled MW-20-126
07/23/2020	10:30	A. Brannick affixed caution tags to wells. Jersey barrier crew on site for guy wire.
07/23/2020	11:25	Begin purging MW-20-127. Jersey barrier crew finished
07/23/2020	12:25	Sampled MW-20-127
07/23/2020	13:45	Begin purging MW-20-128
07/23/2020	14:45	Sampled MW-20-128
07/23/2020	15:15	Begin purging MW-20-129
07/23/2020	16:15	Sampled MW-20-129
07/23/2020	16:50	Begin purging MW-20-130
07/23/2020	17:50	Sampled MW-20-130. Relinquished sample to K. Donahue
07/23/2020	18:20	A. Mandich and A. Brannick off site. Anyssa to Merit to drop samples off

Signature: [redacted]

Waste Management:

Drums On Site

Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/23/2020						yes				

Daily Log

COC Photos

null

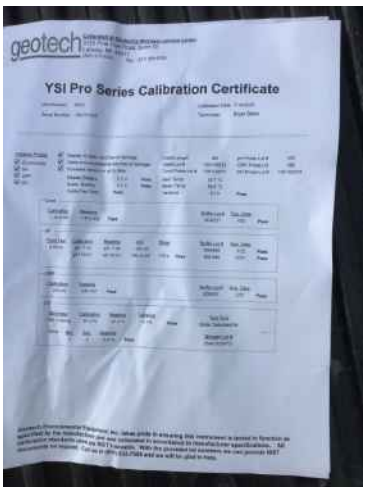
Equipment and Calibration Information:

Supplier:	Geotech	**Model:**	Pro Plus
Rental Number:	6542	**Calibrated:**	yes
Bump Checked:	no	**Calibration Passed:**	yes

Water Quality Meter SN: 19C101202

Date	Time	Calibrated Fulid and Value	Lot #	Expiration Date	Initial Reading	Final Reading
07/23/2020						

Calibration Documents



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Daily Log

Equipment and Calibration Information:

Supplier:	Geotech	**Model:**	Geotech Turbidimeter
Rental Number:	6132	**Calibrated:**	yes
Bump Checked:	no	**Calibration Passed:**	yes

Turbidity Meter SN: 18021648

Date	Time	Calibrated Fulid and Value	Lot #	Expiration Date	Reading
07/23/2020					

Calibration Documents

null

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : LBWL oversight
PPE : Level D
Equipment: --

Weather(°F) : Sunny, 70s
Prepared By: Daniel Stockard

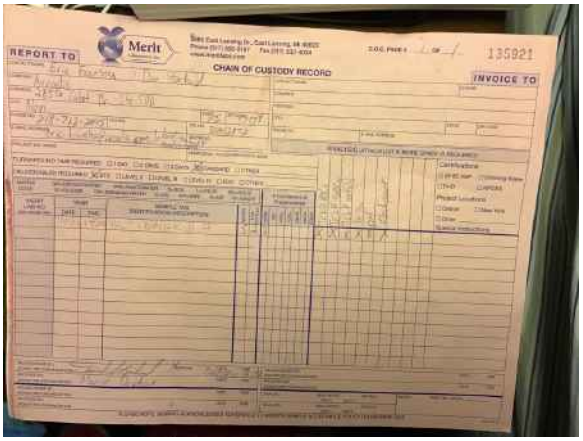
Date	Time	Description of Activities
07/28/2020	07:15	D. Stockard arrived on site, inspected electrical poles LBWL put in last week
07/28/2020	07:20	LBWL on site,
07/28/2020	07:30	LBWL getting started, conducted HS tailgate for Arcadis staff.
07/28/2020	08:20	LBWL working on getting the wire ready to run
07/28/2020	08:45	Allyson Hartz arrived on site, oriented with HS tailgate, site intro. LBWL putting in guy anchors for poles
07/28/2020	09:30	LBWL off site to get materials
07/28/2020	09:40	Took Allyson to Plant 3 for site overview
07/28/2020	10:20	To Plant 3 system for system adjustments and orientation
07/28/2020	12:05	To plant 2 for system inspection and startup prep. JSS on site to finish pipe sleeve improvements
07/28/2020	12:20	LBWL back on site, began putting crossbars onto existing steel pole just south of Saginaw
07/28/2020	12:45	A. Mandich on site
07/28/2020	13:42	LBWL finished at first pole, moved to second steel pole down. A Schember off site to get waste characterization sample jar
07/28/2020	13:53	LBWL working on second pole
07/28/2020	14:20	LBWL communicated they needed more bolts, one went to get them. Began laying out other equipment for the install
07/28/2020	14:50	Took waste characterization sample from roll off. WC-LBWL Rolloff
07/28/2020	15:00	D. Stockard off to P3 to gather info for O&M manual. A. Mandich continuing oversight
07/28/2020	15:45	A. Mandich reported LBWL off site. Installed new fire extinguishers at Plant 3.
07/28/2020	16:00	Back to P2 to touch base with A. Mandich prior to leaving

Signature: [redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/28/2020	no					no				

COC Photos



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Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : LBWL Electrical Install
PPE : Level D
Equipment: --

Weather(°F) : Sunny, 80°
Prepared By: Anyssa Mandich

Date	Time	Description of Activities
07/28/2020	12:50	Anyssa Mandich on site
07/28/2020	13:15	LBWL finished installing cross bars on first pole. Moved to second pole
07/28/2020	13:50	Anyssa off site to obtain waste characterization sample jars and shovel
07/28/2020	14:50	Sampled WC-LBWL Rolloff
07/28/2020	15:15	LBWL off site
07/28/2020	16:30	Arcadis off site

Signature: [redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/28/2020										

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Compressor Voltage Investigation
PPE : Level D
Equipment: --

Weather(°F) : Sunny, 84°
Prepared By: Anyssa Mandich

Date	Time	Description of Activities
07/30/2020	13:00	Anyssa Mandich and Korey Pearson on site. LBWL on site both at Plants 2 and 3.
07/30/2020	13:10	H&S tailgate
07/30/2020	13:25	K. Pearson began investigating compressor voltage issues. LBWL installed more guy wires at Plants 2 and 3
07/30/2020	14:00	K. Pearson discovered a voltage difference in VFD display from the reading.
07/30/2020	14:10	K. Pearson checked the ambient LEL input to see if anything was loose. Did not find anything.
07/30/2020	14:20	K. Pearson off site.
07/30/2020	14:40	Calibrated in line LEL meter.
07/30/2020	16:20	LBWL finished installing their last line. They are planning on having power tomorrow, pending not getting called out anywhere tonight.
07/30/2020	16:30	Anyssa Mandich off site

Signature: [redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/30/2020										

Daily Log

Project Name : Racer Lansing
Project Number : 30042872
Purpose : System O&M Plant 3, System review plant 2
PPE : Level D
Equipment: --

Weather(°F) : Cloudy 60's-80's
Prepared By: Billy Cobern

Date	Time	Description of Activities
08/03/2020	06:30	Field work preparation
08/03/2020	07:00	Depart office
08/03/2020	07:50	Arrive on site (47 miles)
08/03/2020	08:30	Tailgate Safety Complete
08/03/2020	09:00	Begin O&M checklist plant 3
08/03/2020	12:10	Plant 3 O&M complete
08/03/2020	12:30	Begin review at plant 2
08/03/2020	15:45	Plant 2 review complete
08/03/2020	16:00	Depart site
08/03/2020	17:00	Arrive at office (95 miles)

Signature: [redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
08/03/2020	no					no				

Daily Log

Project Name :	RACER Lansing	**Weather(°F) :**	Partly cloudy, 68°
Project Number :	30042872	**Prepared By:**	Anyssa Mandich
Purpose :	LBWL Electrical Install		
PPE :	Level D		
Equipment:	--		

Date	Time	Description of Activities
07/29/2020	07:20	Anyssa Mandich on site. LBWL already on site.
07/29/2020	07:25	H&S tailgate
07/29/2020	07:35	LBWL continued installing cross bars on second pole.
07/29/2020	08:30	Allyson Harts on site
07/29/2020	08:40	Created labels for valves on plant 3 system
07/29/2020	09:15	LBWL finished installing cross bars on second pole. Moved on to third pole (wooden)
07/29/2020	09:50	LBWL finished installing cross bars on third pole (wooden). Began installing cross bars on fourth pole.
07/29/2020	10:15	LBWL finished installing cross bars on fourth pole (wooden). Began running line from pole to pole.
07/29/2020	10:30	LBWL began installing cross bars on fifth pole.
07/29/2020	10:50	LBWL began installing cross bars on sixth pole (wooden)
07/29/2020	11:10	LBWL foreman off site
07/29/2020	12:35	LBWL began installing seventh pole (wooden) cross bars. Finished feeding line to the metal pole closest to Saginaw.
07/29/2020	12:55	LBWL began installing cross bars on the two wooden poles north of Saginaw.
07/29/2020	14:45	LBWL finished running lines across Saginaw for 2 poles and continued installing guy wire covers
07/29/2020	15:40	LBWL off site. Arcadis off site

Signature: [redacted]

Waste Management:

Drums On Site

Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/29/2020										

Other Photos

null

null

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null

null

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Daily Log

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Daily Log

Project Name : RACER Lansing

Project Number : 30042872

Purpose : Biosparge Start Up

PPE : Level D

Equipment: --

Weather(°F) : Partly cloudy, 68°

Prepared By: Anyssa Mandich

Date	Time	Description of Activities
08/03/2020	07:55	Anyssa Mandich on site. Billy Cobern and Eric Feenstra already on site.
08/03/2020	08:00	H&S tailgate
08/03/2020	08:15	Dan Stockard on site
08/03/2020	08:35	Plant 3 O&M form run through
08/03/2020	09:20	MKE on site
08/03/2020	10:15	A. Mandich to Geotech for equipment
08/03/2020	10:20	Begin finishing nutrient hose construction
08/03/2020	10:40	Connected antenna
08/03/2020	10:50	Noticed Ethernet port not connected to switchboard
08/03/2020	11:30	D. Stockard and E. Feenstra trouble shooted modem issues.
08/03/2020	11:35	Tested phases. They were backwards, so swapped back to forward. Began system purge. Began recirculating nutrient tanks to test for leaks. TP-401 had a leaking casing. Disassembled, replaced seal. Retested and leak was not present
08/03/2020	12:00	D. Stockard troubleshooting HMI connectivity with Ebner. Needed to update firmware and address HMI scrambling issue.
08/03/2020	13:00	Reset PLC to address HMI issue
08/03/2020	13:15	B. Cobern and A. Mandich to Plant 3 to switch out MFCs and check condensate drain.
08/03/2020	13:45	E. Feenstra and D. Stockard calibrated LEL meters
08/03/2020	14:20	A. Mandich shipped MFCs to Alicat at FedEx
08/03/2020	14:25	Stopped recirculating nutrient injection lines. Fixed one leak
08/03/2020	14:35	System program back up and running.
08/03/2020	15:30	Reconfigured system program. Dialed in system purge rate at 2000 LPM
08/03/2020	15:45	Clock is synced to Central Time. Cannot sync to Eastern Time
08/03/2020	17:05	Anyssa Mandich off site
08/03/2020	17:30	D. Stockard and E. Feenstra off site. Ended system purge

Signature: [redacted]

Daily Log

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
08/03/2020										

Daily Log

Project Name :	RACER Lansing	**Weather(°F) :**	Raining, 60s
Project Number :	30042872	**Prepared By:**	Daniel Stockard
Purpose :	Biosparge Startup		
PPE :	Level D		
Equipment:	4-gas Meter		

Date	Time	Description of Activities
08/04/2020	08:15	D. Stockard arrived on site. E. Feenstra on site with MKE. Signed on to HS tailgate.
08/04/2020	08:25	MKE balancing flows. Sparging into zone 1. Many leaks noticed on manifold points. MKE began tightening
08/04/2020	08:45	M Samp on site, directed her to begin gauging the southern transects area.
08/04/2020	09:05	M Ebner updated HMI program to fix flow rate formula.
08/04/2020	09:14	Began operational checks on Table S-3
08/04/2020	09:45	MK said they were having issues getting the PVC to steel connection at the individual manifold flow meters to seal up. Will have to discuss with E Tung a solution
08/04/2020	10:20	Noted that the compressor was not turning on or off from PLC. MKE troubleshooting
08/04/2020	11:00	Headed to Plant 3 to get LEL monitoring equipment for Marina and check on system.
08/04/2020	11:15	Identified the issue with the Kaeser. It must be set to the remote mode before it will communicate with the PLC. E Feenstra noted this must be explained in the manual
08/04/2020	11:30	Continued running through Table S-3.
08/04/2020	11:45	MKE expressed they are having difficulty getting the flow meters to stop leaking. Said they could not torque them much more because they could break. Working on a solution
08/04/2020	12:00	MKE resolved to replace the pipe tape on the flow meters with rectorseal.
08/04/2020	12:30	Identified issues with the gas blowdown function (not functioning), LEL maintenance mode buttons (not working), ambient LEL alarm not turning on nor turning on the XP fan. Communicated these issues to Mike Ebner
08/04/2020	13:30	Tried testing the AIR COMPRESSOR FAILED TO RUN alarm and it didn't work. Informed M. Ebner. Pressurized propane line to check for leaks. One identified, which Andrei addressed. Tested pressure switch high alarm and also leak tested propane supply line
08/04/2020	14:10	Finished applying the rectorseal to zone 1. Wait to let it set
08/04/2020	14:15	Updated A. Lorenz on progress and the PVC to steel leaking situation
08/04/2020	14:20	M. Ebner informed us that he had re-activated the AIR COMPRESSOR FAILED TO RUN alarm on the PLC
08/04/2020	15:00	Realized the AIR COMPRESSOR FAILED TO RUN alarm would turn on any time the compressor went to idle due to low demand. Ebner removed the alarm. Working on being able to connect to the compressor remotely.
08/04/2020	03:05	Pressurized Zone 1, no leaks noted.
08/04/2020	15:15	MKE began process of replacing all the nipples that had pipe tape with rectorseal.
08/04/2020	15:30	Gas blowdown function not working because the air flow rate reverts to 0 when the high LEL alarm is tripped. Informed M. Ebner
08/04/2020	16:00	Gas blowdown function fixed
08/04/2020	16:30	Changed IP settings on Kaeser to allow for remote connectivity. IP address is 192.168.12.15
08/04/2020	16:45	D. Stockard off site, E. Feenstra and M. Samp on site for MKE oversight and startup tasks

Daily Log

Signature: [redacted]

Waste Management:										
Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
08/04/2020	no									

Daily Log

Project Name :	RACER Lansing Biosparge Startup	**Weather(°F) :**	70 sunny
Project Number :	30042872	**Prepared By:**	Allyson Hartz
Purpose :	LBWL oversight		
PPE :	Level D		
Equipment:	--		

Date	Time	Description of Activities
07/31/2020	07:45	Arrive to site, LBWL mobilizing
07/31/2020	08:00	Begin work on wires and connections
07/31/2020	13:18	Begin installing transformer and connecting primary power to our secondary power
07/31/2020	14:35	Meter installation
07/31/2020	14:55	LBLW finish work and demobilize
07/31/2020	16:26	Dan arrives to site to turn power on
07/31/2020	17:30	Leave site

Signature: [redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/31/2020	yes					no				See previous field logs for specifics on the waste on site

Other Photos

begin transformer install

null

power is on in system building

picture of system building for Andrew

meter installation

Daily Log

Project Name : RACER Lansing

Project Number : 30042872

Purpose : System start up

PPE : Level D

Equipment: --

Weather(°F) : Rainy, 57

Prepared By: Marina Samp

Date	Time	Description of Activities
08/04/2020	08:45	Onsite, discuss day's activities with Dan, Eric
08/04/2020	09:10	Start gauging wells near zone one for sparge response
08/04/2020	09:15	MW-19-121 at 61.67 feet, about 1 foot higher than baseline
08/04/2020	09:45	MW-16-74 at 60.30, 2.5 feet shallower than baseline, pressure noted when j plug vented
08/04/2020	09:55	MW-19-123 at 60.65, similar to baseline
08/04/2020	10:00	TW-14-02 at 59.23, aboulf 0.5 feet less than baseline
08/04/2020	10:15	TW-16-01 at 58.13, similar to baseline
08/04/2020	10:20	TW-14-01 at 61.90, deeper than baseline
08/04/2020	10:30	MW-20-129 at 59.80, similar to baseline
08/04/2020	10:40	ME-19-122 at 62.36, similar to baseline
08/04/2020	10:45	MW-16-81 at 61.79, about a foot shallower than baseline, noted pressure when venting j plug
08/04/2020	10:55	MW-19-129 at 62.9, similar to baseline
08/04/2020	11:00	Check in with D. Stockard , E. Feenstra, MKE troubleshooting compressor remote start, get supplies from P3 system for leak testing
08/04/2020	12:00	Not currently sparging air due to system checks, go to Ferguson for bushing and brush to remove pipe tape
08/04/2020	13:00	Assemble pressure gauge and quick connect hose
08/04/2020	14:00	MKE reassembling part of manifold to address leaks, system off
08/04/2020	15:00	Turn system on to verify rectorseal fixed leak issues
08/04/2020	15:30	Check for leaks at wellheads in zone 1, note 3 in zone 1, shut system down to resolve compressor communication issue, shut system down to repair, MKE replacing pipe tape with rectorseal on other zones
08/04/2020	18:00	Leaks at wellheads repaired, cycle power for compressor to save IP information, discuss compressor operations/maintenance with E. Feenstra
08/04/2020	19:30	MKE done sealing connections in XP room manifold, all offsite

Signature: [redacted]

Daily Log

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
08/04/2020	no					no				See tracker

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Flagging well, system checks, sewer recon
PPE : Level D
Equipment: --

Weather(°F) : 66, sunny
Prepared By: Marina Samp

Date	Time	Description of Activities
07/24/2020	07:55	Onsite, tailgate (M. Samp, A. Brannick)
07/24/2020	08:20	Start flagging wells on Plant 2, overview of Plant 2 system with Amber
07/24/2020	10:30	Start flagging at Plant 3
07/24/2020	11:20	Compressor check, call Dan, compressor at Plant3 is stable
07/24/2020	12:15	Lunch break
07/24/2020	12:45	Finish flagging at Plant 2
07/24/2020	13:30	Storm sewer overview, locate sanitary manholes on Plant 3
07/24/2020	14:00	Locate manhole upstream of sanitary vault, debris at base, structure 20 feet deep, 30 inch lines, no lid, piece of plywood over it
07/24/2020	14:15	Could not locate eastern outfall on line south of vault. Could be abandoned
07/24/2020	14:40	Locate upstream manhole to sanitary line (furthest south circled on figure screenshot). No pipes visible, backed up with water, assume missing manholes abandoned
07/24/2020	15:30	Locate western of two southern storm discharges, sanitary manhole next to it. Both 8 feet deep, pipes in storm consistent with MICHAVE. Pipes in sanitary 6 inch. Could not locate eastern of southern outfalls
07/24/2020	15:40	Reattempt locating western southern outfall, locate, 8 feet deep, no flow, water in sump, but not pipe, pipe size consistent with MICHAVE
07/24/2020	16:00	Clean up for day
07/24/2020	16:25	Offsite

Signature: [redacted]

Waste Management:

Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
07/24/2020	no					no				See tracker

Other Photos

null

null

null

null

null

null

Daily Log

null

null

Daily Log

Project Name : RACER Lansing
Project Number : 30042872
Purpose : Biosparge Start Up
PPE : Level D
Equipment: --

Weather(°F) : Sunny, 51°
Prepared By: Anyssa Mandich

Date	Time	Description of Activities
08/05/2020	07:00	Anyssa Mandich on site. MKE on site
08/05/2020	07:10	H&S tailgate
08/05/2020	07:30	Tightened connections and began finishing up wiring CAD6 connector to PLC
08/05/2020	08:20	Dan Stockard on site
08/05/2020	08:45	Leak tested manifolds. Addressed a few minor leaks
08/05/2020	09:25	Began testing propane sparging into Zone 1
08/05/2020	10:30	Propane vent line valves were closed, restricting flow. Opened, balanced the flows, and LEL meters are now matching each other. Discovered bug in FQI-352. Removed bug
08/05/2020	11:00	Mobbed to Plant 3 to install fuse
08/05/2020	11:20	Leak tested Zone 1 wellheads. No leaks.
08/05/2020	11:50	Leak tested Zone 2 wellheads
08/05/2020	11:52	Discovered leak in AS-19-E07 and addressed it
08/05/2020	12:10	Leak tested Zone 3 wellheads
08/05/2020	12:18	Leak discovered in AS-19-E03. Addressed leak
08/05/2020	12:30	Leak tested Zone 4 wellheads
08/05/2020	12:36	Discovered leak in AS-19-F12. Addressed leak
08/05/2020	12:40	Leak testedZone 5 transect B
08/05/2020	12:50	Leak tested Zone 6 wellheads
08/05/2020	13:06	Discovered leak in AS-19-F07 and addressed it
08/05/2020	13:10	Leak tested rest of Zone 5 wellheads
08/05/2020	13:25	Continued leak testing flow meters
08/05/2020	14:00	Balanced system flows
08/05/2020	15:15	Ran through Table S-4 checks
08/05/2020	15:45	D. Stockard set up sparge cycle
08/05/2020	16:00	Arcadis off site

Signature: [redacted]

Daily Log

Waste Management:										
Drums On Site										
Date	Are there any waste drums on site?	Number of Drums upon Arrival	Size of Drums	Type of Drums	Condition of Drums	Waste Drummed Today?	Number of drums Created	Size of drums	Condition of Drums	General Waste Comments
08/05/2020										

Other Photos

New fuse install at Plant 3

APPENDIX D

VAP Sampling Figures

LEGEND

WELLS

- BIOSPARGE POINT
- DEEP OVERBUDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- SYSTEM BUILDING
- SAGINAW/ GRAND RIVER FORMATION BOUNDARY

PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- LOWER 1,4-DIOXANE IMPACTS > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > 7.2 µg/L

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 80 160
SCALE IN FEET

DRAFT

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

1,4-DIOXANE ANALYTICAL RESULTS

ARCADIS Design & Consultancy for natural and built assets

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
T:_ENV\RACER\Buffalo\MXDs\2020_Biosparge\Data_Package\Figure 2A - 1_4_Dioxane Analytical Results.mxd PLOTTED: 12/28/2020 11:27:34 AM BY: KPullen

W. SAGINAW AVE

N. ROSEMARY STREET

MW-14-63
PSP-B02
MW-20-126*
PSP-B03
PSP-B01
TW-15-12
MW-16-80
PSP-B04
72-77: 180
ASP-B03
69-74: 200
PSP-B05
70-75: < 1
ASP-B02
68-73: 179
ASP-B04
70-75: < 1
ASP-B01
68-73: 77
VAP-P2-ME106
71-76: 12
VAP-P2-MJ125
65-70: < 1
CSP-B01
70-75: < 1
TW-13-42
TW-14-04
TW-15-13
MW-13-45
PSP-F12
64-69: 41
MW-13-43
TW-15-73
PW-14-02
MW-20-127*
VAP-P2-MQ114
66-71: < 1
CSP-F01
65-69: 110
TW-14-05
VAP-P2-NC103
56-61: 7
63-68: 3
ASP-F03
71-75: 350
VAP-P2-MT92
71-76: < 1
MW-16-85
PSP-C09
VAP-P2-MX71
68-73: 18
PSP-C08
PSP-C10
ASP-F02
67-71: 64
ASP-F01
71-75: 99
PSP-C11
62-67: < 1
MW-19-116 / VAP-P2-NF97
65-70: 11
65-70: 51
PSP-C07
MW-16-84
MW-20-128*
PSP-F11
69-73: 165
TW-16-83
PSP-C04
72-77: < 2
MW-16-82
MW-17-86
PSP-C06
PSP-C05
MW-19-117/
VAP-P2-NI108
53-58: 10
61-66: < 2
PSP-F10
PSP-F08
PSP-C03
71-76: < 2
PSP-F06
MW-14-61
ASP-C02
72-77: < 2
VAP-P2-NL100
65-70: < 1
PSP-F09
MW-15-72
63-68: 16
PSP-F05
PSP-F07
MW-19-115 / PSP-C01
72.5-77.5: 11
72.5-77.5: <1
MW-19-120 / VAP-P2-NU156
66-70: 92
66-70: 165
VAP-P2-NX100
59-64: 6
MW-19-124 / VAP-P2-OA135
65-69: 196
65-69: 220
PSP-E11
PSP-E12
66-70: 88
PSP-C02
72-77: < 1
MW-14-56
MW-19-122 /
VAP-P2-OM112
58-62: 135
58-62: 43
PSP-E10
PSP-E09
63-38: < 1
ASP-D01
62-67: 42
MW-16-81
CSP-D01
64-69: 12
PSP-E02
PSP-E08
PSP-E01
PSP-D02
56-64: 7
ASP-D04
56-61: 6
PSP-E07
ASP-G03
66-70: 119
PSP-E06
64-68: < 1
MW-20-129*
ASP-G02
68-72: 141
PSP-E05
MW-16-79
PSP-G01
PSP-E04
AS-17-03
AS-17-04
PSP-E03
66-70: 54
MW-16-74
AS-17-05
MW-16-78
ASP-G01
63-67: 3
TW-14-02
PSP-G04
66-70: 20
MW-16-76
TW-14-01
AS-16-01
MW-19-121 / VAP-P2-OQ129
66-70: 110
66-70: 99
AS-16-02
PSP-G03
TW-16-01
PSP-G02
MW-19-123 /
VAP-P2-PG104
66-70: 5
66-70: 52
CSP-G02
63-67: 470
PW-14-01
MW-16-77
MW-16-75
MW-13-51
MW-13-52
MW-13-53

LEGEND

WELLS

- BIOSPARGE POINT
- WEATHERED BEDROCK MONITORING WELL
- BLANK CASING
- SOIL BORING/VAP
- LNAPL EXTENT
- LOWER 1,4-DIOXANE IMPACTS > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > 7.2 µg/L
- 1-INCH CONVEYANCE HOSE
- SYSTEM BUILDING
- SAGINAW / GRAND RIVER FORMATION BOUNDARY
- 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

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

0 190 380
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

1,4-DIOXANE ANALYTICAL RESULTS PLANT 2

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2B

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
T:_ENV\RACER\Buffalo\MXDs\2020_Biosparge\Data_Package\Figure 2B - 1_4_Dioxane Analytical Results.mxd PLOTTED: 12/27/2020 10:16:05 AM BY: KPullen

APPENDIX E

Boring Logs

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\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

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		(32.0-37.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/2).		
33					0.0				
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\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: 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
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
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\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: 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		(77.5-88.0') SILT, little clay, low plasticity, rapid dilatancy; dry; stiff; gray (10YR 5/1).		
79					0.0				
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\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
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
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	0.0				
97			36	(94-98) @1400	0.0				
98					0.0				
99			24		0.0		(98.0-110.0') SANDSTONE, very fine to fine; highly consolidated with little soft sand matrix; moist; gray (10YR 5/1).		
100					0.0		Note: Distinct consilidated/unconsolidated boundary at 98.0' bgs with little gradation from weathered to compact.		
101					0.0				
102					0.0				
103					0.0				
104					0.0				
105			120		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

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: Cloudy, 50F

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.		
					0.0		(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					0.0		(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			60		0.0				
4					0.0				
5					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).		
6					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			36		0.0				
9					0.0				
10					0.0				
11					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			120		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 \\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-19-07

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: Cloudy, 50F

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). Note: Medium to coarse sand, subrounded; some granules to large pebbles, subrounded; from 37-37.5' bgs.		
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 \\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: 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: Cloudy, 50F

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							(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 \\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-19-07

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: Cloudy, 50F

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 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-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-19-07

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: Cloudy, 50F

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 \\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-19-07

Sheet: 6 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: Cloudy, 50F

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 \\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-19-08

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: Cloudy, 52F

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.		
							(0.7-1.0') 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					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		(4.0-10.0') SILT and CLAY, medium to low plasticity, rapid dilatancy; trace very fine sand; trace granules, subrounded to subangular; stiff; dry; brown (10YR 4/3).		
6			60		0.0				
7					0.0				
8					0.0				
9					0.0				
10					0.0				
11			120		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					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 \\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

Soil Boring Log

Boring No.: AS-19-08

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: Cloudy, 52F

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:

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-19-08

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
Weather Conditions: Cloudy, 52F

Logger: S. Presswood
Editor: S. Presswood

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		(50.0-51.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine; soft; wet; brown (10YR 4/3).		
51					0.0		(51.0-55.0') SAND, very fine; little silt; well sorted; dry; pale brown (10YR 6/3).		
52					0.0				
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 \\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-19-08

Soil Boring Log

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
Weather Conditions: Cloudy, 52F

Logger: S. Presswood
Editor: S. Presswood

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 \\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-19-08

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: Cloudy, 52F

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		(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.		
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					0.0				
102					0.0				
103			72		0.0				
104					0.0				
105					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-19-08

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: Cloudy, 52F

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:

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-19-09

Soil Boring Log

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: Sunny, 71F

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 \\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-19-09

Soil Boring Log

Sheet: 2 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: Sunny, 71F

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		(27.0-36.5') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/1).		
28					0.0				
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:

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-19-09

Soil Boring Log

Sheet: 3 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: Sunny, 71F

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 \\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-19-09

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: Sunny, 71F

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 \\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-19-09

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: Sunny, 71F

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					0.0				
102			84		0.0				
103					0.0				
104					0.0				
105					0.0				
							End of boring at 105.0' bgs.		

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-19-10

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: Sunny, 60F

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 \\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-19-10

Soil Boring Log

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

Date Started: 05/05/2019
Date Completed: 05/05/2019
Weather Conditions: Sunny, 60F

Logger: A. Westhuis
Editor: S. Presswood

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 \\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-19-10

Soil Boring Log

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: Sunny, 60F

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') 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			120		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					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			120		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:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\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-19-10

Soil Boring Log

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: Sunny, 60F

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 \\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-19-10

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: Sunny, 60F

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			84		0.0				
92					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:

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-19-11

Soil Boring Log

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: Partly Cloudy, 60F

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, 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			60		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					0.0				
9					0.0				
10					0.0				
11			120		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					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

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-19-11

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: Partly Cloudy, 60F

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		(25.0-26.0') SILT, trace clay, nonplastic, slow dilatancy; some very fine to fine sand; well sorted; wet; grayish brown (10YR 5/2).		
26					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).		
27					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).		
28					0.0				
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:

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-19-11

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: Partly Cloudy, 60F

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:

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-19-11

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
Weather Conditions: Partly Cloudy, 60F

Logger: A. Westhuis
Editor: S. Presswood

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:

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-19-11

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: Partly Cloudy, 60F

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 \\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-19-12

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: Cloudy, 70F

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

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

Soil Boring Log

Boring No.: AS-19-12

Sheet: 2 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: Cloudy, 70F

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 \\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-19-12

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: Cloudy, 70F

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 \\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-19-12

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: Cloudy, 70F

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 \\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-19-12

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: Cloudy, 70F

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 \\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-19-13

Soil Boring Log

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: Cloudy, 42F

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 \\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-19-13

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: Cloudy, 42F

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 \\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-19-13

Soil Boring Log

Sheet: 3 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: Cloudy, 42F

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 \\ARCADIS-US.COM\OFFICE\DATA\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-19-13

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: Cloudy, 42F

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 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-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-19-13

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: Cloudy, 42F

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					0.0		Note: Increase in competency and decrease in weathering at 86.0' bgs.		
89				AS-19-13_043019 (87-90) @1715	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 \\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-B01/ASP-B01

Soil Boring Log

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: Partly Cloudy, 80F

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\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-B01/ASP-B01

Soil Boring Log

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: Partly Cloudy, 80F

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\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-B01/ASP-B01

Soil Boring Log

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: Partly Cloudy, 80F

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') SILT, trace clay, nonplastic, no dilatancy; trace fine sand, subrounded; trace small to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
49					0.0		(48.0-56.0') SAND, very fine; some 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				
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\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-B01/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: Partly Cloudy, 80F

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\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-B02/ASP-B02

Soil Boring Log

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: Sunny, 80F

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\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-B02/ASP-B02

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: Sunny, 80F

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\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-B02/ASP-B02

Soil Boring Log

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: Sunny, 80F

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\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-B02/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: Sunny, 80F

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\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-B03/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: Cloudy, 75F

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\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-B03/ASP-B03

Soil Boring Log

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: Cloudy, 75F

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\I-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-B03/ASP-B03

Soil Boring Log

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: Cloudy, 75F

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				
59					0.0		(58.0-59.5') SAND, fine to medium, subrounded; little silt; well sorted; moist to wet; pale brown (10YR 6/3).		
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\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-B03/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: Cloudy, 75F

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\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-B04/PSP-B01

Soil Boring Log

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: Mostly Cloudy, 75F

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\OFFICEDATA\NOVI-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-B04/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: Mostly Cloudy, 75F

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\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-B04/PSP-B01

Soil Boring Log

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: Mostly Cloudy, 75F

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\I-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-B04/PSP-B01

Soil Boring Log

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: Mostly Cloudy, 75F

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 4/2) to 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 4/2). 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\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-B05/PSP-B02

Soil Boring Log

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: Sunny, 80F

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: 451556.1
East Coor: 13064406.2

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOVI-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-B05/PSP-B02

Soil Boring Log

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: Sunny, 80F

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\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-B05/PSP-B02

Soil Boring Log

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: Sunny, 80F

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		(47.0-49.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; dry; light gray (10YR 7/2).		
48					0.0				
49					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).		
50					0.0				
51					0.0				
52			120		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).		
53					0.0				
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			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-B05/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: Sunny, 80F

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\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-B06/PSP-B03

Soil Boring Log

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: Cloudy, 80F

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, trace silt, high plasticity, no dilatancy; 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\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-B06/PSP-B03

Soil Boring Log

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: Cloudy, 80F

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, trace silt, high plasticity, no dilatancy; trace very fine sand; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Glacial till.		
27					0.0				
28					0.0				
29					0.0				
30					0.0		(29.0-30.0') CLAY and SILT, low plasticity to nonplastic, no dilatancy to slow dilatancy; 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 and SILT, low plasticity, no dilatancy; 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, little silt, high plasticity, no dilatancy; 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\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-B06/PSP-B03

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: Cloudy, 80F

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					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-B06/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
Weather Conditions: Cloudy, 80F

Logger: A. Westhuis
Editor: C. Weaver

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, trace clay, nonplastic, rapid dilatancy; 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, little silt, high plasticity, no dilatancy; 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, some silt, low plasticity, no dilatancy; 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				
78					0.0		(77.0-78.0') SHALE with little interbedded sandstone, black (10YR 2/1). Note: Highly competent forming large cores.		
79					0.0		(78.0-80.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent forming large cores. Many small holes and vugs.		
80					0.0				
81			84		0.0		(80.0-82.0') SANDSTONE and SHALE, interbedded. Note: Highly competent forming large cores.		
82					0.0				
83					0.0		(82.0-89.0') SANDSTONE, very fine; well sorted. Note: Highly competent forming large cores.		
84					0.0		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\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-B06/PSP-B03

Soil Boring Log

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: Cloudy, 80F

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\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-B07/PSP-B04

Soil Boring Log

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: Sunny, 78F

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\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-B07/PSP-B04

Soil Boring Log

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: Sunny, 78F

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\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-B07/PSP-B04

Soil Boring Log

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: Sunny, 78F

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\-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-B07/PSP-B04

Soil Boring Log

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: Sunny, 78F

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				
73					0.0		(72.0-72.5') WEATHERED SANDSTONE, very fine; well sorted; little sandstone fragments in a soft sand matrix.		
74					0.0		(72.5-74.5') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent.		
75				PSP-B04(72-77) (081319) @ 1257	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				
78					0.0		(77.0-84.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Highly competent. Some fine shale laminations.		
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\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-B07/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: Sunny, 78F

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\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-E01/PSP-E01

Soil Boring Log

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: Cloudy, 75F

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\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-E01/PSP-E01

Soil Boring Log

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: Cloudy, 75F

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\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-E01/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: Cloudy, 75F

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\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-E01/PSP-E01

Soil Boring Log

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: Cloudy, 75F

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\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-E02/PSP-E02

Soil Boring Log

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: Mostly Cloudy, 80F

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.: 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\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-E02/PSP-E02

Soil Boring Log

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: Mostly Cloudy, 80F

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\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-E02/PSP-E02

Soil Boring Log

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: Mostly Cloudy, 80F

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\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-E02/PSP-E02

Soil Boring Log

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: Mostly Cloudy, 80F

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\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-E03/PSP-E03

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: Sunny, 70F

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\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-E03/PSP-E03

Soil Boring Log

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

Date Started: 09/14/2019
Date Completed: 09/14/2019
Weather Conditions: Sunny, 70F

Logger: A. Westhuis
Editor: K. Donahue

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.5-29.5') 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\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-E03/PSP-E03

Soil Boring Log

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: Sunny, 70F

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\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-E03/PSP-E03

Soil Boring Log

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: Sunny, 70F

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\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-E04/PSP-E04

Soil Boring Log

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: Cloudy, 70F

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: 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\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-E04/PSP-E04

Soil Boring Log

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: Cloudy, 70F

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\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-E04/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: Cloudy, 70F

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 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).		
51					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).		
52					0.0				
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\I-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-E04/PSP-E04

Soil Boring Log

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: Cloudy, 70F

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). Note: Trace very fine shale laminations. Highly competent.		
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\I-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-E05/PSP-E05

Soil Boring Log

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: Cloudy, 70F

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.: 862.1
North Coor: 450921.3
East Coor: 13064899.5

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOVI-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-E05/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: Cloudy, 70F

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\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-E05/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: Cloudy, 70F

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.		

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-E05/PSP-E05

Soil Boring Log

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: Cloudy, 70F

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\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-E06/PSP-E06

Soil Boring Log

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: Cloudy, 75F

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\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-E06/PSP-E06

Soil Boring Log

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: Cloudy, 75F

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\I-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-E06/PSP-E06

Soil Boring Log

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: Cloudy, 75F

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\I-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-E06/PSP-E06

Soil Boring Log

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: Cloudy, 75F

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				
73					0.0		(72.0-75.0') SHALE with interbedded sandstone, light gray (10YR 7/1). Note: Moderate to high competency.		
74					0.0				
75			120		0.0				
76					0.0		(75.0-78.5') SHALE, gray (10YR 5/1). Note: Highly competent.		
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\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-E07/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: Sunny, 75F

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\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-E07/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: Sunny, 75F

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\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-E07/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: Sunny, 75F

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		(50.0-53.0') 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).		
51					0.0				
52					0.0				
53					0.0		(53.0-55.0') SAND, very fine to fine, subrounded; some silt; poorly sorted; dry; light brownish gray (10YR 6/2).		
54					0.0				
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\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-E07/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
Weather Conditions: Sunny, 75F

Logger: A. Westhuis
Editor: K. Donahue

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\I-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-E07/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: Sunny, 75F

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\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-E08/PSP-E08

Soil Boring Log

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: Sunny, 75F

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\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-E08/PSP-E08

Soil Boring Log

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: Sunny, 75F

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\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-E08/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: Sunny, 75F

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\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-E08/PSP-E08

Soil Boring Log

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: Sunny, 75F

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				
66					0.0		(65.0-66.0') WEATHERED SHALE with some interbedded sandstone, light gray (10YR 7/2). Note: Heavily weathered. Low competency.		
67					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.		
68					0.0				
69					0.0		(68.0-73.0') WEATHERED SHALE and SANDSTONE, interbedded, gray (10YR 5/1) to dark gray (10YR 4/1). Note: Moderate competency.		
70					0.0				
71					0.0				
72					0.0				
73					0.0				
74					0.0		(73.0-77.0') SANDSTONE with finely interbedded shale, light gray (10YR 7/2). Note: Moderate to high competency.		
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\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-E08/PSP-E08

Soil Boring Log

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: Sunny, 75F

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\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-E09/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: Sunny, 65F

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\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-E09/PSP-E09

Soil Boring Log

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: Sunny, 65F

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				
31					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).		
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. (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).		
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-E09/PSP-E09

Soil Boring Log

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: Sunny, 65F

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, little silt, medium to high plasticity, slow dilatancy; 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					0.0				
52			108		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; some 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.		
					0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-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-E09/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: Sunny, 65F

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\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-E10/PSP-E10

Soil Boring Log

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: Cloudy, 70F

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:

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\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-E10/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: Cloudy, 70F

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\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-E10/PSP-E10

Soil Boring Log

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: Cloudy, 70F

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			120		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					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; trace very coarse sand to medium pebbles, subrounded; moist; stiff to very stiff; gray (10YR 6/1).		
56					0.0				
57					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).		
58					0.0				
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\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-E10/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: Cloudy, 70F

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\I-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-E11/PSP-E11

Soil Boring Log

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: Cloudy, 75F

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: 451066.4
East Coor: 13065001.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATANOVI-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-E11/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: Cloudy, 75F

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\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-E11/PSP-E11

Soil Boring Log

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

Date Started: 08/12/2019
Date Completed: 08/12/2019
Weather Conditions: Cloudy, 75F

Logger: S. Presswood
Editor: K. Donahue

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\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-E11/PSP-E11

Soil Boring Log

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: Cloudy, 75F

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\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-E12/PSP-E12

Soil Boring Log

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: Cloudy, 75F

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\I-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-E12/PSP-E12

Soil Boring Log

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: Cloudy, 75F

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\-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-E12/PSP-E12

Soil Boring Log

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: Cloudy, 75F

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\-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-E12/PSP-E12

Soil Boring Log

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: Cloudy, 75F

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\I-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-F01/PSP-F12

Soil Boring Log

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

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: Cloudy, 66F

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\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

Soil Boring Log

Boring No.: AS-19-F01/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: Cloudy, 66F

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\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-F01/PSP-F12

Soil Boring Log

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: Cloudy, 66F

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') 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).		
49					0.0				
50					0.0				
51					0.0				
52			120		0.0				
53					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.		
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\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-F01/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: Cloudy, 66F

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\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-F02/CSP-F01

Soil Boring Log

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: Sunny, 72F

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.): 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\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-F02/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: Sunny, 72F

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\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-F02/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: Sunny, 72F

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		(50.0-53.0') CLAY, little silt, medium plasticity, slow dilatancy; trace very course sand, subrounded to subangular; moist; stiff; gray (10YR 6/1).		
51					0.0				
52					0.0				
53					0.0		(53.0-57.5') SAND, very fine to fine, well sorted; dry; light gray (10YR 7/1).		
54					0.0				
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\I-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-F02/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: Sunny, 72F

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\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-F03/ASP-F03

Soil Boring Log

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: Partly Cloudy, 73F

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		(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).		
18					0.0				
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\OFFICE\DATA\NOV\I-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-F03/ASP-F03

Soil Boring Log

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: Partly Cloudy, 73F

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				
26					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).		
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				
31					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).		
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\I-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-F03/ASP-F03

Soil Boring Log

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: Partly Cloudy, 73F

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\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-F03/ASP-F03

Soil Boring Log

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: Partly Cloudy, 73F

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).		
70					0.0		(68.5-69.5') WEATHERED SHALE and SANDSTONE, interbedded; low competency; dark gray (10YR 4/1).		
71					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).		
72					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).		
73			60	ASP-F03(71-75) (072619) @ 0905	0.0				
74					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).		
75					0.0		(74.0-76.0') SHALE, trace sandstone laminations; high competency; gray (10YR 6/1).		
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\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-F04/ASP-F02

Soil Boring Log

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: Sunny, 62F

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\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-F04/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: Sunny, 62F

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\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-F04/ASP-F02

Soil Boring Log

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: Sunny, 62F

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		Note: Wet at 50.0' bgs.		
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		(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).		
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

Boring No.: AS-19-F04/ASP-F02

Soil Boring Log

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: Sunny, 62F

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\I-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-F05/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: Sunny, 85F

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.		
					0.1		(0.5-2.0') PEBBLES, large to very large. Note: Fill.		
2									
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\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-F05/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: Sunny, 85F

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\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-F05/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: Sunny, 85F

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\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-F05/ASP-F01

Soil Boring Log

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: Sunny, 85F

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				
77					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.		
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\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-F06/PSP-F11

Soil Boring Log

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: Cloudy, 85F

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-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\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-F06/PSP-F11

Soil Boring Log

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: Cloudy, 85F

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\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-F06/PSP-F11

Soil Boring Log

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: Cloudy, 85F

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		(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.		
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

Boring No.: AS-19-F06/PSP-F11

Soil Boring Log

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: Cloudy, 85F

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\I-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-F07/PSP-F10

Soil Boring Log

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: Cloudy, 85F

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\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-F07/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: Cloudy, 85F

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\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-F07/PSP-F10

Soil Boring Log

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
Weather Conditions: Cloudy, 85F

Logger: A. Westhuis
Editor: A. Westhuis

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	SD	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\NOV\I-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-F07/PSP-F10

Soil Boring Log

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: Cloudy, 85F

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	SD	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	SD	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	SD	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\-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-F07/PSP-F10

Soil Boring Log

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: Cloudy, 85F

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\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-F08/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: Sunny, 80F

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\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-F08/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: Sunny, 80F

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\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-F08/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: Sunny, 80F

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\NOV\I-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-F08/PSP-F09

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: A. Westhuis and S. Presswood
Editor: K. Donahue
Weather Conditions: Sunny, 80F

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\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-F09/PSP-F08

Soil Boring Log

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: Sunny, 76F

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\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-F09/PSP-F08

Soil Boring Log

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

Date Started: 08/08/2019
Date Completed: 08/08/2019
Weather Conditions: Sunny, 76F

Logger: S. Presswood
Editor: K. Donahue

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		(32.0-36.0') SILT; nonplastic to low plasticity, rapid dilatancy; and SAND, very fine; stiff; wet; brown (10YR 5/3).		
33					0.0				
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\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-F09/PSP-F08

Soil Boring Log

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: Sunny, 76F

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\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

Soil Boring Log

Boring No.: AS-19-F09/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: Sunny, 76F

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\I-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-F10/PSP-F07

Soil Boring Log

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: Sunny, 73F

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\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-F10/PSP-F07

Soil Boring Log

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: Sunny, 73F

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\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-F10/PSP-F07

Soil Boring Log

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: Sunny, 73F

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\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-F10/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: Sunny, 73F

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\I-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-F11/PSP-F06

Soil Boring Log

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: Sunny, 78F

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\OFFICEDATA\NOVI-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-F11/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: Sunny, 78F

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\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-F11/PSP-F06

Soil Boring Log

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: Sunny, 78F

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\I-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-F11/PSP-F06

Soil Boring Log

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: Sunny, 78F

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\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-F12/PSP-F05

Soil Boring Log

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: Cloudy, 82F

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: 451120.2
East Coor: 13065033.0

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\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

Soil Boring Log

Boring No.: AS-19-F12/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: Cloudy, 82F

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\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-F12/PSP-F05

Soil Boring Log

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

Date Started: 08/10/2019
Date Completed: 08/10/2019
Weather Conditions: Cloudy, 82F

Logger: S. Presswood
Editor: K. Donahue

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\-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-F12/PSP-F05

Soil Boring Log

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: Cloudy, 82F

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\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-G01/AS-17-05

Soil Boring Log

Sheet: 1 of 3

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started: _____ Logger: Alex Villhauer
Date Completed: _____ Editor: _____
Weather Conditions: _____

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			24	RC			(0 - 0.9') Concrete		
2							(0.9 - 3') Sand, fine to medium; trace pebble, subrounded; well sorted; moist; loose; dark yellowish brown (10YR 4/4); fill		
3									
4					0.2		(3 - 4') Concrete		
5							(4 - 13') Sand, fine to medium; trace pebble, subrounded; well sorted; moist to wet; loose; dark yellowish brown (10YR 4/4); alluvium; some silt		
6			96	RC	0.0				
7					0.2				
8					0.3				
9									
10									
11					0.2				
12									
13									
14					0.0		(13 - 18') Clay, medium plasticity, no dilatancy; trace pebble, subangular; trace sand, fine to coarse, subangular; moist; medium stiff to soft; dark grayish brown / dark yellowish brown (10YR 4/2); till		
15			120	RC	0.1				
16					0.0				
17									
18									
19							(18 - 22') Sand, fine to medium, subangular; trace pebble, subrounded; some silt, non plastic; well sorted; wet; loose to medium dense; grayish brown (10YR 5/2); outwash		
20									
21									
22					0.0				
23							(22 - 29') Clay, medium plasticity, no dilatancy; trace pebble, subangular; trace sand, fine to coarse, subangular; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
24					0.0				
25			120	RC	0.1				
26					0.0				
27									
28					0.0				
29									
30							(29 - 40') Sand, fine to medium; well sorted; dry; loose; pale brown (10YR 6/3); outwash		
31									
32					0.0				
33									
34					0.0				
35									

Drilling Co.: _____
Driller: _____
Drilling Method: _____
Drilling Fluid: _____
Remarks: _____

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

SOIL BORING LOG_2013 C:\USERS\DROST\DESKTOP\RACER LANSING PLOG EXPORTS\RACER LANSING PLOG BORINGS.GPJ ARCADIS.GDT 11/20/17

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G01/AS-17-05

Soil Boring Log

Project Name: RACER Lansing
Date Started: _____ Logger: Alex Villhauer
Project Number: B0064479.2017.00501
Date Completed: _____ Editor: _____
Project Location: 2801 W. Saginaw Street, Michigan
Weather Conditions: _____

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
36			120	RC	0.0				
37					0.0				
38					0.1				
39									
40									
41					0.0		(40 - 47') Silt, low plasticity, slow dilatancy; trace pebble, subangular; little sand, fine to coarse, subangular; moist; stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
42									
43									
44					0.0				
45			120	RC	0.1				
46					0.0				
47									
48					0.0		(47 - 49.5') Sand, fine to medium; well sorted; dry; medium dense to dense; light gray (10YR 7/1) to pale brown (10YR 6/3); Coarsening upwards		
49									
50							(49.5 - 60') Silt, non plastic, no dilatancy; trace pebble, subangular to angular; some sand, fine to coarse, subangular; dry; stiff; dark gray (10YR 4/1); till; Note: Trace small to large fragments of sandstone with interbedded shale starting at 51ft bgs.		
51					0.0				
52									
53									
54					0.0				
55			48	RC	0.0				
56					0.0				
57									
58					0.0				
59									
60									
61							(60 - 65'); moist; hard; gray (10YR 5/1); Sandstone, sparse interbedded shale.		
62					0.0				
63									
64					0.0				
65			72	RC	0.0				
66					0.0		(65 - 68'); moist; hard; gray (10YR 5/1); Sandstone.		
67									
68					0.0				
69							(68 - 84'); moist; hard; gray (10YR 5/1); Sandstone, sparse interbedded shale. Note: Poor recovery from 60-70ft bgs. Some sample likely washed out.		
70									
71									
72					0.0				

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G01/AS-17-05

Soil Boring Log

Sheet: 3 of 3

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started:
Date Completed:
Weather Conditions:

Logger: Alex Villhauer
Editor:

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
73									
74					0.0				
75			114	RC	0.0				
76					0.0				
77									
78					0.0				
79									
80									
81									
82			24	RC	0.0				
83									
84									
					0.0		End of Boring at 84.0 'bgs.		
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									

SOIL BORING LOG_2013 C:\USERS\DROST\DESKTOP\RACER LANSING PLOG EXPORTS\RACER LANSING PLOG BORINGS.GPJ ARCADIS.GDT 11/20/17

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G02/AS-17-04

Soil Boring Log

Sheet: 1 of 3

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started:
Date Completed: 11/15/2017

Logger: Alex Villhauer
Editor:
Weather Conditions:

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			24	RC			(0 - 0.9') Concrete		
2							(0.9 - 4') Sand, fine to medium; trace pebble, subrounded; well sorted; moist; loose; dark yellowish brown (10YR 4/4); fill		
3									
4					0.2		(4 - 4.4') Concrete		
5							(4.4 - 5') Sand, fine to medium; trace pebble, subrounded; well sorted; moist; loose; dark yellowish brown (10YR 4/4); fill		
6			96	RC	0.1				
7					0.2		(5 - 6.2') Concrete; Light green		
8							(6.2 - 10') Wood; Vertical pile		
9					0.2				
10									
11							(10 - 10.5') Silt, non plastic, slow dilatancy; little sand, fine; wet; very dark brown / dusky yellowish brown (10YR 2/2); organic odor; some organics		
12					0.0		(10.5 - 11.5') Clay, high plasticity; trace sand, fine; moist; soft; very dark gray (10YR 3/1)		
13									
14					0.0		(11.5 - 12.2') And Silt Clay, low plasticity, slow dilatancy; trace sand, fine to medium; moist; soft; very dark gray (10YR 3/1)		
15			120	RC	0.0		(12.2 - 20') Clay, low plasticity, no dilatancy; trace pebble, subangular; trace sand, fine to coarse, subangular; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
16					0.0				
17									
18					0.0				
19									
20									
21							(20 - 25') Clay, low plasticity, no dilatancy; trace pebble, subangular; trace sand, fine to coarse, subangular; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
22					0.0				
23									
24					0.0				
25			120	RC	0.0				
26					0.0		(25 - 26') And Clay Sand, fine to coarse, subrounded; little pebble, subrounded; poorly sorted; moist; loose; dark grayish brown / dark yellowish brown (10YR 4/2)		
27							(26 - 27') Clay, low plasticity, no dilatancy; trace pebble, subangular; trace sand, fine to coarse, subangular; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
28					0.0				
29							(27 - 27.4') Sand, fine to medium; well sorted; moist; loose; brown (10YR 5/3)		
30									
31							(27.4 - 30') Clay, low plasticity, no dilatancy; trace pebble, subangular; trace sand, fine to coarse, subangular; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
32					0.0				
33							(30 - 34') And Silt Clay; trace pebble, subangular to angular; trace sand, fine to coarse, subangular; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
34					0.0				
35							(34 - 34.7') Silt, non plastic, rapid dilatancy; trace granule,		

Drilling Co.:
Driller:
Drilling Method:
Drilling Fluid:
Remarks:

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

SOIL BORING LOG_2013 C:\USERS\DROST\DESKTOP\RACER LANSING PLOG EXPORTS\RACER LANSING PLOG BORINGS.GPJ ARCADIS.GDT 11/20/17

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G02/AS-17-04

Soil Boring Log

Sheet: 2 of 3

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started:
Date Completed: 11/15/2017

Logger: Alex Villhauer
Editor:
Weather Conditions:

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
36			120	RC	0.0		subangular; little sand, fine to medium; dry; stiff; dark gray (10YR 4/1); till		
37					0.0		(34.7 - 36') Sand, medium; well sorted; dry; medium dense; dark brown (10YR 3/3)		
38					0.0		(36 - 37.5') Sand, fine; well sorted; dry; dense; light brownish gray / pale yellowish brown (10YR 6/2)		
39							(37.5 - 40') Sand, fine to medium; well sorted; dry; loose; pale brown (10YR 6/3)		
40									
41					0.0		(40 - 41') Sand, fine; some silt, no dilatancy; well sorted; dry; medium dense; brown (10YR 5/3)		
42							(41 - 43') Sand, fine to medium; well sorted; dry; loose; pale brown (10YR 6/3)		
43									
44					0.0		(43 - 46') Silt, low plasticity, slow dilatancy; trace pebble, subangular; little sand, fine to coarse, subangular; moist; stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
45			120	RC	0.0				
46					0.0				
47							(46 - 48') Sand, fine to medium; well sorted; dry; medium dense to dense; light gray (10YR 7/1) to pale brown (10YR 6/3); Coarsening upwards		
48					0.0				
49							(48 - 49') Silt, non plastic, slow dilatancy; little sand, fine; dry; stiff; grayish brown (10YR 5/2)		
50							(49 - 50') Silt, low plasticity, slow dilatancy; trace pebble, subangular; little sand, fine to coarse, subangular; moist; stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
51									
52					0.0		(50 - 53') Silt, non plastic, no dilatancy; trace pebble, subangular to angular; some sand, fine to coarse, subangular; dry; stiff; dark gray (10YR 4/1); till		
53									
54					0.0		(53 - 59.5') Silt, non plastic, no dilatancy; trace pebble, fine, subangular to angular; some sand, fine to coarse, subangular; trace cobbles, subangular to angular; dry; very stiff; dark gray (10YR 4/1); till		
55			120	RC	0.0				
56					0.0				
57									
58					0.0				
59									
60							(59.5 - 60'); dry; gray (10YR 5/1); weathered rock; Interbedded sandstone and shale		
61							(60 - 66'); No recovery. Washout		
62									
63									
64									
65			48	RC					
66					0.0		(66 - 70'); moist; hard; gray (10YR 5/1); Sandstone, sparse interbedded shale		
67									
68					0.0				
69									
70									
71							(70 - 73'); moist; hard; gray (10YR 5/1); Sandstone		
72					0.0				

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G02/AS-17-04

Soil Boring Log

Sheet: 3 of 3

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started:
Date Completed: 11/15/2017

Logger: Alex Villhauer
Editor:
Weather Conditions:

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
73									
74					0.0		(73 - 78.5'); moist; hard; gray (10YR 5/1); Sandstone, sparse interbedded shale		
75			96	RC	0.0				
76					0.0				
77									
78					0.0				
79							(78.5 - 80'); moist; hard; very dark gray (10YR 3/1); Shale		
80									
81							(80 - 83.4'); moist; hard; very dark gray (10YR 3/1); Shale with thin (1cm) sandstone bands at 81.5 ft, 82.9ft, 83.0ft, and 81.2 ft		
82			44.4	RC	0.0				
83									
84							(83.4 - 83.7'); moist; hard; gray (10YR 5/1); Sandstone		
85							End of Boring at 83.7 'bgs.		
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G03/AS-17-03

Soil Boring Log

Sheet: 1 of 3

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started: _____ Logger: Alex Villhauer
Date Completed: 11/14/2017 Editor: _____
Weather Conditions: Overcast 36 degrees

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			9.6	RC			(0 - 0.8') Concrete		
2			14.4	RC	0.0		(0.8 - 2') Sand, fine to medium; trace pebble, subrounded; well sorted; moist; loose; dark yellowish brown (10YR 4/4); fill		
3					0.0		(2 - 5.7') Sand, fine to medium; trace pebble, subrounded; well sorted; moist; loose; dark yellowish brown (10YR 4/4); fill		
4									
5					0.1				
6			80.4	RC			(5.7 - 6.2') Concrete		
7					0.0		(6.2 - 8.8') Sand, fine to coarse, subangular; trace pebble, subrounded; poorly sorted; moist; medium dense; dark yellowish brown (10YR 4/4)		
8									
9							(8.8 - 9') And Silt Sand, fine; moist; black (10YR 2/1); Organics		
10							(9 - 12.5') Peat; no dilatancy; moist; Spongy; very dark brown / dusky yellowish brown (10YR 2/2)		
11					0.0				
12									
13					0.0		(12.5 - 14') Clay, medium plasticity, no dilatancy; moist; soft; dark grayish brown / dark yellowish brown (10YR 4/2)		
14			120	RC	0.0				
15					0.0		(14 - 18.4') Clay, high plasticity, no dilatancy; moist; soft; gray (10YR 5/1)		
16									
17									
18					0.0				
19							(18.4 - 19') Sand, fine to coarse, subangular; little pebble, subrounded; poorly sorted; moist; loose; grayish brown (10YR 5/2)		
20									
21					0.1		(19 - 19.5') Sand, fine to coarse, subangular; little pebble, subrounded; poorly sorted; moist; loose; grayish brown (10YR 5/2)		
22									
23					0.1		(19.5 - 27.5') Clay, low plasticity, no dilatancy; trace pebble, subangular to angular; trace sand, fine; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
24			120	RC	0.0				
25					0.0				
26									
27					0.0				
28							(27.5 - 28') Silt, non plastic, slow dilatancy; trace pebble, angular; trace sand, fine; wet; stiff; dark grayish brown / dark yellowish brown (10YR 4/2)		
29									
30							(28 - 29') Sand, fine to medium; well sorted; moist; grayish brown (10YR 5/2)		
31					0.0		(29 - 31') Sand, fine to medium; well sorted; moist; grayish brown (10YR 5/2)		
32							(31 - 32.5') And Pebble Sand, fine to coarse, subrounded; poorly sorted; moist; dark grayish brown / dark yellowish brown (10YR 4/2)		
33					0.0				
34			120	RC	0.0		(32.5 - 34.2') And Sand Silt, fine, non plastic, slow dilatancy; moist; medium stiff; dark grayish brown / dark yellowish brown (10YR 4/2)		
35									

Drilling Co.: _____
Driller: _____
Drilling Method: _____
Drilling Fluid: _____
Remarks: _____

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

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ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G03/AS-17-03

Soil Boring Log

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started:
Date Completed: 11/14/2017

Logger: Alex Villhauer
Editor:
Weather Conditions: Overcast 36 degrees

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
36					0.0		(34.2 - 35') And Pebble Sand, fine to coarse, subrounded; poorly sorted; moist; dark grayish brown / dark yellowish brown (10YR 4/2)		
37					0.0		(35 - 39') And Silt Clay, low plasticity, no dilatancy; trace pebble, subangular to angular; trace sand, fine to medium; moist; stiff; dark grayish brown / dark yellowish brown (10YR 4/2); till		
38									
39									
40							(39 - 45') Silt, non plastic, rapid dilatancy; trace pebble, subangular to angular; some sand, fine to medium; trace cobbles, subangular; moist; very stiff; very dark grayish brown (10YR 3/2); till		
41					0.0				
42									
43					0.0				
44			66	RC	0.0				
45					0.0				
46							(45 - 49') Sand, fine to medium; well sorted; dry; medium dense; grayish brown (10YR 5/2)		
47					0.1				
48									
49									
50							(49 - 51.5') Silt, non plastic, rapid dilatancy; trace pebble, subangular to angular; some sand, fine to medium; trace cobbles, subangular; moist; very stiff; very dark grayish brown (10YR 3/2); till		
51					0.1				
52							(51.5 - 51.8') Sand, fine to medium; well sorted; dry; medium dense; grayish brown (10YR 5/2)		
53					0.1		(51.8 - 52.7') Silt, non plastic, rapid dilatancy; trace pebble, subangular to angular; some sand, fine to medium; trace cobbles, subangular; moist; very stiff; very dark grayish brown (10YR 3/2); till		
54			120	RC	0.1				
55					0.1		(52.7 - 53') Sand, fine to medium; well sorted; dry; medium dense; grayish brown (10YR 5/2)		
56							(53 - 59') Silt, low plasticity, slow dilatancy; trace pebble, subangular to angular; some sand, fine; trace cobbles, angular; dry; very stiff; very dark grayish brown (10YR 3/2); till		
57					0.1				
58									
59									
60							(59 - 62.5') Silt, low plasticity, slow dilatancy; trace pebble, subangular to angular; some sand, fine; trace boulders; trace cobbles, angular; dry; very stiff; very dark grayish brown (10YR 3/2); till; Sandstone boulder from 59.8-62 ft bgs		
61					0.1				
62									
63			84	RC	0.1		(62.5 - 63.5'); dry; gray (10YR 5/1); weathered rock; Interbedded sandstone and shale		
64					0.1		(63.5 - 64.8'); dry; very dark gray (10YR 3/1); weathered rock; shale		
65									
66					0.1		(64.8 - 66'); dry; gray (10YR 5/1); weathered rock; Interbedded sandstone and shale		
67							(66 - 68.5'); dry; gray (10YR 5/1); weathered rock; Fine sandstone		
68			36	RC	0.0				
69									
70					0.0		(68.5 - 70'); dry; dark gray (10YR 4/1); weathered rock; Interbedded sandstone and shale		
71							(70 - 75'); No recovery. Washout		
72									

SOIL BORING LOG_2013 C:\USERS\IDROST\DESKTOP\RACER LANSING PLOG EXPORTS\RACER LANSING PLOG BORINGS.GPJ ARCADIS.GDT 11/20/17

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G03/AS-17-03

Soil Boring Log

Sheet: 3 of 3

Project Name: RACER Lansing
Project Number: B0064479.2017.00501
Project Location: 2801 W. Saginaw Street, Michigan

Date Started:
Date Completed: 11/14/2017

Logger: Alex Villhauer
Editor:
Weather Conditions: Overcast 36 degrees

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
73									
74									
75			60	RC	0.0		(75 - 76'); moist; hard; very dark gray (10YR 3/1); Shale		
76									
77					0.0		(76 - 80'); moist; hard; gray (10YR 5/1); Sandstone, sparse interbedded shale		
78									
79					0.0				
80									
81			20.4	RC			(80 - 83.5'); moist; hard; gray (10YR 5/1); Sandstone, sparse interbedded shale		
82									
83									
84							End of Boring at 83.5 'bgs.		
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									

SOIL BORING LOG_2013 C:\USERS\IDROST\DESKTOP\RACER LANSING PLOG EXPORTS\RACER LANSING PLOG BORINGS.GPJ ARCADIS.GDT 11/20/17

ARCADIS Design & Consultancy for natural and built assets

Boring No.: AS-19-G04/PSP-G01

Soil Boring Log

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: Sunny, 90F

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\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-G04/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: Sunny, 90F

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\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-G04/PSP-G01

Soil Boring Log

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: Sunny, 90F

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\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-G04/PSP-G01

Soil Boring Log

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: Sunny, 90F

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\-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-G05/ASP-G02

Soil Boring Log

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: Sunny, 75F

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\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-G05/ASP-G02

Soil Boring Log

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: Sunny, 75F

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\I-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-G05/ASP-G02

Soil Boring Log

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: Sunny, 75F

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\I-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-G05/ASP-G02

Soil Boring Log

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: Sunny, 75F

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\-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-G06/ASP-G03

Soil Boring Log

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: Sunny, 90F

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\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-G06/ASP-G03

Soil Boring Log

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: Sunny, 90F

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\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-G06/ASP-G03

Soil Boring Log

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
Weather Conditions: Sunny, 90F

Logger: A. Westhuis
Editor: A. Westhuis

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\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-G06/ASP-G03

Soil Boring Log

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: Sunny, 90F

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\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-G07/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: Sunny, 77F

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\OFFICEDATA\NOVI-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-G07/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: Sunny, 77F

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\I-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-G07/CSP-G02

Soil Boring Log

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: Sunny, 77F

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 to moist; 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\I-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-G07/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: Sunny, 77F

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		(68.0-70.0') 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\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-G08/PSP-G02

Soil Boring Log

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: Partly Cloudy, 80F

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\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-G08/PSP-G02

Soil Boring Log

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: Partly Cloudy, 80F

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, some silt, medium to high plasticity, no dilatancy; 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\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-G08/PSP-G02

Soil Boring Log

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: Partly Cloudy, 80F

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, some silt, medium to high plasticity, no dilatancy; 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\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-G08/PSP-G02

Soil Boring Log

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: Partly Cloudy, 80F

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\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-G09/PSP-G03

Soil Boring Log

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: Partly Cloudy, 80F

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\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-G09/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: Partly Cloudy, 80F

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\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-G09/PSP-G03

Soil Boring Log

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: Partly Cloudy, 80F

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\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-G09/PSP-G03

Soil Boring Log

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: Partly Cloudy, 80F

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				
73					0.0		(72.0-75.0') SANDSTONE, very fine, well sorted; light gray (10YR 7/2). Note: Highly competent.		
74					0.0				
75			120		0.0				
76					0.0		(75.0-76.5') SHALE; dark gray (10YR 4/1). Note: Highly competent.		
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\I-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-G10/PSP-G04

Soil Boring Log

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: Cloudy, 70F

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; trace large pebbles; subrounded to subangular; poorly sorted; brown (10YR 5/3). Note: Fill.		
2					0.0				
3			60		0.0				
4					0.0				
5					0.0				
6					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			60		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					0.0				
12					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).		
13					0.0		(12.0-20.0') CLAY, medium plasticity, slow dilatancy; some sand; some large pebbles, subrounded; poorly sorted; dark gray (10YR 4/1).		
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: 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\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-G10/PSP-G04

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

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\I-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-G10/PSP-G04

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
Weather Conditions: Cloudy, 70F

Logger: A. Westhuis
Editor: K. Donahue

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\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-G10/PSP-G04

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

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\I-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.: ASP-B04

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: Partly Cloudy, 75F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			84		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					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			120		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					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\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.: ASP-B04

Soil Boring Log

Sheet: 2 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: Partly Cloudy, 75F

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\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.: 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: Partly Cloudy, 75F

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\I-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.: 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: Partly Cloudy, 75F

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\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.: 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: Partly cloudy, 70F

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; little silt; trace granules to small pebbles, subrounded; 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\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.: ASP-C02

Soil Boring Log

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: Partly cloudy, 70F

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\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.: ASP-C02

Soil Boring Log

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: Partly cloudy, 70F

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		(44.0-47.5') SAND, very fine to fine, subrounded; and SILT; poorly sorted; dry; light brownish gray (10YR 6/2).		
45					0.0				
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)		
49					0.0		(49.0-50.0') SAND, medium; little coarse sand to pebbles, subangular; trace to little silt; little clay, nonplastic, no dilatancy; poorly sorted; dry; brown (10YR 5/3).		
50					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).		
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		(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\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.: 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: Partly cloudy, 70F

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				
71					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.		
72					0.0				
73					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.		
74				ASP-C02(72-77) (082219) @ 1345	0.0		(73.0-76.0') SANDSTONE, very fine, well sorted; light gray (10YR 7/1). Note: Trace fine shale laminations, highly competent.		
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. 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\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.: ASP-D01

Soil Boring Log

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: Cloudy 71F

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: 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\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.: ASP-D01

Soil Boring Log

Sheet: 2 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: Cloudy 71F

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\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.: ASP-D01

Soil Boring Log

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: Cloudy 71F

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. Note: Highly weathered. Trace interbedded shale, gray (10YR 5/1).		
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\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.: ASP-D01

Soil Boring Log

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: Cloudy 71F

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\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.: ASP-D04

Soil Boring Log

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: Cloudy, 64F

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\OFFICEDATA\NOVI-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.: 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: Cloudy, 64F

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\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.: ASP-D04

Soil Boring Log

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: Cloudy, 64F

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. Note: Poor recovery from 57.0-66.0' bgs.		
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).		
61					0.0				
62			31		0.0				
					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.: 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: Cloudy, 64F

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).		
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\I-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.: 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: Partly Cloudy, 85F

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\-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.: ASP-G01

Soil Boring Log

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: Partly Cloudy, 85F

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\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.: ASP-G01

Soil Boring Log

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: Partly Cloudy, 85F

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 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.: ASP-G01

Soil Boring Log

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: Partly Cloudy, 85F

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			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.		
69					0.0				
70					0.0				
71			120		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					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\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.: CSP-B01

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: None

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\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.: CSP-B01

Soil Boring Log

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: None

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\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.: 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: None

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		(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\I-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.: 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: None

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		(72.0-74.0') SANDSTONE, very fine, subrounded, well sorted; light gray (10YR 7/2). Note: Moderately competent.		
73					0.0				
74					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.		
75					0.0				
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\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.: CSP-D01

Soil Boring Log

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: Cloudy, 63

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\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.: 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: Cloudy, 63

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\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.: CSP-D01

Soil Boring Log

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: Cloudy, 63

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		(58.0-63.0') SILT, nonplastic, rapid dilatancy; and SAND, very fine, subrounded; some small to large pebbles; stiff; dry; gray (10YR 5/1). Note: Some fragments of sandstone intermixed.		
59					0.0				
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\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.: 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: Cloudy, 63

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') WEATHERED SHALE, very dark gray (10YR 3/1) with some fine sandstone laminations. Note: Highly weathered. Little competency.		
65					0.0		(64.0-65.5') WEATHERED 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\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.: MW-19-109

Soil Boring Log

Sheet: 1 of 5

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

Date Started: 05/30/2019
Date Completed: 05/30/2019

Logger: S. Presswood
Editor: S. Presswood

Weather Conditions: Cloudy, 70F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
1					0.0		(0.0-0.5') CONCRETE.	(0.0-1.0' bgs) Cement
					0.0		(0.5-3.0') SILT, trace clay, low plasticity, slow dilatancy; trace very fine sand; wet; brown (10YR 4/3).	
2					0.0			
3			60		0.0		(3.0-6.0') SAND, fine to medium; and SILT, some clay, low plasticity, rapid dilatancy; well sorted; dry; brown (10YR 5/3).	
4					0.0			
5					0.0			
6					0.0		(6.0-8.5') CLAY, some silt, low plasticity, slow dilatancy; stiff; dry; brown (10YR 4/3).	(-3.0-85.0' bgs) 2" Sch 40 PVC Well Casing
7					0.0			
8			60		0.0			
9					0.0		(8.5-10.0') CLAY, little silt, medium plasticity, slow dilatancy; trace granules, subrounded to subangular; stiff; dry; brown (10YR 5/3).	
10					0.0			(1.0-81.0' bgs) Bentonite Quick Grout
11					0.0		(10.0-15.5') SILT, trace clay, low plasticity, rapid dilatancy; stiff; dry; dark grayish brown (10YR 4/2).	
12					0.0			
13					0.0			
14					0.0			
15			120		0.0			
16					0.0		(15.5-17.5') SAND, very fine to fine; and SILT; well sorted; dry; light brownish gray (10YR 6/2).	
17					0.0			
18					0.0		(17.5-23.0') SAND, fine to medium; well sorted; dry; very pale brown (10YR 7/4).	
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:

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\OFFICE\DATA\NOV\I-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.: MW-19-109

Soil Boring Log

Sheet: 2 of 5

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

Date Started: 05/30/2019
Date Completed: 05/30/2019

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(17.5-23.0') SAND, fine to medium; well sorted; dry; very pale brown (10YR 7/4).		
22					0.0				
23					0.0				
24					0.0		(23.0-29.0') SAND, very fine; well sorted; dry; grayish brown (10YR 5/2).		
25			120		0.0				
26					0.0				
27					0.0				
28					0.0				
29					0.0				
30					0.0		(29.0-31.0') SAND, very fine to medium; poorly sorted; dry; dark gray (10YR 4/1).	(1.0-81.0' bgs) Bentonite Quick Grout	
31					0.0				
32					0.0		(31.0-34.0') CLAY, trace silt, high plasticity, low dilatancy; trace granules, subrounded to subangular; medium stiff; dry; gray (10YR 5/1).		
33					0.0				
34					0.0				
35			120		0.0		(34.0-42.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/2).		
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\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.: MW-19-109

Soil Boring Log

Sheet: 3 of 5

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

Date Started: 05/30/2019
Date Completed: 05/30/2019

Logger: S. Presswood
Editor: S. Presswood
Weather Conditions: Cloudy, 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		(42.0-42.5') SAND, very fine; well sorted; dry; brown (10YR 4/3).		
44					0.0		(42.5-46.0') SAND, very fine to coarse; trace granules, subrounded to subangular; poorly sorted; dry; brown (10YR 4/3).		
45			120		0.0				
46					0.0		(46.0-57.0') SAND, very fine to fine; well sorted; dry; light gray (10YR 7/2).		
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51					0.0				
52					0.0			(1.0-81.0' bgs) Bentonite Quick Grout	
53					0.0				
54					0.0				
55			120		0.0				
56					0.0				
57					0.0				
58					0.0		(57.0-58.0') SAND, very fine; well sorted; dry; gray (10YR 5/1).		
59					0.0		(58.0-68.5') SAND, very fine to fine; well sorted; moist; brown (10YR 5/3).		
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\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.: MW-19-109

Sheet: 4 of 5

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

Date Started: 05/30/2019
Date Completed: 05/30/2019

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
64					0.0		(58.0-68.5') SAND, very fine to fine; well sorted; moist; brown (10YR 5/3).		
65			120		0.0				
66					0.0				
67					0.0				
68					0.0				
69					0.0		(68.5-83.0') SILT, nonplastic, rapid dilatancy; trace very fine sand; stiff; dry; dark gray (10YR 4/2).		
70					0.0				
71					0.0			(1.0-81.0' bgs) Bentonite Quick Grout	
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			(81.0-83.0') Choker Sand	
83					0.0				
84			96		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-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.: MW-19-109

Sheet: 5 of 5

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

Date Started: 05/30/2019
Date Completed: 05/30/2019

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
85					0.0		(83.0-86.5') WEATHERED SANDSTONE, very fine to fine; well sorted; loosely consolidated; wet; light gray (10YR 7/1). Note: Little consolidated pieces of sandstone in soft sand matrix.	(83.0-92.0' bgs) K&E 00 Filter Pack Sand (85.0-90.0') 2" Stainless Steel 10-Slot Well Screen	
86					0.0				
87					0.0		(86.5-91.0') SANDSTONE, very fine to fine; well sorted; wet; light gray (10YR 7/1). Note: Increase in competency and decrease in weathering at 86.5' bgs.		
88					0.0				
89			36		0.0				
90					0.0				
91					0.0		End of boring at 91.0' bgs.		
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\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.: 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: Sunny, 85F

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\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.: 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: Sunny, 85F

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\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.: 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: Sunny, 85F

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		(47.0-56.0') SAND, very fine; some silt; well sorted; dry; light brownish gray (10 YR 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		(56.0-65.0') 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\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.: PSP-B05

Soil Boring Log

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: Sunny, 85F

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\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.: PSP-C01

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: 08/27/2019

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details
							(0.0-47.0') Blind drilled.	(0.0-1.0' bgs) Cement (-3.0-72.5' bgs) 2" Sch 40 PVC Well Casing (4.0-68.5' bgs) Bentonite Quick Grout

3' Stick Up Stainless Steel Protective Casing

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\-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.: 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: Cloudy, 75F

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\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.: PSP-C01

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: 08/27/2019
Logger: A. Westhuis
Editor: K. Donahue
Weather Conditions: Cloudy, 75F

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		(47.0-52.5') 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			(4.0-68.5' bgs) Bentonite Quick Grout	
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\I-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.: 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: Cloudy, 75F

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\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.: PSP-C02

Soil Boring Log

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: Sunny, 70F

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\OFFICEDATA\NOVI-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.: PSP-C02

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: Sunny, 70F

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\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.: PSP-C02

Soil Boring Log

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: Sunny, 70F

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\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.: 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: Sunny, 70F

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					0.0				
71			84		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. 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\OFFICE\DATA\NOV\I-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.: 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: Cloudy, Rain, 75F

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, little silt, medium to high plasticity, no dilatancy; trace 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, little silt, high plasticity, no dilatancy; 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\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.: PSP-C03

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: Cloudy, Rain, 75F

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, some silt, medium to high plasticity, no dilatancy; 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		(27.0-32.0') CLAY, little silt, high plasticity, no dilatancy; little to trace granules to very large pebbles, subrounded; trace fine sand, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
28					0.0				
29					0.0				
30					0.0				
31					0.0				
32			120		0.0		(32.0-40.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light brown (10YR 7/1).		
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		(40.0-42.0') CLAY, some silt, low plasticity, no dilatancy; 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\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.: PSP-C03

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: 09/03/2019

Logger: A. Westhuis
Editor: C. Weaver
Weather Conditions: Cloudy, Rain, 75F

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, 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: 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\I-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.: 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: Cloudy, Rain, 75F

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\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.: 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
Logger: A. Westhuis
Editor: C.Weaver
Weather Conditions: Sunny, 75F

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\OFFICEDATA\NOVI-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.: 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: Sunny, 75F

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\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.: PSP-C04

Soil Boring Log

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: Sunny, 75F

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		(47.0-58.0') 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.		
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		(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.		
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\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.: 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: Sunny, 75F

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). Note: Heavily weathered, no competency.		
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\I-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.: 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: Sunny, 75F

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\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.: 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: Sunny, 75F

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\I-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.: 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: Sunny, 75F

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									
48					0.0		(47.0-49.0') CLAY, some silt; low plasticity to nonplastic, no dilatancy; some very fine to fine sand, 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.		
49					0.0				
50					0.0		(49.0-50.0') SAND, fine, subrounded; little silt; well sorted; dry; light brownish gray (10YR 6/2).		
51					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.		
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\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.: 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: Sunny, 75F

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). Note: Many small fragments of interbedded sandstone and shale. No competency.		
65					0.0		(63.5-68.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). 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\I-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.: 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: Partly cloudy, 80F

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\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.: PSP-C06

Soil Boring Log

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: Partly cloudy, 80F

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\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.: PSP-C06

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: Partly cloudy, 80F

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\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

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: Partly cloudy, 80F

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\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.: 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: Sunny, 80F

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\OFFICEDATA\NOVI-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.: 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: Sunny, 80F

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\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.: PSP-C07

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: Sunny, 80F

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\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.: PSP-C07

Soil Boring Log

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: Sunny, 80F

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		(68.0-69.0') SHALE with little fine sandstone laminations. Note: Moderate to high competency. Some large cores.		
69					0.0		(69.0-70.0') SANDSTONE with some very fine shale laminations. Note: High competency. Large cores.		
70			72		0.0		(70.0-72.5') SHALE with little very fine sandstone laminations. Note: Many large cores. Highly competent.		
71					0.0				
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\I-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.: 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: Cloudy, 80F

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\OFFICEDATA\NOVI-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.: PSP-C08

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: Cloudy, 80F

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\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.: PSP-C08

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: Cloudy, 80F

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		(47.0-68.0') 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.		
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\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.: PSP-C08

Soil Boring Log

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: Cloudy, 80F

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\I-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.: 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: Cloudy, 70F

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\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

Soil Boring Log

Boring No.: PSP-C09

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: Cloudy, 70F

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		Note: Small, fine sand seam, wet, at 23.0' bgs.		
24					0.0				
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\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.: 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: Cloudy, 70F

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		(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.		
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		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\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.: 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: Cloudy, 70F

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\I-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.: 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: Rain, 55F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
							(0.0-44.0') Blind drilled.		

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\OFFICEDATA\NOVI-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.: 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: Rain, 55F

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\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.: PSP-C10

Soil Boring Log

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

Date Started: 09/09/2019
Date Completed: 09/09/2019
Weather Conditions: Rain, 55F

Logger: S. Johnson
Editor: C. Weaver

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					0.4		(44.0-45.5') SAND, very fine, subrounded; little clay; little small pebbles, subangular; poorly sorted; wet; dark gray (10YR 4/1).		
45					0.1		(45.5-46.0') SAND, very fine to fine, subrounded; trace small pebbles; moist; well sorted; pale brown (10YR 6/3).		
46					0.0		(46.0-49.0') SILT, some clay, medium plasticity, no dilatancy; dry; stiff; dark gray (10YR 4/1).		
47					0.0				
48					0.0				
49			120		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).		
50					0.0		(49.5-57.0') SILT, some clay, medium plasticity, no dilatancy; little small to large pebbles; dry; stiff; very dark gray (10YR 6/1).		
51					0.0				
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		(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.		
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\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.: 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: Rain, 55F

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		(77.5-84.0') SHALE; very dark gray (10YR 3/1); some fine sandstone laminations; gray (10YR 7/1). Note: Highly competent.		
79			120		0.0				
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\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.: 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: Rain, 55F

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\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.: PSP-C11

Soil Boring Log

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: 66F

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\OFFICEDATA\NOVI-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.: 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: 66F

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\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.: PSP-C11

Soil Boring Log

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: 66F

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, some clay, low to medium plasticity, no dilatancy; 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\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.: PSP-C11

Soil Boring Log

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: 66F

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\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.: 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: Sunny, 64F

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\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.: PSP-D02

Soil Boring Log

Sheet: 2 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: Sunny, 64F

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, some silt, medium to high plasticity, slow dilatancy; 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\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.: PSP-D02

Soil Boring Log

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: Sunny, 64F

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		(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).		
46					0.0		(46.0-47.0') SAND, fine to medium, trace coarse sand, subrounded to subangular; well sorted; dry; very loose; light gray (10YR 7/1).		
47									
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\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.: PSP-D02

Soil Boring Log

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: Sunny, 64F

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\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.: VAP-P2-ME106

Soil Boring Log

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: Cloudy, rain, 60F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
0					NA		(0.0-0.8') CONCRETE.		
1					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).		
2					0.0				
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\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.: 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: Cloudy, rain, 60F

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\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.: 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: Cloudy, rain, 60F

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\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.: VAP-P2-ME106

Sheet: 4 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: Cloudy, rain, 60F

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					0.0				
74			48	VAP-P2-ME106(71-76) (101419) @ 0815	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\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.: 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: none

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\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.: 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: none

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\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.: VAP-P2-MJ125

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: none

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\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.: 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: none

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\I-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.: VAP-P2-MQ114

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: Sunny, 70F

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\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.: 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: Sunny, 70F

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\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.: 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: Sunny, 70F

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\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.: VAP-P2-MQ114

Soil Boring Log

Sheet: 4 of 4

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

Date Started: 10/10/2019
Date Completed: 10/11/2019
Weather Conditions: Sunny, 70F

Logger: A. Westhuis
Editor: K. Donahue

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)(101[illegible]19) @ 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\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.: VAP-P2-MT92

Soil Boring Log

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: Cloudy, 45F

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					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			84		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\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.: VAP-P2-MT92

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: Cloudy, 45F

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		(28.5-44.0') SAND, very fine to fine, subrounded; trace to little 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\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.: VAP-P2-MT92

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: Cloudy, 45F

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\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.: 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: Cloudy, 45F

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\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.: 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: Sunny, 48F

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\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.: 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: Sunny, 48F

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\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.: 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: Sunny, 48F

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\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.: 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: Sunny, 48F

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			72		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					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\I-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.: 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: Sunny, 70F

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				
10			60		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).		
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, some silt, medium plasticity, slow dilatancy; 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\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.: VAP-P2-NC103

Sheet: 2 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: Sunny, 70F

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, some silt, medium plasticity, slow dilatancy; 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, little to some silt, high plasticity, slow dilatancy; 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\I-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.: 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: Sunny, 70F

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\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.: 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: Sunny, 70F

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') 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			60	VAP-P2-NC103(63-68)(092[illegible]19) @ 1115	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\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.: VAP-P2-NF97

Soil Boring Log

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: Rain, 63F

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\OFFICE\DATA\NOV\I-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.: 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: Rain, 63F

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\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.: VAP-P2-NF97

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: S. Johnson
Editor: K. Donahue
Weather Conditions: Rain, 63F

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				
53					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).		
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\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.: 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

Logger: S. Johnson
Editor: K. Donahue
Weather Conditions: Rain, 63F

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\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.: 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: Partly Cloudy, 67F

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 Protection Casing

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\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.: VAP-P2-NI108

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: Partly Cloudy, 67F

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\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.: VAP-P2-NI108

Soil Boring Log

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: Partly Cloudy, 67F

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; 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					0.0			(60.5-67.5') Bentonite Pellets.	
			67		0.0				

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-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.: VAP-P2-NI108

Soil Boring Log

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: Partly Cloudy, 67F

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).		
65					0.0			(60.5-67.5') Bentonite Pellets.	
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\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.: VAP-P2-NL100

Soil Boring Log

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: Sunny, 82F

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\NOVI-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.: VAP-P2-NL100

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: Sunny, 82F

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\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.: VAP-P2-NL100

Soil Boring Log

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

Date Started: 09/20/2019
Date Completed: 09/20/2019
Weather Conditions: Sunny, 82F

Logger: E. Redner
Editor: K. Donahue

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; dry; 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\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.: 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: Sunny, 82F

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\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.: VAP-P2-NU156

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: Cloudy, 60F

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		(1.5-4.0') 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			(-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		(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			

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-19-120.

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\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.: 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: Cloudy, 60F

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).		
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			(1.0-62.0' bgs) Bentonite Quick Grout	
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\NOV\I-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.: VAP-P2-NU156

Soil Boring Log

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: Cloudy, 60F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
42					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).		
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		(51.0-62.0') 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			(62.0-63.0') Bentonite Pellets	

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\I-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.: VAP-P2-NU156

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: Cloudy, 60F

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				
72							End of boring at 71.0' 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\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.: 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: Sunny, 72F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			50		0.0		(0.0-9.5') CONCRETE.		
2					0.0				
3					0.0				
4					0.0				
5					0.0				
6			50		0.0				
7					0.0				
8					0.0				
9					0.0				
10					0.0				
11			77		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).		
12					0.0				
13					0.0				
14					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\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

Soil Boring Log

Boring No.: VAP-P2-NX100

Sheet: 2 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: Sunny, 72F

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\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.: 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: Sunny, 72F

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\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BIOSPARGE\WELL INSTALLS\BORING LOGS\RACER LANSING PLANTS 2 AND 3 BIOSPARGE_062220.GPJ ARCADIS_2013.GDT 7/9/20

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: Sunny, 72F

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\I-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.: VAP-P2-OA135

Soil Boring Log

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: Cloudy, 50F

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 Riser

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\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.: 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: Cloudy, 50F

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\I-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.: 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: Cloudy, 50F

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\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

Soil Boring Log

Boring No.: 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: Cloudy, 50F

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\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.: 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: Cloudy, light rain, 50F

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			(1.0-55.0' 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			
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\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.: 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: Cloudy, light rain, 50F

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\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.: 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: Cloudy, light rain, 50F

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\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.: 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: Cloudy, light rain, 50F

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.		
							End of boring at 65.0' bgs.		
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\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.: 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: Cloudy, 60F

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			
11					0.1			(1.0-62.0' bgs) Bentonite Quick Grout
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\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.: VAP-P2-OQ129

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: Cloudy, 60F

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\I-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.: VAP-P2-OQ129

Soil Boring Log

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: Cloudy, 60F

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\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.: VAP-P2-OQ129

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: Cloudy, 60F

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\I-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.: 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: Cloudy, windy, 45F

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\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.: 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: Cloudy, windy, 45F

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).		
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			(1.0-62.0' bgs) Bentonite Quick Grout	
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\I-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.: VAP-P2-PG104

Soil Boring Log

Sheet: 3 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: Cloudy, windy, 45F

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\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.: VAP-P2-PG104

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: Cloudy, windy, 45F

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				
72							End of boring at 71.0' bgs.		
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\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.: 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\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-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\OFFICE\DATA\NOV\I-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

Soil Boring Log

Boring No.: VAP-P2-NU156

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\I-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.: 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			
11					0.1			(1.0-62.0' bgs) Bentonite Quick Grout
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		(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).		
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\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

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
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			(1.0-62.0' bgs) Bentonite Quick Grout	
52					0.0				
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\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

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\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

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

Boring No.: MW-19-122/VAP-P2-OM112

Soil Boring Log

Sheet: 3 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
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.		
							End of boring at 65.0' bgs.		
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.: 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

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
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

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
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

Soil Boring Log

Boring No.: MW-19-123/VAP-P2-PG104

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: 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).		
70					0.0			(66.0-71.0') 2" Stainless Steel 10-Slot Well Screen	
71			12		0.0				
72							End of boring at 71.0' 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

Boring No.: MW-19-124/VAP-P2-OA135

Soil Boring Log

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 Riser

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\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
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\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

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
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

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
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.: MW-19-125

Sheet: 1 of 3

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

Date Started: 11/12/2019
Date Completed: 11/14/2019

Logger: A.Westhuis
Editor: C. Cisco
Weather Conditions: 20° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1–40							(0.0-47.0') No lithology recorded. Blind drilled.	(0.0-100.0') 8.0" dia. drilled hole (0.0-100.0') Bentonite Grout (Portland Cement) (0.0-100.0') 4.0" dia. Permanent Steel Casing	

Drilling Co.: Cascade
Driller: Joe Lary III
Drilling Method: Sonic Drilling
Drilling Fluid: None
Remarks:

Sampling Method: 10.0' Sonic
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: 451381.7
East Coor: 13064453.2

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_040620.GPJ ARCADIS_2013.GDT 4/7/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-19-125

Soil Boring Log

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

Date Started: 11/12/2019
Date Completed: 11/14/2019
Logger: A.Westhuis
Editor: C. Cisco
Weather Conditions: 20° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
41							(0.0-47.0') No lithology recorded. Blind drilled.		
42									
43									
44									
45									
46									
47									
48					0.0		(47.0-49.0') SAND, very fine to fine, subrounded; some silt; well sorted; dry to moist; light brownish gray (10YR 6/2).		
49					0.0				
50					0.0		(49.0-58.0') SAND, fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		
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		(58.0-72.0') CLAY, nonplastic to low plasticity, no dilatancy; and SILT; trace sand, very fine to fine, subrounded; trace granules to large pebbles, subrounded; dry to moist; stiff to very stiff; grayish brown (10YR 5/2). Note: Trace small to large fragm		
60					0.0				
61					0.0				
62			120		0.0				
63					0.0				
64					0.0				
65					0.0		Note: Very stiff to hard at 64.0' bgs.		
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0				
72			84		0.0		(72.0-74.0') SANDSTONE, very fine, weathered, light gray (10YR 7/2); and SHALE, dark gray (10YR 4/1); well sorted. Note: Finely interbedded sandstone and shale, heavily weathered, no competency.		
73					0.0				
74					0.0		(74.0-75.0') SHALE; dark gray (10YR 4/1). Note: No weathering, highly competent.		
75					0.0				
76					0.0		(75.0-77.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/2). Note: No weathering, highly competent. Little fine shale laminations present.		
77					0.0				
78					0.0		(77.0-79.0') SHALE, dark gray (10YR 4/1). Note: Trace sandstone laminations present.		
79					0.0				
80					0.0		(79.0-81.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/2). Note: Little to trace shale laminations present.		
81					0.0				
82			120		0.0		(81.0-83.0') SHALE; dark gray (10YR 4/1).		

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_040620.GPJ ARCADIS_2013.GDT 4/7/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-19-125

Sheet: 3 of 3

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

Date Started: 11/12/2019
Date Completed: 11/14/2019

Logger: A.Westhuis
Editor: C. Cisco
Weather Conditions: 20° F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
84					0.0		Note: Trace sandstone laminations.		
85					0.0		(83.0-88.0') SANDSTONE, very fine; well sorted; light gray (10YR 4/2). Note: Trace shale laminations present.		
86					0.0				
87					0.0				
88					0.0				
89					0.0		(88.0-115.0') SANDSTONE, very fine; well sorted; light gray (10YR 7/2). Note: Some interbedded shale, dark gray (10YR 4/1) present.		
90					0.0				
91					0.0				
92			108		0.0				
93					0.0				
94					0.0				
95					0.0				
96					0.0				
97					0.0				
98			48		0.0				
99					0.0				
100					0.0				
101					0.0		Note: Tri-core bit used to open borehole from 100.0-115.0' bgs. Cuttings flushed out, used to record lithology.		
102					0.0				
103					0.0				
104					0.0			(100.0-115.0') 2.0" dia. Stainless-Steel 0.010-Slot Screen	
105					0.0				
106					0.0				
107					0.0				
108			0		0.0			(100.0-115.0') 3.0" dia. drilled hole, open borehole	
109					0.0				
110					0.0				
111					0.0				
112					0.0				
113					0.0				
114					0.0				
115					0.0				
116							End of boring at 115.0' bgs.		
117									
118									
119									
120									
121									
122									
123									
124									
125									

Remarks:

SOIL BORING LOG_2013 G:\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_040620.GPJ ARCADIS_2013.GDT 4/7/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-126 / SB-P2-LW84

Soil Boring Log

Sheet: 1 of 3

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

Logger: A.Westhuis
Editor: C. Cisco
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		(0.0-0.3') TOPSOIL/GRASS.		
2					0.0		(0.3-2.0') CLAY, low to medium plasticity, no dilatancy; some silt; little to some sand, fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; dry; stiff; dark yellowish brown (10YR 4/4). Note: Fill material. Trace brick fragments present.		
3			60		0.0		(2.0-5.0') CLAY, medium plasticity, no dilatancy; some silt; little to trace sand, fine, subrounded; trace granules, subrounded; trace pebbles, small to very large, subrounded; dry; stiff; grayish brown (10YR 5/2).		
4					0.0				
5					0.0				
6					0.0		(5.0-16.5') CLAY, high plasticity, no dilatancy; little silt; trace sand, fine, subrounded; trace granules, subrounded; trace pebbles, small to very large, subrounded; moist; medium stiff to stiff; gray (10YR 5/1).		
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			84		0.0			(0.0-65.0') 6.0" dia. drilled hole with 2.0" dia. Sch 40 PVC Casing cemented in-place with Bentonite Quick Grout	
16					0.0				
17					0.0		(16.5-16.8') SAND, medium to coarse, subangular; trace granules, subrounded to subangular; trace pebbles, small to large, subrounded to subangular; trace silt; poorly sorted; wet; pale brown (10YR 6/3).		
18					0.0				
19					0.0		(16.8-19.6') CLAY, high plasticity, no dilatancy; little silt; trace sand, fine, subrounded; trace granules, subrounded; trace pebbles, small to very large, subrounded; moist; medium stiff; gray (10YR 5/1).		
20					0.0				
21					0.0		(19.6-22.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; wet; pale brown (10YR 6/3).		
22					0.0				
23			84		0.0		(22.0-26.0') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to very large, subrounded; moist; medium stiff; gray (10YR 5/1).		
24					0.0				
25					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: bgs = below ground surface.

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.: 859.5
North Coor: 451620.9
East Coor: 13064385.8

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-126 / SB-P2-LW84

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
26			84		0.0			(0.0-69.0') 2.0" dia. PVC casing	
27					0.0		(26.0-28.5') SAND, very fine to fine, subrounded; little silt; well sorted; wet; pale brown (10YR 6/3).		
28					0.0				
29					0.0		(28.5-37.5') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; stiff; gray (10YR 5/1).		
30					0.0				
31			120		0.0				
32					0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0		(37.5-50.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/1).		
39					0.0				
40					0.0				
41			120		0.0				
42					0.0				
43					0.0				
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51			120		0.0		(50.0-60.0') SILT, nonplastic, rapid dilatancy; little to some sand, very fine; well sorted; wet; pale brown (10YR 6/3).		

Remarks:

SOIL BORING LOG 2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE 102220.GPJ ARCADIS 2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-20-126 / SB-P2-LW84

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
53					0.0		(50.0-60.0') SILT, nonplastic, rapid dilatancy; little to some sand, very fine; well sorted; wet; pale brown (10YR 6/3).		
54					0.0				
55					0.0				
56			120		0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0		(60.0-65.0') CLAY, low plasticity, no dilatancy; some silt; little sand, very fine to fine, subrounded; trace to little granules, subrounded; trace to little pebbles, small to very large, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Little fragments of sandstone present.		
61					0.0				
62					0.0				
63					0.0				
64					0.0				
65			120		0.0		(65.0-72.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Heavily weathered sandstone fragments in a mostly soft sand matrix. No competency.	(65.0-66.0') Bentonite Time-Release Coated Pellets (66.0-67.0') Fine Choker Sand	
66					0.0				
67					0.0				
68					0.0				
69					0.0				
70					0.0				
71					0.0			(67.0-75.0') Filter Pack Sand (69.0-74.0') 2.0" dia. Stainless-Steel 0.010-Slot Screen	
72				VAP-P2-LW84 (70-74) (071520) @ 11:30	0.0				
73			60		0.0		(72.0-72.5') WEATHERED SHALE; black (10YR 2/1).		
74					0.0		(72.5-75.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Little interbedded shale, dark gray (10YR 4/1).		
75					0.0				
76							End of boring at 75.0' bgs.		
77									
78									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-127 / SB-P2-MM85

Soil Boring Log

Sheet: 1 of 3

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

Logger: A.Westhuis
Editor: C. Cisco
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		(0.0-1.0') CONCRETE.		
2					0.0		(1.0-3.0') SAND, fine to medium, subrounded; trace sand, coarse, subrounded; trace to little granules, subrounded; trace to little pebbles, small to large, subrounded; poorly sorted; dry; brown (10YR 5/3). Note: Fill material.		
3			60		0.0				
4					0.0		(3.0-6.5') SILT, nonplastic, no dilatancy; little to some sand, very fine, subrounded; trace clay; trace granules, subrounded; trace pebbles, small to medium, subrounded; moist; soft; dark yellowish brown (10YR 3/4).		
5					0.0				
6					0.0				
7			60		0.0		(6.5-9.5') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small, subrounded; moist; stiff; grayish brown (10YR 5/2).		
8					0.0				
9					0.0				
10					0.0		(9.5-12.0') SAND, fine to medium, subrounded; trace granules, subrounded; trace silt; well sorted; wet; yellowish brown (10YR 5/4).		
11					0.0				
12					0.0		(12.0-15.0') SAND, fine, subrounded; trace silt; well sorted; wet; brown (10YR 5/3).	(0.0-68.0') 6.0" dia. drilled hole with 2.0" dia. Sch 40 PVC Casing cemented in-place with Bentonite Quick Grout	
13					0.0				
14					0.0				
15			120		0.0		(15.0-16.5') SAND, medium to very coarse, subangular; little to some granules, subangular; little to some pebbles, small to medium, subangular; trace to little silt; poorly sorted; wet; grayish brown (10YR 5/2).		
16					0.0				
17					0.0		(16.5-19.5') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; stiff; gray (10YR 5/1).		
18					0.0				
19					0.0				
20					0.0		(19.5-24.5') SAND, very fine to coarse, subrounded; little granules, subrounded; little pebbles, small, subrounded; trace to little silt; poorly sorted; wet; grayish brown (10YR 5/2).		
21					0.0				
22					0.0				
23			120		0.0				
24					0.0				
25					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: bgs = below ground surface.

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: 451443.4
East Coor: 13064395.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOVI-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-127 / SB-P2-MM85

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
26					0.0		(24.5-27.0') CLAY, high plasticity, no dilatancy; little silt; little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to very large, subrounded; trace cobbles, small to very large, subrounded; moist; medium stiff; gray (10YR 5/1).		
27					0.0				
28			120		0.0		(27.0-27.5') SAND, very fine to medium, subrounded; trace granules, subrounded; trace pebbles, small, subrounded; trace silt; poorly sorted; wet; pale brown (10YR 6/3).		
29					0.0		(27.5-38.5') CLAY, medium to high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; stiff; gray (10YR 5/1).		
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		(38.5-40.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/1).	(0.0-72.0') 2.0" dia. PVC casing	
40					0.0				
41					0.0		(40.0-43.0') SILT, nonplastic, no dilatancy; little sand, very fine to fine, subrounded; trace clay; trace pebbles, large to very large, subrounded; moist; soft; dark gray (10YR 4/1).		
42					0.0				
43					0.0				
44					0.0		(43.0-59.5') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/1).		
45			120		0.0				
46					0.0				
47					0.0				
48					0.0				
49					0.0				
50					0.0				
51			108		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_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-20-127 / SB-P2-MM85

Sheet: 3 of 3

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
53					0.0		(43.0-59.5') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/1).		
54					0.0				
55					0.0				
56			108		0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0		(59.5-66.0') CLAY, medium plasticity, no dilatancy; some silt; trace sand, very fine to fine, subrounded; trace pebbles, medium to large, subrounded; moist; very stiff; grayish brown (10YR 5/2). Note: Little to some fragments of sandstone present.		
61					0.0				
62					0.0				
63					0.0				
64					0.0				
65			120		0.0				
66					0.0				
67					0.0		(66.0-70.0') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. No competency. Some finely interbedded sandstone, light gray (10YR 7/1).	(68.0-69.0') Bentonite Time-Release Coated Pellets	
68					0.0				
69					0.0			(69.0-70.0') Fine Choker Sand	
70					0.0				
71					0.0		(70.0-74.0') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. No competency. Trace to little finely interbedded sandstone, light gray (10YR 7/1).	(70.0-78.0') Filter Pack Sand	
72			48		0.0				
73					0.0				
74					0.0				
75				VAP-P2-MM85 (73-77) (071520) @ 17:40	0.0		(74.0-78.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Moderate weathering with little to some competency.	(72.0-77.0') 2.0" dia. Stainless-Steel 0.010-Slot Screen	
76			48		0.0				
77					0.0				
78					0.0				
							End of boring at 78.0' bgs.		

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MII\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-128 / SB-P2-ND131

Soil Boring Log

Sheet: 1 of 3

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

Logger: A.Westhuis
Editor: C. Cisco
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		(0.0-1.0') CONCRETE.		
2					0.0		(1.0-2.0') SAND, fine to medium, subrounded; little granules, subrounded; little pebbles, small to large, subrounded; trace silt; poorly sorted; dry; pale brown (10YR 6/3). Note: Fill material.		
3			60		0.0				
4					0.0		(2.0-5.0') CLAY, medium to low plasticity, no dilatancy; some silt; little sand, fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; dry to moist; stiff; grayish brown (10YR 5/2). Note: Metal fragments present from 4.0-5.0' bgs.		
5					0.0				
6					0.0		(5.0-9.5') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; medium stiff; gray (10YR 5/1).		
7					0.0				
8			60		0.0				
9					0.0				
10					0.0				
11					0.0		(9.5-13.0') SAND, fine to coarse, subrounded; little granules, subrounded; little pebbles, small to medium, subrounded; little silt; poorly sorted; wet; pale brown (10YR 6/3).		
12					0.0				
13					0.0				
14					0.0		(13.0-22.0') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to very large, 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				
21					0.0				
22					0.0				
23			120		0.0		(22.0-25.0') SAND, medium, subrounded; trace sand, coarse, subrounded; trace granules, subrounded; trace silt; well sorted; wet; pale brown (10YR 6/3).		
24					0.0				
25					0.0				

Construction Details: (0.0-61.0') 6.0" dia. drilled hole with 2.0" dia. Sch 40 PVC Casing cemented in-place with Bentonite Quick Grout

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: bgs = below ground surface.

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: 451290.6
East Coor: 13064840.6

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-128 / SB-P2-ND131

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020
Weather Conditions: 80° 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
26			120		0.0		(25.0-40.0') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; stiff; grayish brown (10YR 5/2).	(0.0-65.0') 2.0" dia. PVC casing	
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31			120		0.0				
32					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			120		0.0		(40.0-42.0') SILT, nonplastic, slow dilatancy; little sand, very fine; trace clay; well sorted; wet; grayish brown (10YR 5/2).		
42					0.0				
43					0.0		(42.0-47.0') CLAY, medium to high plasticity, no dilatancy; little silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to very large, subrounded; moist; stiff; grayish brown (10YR 5/2).		
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-60.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; dry; light gray (10YR 7/1).		
49					0.0				
50					0.0				
51			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_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-20-128 / SB-P2-ND131

Sheet: 3 of 3

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/15/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
53					0.0		(47.0-60.0') SAND, very fine to fine, subrounded; trace to little silt; well sorted; dry; light gray (10YR 7/1).		
54					0.0				
55					0.0				
56			120		0.0				
57					0.0				
58					0.0				
59					0.0				
60					0.0				
61					0.0		(60.0-62.0') CLAY, nonplastic to low plasticity; some silt; little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; stiff; grayish brown (10YR 5/2). Note: Trace fragments of sandstone present.	(61.0-62.0') Bentonite Time-Release Coated Pellets	
62					0.0		(62.0-64.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Heavily weathered. No competency.	(62.0-63.0') Fine Choker Sand	
63					0.0				
64					0.0		(64.0-65.5') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. No competency.	(63.0-70.0') Filter Pack Sand	
65			120		0.0				
66					0.0		(65.5-66.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Heavily weathered. No competency. Trace finely interbedded shale, gray (10YR 5/1).		
67				VAP-P2-ND131 (66-70) (071620) @ 09:25	0.0			(65.0-70.0') 2.0" dia. Stainless-Steel 0.010-Slot Screen	
68					0.0		(66.0-70.0') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. No competency. Trace to little finely interbedded sandstone, light gray (10YR 7/1).		
69					0.0				
70					0.0				
71							End of boring at 70.0' bgs.		
72									
73									
74									
75									
76									
77									
78									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-129 / SB-P2-OP97

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/16/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			60		0.0		(0.0-0.5') CONCRETE.	(0.0-60.0') 6.0" dia. drilled hole with 2.0" dia. Sch 40 PVC Casing cemented in-place with Bentonite Quick Grout	
2					0.0		(0.5-1.0') SAND, very fine to fine, subrounded; trace granules, subrounded; trace silt; well sorted; dry; yellowish brown (10YR 5/4). Note: Fill material.		
3					0.0		(1.0-4.0') CLAY, medium to low plasticity, no dilatancy; some silt; trace to little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; stiff; light brownish gray (10YR 6/2).		
4					0.0				
5					0.0		(4.0-7.0') SAND, fine, subrounded; trace granules, subrounded; trace silt; well sorted; moist; pale brown (10YR 6/3).		
6			60		0.0				
7					0.0				
8					0.0		(7.0-9.5') CLAY, medium plasticity, no dilatancy; some silt; trace sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; stiff; pale brown (10YR 6/3).		
9					0.0				
10					0.0		(9.5-25.0') SAND, fine to medium, subrounded; trace silt; well sorted; wet; pale brown (10YR 6/3).		
11			96		0.0				
12					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				
21			120		0.0				
22					0.0				
23					0.0				
24					0.0				
25					0.0				

Drilling Co.: Traut Drilling
Driller: Dan Karasch
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: bgs = below ground surface.

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: 450915.4
East Coor: 13064506.3

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICEDATA\NOV-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Boring No.: MW-20-129 / SB-P2-OP97

Soil Boring Log

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/16/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
26			120		0.0		(25.0-35.0') CLAY, medium to high plasticity, no dilatancy; some silt; little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; moist; soft to medium stiff; grayish brown (10YR 5/2). Note: Very coarse sand lens present at 27.0' bgs. Wet.		
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31			120		0.0				
32					0.0				
33					0.0				
34					0.0				
35					0.0				
36					0.0		(35.0-37.0') SAND, fine to medium, subrounded; trace silt; well sorted; moist; pale brown (10YR 6/3).		
37					0.0		(37.0-42.0') SILT, nonplastic to low plasticity; little to some clay; little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; poorly sorted; moist; gray (10YR 5/1).	(0.0-63.0') 2.0" dia. PVC casing	
38					0.0				
39					0.0				
40					0.0				
41			120		0.0				
42					0.0		(42.0-47.0') SAND, very fine to fine, subrounded; little silt; well sorted; dry; light gray (10YR 7/1).		
43					0.0				
44					0.0				
45					0.0				
46					0.0				
47					0.0				
48					0.0		(47.0-58.0') SILT, nonplastic, no dilatancy; little clay; little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; poorly sorted; stiff; gray (10YR 5/1).		
49					0.0				
50					0.0				
51			120		0.0		Note: Trace sandstone fragments present at 50.0' bgs and continuing throughout the silt down to 58.0' 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 102220.GPJ ARCADIS 2013.GDT 10/23/20

ARCADIS Design & Consultancy for natural and built assets

Soil Boring Log

Boring No.: MW-20-129 / SB-P2-OP97

Sheet: 3 of 3

Project Name: RACER Lansing
Project Number: 30042872
Project Location: Lansing, MI

Date Started: 07/16/2020
Date Completed: 07/17/2020

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

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
53					0.0		(47.0-58.0') SILT, nonplastic, no dilatancy; little clay; little sand, very fine to fine, subrounded; trace granules, subrounded; trace pebbles, small to large, subrounded; poorly sorted; stiff; gray (10YR 5/1).		
54					0.0				
55					0.0				
56			120		0.0				
57					0.0				
58					0.0				
59					0.0		(58.0-62.5') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. No competency.		
60					0.0			(60.0-61.0') Bentonite Time-Release Coated Pellets	
61					0.0			(61.0-62.0') Fine Choker Sand	
62					0.0			(62.0-69.0') Filter Pack Sand	
63					0.0		(62.5-64.0') WEATHERED SANDSTONE, very fine to fine, subrounded; well sorted; light gray (10YR 7/1). Note: Heavily weathered. Little finely interbedded shale, dark gray (10YR 4/1).		
64					0.0		(64.0-66.0') WEATHERED SHALE; dark gray (10YR 4/1). Note: Heavily weathered. Moderate to low competency. Some finely interbedded sandstone, light gray (10YR 7/1).		
65			108		0.0				
66					0.0			(64.0-69.0') 2.0" dia. Stainless-Steel 0.010-Slot Screen	
67				VAP-P2-OP97 (65-69) (071620) @ 14:40	0.0		(66.0-69.0') WEATHERED SANDSTONE, very fine; well sorted; light gray (10YR 7/1). Note: Some finely interbedded shale, gray (10YR 5/1).		
68					0.0				
69					0.0				
70							End of boring at 69.0' bgs.		
71									
72									
73									
74									
75									
76									
77									
78									

Remarks:

SOIL BORING LOG_2013 \\ARCADIS-US.COM\OFFICE\DATA\NOV\-MI\COMMON\RACER LANSING\WORKING DATA ANALYSIS\BORING LOGS\RACER LANSING MASTER DATABASE_102220.GPJ ARCADIS_2013.GDT 10/23/20

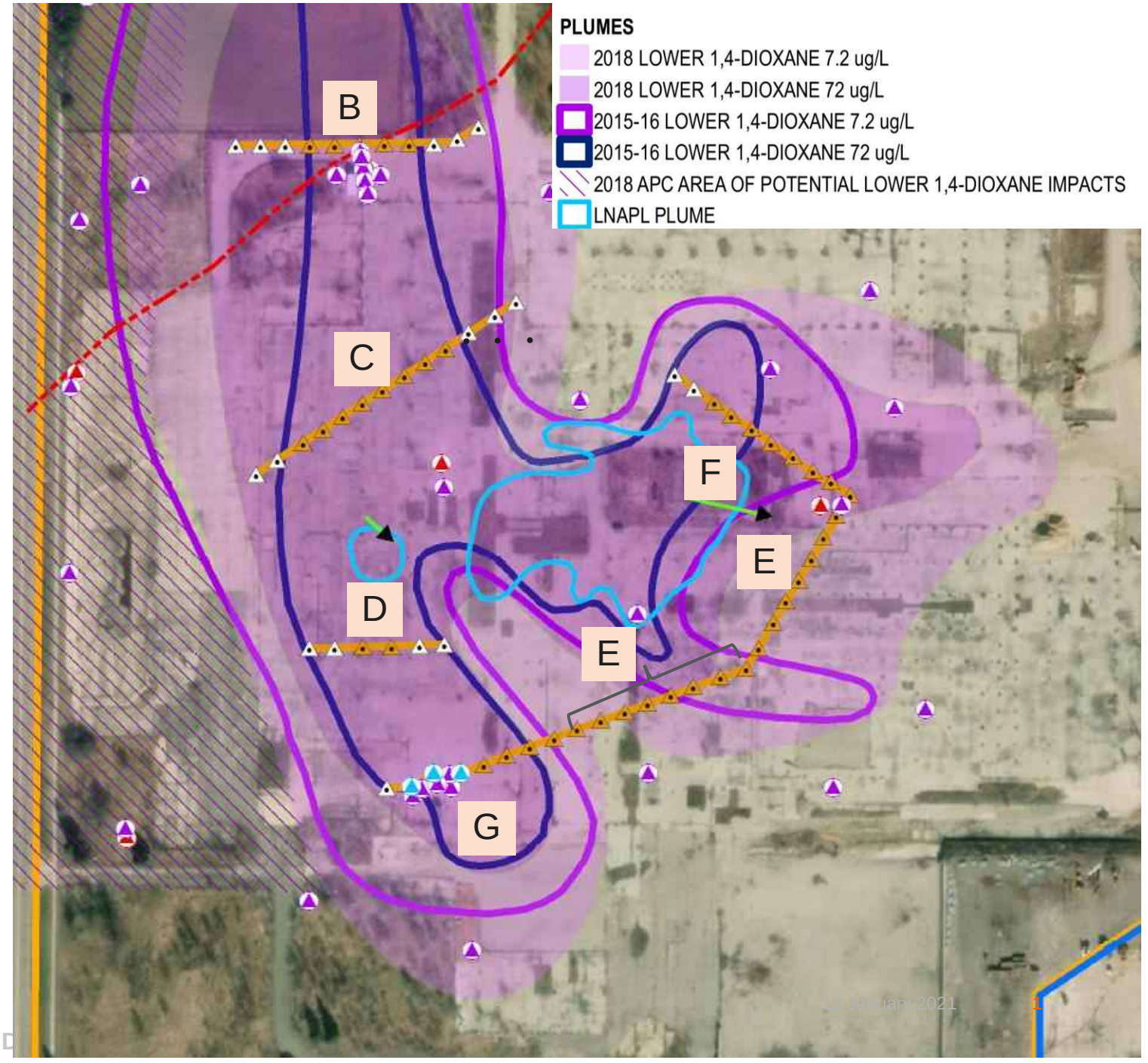
APPENDIX F

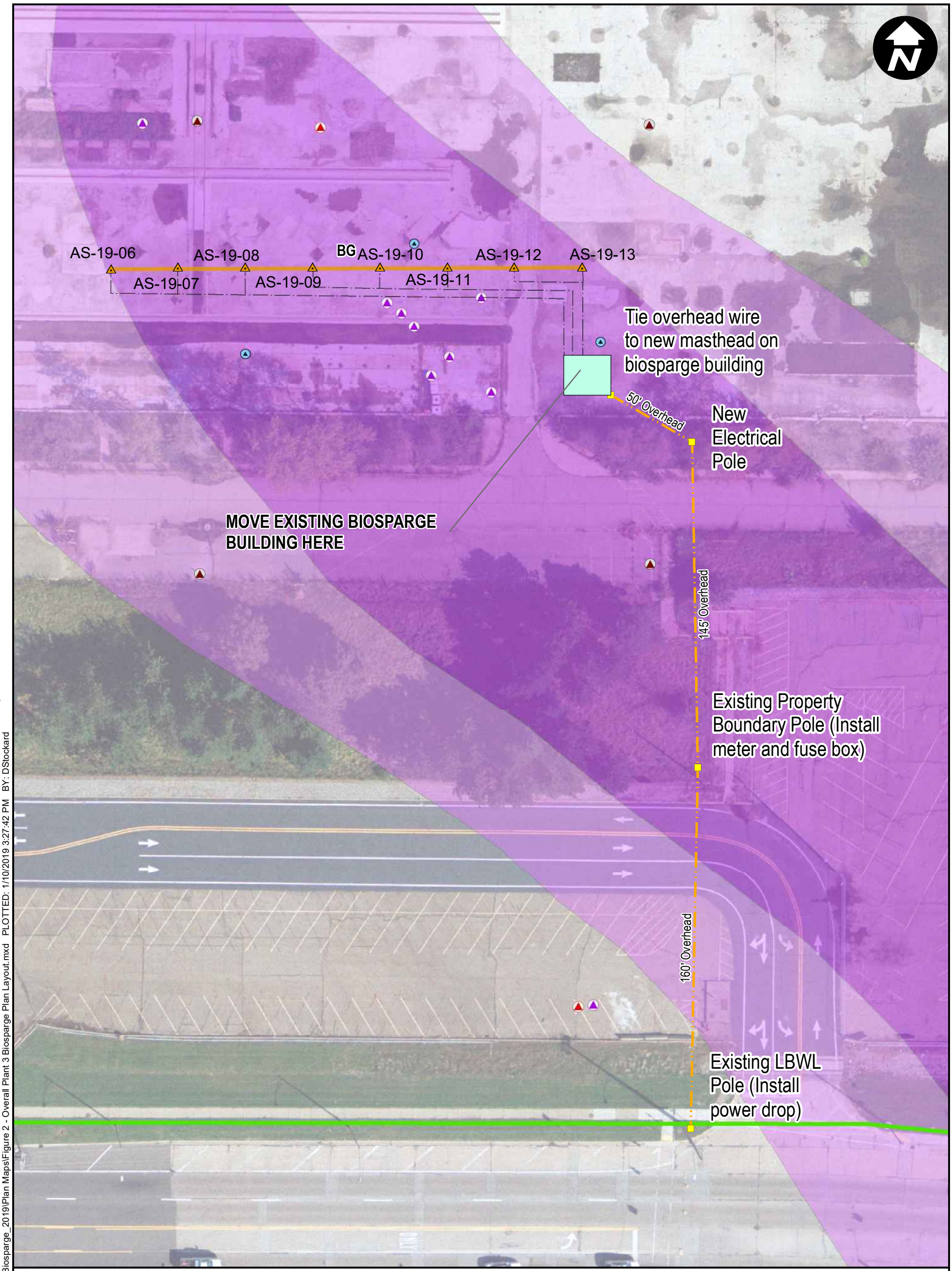
2019 Biosparge Installation Plans

Plant 2 Biosparge Plan

- Planned sparge points located within 72 µg/L 1,4-dioxane contour based on 2015-2016 results
- Contingent sparge points located within 72 µg/L 1,4-dioxane contour based on December 2018 results
- VAP sample edges of each transect (outermost planned sparge point) and move inward/outward accordingly
- Install sparge point if 1,4-dioxane > 10 µg/L

BIOSPARGE WELL
WEATHERED BEDROCK MONITORING WELL
BEDROCK MONITORING WELL
PLANNED SPARGE POINT
CONTINGENT SPARGE POINT
BIOSPARGE TRANSECT
FORMATION BOUNDARY





CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: B0064479.2018 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
C:\Users\DStockard\Documents\Racers lansing\ArcMap\Biosparge_2019\Plan Maps\Figure 2 - Overall Plant 3 Biosparge Plan Layout.mxd PLOTTED: 1/10/2019 3:27:42 PM BY: DStockard

PROPOSED BIOSPARGE STRUCTURES
- EXISTING SYSTEM BUILDING
- BIOSPARGE POINTS
- ELECTRIC FEATURE
- ELECTRICAL WIRE
- TRANSECTS
- ABOVEGROUND HOSE

MONITORING WELLS
- DEEP MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- PROPOSED PERFORMANCE MONITORING WELL

OTHER
- PLANT 3
- 1,4-DIOXANE IN LOWER AQUIFER ABOVE 7.2 MICROGRAMS PER LITER
- 1,4-DIOXANE IN LOWER AQUIFER ABOVE 72 MICROGRAMS PER LITER

Plume map based on December 2018 Semi-Annual Groundwater Sampling

NOTES:
1) QUANTITY AND LOCATIONS OF SPARGE POINTS MAY BE ADJUSTED BASED ON FIELD CONDITIONS
2) UTILITY LOCATIONS ARE APPROXIMATE

0 50 100
SCALE IN FEET

DRAFT

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PROPOSED PLANT 3 BIOSPARGE SITE PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

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