

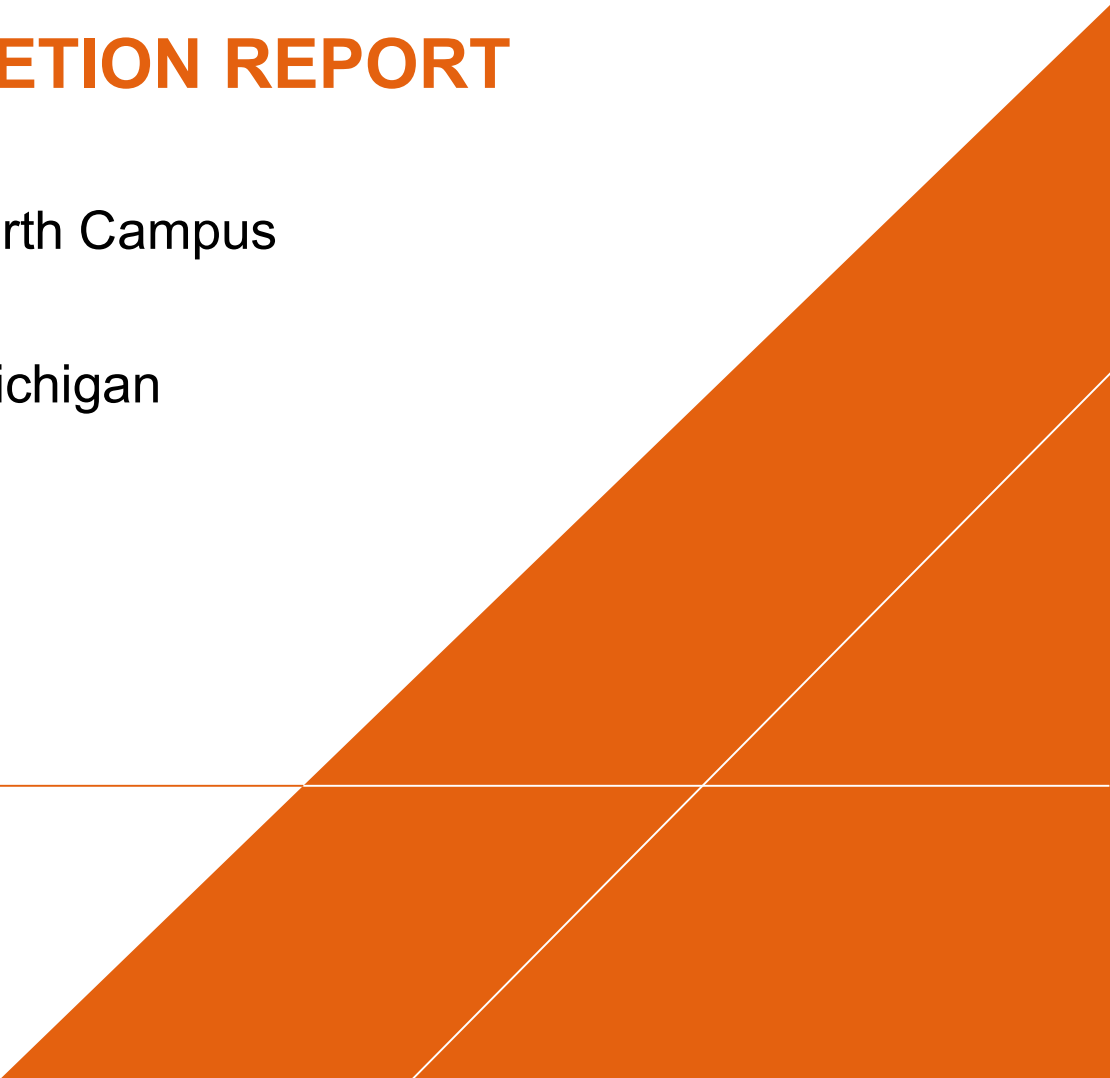
Revitalizing Auto Communities Environmental
Response Trust (RACER)

MONTCALM SEEP CONTROL SYSTEM INTERIM MEASURE COMPLETION REPORT

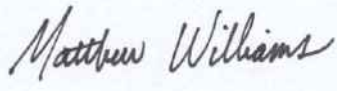
Pontiac North Campus

Pontiac, Michigan

July 2020

A large, solid orange geometric shape, resembling a right-angled triangle or a trapezoid, is positioned in the bottom right corner of the page. It is oriented with its hypotenuse facing upwards and to the right, creating a dynamic visual element.

**MONTCALM SEEP
CONTROL SYSTEM
INTERIM MEASURE
COMPLETION REPORT**



Matt Williams
Project Environmental Engineer



Brad Saunders
Principal Engineer

Prepared for:
Peter Ramanauskas
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard LU-9J
Chicago, Illinois 60604-3590

Prepared by:
Arcadis of Michigan, LLC
28550 Cabot Drive
Suite 500
Novi
Michigan 48377
Tel 248 994 2240
Fax 248 994 2241

Our Ref.:
30042811.00007

Date:
July 2020

CONTENTS

1	INTRODUCTION AND OBJECTIVES	1
2	INJECTION WELL INSTALLATIONS	1
2.1	Injection Well INJ-01-17	1
2.2	Injection Well INJ-02-18	1
3	FIELD WORK PREPARATION	2
3.1	Contractor Selection	2
3.2	Permitting/Notifications	2
3.3	Utility Location	3
4	GROUNDWATER COLLECTION & REINJECTION SYSTEM INSTALLATION FIELD ACTIVITIES	3
4.1	Fence Gate Installation	3
4.2	Clearing Activities	4
4.3	Toe Drain Restoration/Alterations, Temporary Sump Installation	4
4.4	Conveyance Pipe and Cleanout Installation	4
4.5	Sump and Pumping System Installation	5
4.6	Sump Area Controls Installation	5
4.7	Injection Area Controls Installation	6
4.8	Surface Restoration	6
5	SYSTEM OPERATION & MONITORING ACTIVITIES	6
5.1	Remote Monitoring	6
5.1.1	Flow	7
5.1.2	Pressure Levels	7
5.1.3	Water Levels	7
5.1.4	Pump Operations	7
5.2	Physical Monitoring	8
5.2.1	Soil Sampling and Analysis	8
5.2.2	Groundwater Level Monitoring	8
5.2.3	Groundwater Sampling and Analysis	8
6	REFERENCES	10

TABLES

Table 1. Soil Analytical Results

Table 2. Final Survey Coordinates

FIGURES

Figure 1. Site Layout Map

Figure 2. Groundwater Contour Map – Baseline – October 2018

Figure 3. Groundwater Contour Map – October 2019

Figure C-1. Site Layout

Figure C-2. Toe Drain Alterations

Figure E-1. Electrical Details

Figure E-2. Electrical Details

Figure M-1. Sump Detail

Figure M-2. Conveyance Pipe Cross-Sections

Figure M-3. Cleanout and Distribution Valve Details

Figure M-4. Injection Well Details and Schedule

Figure M-5. Fence Gate Detail

Figure P-1. Piping and Instrumentation Diagram

Figure I-1. MCP Pump Panel Layout

Figure I-1A. Injection Panel Layout

Figure I-2. Dewatering Pump Panel Power Distribution

Figure I-3. Dewatering Pump Panel Micrologix 24VDC Inputs

Figure I-4. Dewatering Pump Panel Layout Micrologix Analog Inputs

Figure I-5. Dewatering Pump Panel Micrologix Outputs

Figure I-6. MCP Telemetry to Injection Wells

Figure I-7. Injection Panel Wiring Diagram

Figure I-8. One-Line Diagram

ATTACHMENTS

Attachment A Injection Well Logs

Attachment B Soil Analytical Laboratory Reports

Attachment C City of Pontiac Electrical Permit

Attachment D Photo Log

Attachment E Weekly Work Reports

Attachment F Equipment Specification Sheets

1 INTRODUCTION AND OBJECTIVES

Arcadis of Michigan, LLS (Arcadis) has prepared this report on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER) Trust in accordance with the April 2018 Montcalm Seep Interim Measure Work Plan (IMWP). This report describes the actions taken to complete the installation and startup operations of a groundwater extraction and upgradient re-injection system to mitigate a groundwater seep along the E. Montcalm Street right-of-way (ROW) near the southern property boundary of the RACER Trust Pontiac North Campus Site (Site) located in Pontiac, Michigan (**Figure 1**). Approval for the implementation of the IMWP was granted by the Michigan Department of Environment, Great Lakes and Energy (EGLE, formerly the Michigan Department of Environmental Quality [MDEQ]) on June 8, 2018, and by the United States Environmental Protection Agency (USEPA) on June 25, 2018.

The purpose of the system is to mitigate the potential for groundwater to seep along Montcalm St. and into the City of Pontiac's storm sewer system, and eliminate water flowing over the sidewalk and right-of-way into the street. The system relocates water from a pre-existing toe drain collection line adjacent to Montcalm St. to an upgradient area of the Site where it is re-injected into the subsurface. The scope of work included preparation activities, installation of two upgradient groundwater injection wells, rehabilitation of the toe drain, installation of an extraction sump and submersible pumping system, installation of conveyance piping to route recovered water to the upgradient injection wells, installation of supporting system controls, startup operations, and the first year periodic monitoring and maintenance activities.

This report describes the work activities which commenced in August 2018 and carried through the 2019 calendar year.

2 INJECTION WELL INSTALLATIONS

As specified in the approved IMWP, two injection wells were previously installed approximately 1,600 feet upgradient from the seep area (**Figure C-1**).

2.1 Injection Well INJ-01-17

One injection well (INJ-01-17) was installed and developed in October 2017 to complete an injection test and validate design assumptions regarding the injectability to the subsurface, as previously described in the IMWP. The well construction log for INJ-01-17 was provided in Attachment 1 of the January 2018 Injection Test Summary Report and is included in this report as **Attachment A**.

2.2 Injection Well INJ-02-18

Arcadis subcontracted Stearns Drilling Company of Dutton, Michigan to install and develop the second injection well (INJ-02-18) on August 13-14, 2018 as part of the scope of work to complete installation of the system. Injection well INJ-02-18 is six inches in diameter with a PVC riser and 20-foot stainless steel v-wire wrapped 20 slot screen installed from 17-37 feet below ground surface (bgs). The observations from the boring log were used to determine well screen location, which was positioned to intersect soils

that appeared to be more transmissive. Lithology similar to INJ-01-17 was observed. Soil analytical sampling was conducted to document baseline conditions. Soil samples were collected from three depths. The first at 4-5 feet (bgs), the second at 16-17 feet bgs, and the third at 20-21 feet bgs. The analysis of the soil was performed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and total metals. Soil analytical results are summarized in **Table 1** with soil laboratory analytical reports provided in **Attachment B**. The well construction log for INJ-02-18 is included in **Attachment A**.

3 FIELD WORK PREPARATION

The *Montcalm Seep Interim Measure Work Plan (Revised 2018-April)* was provided to the USEPA and EGLE in preparation for seep reinjection implementation. USEPA commented on the work plan and approved it on June 25, 2018 following review and approval by the EGLE Waste Management and Radiological Protection Division for compliance with Part 111 and 201, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, Act 451 in accordance with Rule 323.2213 of the Part 22 Rules for Part 31.

3.1 Contractor Selection

In August 2018 RACER, supported by Arcadis, completed a bidding process to select a contractor to implement the approved Interim Measures Work Plan.

As a result of the bidding process, in late September 2018 RACER selected Job Site Services, Inc. (JSS) of Bay City, Michigan

Arcadis was responsible for providing necessary observation and documentation of IMWP implementation at the Site. Arcadis was also responsible for documenting completion of the project consistent with the USEPA-approved IMWP.

3.2 Permitting/Notifications

Based on the activities performed on Site, a Groundwater Discharge Permit through the Groundwater Permits Unit of MDEQ's Water Resources Division was not required; an explanation is documented in the *IMWP* and compliance with this exemption was reviewed by EGLE and approved on June 25, 2018.

A soil erosion sedimentation control (SESC) permit was also not applicable for this work due to less than one acre of disturbance and because all excavation areas are located more than 500 feet from a lake or stream. SESC best practices such as silt fencing and catch basin filters were utilized during construction and inspected similar to what would be required for a permitted scenario.

An electrical permit through the City of Pontiac was obtained prior to final electrical service installation and was approved through an onsite inspection on December 18, 2018 for permit number PE180553. A copy of the permit electrical details is included as **Attachment C**.

Given that work activities were being performed on property being leased by RACER to USPS, USPS was notified of planned activities and anticipated schedule prior to the commencement of work in accordance with past practices. USPS was also notified daily in order to facilitate site access through

USPS-controlled security gates.

3.3 Utility Location

Prior to mobilizing to the Site, JSS contacted MISS DIG and visited the site to locate public utilities near the work area on October 22, 2018. MISS DIG utilized US Infrastructure Company (USIC) to assist in the identification of gas lines. In addition, JSS retained Ground Penetrating Radar Systems, LLC (GPRS) of Toledo, Ohio to perform a private utility clearance. Arcadis mobilized to the site with JSS and GPRS to facilitate the joint utility locate on October 22, 2018. During the locating activities, GPRS performed a private utility clearance in the sump area, toe drain area, and planned conveyance line path which did not result in the identification of unexpected utilities in areas of planned digging and excavating.

In addition, during the project, an unexpected abandoned gas line was encountered slightly south of the planned sump location. While limited records were identified identifying the gas line as abandoned, Consumers Energy was contacted and USIC mobilized to the Site but they were unable to provide definitive information regarding the abandonment status due to the line being located on private property. Arcadis subcontracted The Underground Detective of Cincinnati, Ohio to perform a focused search and on-site visit on November 26, 2018 to confirm the gas was abandoned and not pressurized.

4 GROUNDWATER COLLECTION & REINJECTION SYSTEM INSTALLATION FIELD ACTIVITIES

The work associated with the installation of infrastructure to control the groundwater seepage adjacent to Montcalm St. is described in detail in the following sections:

- Fence Gate Installation
- Clearing
- Toe Drain Restoration/Alterations, Temporary Sump Installation
- Conveyance Pipe and Cleanout Installation
- Permanent Sump & Pumping System Installation
- Sump Area Controls Installation
- Injection Area Controls Installation

At the conclusion of significant system installation components, a professional surveyor was contracted to document final elevations of important features related to the scope of work. Surveying Solutions, Inc. of Standish, Michigan completed the survey on December 18, 2018 and the data is documented in **Table 2**. A photolog depicting an overview of construction activities is included as **Attachment D**, and **Attachment E** includes weekly work reports covering the system installation. Equipment specification sheets related to the materials and equipment installed are located in **Attachment F**.

4.1 Fence Gate Installation

To facilitate construction activities and future maintenance and monitoring activities along Montcalm Street, JSS contracted with Midland Fence Company, Inc. of Midland, Michigan to install an access gate at the southwest corner of the property. The fence gate was installed at a location slightly north of the

Saginaw Street extension entrance on October 24, 2018. The fence opening is 15 feet wide and consists of two chain-link double swing gates. The gate is 8 feet tall and swings open from the middle. Fence gate details are depicted on **Figure M-5**.

4.2 Clearing Activities

High brush and grasses which were present at the sump, toe drain, and conveyance line areas were cleared with a brush hog by JSS on October 23, 2018 to allow easier access to working spaces. Stone to supplement the construction access at the newly installed fence gate was placed to minimize sediment from being tracked onto the road.

4.3 Toe Drain Restoration/Alterations, Temporary Sump Installation

To restore the toe drain, JSS subcontracted Monchilov Sewer Service LLC of Fairgrove, Michigan to jet out the interior of the toe drain on October 25, 2018. Jetting equipment was inserted at the cleanouts on each end of the toe drain and at a central excavated location, with potable city water supplied from water tanks. Each side of the toe drain was jetted, verifying no obstructions were present. Dewatering at the central excavation area in the location of the temporary sump was conducted, and water was discharged on the vegetated ground surface for infiltration into the USPS field upgradient of the construction activities to the north. Dewatering from the sump location was maintained throughout the course of construction activities.

Rehabilitation and alteration of the toe drain was performed in a manner to facilitate future maintenance activities. The toe drain was historically connected to a pump station which was abandoned in place via filling with concrete in 2012 when the pump station collection vault was bulk headed to terminate direct discharge to the sewer system through the former storm water treatment facility (also known as the Duck Pond). A new section of drain pipe and collection trench was installed around the abandoned pump station to connect the two ends of the collection drain. The new toe drain alteration pipe was constructed of six-inch PVC with two rows of standard bottom positioned openings similar to the existing toe drain. The drain pipe was installed with a 1% slope towards the collection sump located centrally along the length of the drain.

4.4 Conveyance Pipe and Cleanout Installation

JSS subcontracted A-1 Underground Installation, Inc. (A-1 Underground) of Bay City, Michigan to conduct horizontal boring and pull conveyance piping with tracer wire through the boreholes along the approximate 1600-foot stretch. Work was completed from October 28 through November 2, 2020. Conveyance piping installed for transporting water to the injection wells is comprised of two-inch diameter SDR11 HDPE pipe, and was fused by JSS at all pipe splice locations. Tracer wire connected to the exterior of the piping was extended along the same length to facilitate future locating efforts. JSS conducted trenching at each of the five cleanout locations to facilitate connection to the piping and installation of the cleanout valves and access vaults.

Details of the conveyance piping installation are provided in **Figure M-2**. In general, the depth of conveyance piping from the sump to the injection area was targeted below the frost line in the range of approximately 4-5 feet bgs. In consideration of structural integrity, the depth of the piping below the

USPS entrance roadway was targeted slightly deeper at approximately 6 feet bgs. Cleanout points were installed every 300 to 350 feet along the piping to allow for periodic high-pressure cleaning of the pipe interior, and for potentially removing air pockets from the piping. Valves for accessing cleanouts and for isolating flow to injection infrastructure were fused into conveyance piping below grade so that the valves are below the frost line. Valve stems are accessible at grade for all valves and are operable with the use of a valve key as shown on **Figure M-3**.

At each injection well, the 2 inch diameter HDPE pipe transitions to a 1.25 inch diameter connection in the side of the injection well. A pitless adapter routes flow down with a drop pipe inside the injection well in accordance with the details shown on **Figure M-4**.

4.5 Sump and Pumping System Installation

JSS installed a new 48-inch diameter fiberglass prepackaged sump with duplex high head submersible sump pumps approximately 100 feet west of the abandoned pump station. Prior to setting the sump, JSS placed gravel in the sump excavation, overlaid it with a circular concrete base, and horizontally leveled the base. Prior to installation, two inlets were drilled and couplings installed/sealed at 180 degrees apart for the toe drain entries, and an outlet was drilled and coupling installed for the conveyance piping outlet.

The sump is 84 inches tall and contains two submersible pumps on slide rails with operating on/off float switches. The pumps are single phase 240-volt, 14.5-amp, two horsepower units with built in thermal overloads. In normal operation, one pump will be used while the other is in stand-by mode.

The toe drain collection pipes empty into the sump via gravity flow through below grade, inline cleanouts to filter water on each side prior to entry as depicted on **Figure C-2**. Water is pumped from within the sump through a single discharge pipe connected to both pump ends. Two pumps were installed so that a backup is available and to facilitate continuation of seep dewatering in the event a pump requires maintenance or replacement.

On the conveyance discharge pipe, a gate valve, pressure transmitter, pressure gauge, and flow meter were plumbed into the conveyance piping after the two pump discharge pipes combined and before the pipe exits the sump. Remote telemetry is utilized to cease operation of the pumps in the event of high water levels at the injection wells. Sump details are depicted on **Figure M-1**.

4.6 Sump Area Controls Installation

JSS subcontracted Motor City Electric of Detroit, Michigan to install electrical infrastructure and supporting structures adjacent to the sump. Electrical infrastructure which was installed in December 2018 adjacent to the sump includes a main control panel, circuit breaker panel, antennae, service disconnect, and meter in accordance with **Figures E-1 and I-1**. A human machine interface (HMI) at the main control panel allows technicians to observe pump operation, discharge pressure and flowrate, water elevation at the injection wells, and alarm conditions. The control panel also includes hand/off/auto switches for both pumps, an alarm reset, and an emergency stop button. The “auto” position of the pump hand/off/auto switches setting allows the pumps to turn on and off based on the float positions in the sump. An alternation switch also controls how pumps operate in automated settings. When in “P-100” P-100 is selected as the lead in operation, “Auto Alt” alternate pumps every time the pumps turn off, and “P-200” allows for the selection of P-200 to be lead pump all the time.

240 volt, 100 amp electrical service from DTE Energy of Detroit, Michigan was established from the pole routing overhead service to the east of the sump. As a subcontractor to DTE, Katz Excavating of Pontiac, Michigan ran underground service from the pole to the meter with conductors and conduit on January 16, 2019. Motor City Electric grounded equipment as described on **Figure I-8** and energized the panel on February 15, 2019. Once the main control panel was energized and the injection area electrical equipment and controls were installed Serve Electric of Sterling Heights, Michigan was subcontracted by JSS to program the programmable logic control and facilitate programming updates through startup which was substantially completed by June 2019. Alarm functionality, pump operation, and control panel display outputs were all tested and verified in accordance with project requirements with Serve Electric. Instrumentation controls and wiring details are provided on **Figures I-2 through I-5**.

4.7 Injection Area Controls Installation

JSS also subcontracted Motor City Electric to install electrical infrastructure and supporting structures at the injection area. The work was substantially completed in May of 2019. Electrical infrastructure installed includes a panel for transducer radio communication, antennae, a solar panel, and two marine batteries housed in a separate panel with a battery tender in accordance with **Figures I-1A**. Transducer cables extend from injection well vaults through conduit below ground and are vented to aneroid bellows in the adjacent panel. Transducer outputs are transmitted back to the sump main control panel and water elevations are displayed on the human machine interface. Instrumentation controls and wiring details are provided on **Figures I-6 and I-7**.

4.8 Surface Restoration

Due to the timing of construction and excavating activities over the winter months from 2018-2019, and also due to a cold and wet spring, restoration of disturbed soils in the sump area, toe drain area, and cleanout locations were deferred until May 2019 when JSS completed grading in these areas and planted grass seed. In addition to seeding all disturbed work areas, JSS installed a concrete pad around the sump and cleanouts along Montcalm Street, and also installed concrete pads around the injection wells and valve vaults by the injection area. Vegetation was established by June of 2019 when JSS completed site restoration activities following bollard installation around the injection system control panel.

5 SYSTEM OPERATION & MONITORING ACTIVITIES

5.1 Remote Monitoring

System operation and monitoring utilizes remote telemetry devices which were installed for the following parameters:

- Flow
- Pressure levels
- Water levels
- Pump operations

Alarms and notifications are emailed to the project team. Remote login also allows the project team to remotely check the HMI and system operation as required. An uninterruptable power supply provides backup power to provide notification of power loss in the event electricity is lost at the site.

5.1.1 Flow

Flow rate is displayed on the HMI at the main control panel. There are no alarms associated with the flow rate. Flows have been estimated to operate between 3 -4.5 gpm continuously. The current flow meter which was sized for higher and more intermittent flows has a minimum output of 3.5 gpm and does not register flow beneath that value.

5.1.2 Pressure Levels

A pressure gauge was installed on the pump discharge pipe in the fiberglass sump. This gauge is used to determine changes in backpressure on the system and to monitor potential fouling within injection wells and conveyance piping. The pressure gauge is accompanied by a pressure transmitter interlocked with pump operation so that the pumps are shut down when backpressure climbs too high. The high-pressure alarm point is currently set at 60 psi, which is the maximum operational pressure of the pump. System operational pressures were designed to operate at 44 psi, which has been demonstrated in operation to be enough pressure to overcome frictional and hydraulic losses and inject water at the injection wells.

5.1.3 Water Levels

A high-level float in the sump notifies Arcadis if the water level in the sump rises and floods the sump. This alarm does not stop the pump from operating but a notification warning is sent to prompt inspection as needed.

In addition, water level transducers were installed in each injection well to measure the static water level depth below ground surface. Furthermore, a transducer with remote telemetry is located at each injection well location. Transducer readings are transmitted via radio back to the main control panel. In the event that the water level rises too high at either injection well location operation of the pump will automatically be shut down and Arcadis will receive immediate notification via the remote telemetry system. The depth below ground surface at which shutdown of the pump is typically set to be actuated is 1-3 feet bgs. This was determined by water levels measured during initial monitoring events and is adjusted at the lower end during winter months to prevent potential issues associated with freezing.

5.1.4 Pump Operations

Due to a higher than anticipated flow into the sump, one of the two sump pumps operates continuously instead of intermittently as originally anticipated. Pumps are periodically alternated to ensure that an operable backup is available. Pumps are able to be operated as indicated in the work plan (float switch inputs turning pumps on and off), but due to injection limitations are not able to pump fast enough to activate float switches. Outside of alarm shutdowns, pumping may occur continuously. It was necessary to continue pumping water from the sump to the ground surface north of the sump in order to accommodate excess flow that could not be accommodated by the injection wells.

5.2 Physical Monitoring

In addition to the remote telemetry monitoring, weekly in-person inspections are performed to confirm water levels in the sump, pump operation, and injection well water levels. As previously described in the IM Work Plan, a monitoring well network was established to evaluate water levels and potential water quality impacts due to operation of the seep injection system. Consistent with the samples from INJ-01-17 described in the IM Work Plan, soil samples were collected at INJ-02-18 to document baseline conditions.

5.2.1 Soil Sampling and Analysis

Soil sampling and laboratory analysis was conducted for target contaminants of potential concern at INJ-02-18 and is documented on **Table 1**. Soil samples collected showed no detections of VOCs or PCBs consistent with sampling conducted at INJ-01-17 as described in the January 2018 Injection Test Summary Report. Soils had low level detections of SVOCs at the shallow depth of 4-5 feet bgs, with a EGLE Part 201 groundwater surface water interface (GSI) protection criteria exceedance of phenanthrene. In addition, soil at INJ-02-18 from 4-5 feet bgs had non-residential drinking water and GSI protection criteria exceedances for cobalt, manganese and mercury. At deeper depths of 16-17 feet and 20-21 feet bgs, cobalt and manganese exceeded non-residential drinking water and GSI protection criteria, and selenium exceeded GSI protection criteria. Soil concentrations of detected metals were within the typical range of statewide data reported in the Michigan Background Soil Survey, with the exception of selenium which was detected at a concentration of 1,340 µg/kg which is just outside the typical statewide soil range (up to 1,300 µg/kg) but is within the background range for sands and topsoil in the Huron-Erie Glacial Lobe (the Site is located in the Huron-Erie Glacial Lobe). Furthermore, the drinking water and GSI pathway in the vicinity of the injection wells is incomplete, and institutional controls have been implemented to restrict the use of groundwater and manage soil at the site.

5.2.2 Groundwater Level Monitoring

Consistent with the IM Work Plan, groundwater levels have been monitored during select inspection events as previously defined to allow for the development of groundwater contours and evaluation of changes in groundwater flow due to system operation. Groundwater elevations are shown for baseline conditions prior to system operation in October 2018 (**Figure 2**) and after the system was operating for several months in October 2019 (**Figure 3**). Prior to and during system operation, groundwater flows in the south/southwest direction from the injection wells towards the toe drain and groundwater contours across the Site remain generally consistent with historical observations. Other groundwater elevations will be provided in a separate report. In addition, injection wells were installed with transducers to continuously monitor groundwater elevation at the injection wells and ensure the groundwater at the injection wells does not raise to ground surface. As expected, localized mounding has been observed near the injection wells (MW-03-17 and MW-04-17), but not at the nearest downgradient well (TW-09-01).

5.2.3 Groundwater Sampling and Analysis

Groundwater sampling events and laboratory analysis have been conducted for target contaminants of potential concern as well for key water quality parameters to determine in combination with flow contours

Montcalm Seep Control System Interim Measure Completion Report

if the seep control operation is functioning properly without causing undesirable contamination mobility. Results will be submitted in a separate monitoring report.

6 REFERENCES

Arcadis 2018. Montcalm Seep Interim Measure Work Plan, RACER Trust, Pontiac Michigan, Revised April 2018.

Arcadis 2018. Montcalm Seep Injection Test Summary and Interim Measure Work Plan Implementation Report, RACER Trust, Pontiac Michigan, January 31, 2018.

Arcadis 2016. Supplemental Site Characterization Summary, RACER Trust, Pontiac Michigan, July 21, 2016.

Arcadis 2015. Montcalm Avenue Seep Assessment, RACER Trust, Pontiac Michigan, February 5, 2015.

Arcadis 2012. RCRA Facilities Investigation, RACER Trust, Pontiac Michigan, July 9, 2012.

Michigan Department of Environment, Great Lakes, and Energy (EGLE). 2015. Michigan Background Soil Survey 2005, Updated in 2015.

TABLES



Table 1.
Soil Analytical Results
RACER Pontiac North Campus
Pontiac, Michigan

Location ID:	MDEQ 2013	MDEQ 2013	MDEQ 2013	INJ-01-17	INJ-01-17	INJ-02-18	INJ-02-18	INJ-02-18
Sample Depth:	Direct Contact	GSIP	Non-residential Drinking Water	16-17'	20-21'	4-5'	16-17'	20-21'
Date Collected:				10/17/17	10/17/17	08/13/18	08/13/18	08/13/18
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Sample Name:				INJ-01-17_(16-17)	INJ-01-17_(20-21)	INJ-02-18_(4-5)	INJ-02-18_(16-17)	INJ-02-18_(20-21)
Volatile Organics								
Acetone	1.00E+08	3.40E+04	3.40E+05	1,100 U	1,100 U	600 U	900 U	800 U
Benzene	4.30E+05	4.00E+03	1.00E+02	70 U	70 U	60 U	90 U	80 U
Bromodichloromethane	5.30E+05	--	1.60E+03	70 U	70 U	60 U	90 U	80 U
Bromoform	4.20E+06	--	1.60E+03	70 U	70 U	60 U	90 U	80 U
Bromomethane	1.70E+07	2.00E+02	7.60E+03	400 U	400 U	60 U	90 U	80 U
2-Butanone (MEK)	1.00E+08	4.40E+04	2.20E+05	1,100 U	1,100 U	600 U	900 U	800 U
Carbon disulfide	5.50E+07	--	3.60E+04	400 U	400 U	60 U	90 U	80 U
Carbon tetrachloride	5.10E+05	7.60E+02	1.00E+02	70 U	70 U	60 U	90 U	80 U
Chlorobenzene	1.70E+07	5.00E+02	2.00E+03	70 U	70 U	60 U	90 U	80 U
Chloroethane	1.70E+07	2.20E+04	1.50E+04	400 U	400 U	60 U	90 U	80 U
Chloroform	8.50E+06	7.00E+03	1.60E+03	70 U	70 U	60 U	90 U	80 U
Chloromethane	1.00E+07	--	2.20E+04	400 U	400 U	60 U	90 U	80 U
Cyclohexane	--	--	--	70 U	70 U	600 U	900 U	800 U
1,2-Dibromo-3-chloropropane	--	--	--	70 U	70 U	60 U	90 U	80 U
Dibromochloromethane	3.90E+05	--	1.60E+03	70 U	70 U	60 U	90 U	80 U
1,2-Dibromoethane	--	--	--	70 U	70 U	60 U	90 U	80 U
1,2-Dichlorobenzene	1.00E+08	2.60E+02	1.20E+04	70 U	70 U	60 U	90 U	80 U
1,3-Dichlorobenzene	1.70E+06	5.60E+02	760	70 U	70 U	60 U	90 U	80 U
1,4-Dichlorobenzene	2.60E+06	3.40E+02	1.50E+03	70 U	70 U	60 U	90 U	80 U
Dichlorodifluoromethane	4.30E+06	--	2.20E+03	70 U	70 U	60 U	90 U	80 U
1,1-Dichloroethane	5.80E+06	1.50E+04	1.30E+04	70 U	70 U	60 U	90 U	80 U
1,2-Dichloroethane	3.60E+05	1.50E+04	1.00E+02	70 U	70 U	60 U	90 U	80 U
1,1-Dichloroethene	4.30E+07	1.50E+04	1.40E+02	70 U	70 U	60 U	90 U	80 U
trans-1,2-Dichloroethene	1.70E+07	3.00E+04	2.00E+03	70 U	70 U	60 U	90 U	80 U
cis-1,2-Dichloroethene	1.70E+06	1.20E+04	1.40E+03	70 U	70 U	60 U	90 U	80 U
1,2-Dichloropropane	9.20E+05	4.60E+03	1.00E+02	70 U	70 U	60 U	90 U	80 U
cis-1,3-Dichloropropene	--	--	--	70 U	70 U	60 U	90 U	80 U
trans-1,3-Dichloropropene	--	--	--	70 U	70 U	60 U	90 U	80 U
Ethylbenzene	3.00E+06	3.60E+02	1.50E+03	70 U	70 U	60 U	90 U	80 U
2-Hexanone (methyl butyl ketone)	4.30E+06	--	1.90E+03	4,000 U	4,000 U	600 U	900 U	800 U
Isopropylbenzene	8.50E+07	6.60E+02	--	70 U	70 U	60 U	90 U	80 U
Methyl Acetate	--	--	--	4,000 U	4,000 U	600 U	900 U	800 U
4-Methyl-2-pentanone (MIBK)	4.30E+07	--	1.90E+04	4,000 U	4,000 U	600 U	900 U	800 U
tert-Methyl butyl ether (MTBE)	9.80E+06	1.40E+05	8.00E+02	400 U	400 U	60 U	90 U	80 U
Methyl cyclohexane	--	--	--	70 U	70 U	600 U	900 U	800 U
Methylene chloride	5.10E+06	3.00E+04	1.00E+02	400 U	400 U	60 U	90 U	80 U
Styrene	2.60E+06	1.60E+03	1.00E+02	70 U	70 U	60 U	90 U	80 U

Table 1.
Soil Analytical Results
RACER Pontiac North Campus
Pontiac, Michigan

Location ID:	MDEQ 2013	MDEQ 2013	MDEQ 2013	INJ-01-17	INJ-01-17	INJ-02-18	INJ-02-18	INJ-02-18
Sample Depth:	Direct Contact	GSIP	Non-residential Drinking Water	16-17'	20-21'	4-5'	16-17'	20-21'
Date Collected:				10/17/17	10/17/17	08/13/18	08/13/18	08/13/18
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Sample Name:				INJ-01-17_(16-17)	INJ-01-17_(20-21)	INJ-02-18_(4-5)	INJ-02-18_(16-17)	INJ-02-18_(20-21)
1,1,2,2-Tetrachloroethane	1.70E+05	1.60E+03	3.60E+02	70 U	70 U	60 U	90 U	80 U
Tetrachloroethene	5.10E+06	1.20E+03	1.00E+02	70 U	70 U	60 U	90 U	80 U
Toluene	6.70E+07	5.40E+03	1.60E+04	70 U	70 U	60 U	90 U	80 U
1,1,2-Trichloro-1,2,2-trifluoroethane	1.00E+08	8.60E+02	4.60E+06	100 U	100 U	60 U	90 U	80 U
1,2,4-Trichlorobenzene	1.10E+06	4.40E+03	3.10E+03	100 U	100 U	60 U	90 U	80 U
1,1,1-Trichloroethane	1.00E+08	1.80E+03	4.00E+03	70 U	70 U	60 U	90 U	80 U
1,1,2-Trichloroethane	3.40E+05	6.60E+03	1.00E+02	70 U	70 U	60 U	90 U	80 U
Trichloroethene	2.50E+05	4.00E+03	1.00E+02	70 U	70 U	60 U	90 U	80 U
Trichlorofluoromethane	1.00E+08	--	1.10E+05	100 U	100 U	60 U	90 U	80 U
Vinyl chloride	4.60E+04	2.60E+02	4.00E+01	100 U	100 U	60 U	90 U	80 U
p,m-Xylene	1.00E+08	8.20E+2	5.60E+03	100 U	100 U	60 U	90 U	80 U
o-Xylene				70 U	70 U	60 U	90 U	80 U
Semivolatile Organics								
Acenaphthene	5.10E+07	6.10E+03	1.80E+05	330 U	330 U	830 U	330 U	330 U
Acenaphthylene	5.10E+07	--	1.80E+05	330 U	330 U	830 U	330 U	330 U
Anthracene	1.00E+08	--	2.30E+04	330 U	330 U	1,000	330 U	330 U
Benzo(a)anthracene	(Q)	--	5.30E+04	330 U	330 U	830 U	330 U	330 U
Benzo(b)fluoranthene	(Q)	--	2.90E+04	330 U	330 U	830 U	330 U	330 U
Benzo(k)fluoranthene	(Q)	--	1.50E+04	330 U	330 U	830 U	330 U	330 U
Benzo(ghi)perylene	2.10E+06	--	1.60E+04	330 U	330 U	830 U	330 U	330 U
Benzo(a)pyrene	4.10E+04	--	3.80E+03	330 U	330 U	830 U	330 U	330 U
4-Bromophenyl phenyl ether	--	--	--	330 U	330 U	830 U	330 U	330 U
Butyl benzyl phthalate	9.90E+06	1.50E+04	7.60E+04	330 U	330 U	830 U	330 U	330 U
4-Chloro-3-methylphenol	5.00E+07	2.80E+02	3.40E+04	280 U	280 U	830 U	330 U	280 U
2-Chloronaphthalene	--	--	--	330 U	330 U	830 U	330 U	330 U
4-Chloroaniline	--	--	--	330 U	330 U	830 U	330 U	330 U
bis(2-Chloroethoxy)methane	--	--	--	330 U	330 U	830 U	330 U	330 U
bis(2-Chloroethyl)ether	3.00E+04	1.00E+02	6.60E+01	330 U	330 U	830 U	330 U	330 U
bis(2-Chloroisopropyl)ether	--	--	--	330 U	330 U	830 U	330 U	330 U
2-Chlorophenol	4.00E+06	3.60E+02	2.60E+03	330 U	330 U	830 U	330 U	330 U
4-Chlorophenyl phenyl ether	--	--	--	330 U	330 U	830 U	330 U	330 U
Chrysene	--	--	--	330 U	330 U	1,080	330 U	330 U
p,m-Cresol (Methyphenols)	--	--	--	330 U	330 U	830 U	330 U	330 U
o-Cresol (2-Methyphenol)	--	--	--	330 U	330 U	830 U	330 U	330 U
Di-n-Butylphthalate	3.30E+06	3.60E+02	4.10E+03	330 U	330 U	830 U	330 U	330 U
Di-n-Octylphthalate	1.50E+07	--	9.90E+04	330 U	330 U	830 U	330 U	330 U
Dibenzo(ah)anthracene	(Q)	--	1.50E+05	330 U	330 U	830 U	330 U	330 U
Dibenzofuran	8.50E+05	1.20E+03	5.60E+03	330 U	330 U	830 U	330 U	330 U

Table 1.
Soil Analytical Results
RACER Pontiac North Campus
Pontiac, Michigan

Location ID:	MDEQ 2013 Direct Contact	MDEQ 2013 GSIP	MDEQ 2013 Non-residential Drinking Water	INJ-01-17 16-17' 10/17/17 µg/kg INJ-01-17_(16-17)	INJ-01-17 20-21' 10/17/17 µg/kg INJ-01-17_(20-21)	INJ-02-18 4-5' 08/13/18 µg/kg INJ-02-18_(4-5)	INJ-02-18 16-17' 08/13/18 µg/kg INJ-02-18_(16-17)	INJ-02-18 20-21' 08/13/18 µg/kg INJ-02-18_(20-21)
Sample Depth: Date Collected: Units Sample Name:	µg/kg	µg/kg	µg/kg					
1,2-Dichlorobenzene	1.00E+08	2.60E+02	1.20E+04	330 U	330 U	830 U	330 U	330 U
1,3-Dichlorobenzene	1.70E+06	5.60E+02	7.60E+02	330 U	330 U	830 U	330 U	330 U
1,4-Dichlorobenzene	2.60E+06	3.40E+02	1.50E+03	330 U	330 U	830 U	330 U	330 U
3,3'-Dichlorobenzidine	7.40E+04	2.00E+03	8.40E+02	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U
2,4-Dichlorophenol	1.70E+07	3.30E+02	7.60E+03	330 U	330 U	830 U	330 U	330 U
Diethylphthalate	1.00E+08	2.20E+03	3.00E+05	330 U	330 U	830 U	330 U	330 U
2,4-Dimethylphenol	1.70E+07	7.60E+03	7.60E+03	330 U	330 U	830 U	330 U	330 U
Dimethylphthalate	8.50E+07	--	3.80E+04	330 U	330 U	830 U	330 U	330 U
4,6-Dinitro-2-methylphenol	--	--	--	830 U	830 U	830 U	830 U	830 U
2,4-Dinitrophenol	1.70E+06	3.80E+02	7.60E+02	830 U	830 U	830 U	830 U	830 U
2,4-Dinitrotoluene	4.90E+04	--	1.10E+02	330 U	330 U	830 U	330 U	330 U
2,6-Dinitrotoluene	--	--	--	330 U	330 U	830 U	330 U	330 U
1,2-Diphenylhydrazine	--	--	--	330 U	330 U	830 U	330 U	330 U
bis(2-Ethylhexyl)phthalate	3.40E+06	5.40E+04	2.30E+04	330 U	330 U	830 U	330 U	330 U
Fluoranthene	4.90E+07	2.80E+03	4.60E+05	330 U	330 U	1,950	330 U	330 U
Fluorene	3.40E+07	3.50E+03	2.20E+05	330 U	330 U	1,300	330 U	330 U
Hexachlorobenzene	1.20E+04	3.30E+02	2.00E+02	330 U	330 U	830 U	330 U	330 U
Hexachlorobutadiene	4.30E+05	5.00E+01	5.40E+02	330 U	330 U	830 U	330 U	330 U
Hexachlorocyclopentadiene	4.30E+05	--	2.40E+03	330 U	330 U	830 U	330 U	330 U
Hexachloroethane	6.00E+05	3.00E+02	2.60E+02	330 U	330 U	830 U	330 U	330 U
Indeno(1,2,3-cd)pyrene	(Q)	--	1.20E+04	330 U	330 U	830 U	330 U	330 U
Isophorone	3.50E+07	2.60E+04	7.60E+04	330 U	330 U	830 U	330 U	330 U
2-Methylnaphthalene	3.40E+06	1.50E+03	6.10E+03	330 U	330 U	830 U	330 U	330 U
Naphthalene	8.50E+07	5.50E+02	9.50E+04	330 U	330 U	830 U	330 U	330 U
2-Nitroaniline	--	--	--	330 U	330 U	830 U	830 U	830 U
3-Nitroaniline	--	--	--	830 U	830 U	830 U	830 U	830 U
4-Nitroaniline	--	--	--	830 U	830 U	830 U	830 U	830 U
Nitrobenzene	1.70E+06	3.60E+03	7.60E+02	330 U	330 U	830 U	330 U	330 U
2-Nitrophenol	1.70E+06	--	7.60E+02	330 U	330 U	830 U	330 U	330 U
4-Nitrophenol	--	--	--	830 U	830 U	830 U	830 U	830 U
N-Nitrosodi-n-propylamine	4.70E+03	--	1.10E+01	330 U	330 U	830 U	330 U	330 U
N-Nitrosodiphenylamine	6.80E+06	--	6.40E+04	330 U	330 U	830 U	330 U	330 U
Pentachlorophenol	6.50E+04	(G,X)	1.60E+02	330 U	330 U	830 U	330 U	330 U
Phenanthrene	2.60E+07	1.10E+03	3.00E+05	330 U	330 U	3,470	330 U	330 U
Phenol	1.00E+08	9.00E+03	1.10E+05	330 U	330 U	830 U	330 U	330 U
Pyrene	3.70E+07	--	2.40E+05	330 U	330 U	3,330	330 U	330 U
1,2,4-Trichlorobenzene	1.10E+06	4.40E+03	3.10E+03	330 U	330 U	830 U	330 U	330 U
2,4,5-Trichlorophenol	2.60E+07	--	3.30E+04	330 U	330 U	830 U	330 U	330 U
2,4,6-Trichlorophenol	3.00E+06	3.30E+02	9.80E+03	330 U	330 U	830 U	330 U	330 U

Table 1.
Soil Analytical Results
RACER Pontiac North Campus
Pontiac, Michigan

Location ID:	MDEQ 2013	MDEQ 2013	MDEQ 2013	INJ-01-17	INJ-01-17	INJ-02-18	INJ-02-18	INJ-02-18
Sample Depth:	Direct Contact	GSIP	Non-residential Drinking Water	16-17'	20-21'	4-5'	16-17'	20-21'
Date Collected:				10/17/17	10/17/17	08/13/18	08/13/18	08/13/18
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Sample Name:				INJ-01-17_(16-17)	INJ-01-17_(20-21)	INJ-02-18_(4-5)	INJ-02-18_(16-17)	INJ-02-18_(20-21)
Metals								
Antimony	6.00E+05	9.40E+04	4.30E+03	500 U	500 U	500 U	500 U	500 U
Arsenic	5.20E+04	4.70E+03	4.70E+03	4,030	2,520	2,040	2,530	1,450
Barium	1.00E+08	4.40E+05 (G)	1.30E+06	34,700	15,100	56,100	43,700	30,100
Beryllium	2.90E+05	8.40E+04 (G)	5.10E+04	260	200 U	360	250	200 U
Cadmium	2.20E+05	3.00E+03 (G,X)	6.00E+03	220	200 U	200 U	230	200 U
Chromium (III)	1.00E+08	3.00E+09 (G,X)	1.00E+08	8,440				
Chromium (VI)	3.60E+04	(G,X)	3.10E+04		3,230	11,600	11,100	3730
Cobalt	7.40E+05	2.00E+03	1.10E+02	7,820	1,790	4,290	6,160	2,220
Copper	2.50E+06	7.30E+04 (G)	5.80E+06	14,900	5,280	12,800	7,270	7,980
Lead	7.60E+05	2.50E+06 (G,X)	1.80E+05	7,840	3,300	22,600	5,420	3,720
Manganese	3.20E+07	2.60E+04 (G,X)	1.00E+03	361,000	563,000	246,000	473,000	199,000
Mercury	1.50E+05	2.60E-02	4.00E+01	50 U	50 U	149	50 U	50 U
Nickel	4.00E+06	7.60E+04 (G)	1.10E+05	17,000	6,990	10,800	14,800	6,540
Selenium	1.20E+07	4.20E+02	4.20E+03	910	400 U	400 U	1,150 U	1,340
Silver	6.70E+05	1.00E+02	1.40E+04	200 U	200 U	200 U	200 U	200 U
Thallium	2.50E+04	4.20E+03	2.30E+03	200 U	200 U	200 U	200 U	200 U
Vanadium	3.30E+04	4.30E+05	2.10E+04	12,300	4,080	12,100	10,900	6,410
Zinc	1.00E+08	1.70E+05 (G)	5.00E+06	34,900	9,920	36,900	34,300	16,100
Organics -PCBs/Pesticides								
PCB-1016	--	--	--	330 U	330 U	330 U	330 U	330 U
PCB-1242	--	--	--	330 U	330 U	330 U	330 U	330 U
PCB-1221	--	--	--	330 U	330 U	330 U	330 U	330 U
PCB-1232	--	--	--	330 U	330 U	330 U	330 U	330 U
PCB-1248	--	--	--	330 U	330 U	330 U	330 U	330 U
PCB-1254	--	--	--	330 U	330 U	330 U	330 U	330 U
PCB-1260	--	--	--	330 U	330 U	330 U	330 U	330 U

Table 1.
Soil Laboratory Analytical Results
RACER Pontiac North Campus
Pontiac, Michigan

Notes:

1. Criteria from Michigan Department of Environment, Great Lakes, and Energy. 2018. Clean Up Criteria Requirements Table 3: Soil: Nonresidential, Part 201 Generic Cleanup Criteria and Screening Levels, January 10, 2018; GSI Protection criteria updated June 25, 2018.
2. "-" = The compound was not listed in the MDEQ criteria
3. Groundwater Surface Water Interface Protection Criteria listed for barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel and zinc are calculated based on a hardness of 150 mg/L-CaCO₃ for southern Lower Peninsula protected as a drinking water source.

Footnotes for Criteria:

1. G=Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water
2. Q=Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using relative potential potencies to benzo(a)pyrene
3. X=The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source.

Abbreviations:

- µg/kg Microgram per kilogram
GSIP Groundwater Surfacewater Interface Protection
MDEQ Michigan Department of Environmental Quality
U Compound analyzed for but not detected above the detection limit.

Table 2.
Final Survey Coordinates
RACER Pontiac North Campus
Pontiac, Michigan

Number	Description	POINT_X	POINT_Y	POINT_Z Surveyed	Z Adjustment Description	Z Adjusted Elevation	POINT_Z Adjusted
1	Old storm drain system manhole on east portion of Site lined up north of east end of duck pond bdg	13412813.4400	423242.602000	958.24			
2	Sanitary sewer manhole on east portion of Site lined up north of center of duck pond bdg	13412780.7000	423249.827000	962.94			
3	East End Toe Drain Access Manhole	13412706.4200	423226.924000	949.78	6IN TOE DRAIN	-6.85	942.933
4	8" Plastic pipe surface water inlet in immediate vicinity of east end of toe drain	13412712.1100	423225.377000	947.84			
5	Abandoned apparent electric vault in the east-central vicinity of the toe drain	13412452.7300	423216.155000	943.69			
6	Intermediate East-Central Toe Drain Vault/Collection Sump - 6" Toe Drain Inlet from East	13412429.4000	423220.700000	940.42			
7	Intermediate East-Central Toe Drain Vault/Collection Sump - 6" Toe Drain Outlet to West	13412427.0500	423220.419000	940.24			
8	Intermediate East-Central Toe Drain Vault/Collection Sump Bottom	13412428.3400	423220.684000	939.97			
9	Intermediate East-Central Toe Drain Vault/Collection Sump - Top Center Grate	13412428.2800	423220.544000	944.79			
10	South-Central Fence Man-Gate Post	13412269.0000	423200.245000	942.14			
11	South-Central Fence Man-Gate Post	13412266.0100	423200.206000	942.30			
12	DTE Source Power Pole & Electrical Conduit Start (New) - Off-Site Montcalm ROW	13412248.8100	423177.543000	941.99			
13	Estimated Location of Old Sump (No Longer Present)	13412233.0600	423207.648000				
14	Dewatering Sump Power Rack (New)	13412176.0900	423207.094000	941.99			
15	Dewatering Sump Power Rack (New)	13412175.4900	423212.167000	941.67			
16	Toe Drain East Sump Cleanout (New)	13412173.4700	423212.338000	941.57			
17	Toe Drain West Sump Cleanout (New)	13412165.6000	423211.372000	941.73			
18	Dewatering Sump (New) - Top Center	13412169.9600	423212.373000	941.85			
19	Dewatering Sump (New) - 6" Toe Drain Inlet from East	13412171.2900	423212.325000	937.47			
20	Dewatering Sump (New) - 6" Toe Drain Inlet from West	13412169.1100	423211.973000	937.51			
21	Dewatering Sump (New) - 2" Conveyance Line Outlet to North	13412170.0900	423213.307000	938.02			
22	Random Coordinate Verification Check/Calibration - Monitoring Well TW-MD-01	13412112.2500	423212.421000	944.30			
23	West End Toe Drain Access Manhole	13411903.0200	423201.035000	945.49	6IN TOE DRAIN	-5.48	940.01
24	Grated Storm Drain Catch Basin Inlet (assumed bulkheaded downstream) in Rocky Drainage Area at Southwest corner of Site	13411866.6300	423193.095000	942.06			
25	DTE Power Pole on-Site Southwest Corner of Site	13411829.3900	423186.009000	944.63			
26	Triangular Southwest Property Boundary Fence Post	13411797.5100	423181.257000	945.56			
27	Triangular Southwest Property Boundary Fence Post	13411787.8300	423188.628000	946.32			
28	Triangular Southwest Property Boundary Fence Post	13411781.0900	423292.639000	947.75			

Table 2.
Final Survey Coordinates
RACER Pontiac North Campus
Pontiac, Michigan

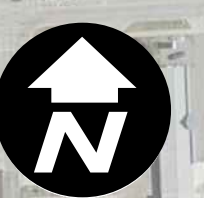
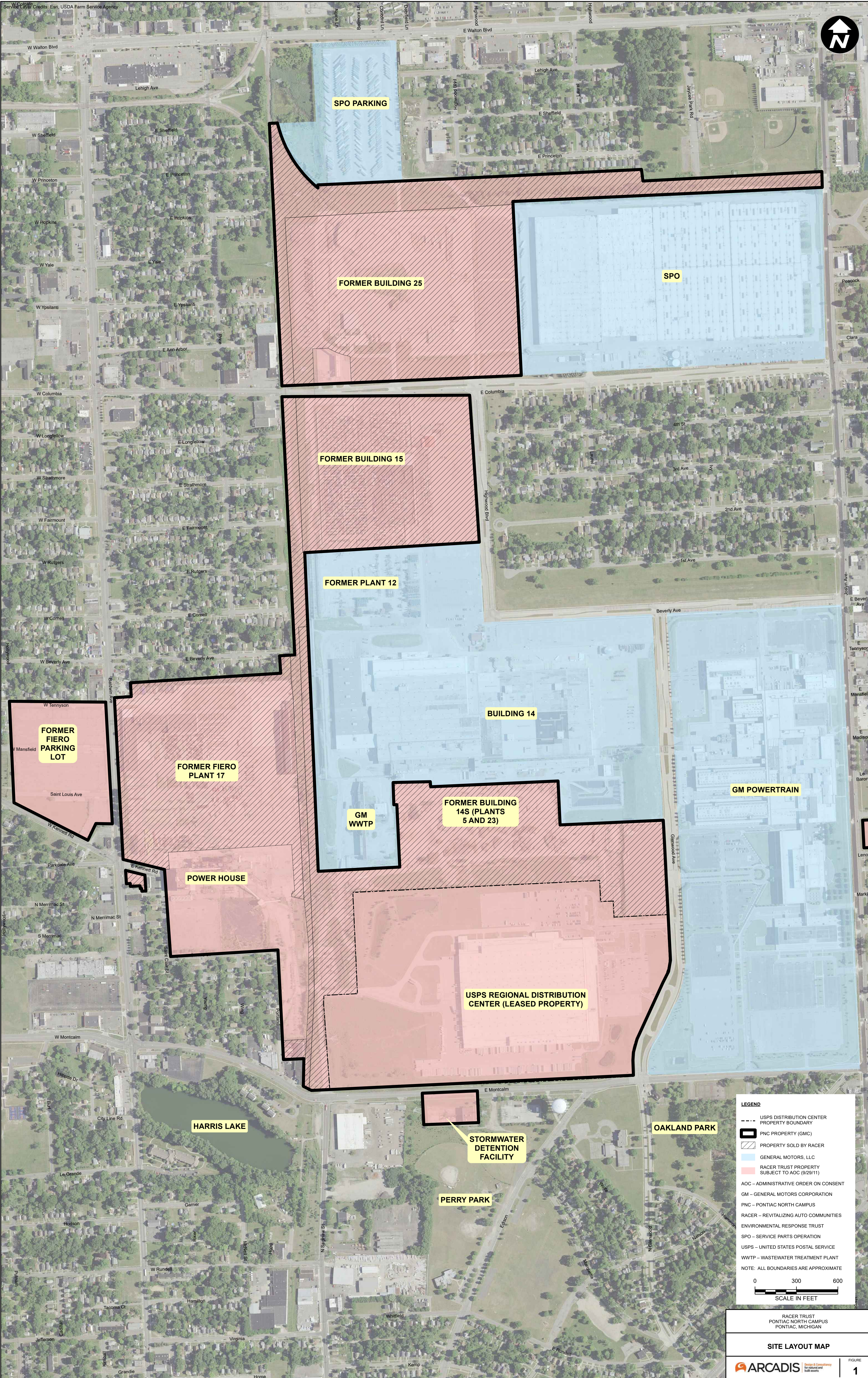
Number	Description	POINT_X	POINT_Y	POINT_Z Surveyed	Z Adjustment Description	Z Adjusted Elevation	POINT_Z Adjusted
29	Fence Gate Post Along Fence Line off of Saginaw Entrance (Newly Installed)	13411781.7300	423296.478000	947.68			
30	Fence Gate Post South Inset off of Saginaw Entrance (Newly Installed)	13411780.9300	423312.801000	947.83			
31	Fence Gate Post North Inset off of Saginaw Entrance (Newly Installed)	13411779.3000	423320.950000	947.85			
32	Re-Injection System Conveyance Line Cleanout #5 Access Point	13412046.6000	423499.334000	973.57			
33	Re-Injection System Conveyance Line Cleanout #5 Access Point	13412044.7800	423506.696000	973.18	TOP OF CONVEYANCE	-5	968.178
34	USPS Light Post (Center of Field)	13412083.7600	423507.474000	972.27			
35	Re-Injection System Conveyance Line Cleanout #4 Access Point	13412027.0600	423809.677000	963.72			
36	Re-Injection System Conveyance Line Cleanout #4 Access Point	13412028.5700	423815.498000	963.82	TOP OF CONVEYANCE	-5	958.816
37	Random Coordinate Verification Check/Calibration - Monitoring Well SB-77-15 (Need to Confirm)	13412021.3400	423815.620000	964.32			
38	Re-Injection System Conveyance Line Cleanout #3 Access Point	13412226.4700	424046.136000	965.44			
39	Re-Injection System Conveyance Line Cleanout #3 Access Point	13412231.1200	424052.107000	965.16	TOP OF CONVEYANCE	-5	960.155
40	USPS Light Post (Northwest Corner)	13412063.3800	423987.651000	965.85			
41	Re-Injection System Conveyance Line Cleanout #2 Access Point	13412432.7200	424284.873000	967.69			
42	Re-Injection System Conveyance Line Cleanout #2 Access Point	13412436.8400	424288.216000	967.72	TOP OF CONVEYANCE	-5	962.715
43	USPS Light Post (North Side)	13412843.0900	424493.284000	971.03			
44	Re-Injection System Conveyance Line Cleanout #1 Access Point	13412620.9600	424496.837000	964.70			
45	Re-Injection System Conveyance Line Cleanout #1 Access Point	13412626.1000	424503.114000	965.28	TOP OF CONVEYANCE	-5	960.275
46	Conveyance Line Ball Valve Prior to Split to Injection Wells	13412644.1000	424527.591000	966.05			
47	Conveyance Line Gate Valve Inline to INJ-01	13412643.9100	424530.575000	966.21			
48	Injection Well INJ-01	13412629.1700	424542.353000	965.61			
49	Conveyance Line Gate Valve Inline to INJ-02	13412646.9200	424527.357000	967.92	TOP OF 6IN PVC	-2	965.923
50	Injection Well INJ-02	13412674.6000	424503.647000	966.60			
51	Gas Line Point (north side of property) per Utility Clearance	13412711.8400	424339.662000	970.36			
52	Gas Line Point (north side of property) per Utility Clearance	13412700.2900	424355.992000	969.31			
53	Gas Line Point (north side of property) per Utility Clearance	13412678.8800	424371.983000	968.23			
54	Gas Line Point (north side of property) per Utility Clearance	13412657.4400	424378.450000	967.96			
55	Gas Line Point (north side of property) per Utility Clearance	13412644.0400	424380.148000	967.88			
56	Gas Line Point (north side of property) per Utility Clearance	13412615.2500	424377.301000	967.48			
57	Intersection of Gas Line (at appr 2.5 ft below ground level) and Conveyance Line (at approx 5' below ground level)	13412513.8200	424379.735000	966.48	TOP OF CONVEYANCE	-10	956.478

Table 2.
Final Survey Coordinates
RACER Pontiac North Campus
Pontiac, Michigan

Number	Description	POINT_X	POINT_Y	POINT_Z Surveyed	Z Adjustment Description	Z Adjusted Elevation	POINT_Z Adjusted
58	Gas Line Point (north side of property) per Utility Clearance	13412462.8000	424383.439000	967.07			
59	Gas Line Point (north side of property) per Utility Clearance	13412442.0900	424383.024000	966.98			
60	Gas Line Point (north side of property) per Utility Clearance	13412319.4300	424330.001000	966.06			
61	Gas Line Point (north side of property) per Utility Clearance	13412256.0700	424286.762000	965.46			
62	Gas Line Point (north side of property) per Utility Clearance	13412207.2500	424236.567000	965.13			
63	Gas Line Point (north side of property) per Utility Clearance	13412175.4900	424179.534000	964.57			
64	Gas Line Point (north side of property) per Utility Clearance	13412169.2000	424149.506000	964.64			
65	Gas Line Point (north side of property) per Utility Clearance	13412141.6300	424099.486000	964.81			
66	Gas Line Point (north side of property) per Utility Clearance	13412116.7400	424075.440000	965.01			
67	Gas Line Point (north side of property) per Utility Clearance	13412089.2400	424070.526000	964.60			
68	Gas Line Point (north side of property) per Utility Clearance	13412091.7700	423966.958000	966.08			
69	Gas Line Point (north side of property) per Utility Clearance	13412049.9200	423961.309000	965.69			
70	Gas Line Point (north side of property) per Utility Clearance	13412028.4800	423962.545000	965.89			
71	Gas Line Point (north side of property) per Utility Clearance	13412021.3200	423955.021000	965.52			
72	Gas Line Point (north side of property) per Utility Clearance	13412022.8500	423925.822000	965.13			
73	Estimated Location of 90 degree elbow on-Site where electrical conduit run turns from north to west towards the Dewatering Sump	13412246.2100	423209.076000	942.60			

FIGURES





LEGEND

- USPS DISTRIBUTION CENTER PROPERTY BOUNDARY
- PNC PROPERTY BOUNDARY (GMC)
- ▨ PROPERTY SOLD BY RACER
- GENERAL MOTORS, LLC
- RACER TRUST PROPERTY SUBJECT TO AOC (9/29/11)

AOC – ADMINISTRATIVE ORDER ON CONSENT
 GM – GENERAL MOTORS CORPORATION
 PNC – PONTIAC NORTH CAMPUS
 RACER – REVITALIZING AUTO COMMUNITIES ENVIRONMENTAL RESPONSE TRUST
 SPO – SERVICE PARTS OPERATION
 USPS – UNITED STATES POSTAL SERVICE
 WWTP – WASTEWATER TREATMENT PLANT
 NOTE: ALL BOUNDARIES ARE APPROXIMATE

0 300 600
 SCALE IN FEET

RACER TRUST
 PONTIAC NORTH CAMPUS
 PONTIAC, MICHIGAN

SITE LAYOUT MAP

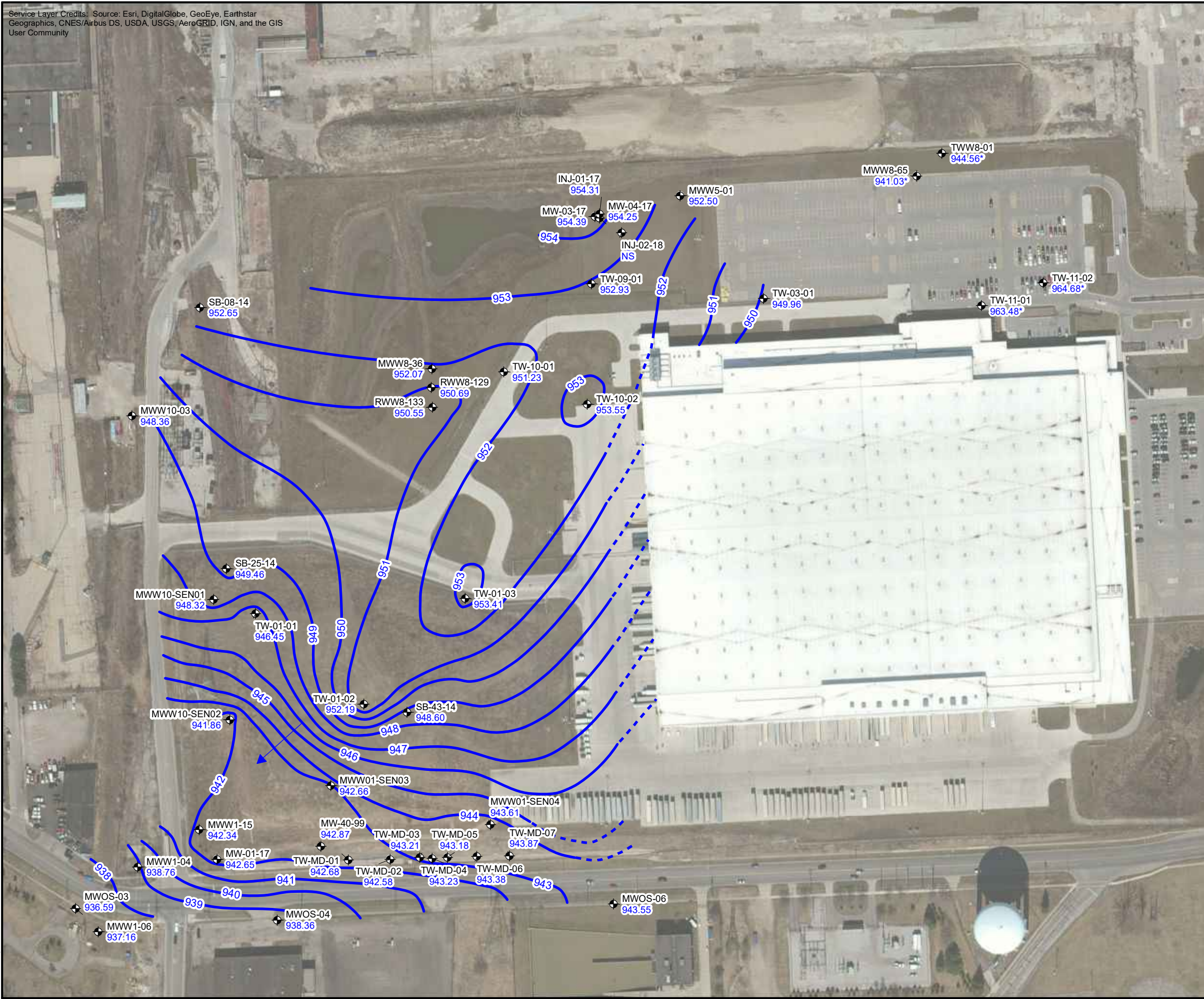
ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

CITY: NOV 10, 2011; ENV: DB TRV; PRC: PM, B. SANDERS; TR: PROJECT NUMBER: 30008882
 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 4113 Feet
 FILE: ENV: Arcadis\Information\Company\Projects\pontiac\campos\Documents\Map\Map\Map_08.mxd; PLOT: 7/7/2020 12:29:54 PM; BY: athena



CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl D:\GIS\Project Files\MotorLiqui\Company\PontiacNorthCampus\Documents\GW_Baseline\GW_Baseline_2018.mxd PLOTTED: 6/17/2020 1:50:54 PM BY: TYarborough



LEGEND

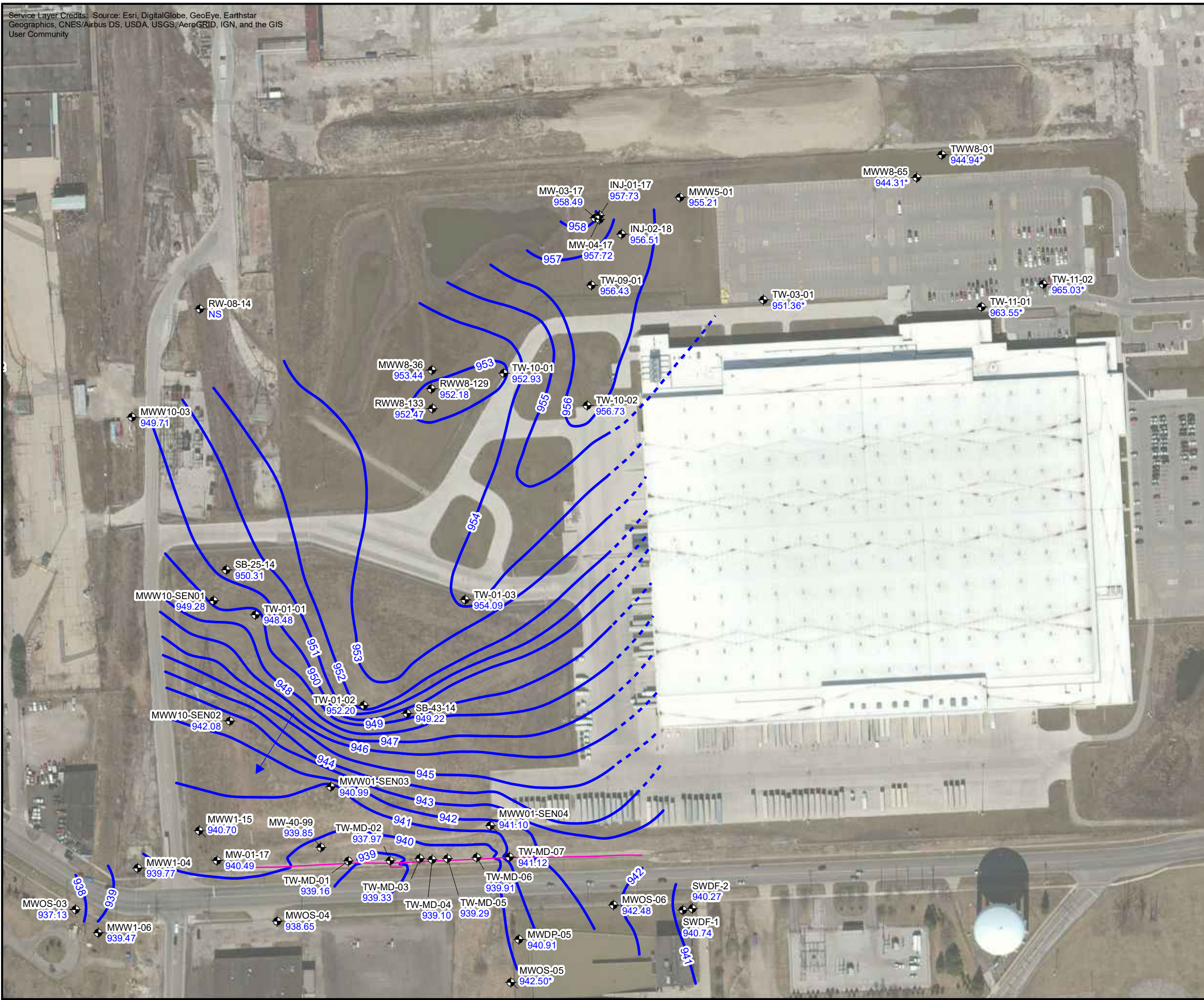
- ◆ GROUNDWATER MONITORING WELL
- 937.70 GROUNDWATER ELEVATION
- * WELL NOT APPROPRIATE FOR GROUNDWATER CONTOURING DUE TO SCREEN DEPTH AND/OR NOT REPRESENTATIVE OF SITE HYDROLOGY
- 955— GROUNDWATER CONTOUR (CONTOUR INTERVAL 1.0 FEET) (DASHED WHERE INFERRED)
- ← APPROXIMATE GROUNDWATER FLOW DIRECTION
- NS NOT SURVEYED

1. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
2. GROUNDWATER ELEVATIONS CALCULATED FROM WATER LEVELS COLLECTED ON OCTOBER 1 - 5, 2018.
3. ALL ELEVATIONS ARE REFERENCED TO A MEAN SEA LEVEL DATUM AND ARE IN UNITS OF FEET ABOVE MEAN SEA LEVEL.
4. THE EQUIVALENT GROUNDWATER ELEVATION IS CALCULATED WHERE LNAPL IS PRESENT USING THE LNAPL SURFACE ELEVATION, THE THICKNESS OF LNAPL AND THE APPROXIMATE SPECIFIC DENSITY OF THE LNAPL (0.88).



RACER TRUST
PONTIAC, MICHIGAN
PONTIAC NORTH CAMPUS

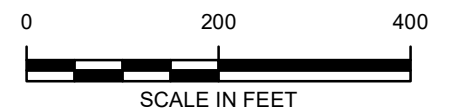
**GROUNDWATER CONTOUR MAP
BASELINE - OCTOBER 2018**



LEGEND

- ◆ GROUNDWATER MONITORING WELL LOCATION
- 937.70 GROUNDWATER ELEVATION
- * WELL NOT APPROPRIATE FOR GROUNDWATER CONTOURING DUE TO SCREEN DEPTH AND/OR NOT REPRESENTATIVE OF SITE HYDROLOGY
- 955— GROUNDWATER CONTOUR (CONTOUR INTERVAL 1.0 FEET) (DASHED WHERE INFERRED)
- ← APPROXIMATE GROUNDWATER FLOW DIRECTION
- TOE DRAIN AND SUMP

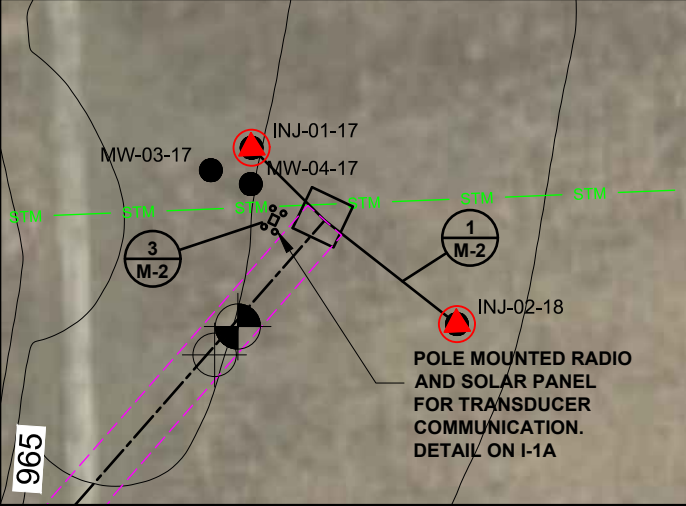
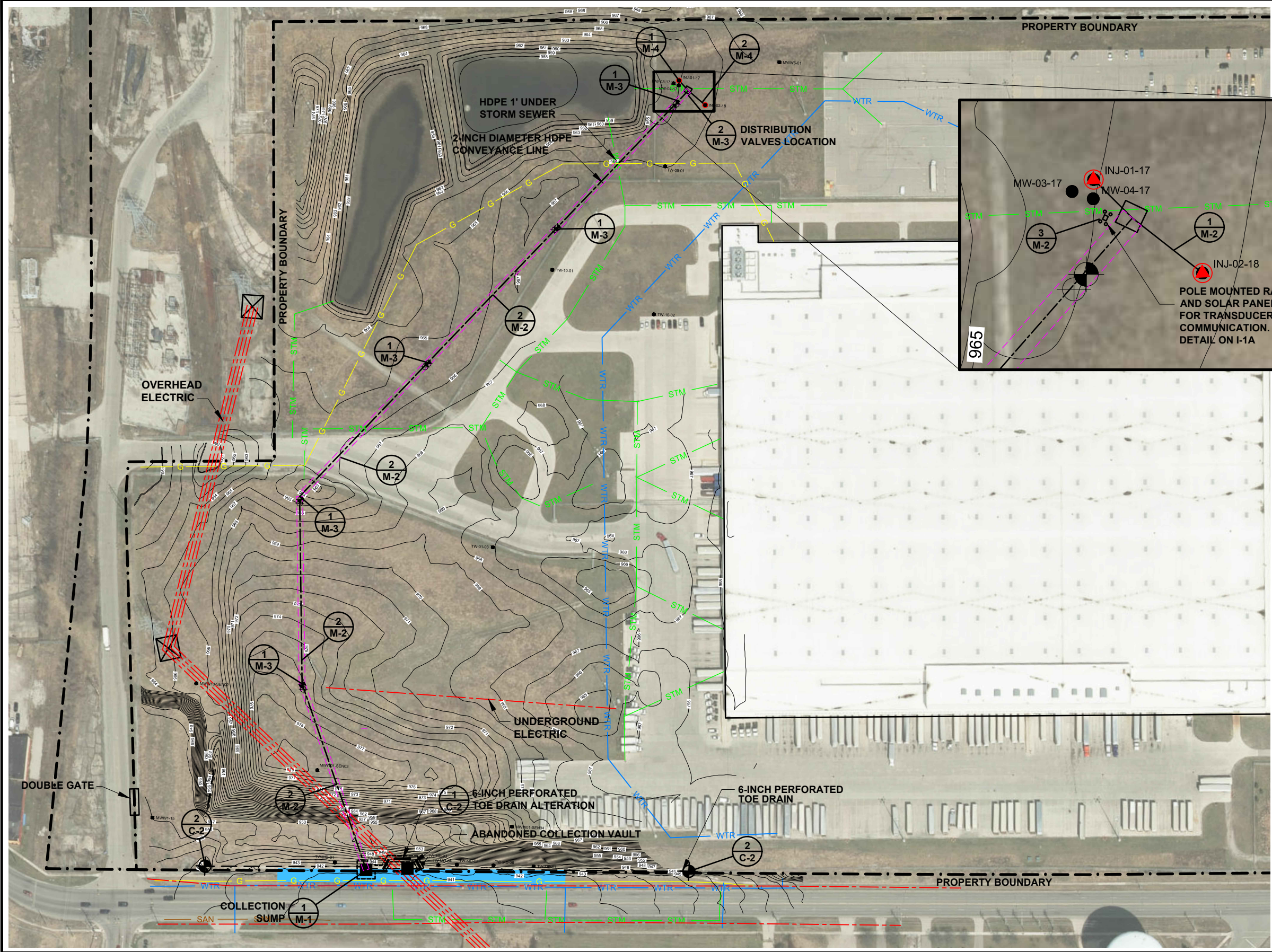
1. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
2. GROUNDWATER ELEVATIONS CALCULATED FROM WATER LEVELS COLLECTED ON OCTOBER 7 - 10, 2019.
3. ALL ELEVATIONS ARE REFERENCED TO A MEAN SEA LEVEL DATUM AND ARE IN UNITS OF FEET ABOVE MEAN SEA LEVEL.
4. THE EQUIVALENT GROUNDWATER ELEVATION IS CALCULATED WHERE LNAPL IS PRESENT USING THE LNAPL SURFACE ELEVATION, THE THICKNESS OF LNAPL AND THE APPROXIMATE SPECIFIC DENSITY OF THE LNAPL (0.88).



RACER TRUST
PONTIAC, MICHIGAN
PONTIAC NORTH CAMPUS

**GROUNDWATER CONTOUR
MAP - OCTOBER 2019**

CITY: DIV/GRU/UP: DB: LD: PIC: PM: TM: LVR/ON: OFF=REF-
 D:\GIS\Project Files\MotorsLiquitationCompany\PontiacNorthCampus\CAD_Data\StormDesign\AsBuilt\AsBuilt_PNC_01_SteelLayout.dwg LAYOUT: C-1 SAVED: 6/30/2020 3:07 PM ACADVER: 23.05 (LMS TECH) PAGES: 1 PLOTSTYLETABLE: ARCADIS.MVLCTB PLOTTED: 6/30/2020 3:15 PM BY: YARBROUGH, TOBI

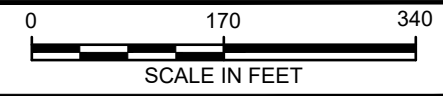


LEGEND

- MONTCALM NETWORK MONITORING WELL LOCATION
- ⊕ CLEAN-OUT ACCESS BOX
- ⊕ CLEAN-OUT VALVE KEY ACCESS
- ▲ INJECTION WELL
- CONVEYANCE LINE
- - - EXISTING PERFORATED TOE DRAIN
- PERFORATED TOE DRAIN
- G GAS MAIN
- SAN SANITARY SEWER
- STM STORM SEWER
- WTR WATER MAIN
- OVERHEAD/UNDERGROUND ELECTRICAL
- AREA OF HORIZONTALLY BORED PIPE INSTALLATION
- SEEP AREA

NOTES

1. MONITORING WELLS SHOWN ARE EXISTING. NOT ALL MONITORING WELLS ARE SHOWN DUE TO DENSITY. ALL LOCATIONS IN PROXIMITY OF THE CONVEYANCE PIPE AND WHICH ARE INCLUDED IN THE MONITORING WELL NETWORK HAVE BEEN DISPLAYED.
2. GROUND SURFACE CONTOURS ARE APPROXIMATE.



No.	Date	Revisions	By	Ckd
2	04/30/2020	As-Built Drawing Set Revisions	TRY	MW
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRY	MW

Project Mgr.
BS
 Designed by
DMS
 Drawn by
TRY
 Checked by
MRW



RACER TRUST
PONTIAC NORTH CAMPUS

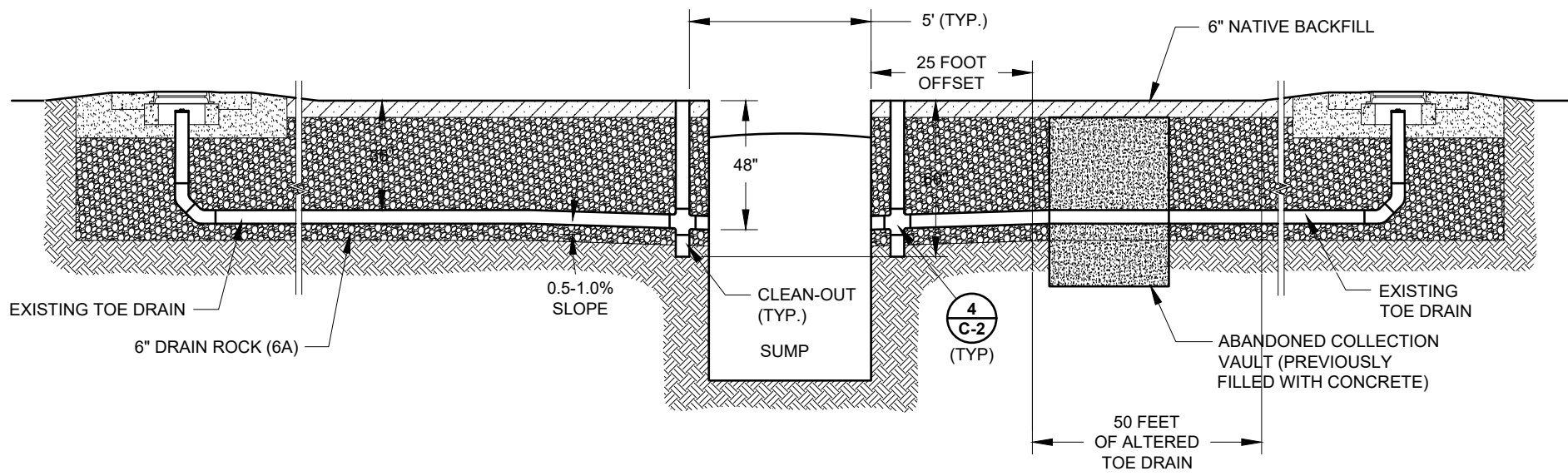
SITE LAYOUT

GENERAL

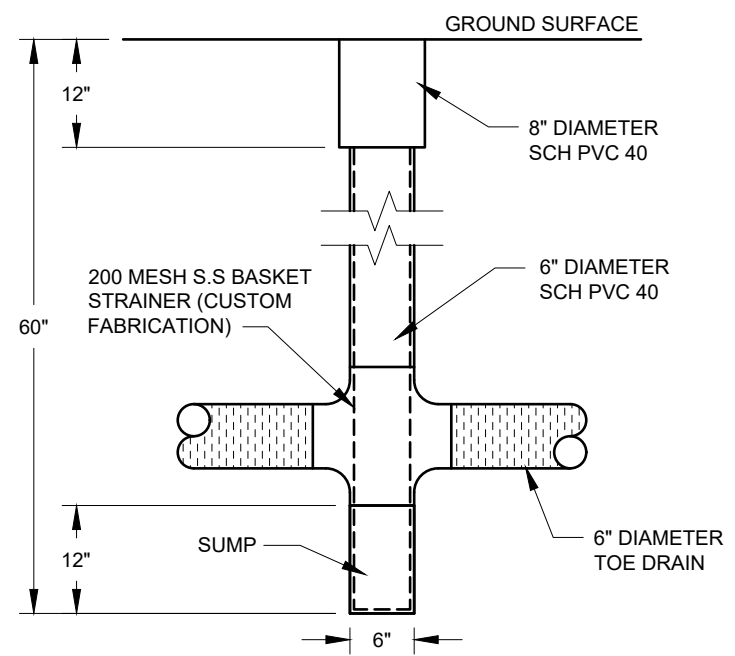
ARCADIS Project No.
30042811.00007
 Date
MAY 2020
 ARCADIS
 ARCADIS OF MICHIGAN, LLC.
 300 S. WASHINGTON
 SQUARE, STE 315
 LANSING, MICHIGAN 48933

C-1

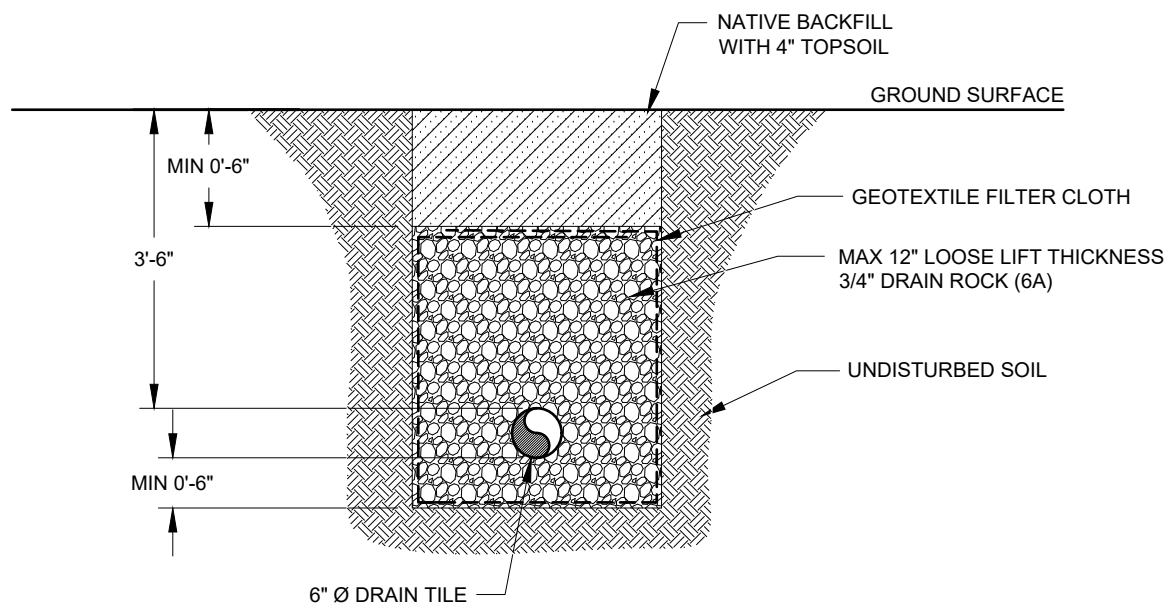
CITY: DIV/GRUOP: DB: LD: PIC: PM: TM: LVR:ON:OFF=REF: D:\GIS\Project Files\MotorsLiquidationCompany\PontiacNorthCampus\CAD_Data\StormDesign\AsBuilt\AsBuilt_PNC_01_SteelLayout.dwg LAYOUT: C-2 SAVED: 7/2/2020 3:27 PM ACADVER: 23.05 (LMS TECH) PAGES: 27 PLOT: 7/2/2020 3:27 PM BY: YARBROUGH, TOBI



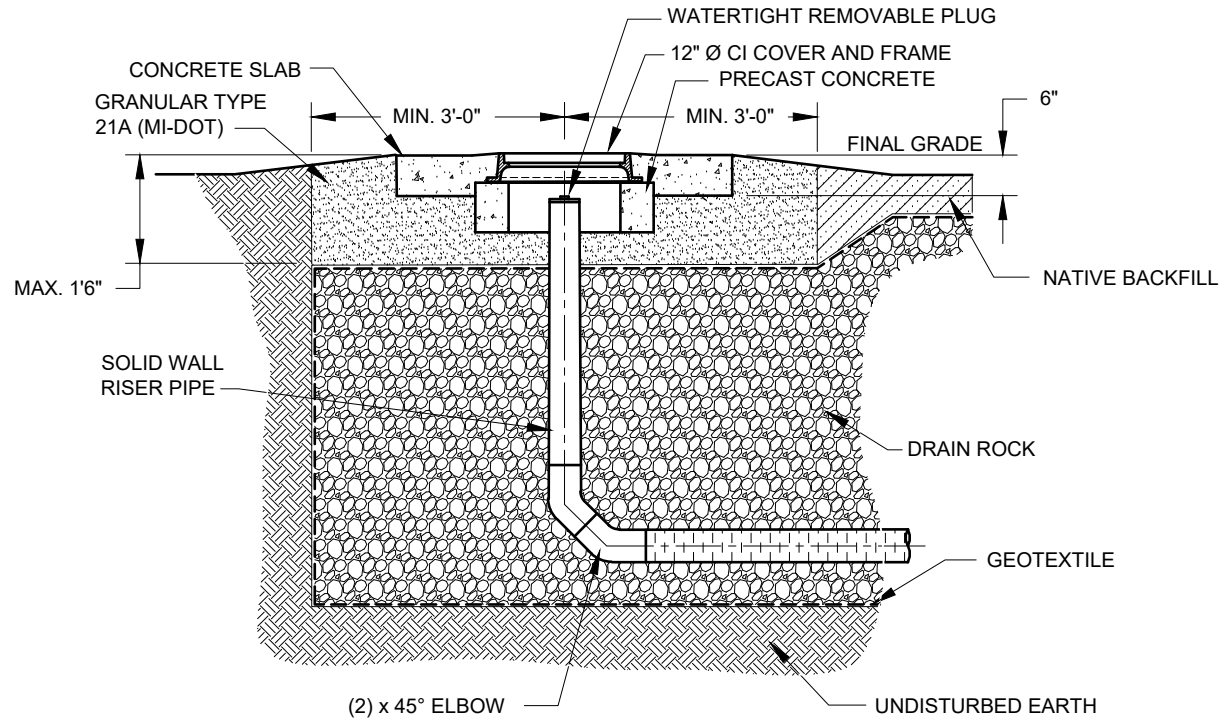
TOE DRAIN TRENCH DETAIL 3
C-2
NOT TO SCALE



SUMP CLEAN-OUT DETAIL 4
C-2
NOT TO SCALE



DETAIL SOURCE: ENCORE DRAWING TITLED DETAILS OF PUMP STATION, TRENCH, MANHOLE AND CLEAN-OUT
NOTE: FOR INFORMATIONAL PURPOSES.
TRENCH DETAIL (EXISTING) 1
C-2
NOT TO SCALE



DETAIL SOURCE: ENCORE DRAWING TITLED DETAILS OF PUMP STATION, TRENCH, MANHOLE AND CLEAN-OUT
NOTE: FOR INFORMATIONAL PURPOSES.
TOE DRAIN CLEAN-OUT DETAIL (EXISTING) 2
C-2
NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
2	04/30/2020	As-Built Drawing Set Revisions	TRY	MW
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRY	MW

THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REUSED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAME.

Project Mgr. BS
Designed by DMS
Drawn by TRY
Checked by MRW

ARCADIS
ARCADIS OF MICHIGAN, LLC.

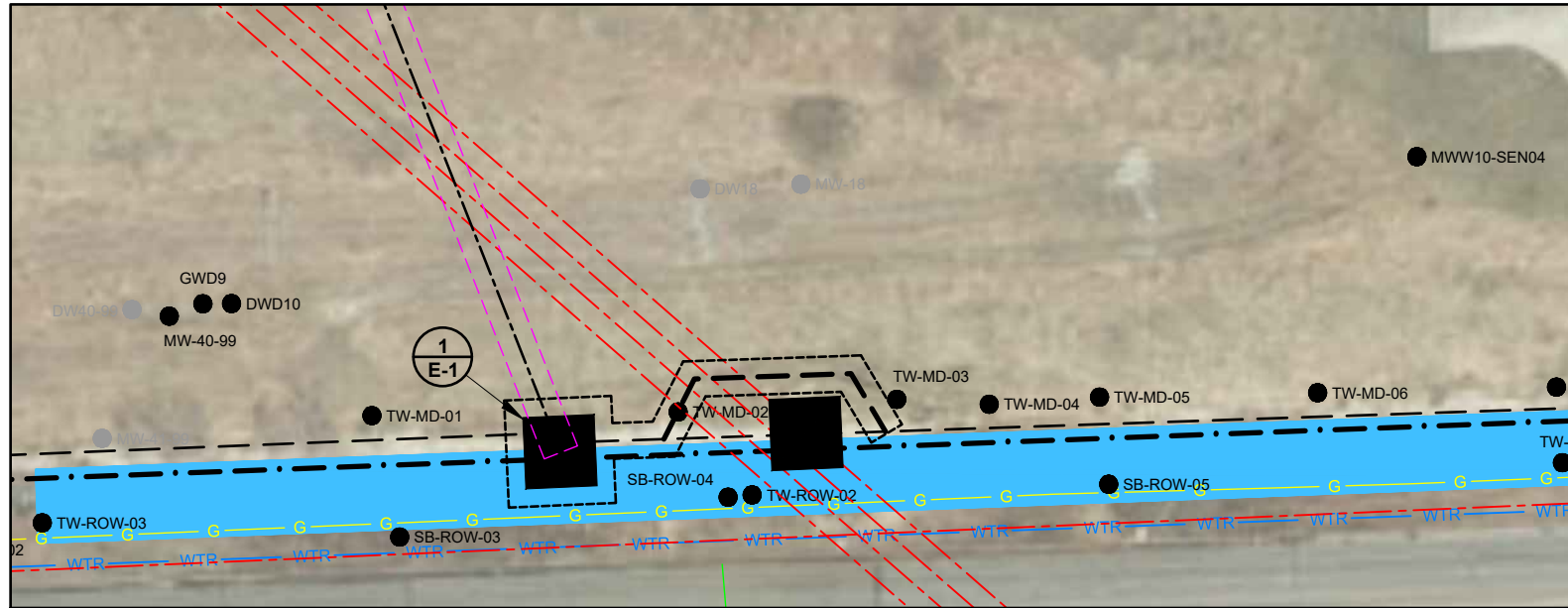
RACER TRUST
PONTIAC NORTH CAMPUS

TOE DRAIN ALTERATIONS
GENERAL

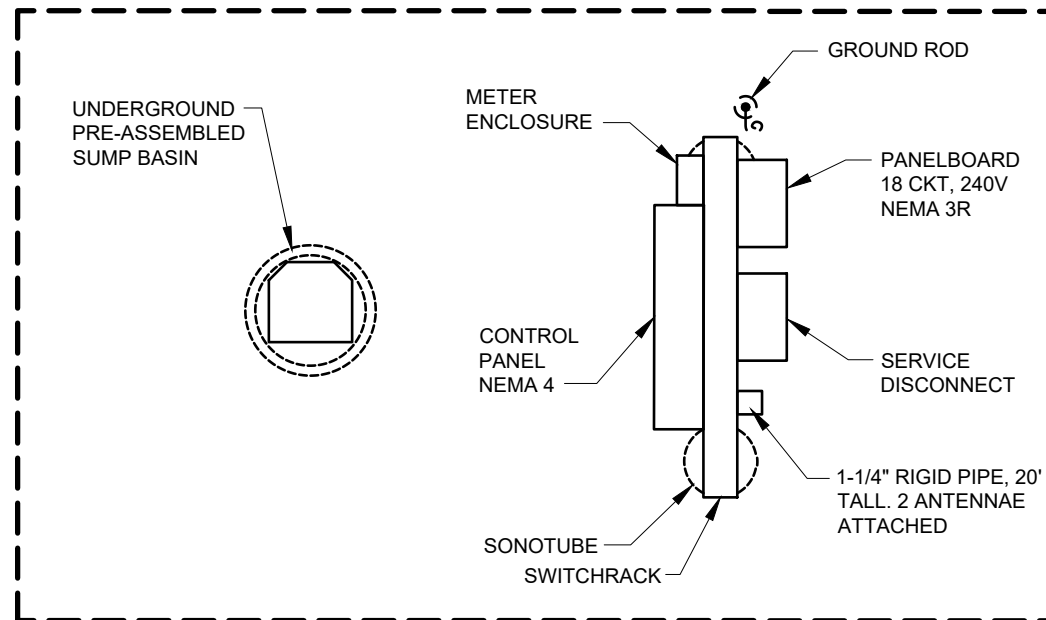
ARCADIS Project No. 30042811.00007
Date MAY 2020
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON SQUARE, STE 315
LANSING, MICHIGAN 48933

C-2

CITY: DIV/GRU/UP: DB: LD: PIC: PM: TM: LVR:ON:OFF=REF- D:\GIS\Project Files\Motors\Liquidation\Company\PontiacNorthCampus\CAD_Data\StormDesign\AsBuilt\AsBuilt_PNC_01_SteelLayout.dwg LAYOUT: E-1 SAVED: 6/4/2020 1:07 PM ACADVER: 23.05 (LMS TECH) PAGESETUP: -- PLOTSTYLETABLE: ARCADIS NOV1.CTB PLOTTED: 6/4/2020 1:56 PM BY: YARBROUGH, TOBI



SUMP AREA SITE PLAN
NOT TO SCALE



SUMP AREA PLAN
NOT TO SCALE

NOTES:

1. CONTRACTOR PROVIDED NECESSARY ENCLOSURES, EQUIPMENT, CONDUIT, AND FITTINGS SUITABLE FOR WEATHER AND ACCORDING TO NEC REQUIREMENTS.
2. CONTRACTOR COORDINATED WITH UTILITY UNDERGROUND FEED AND STUB UP LOCATION.

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:		USE TO VERIFY FIGURE REPRODUCTION SCALE	
No.	Date	Revisions	By Ckd
2	04/30/2020	As-Built Drawing Set Revisions	TRY MW
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRY MW

Project Mgr. BS
 Designed by DMS
 Drawn by TRY
 Checked by MRW

ARCADIS OF MICHIGAN, LLC.

RACER TRUST
 PONTIAC NORTH CAMPUS

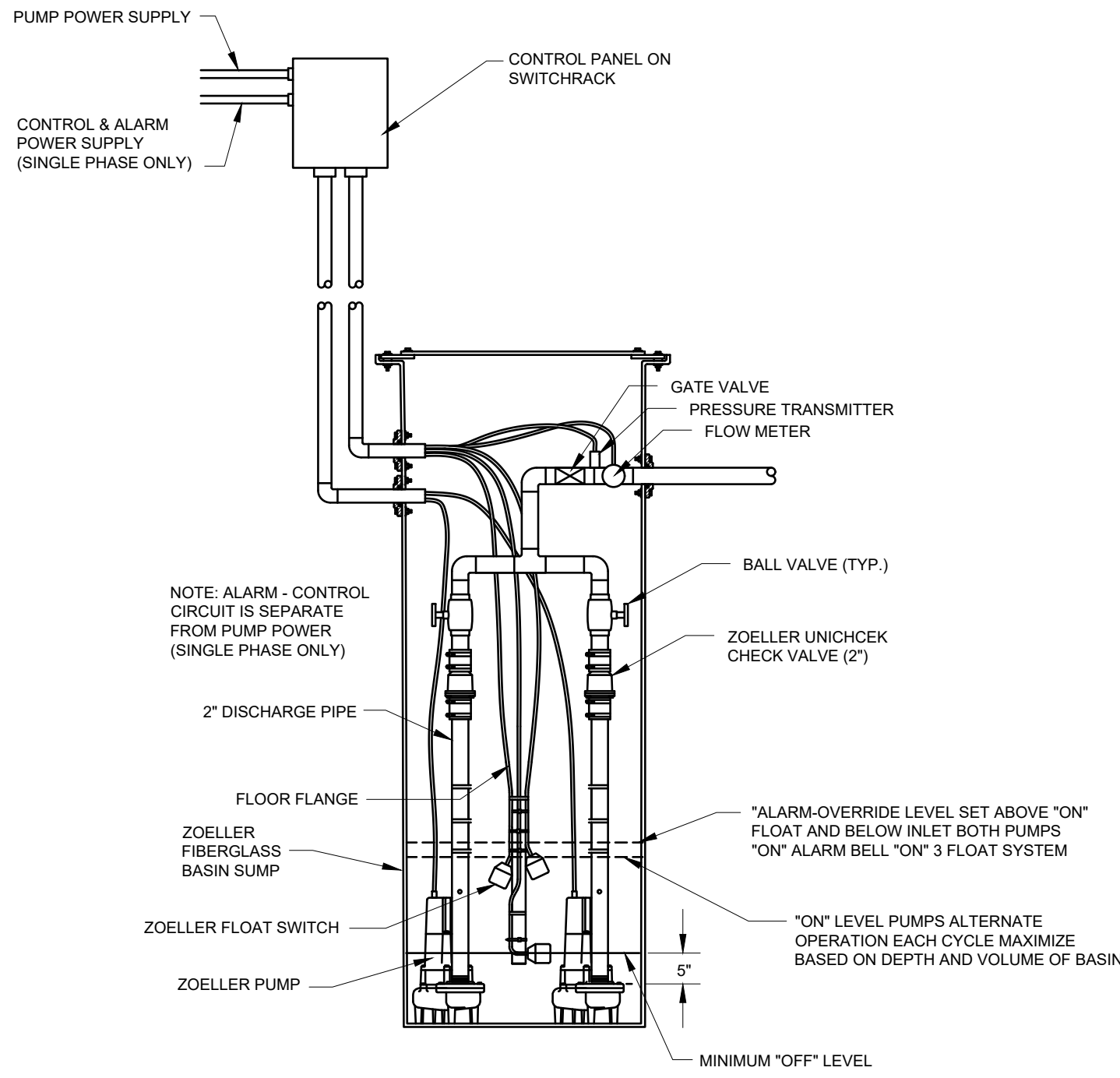
ELECTRICAL DETAILS

GENERAL

ARCADIS Project No. 30042811.00007
 Date MAY 2020
 ARCADIS OF MICHIGAN, LLC.
 300 S. WASHINGTON SQUARE, STE 315
 LANSING, MICHIGAN 48933

E-1

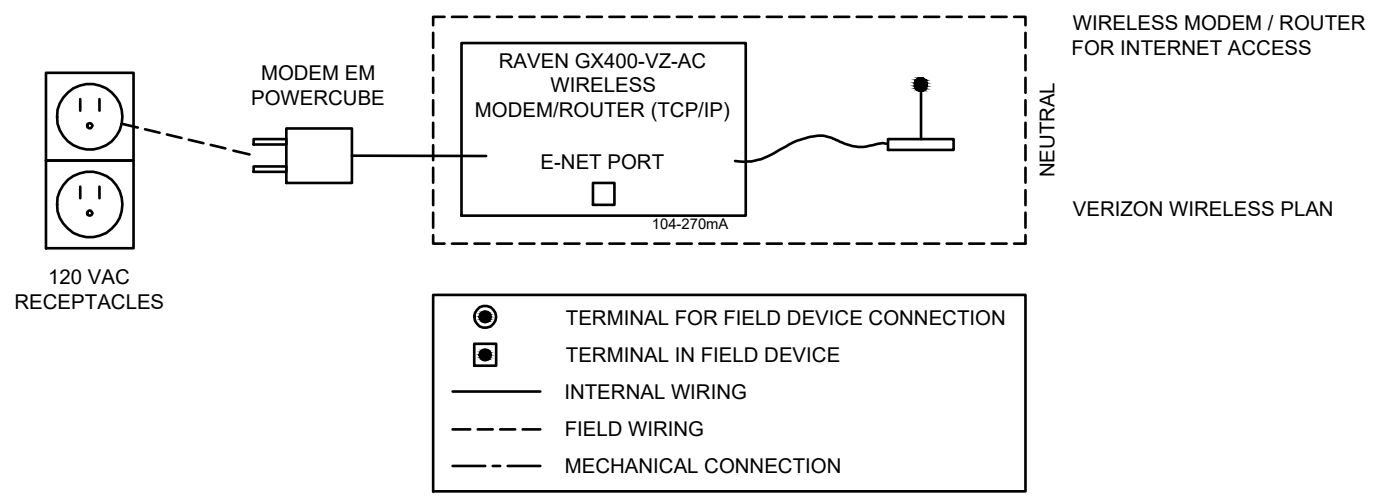
CITY: DIV/GRUP: DB: LD: PIC: PM: TM: LVR:ON=OFF=REF- D:\GIS\Project Files\Motors\LiquidationCompany\PontiacNorthCampus\CAD_Data\StormDesign\AsBuilt\AsBuilt_PNC_01_SteelLayout.dwg LAYOUT: E-2 SAVER: 6/5/2020 10:53 AM ACADVER: 23.05 (LMS TECH) PAGES: 23 PLOT: 6/5/2020 10:53 AM BY: YARBROUGH, TOBI



DUPLEX ELECTRICAL ALTERNATING SYSTEM
NOT TO SCALE

240V POWER PANELBOARD SCHEDULE						
PANEL: PP-1	LOCATION: SUMP SWITCHRACK	RATING: 100A., 240V 1PH., 3W. 22KA MIN. INTERRUPT		MAIN: 100A MAIN LUGS		
	MOUNTING: SURFACE			ENCLOSURE: NEMA 1		
LOAD DESIGNATION	CKT. BKR.	CKT. NO.	PHASE	CKT. NO.	CKT. BKR.	LOAD DESIGNATION
P-1	20	1		2		
	2P	3		4		
P-2	20	5		6		SPACE
	2P	7		8		
GFCI CONVENIENCE RCPT	20	9		10		SPACE
SUMP CONTROL BOX	20	11		12		
SPARE	20	13		14		SPACE
SPARE	20	15		16		

PANEL SCHEDULE
NOT TO SCALE



COMMUNICATION DIAGRAM
NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.		USE TO VERIFY FIGURE REPRODUCTION SCALE	
No.	Date	Revisions	By Ckd
2	04/30/2020	As-Built Drawing Set Revisions	TRY MW
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRY MW

Project Mgr. BS
 Designed by DMS
 Drawn by TRY
 Checked by MRW

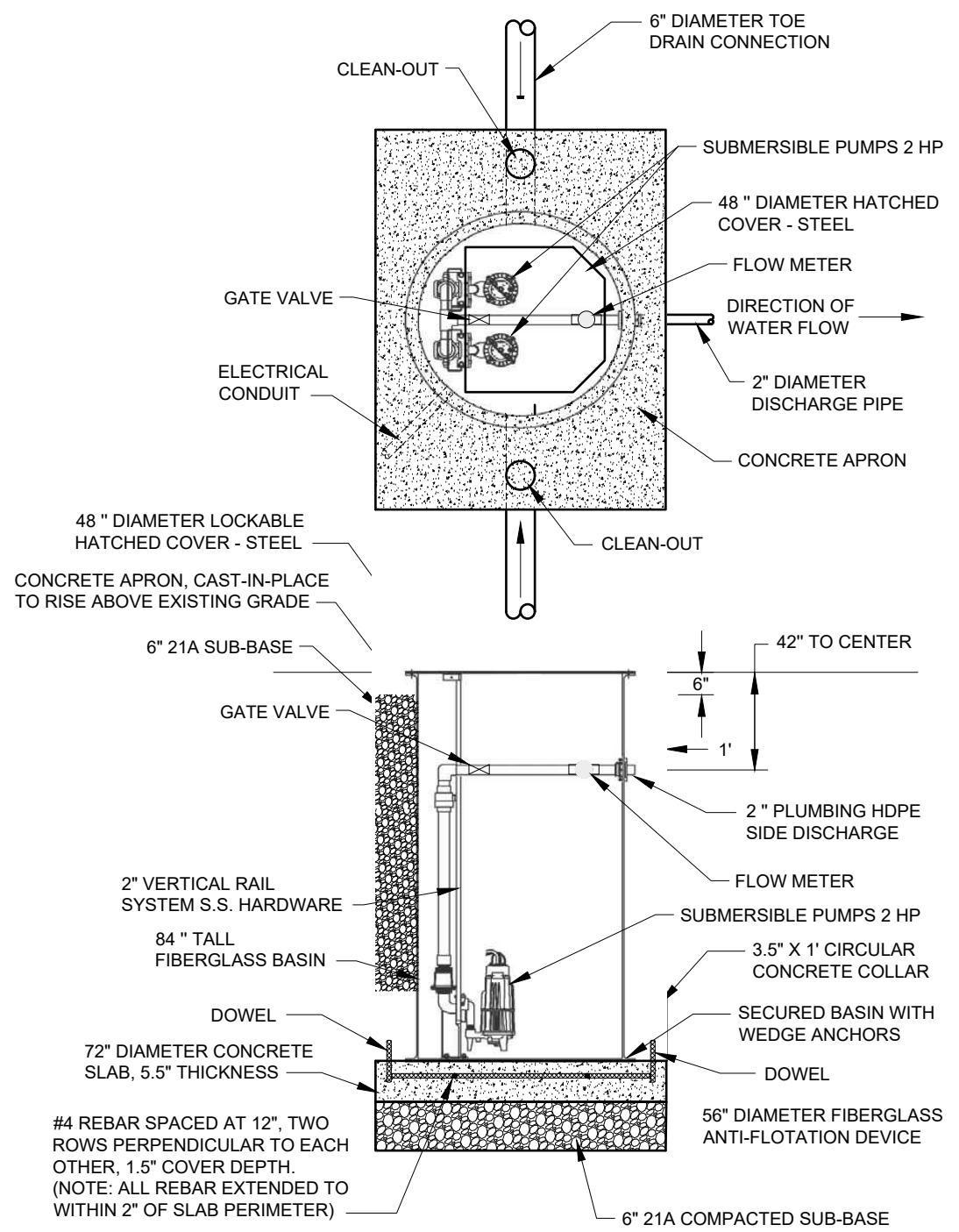
ARCADIS
ARCADIS OF MICHIGAN, LLC.

RACER TRUST
PONTIAC NORTH CAMPUS

ELECTRICAL DETAILS
GENERAL

ARCADIS Project No. 30042811.00007
 Date MAY 2020
 ARCADIS OF MICHIGAN, LLC.
 300 S. WASHINGTON SQUARE, STE 315
 LANSING, MICHIGAN 48933

CITY: DIV/GRU/UP: DB: LD: PIC: PM: TM: LYR:ON=OFF=REF- D:\GIS\Project Files\Motors\Liquidation\Company\PontiacNorthCampus\CAD_Data\StormDesign\AsBuilt\AsBuilt_PNC_01_SteelLayout.dwg LAYOUT: M-1 SAVED: 7/2/2020 10:22 AM ACADVER: 23.0.5 (LMS TECH) PAGES: 1 PLOT: 7/2/2020 10:22 AM BY: YARBROUGH, TOBI



NOTE: SUMP BASIN WITH PUMP IS A PRE-PACKAGED UNIT

SUMP VAULT DETAIL
NOT TO SCALE



THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:		USE TO VERIFY FIGURE REPRODUCTION SCALE	
---	--	---	--

No.	Date	Revisions	By	Ckd
2	04/30/2020	As-Built Drawing Set Revisions	TRY	MW
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRY	MW

Project Mgr.	BS
Designed by	DMS
Drawn by	TRY
Checked by	MRW

ARCADIS OF MICHIGAN, LLC.

RACER TRUST
PONTIAC NORTH CAMPUS

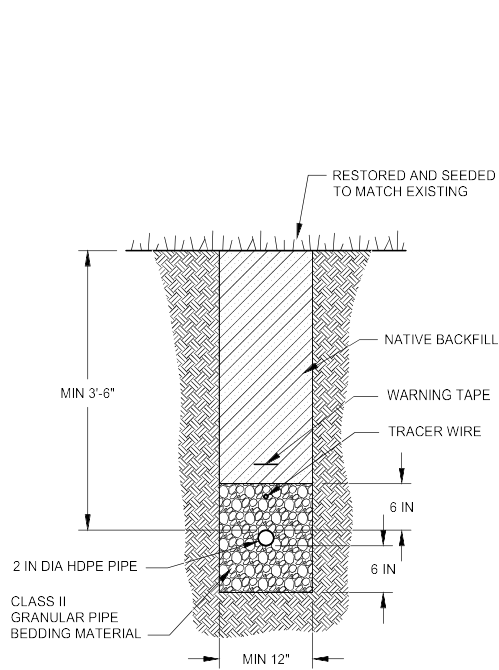
SUMP DETAIL

GENERAL

ARCADIS Project No. 30042811.00007
Date MAY 2020
ARCADIS ARCADIS OF MICHIGAN, LLC. 300 S. WASHINGTON SQUARE, STE 315 LANSING, MICHIGAN 48933

M-1

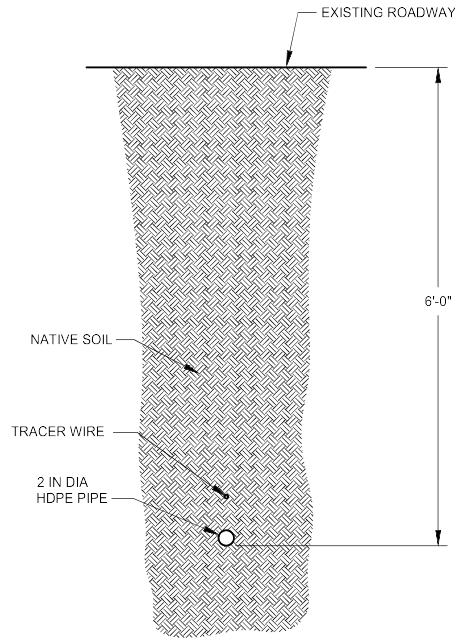
CITY: DIV/GROUP: DB: LD: PIC: PM: TR: LVR: ON: OFF: REF: PROJECT: LOCATION: COMPANY: PONTIAC NORTH CAMPUS: CAD: DATE: 04/30/2020: 3:08 PM: ACADIVER: 20.05 (LMS TECH): PAGES: 20: PLOTTED: 05/26/2020 12:22 PM: BY:



NOTES:

1. TRACER WIRE INSTALLED IS #14 AWG COPPER WITH 30 MIL POLYETHYLENE INSULATION OR APPROVED EQUAL. TRACER WIRE IS PLACED DIRECTLY ABOVE THE CENTER OF PIPE AND SECURED EVERY 5 FEET OF PIPE LENGTH WITH TAPE TO PREVENT DISPLACEMENT DURING BACKFILL. TRACER IS CONNECTED WITH CONDUCTIVE LUGS OR EQUIVALENT AT TRENCH JUNCTIONS. TRACER WIRE WAS DAYLIGHTED AT THE BEGINNING AND END OF PIPE TO FACILITATE ENERGIZING BY UTILITY LOCATORS.

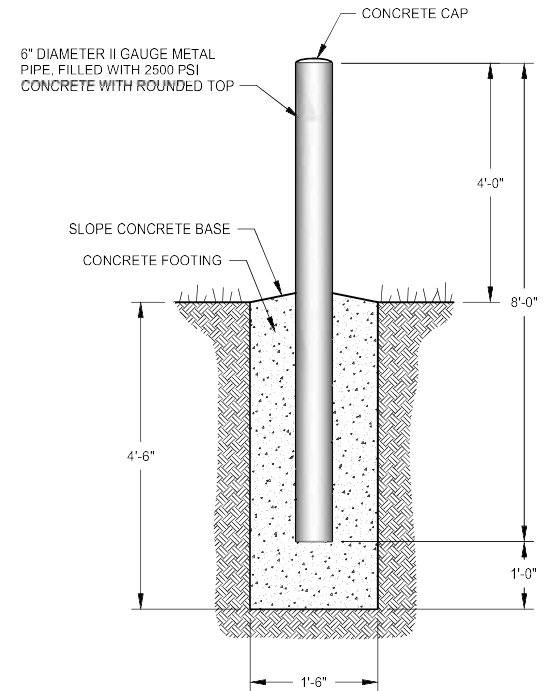
TRENCH DETAIL (1)
NOT TO SCALE (M-2)



NOTES:

1. TRACER WIRE INSTALLED IS #14 AWG COPPER AND HAS 30 MIL POLYETHYLENE INSULATION OR APPROVED EQUAL. TRACER WIRE IS PLACED DIRECTLY ABOVE THE CENTER OF PIPE AND SECURED EVERY 5 FEET OF PIPE LENGTH WITH TAPE TO PREVENT DISPLACEMENT DURING BACKFILL. TRACER IS CONNECTED WITH CONDUCTIVE LUGS OR EQUIVALENT AT TRENCH JUNCTIONS. TRACER WIRE WAS DAYLIGHTED AT THE BEGINNING AND END OF PIPE TO FACILITATE ENERGIZING BY UTILITY LOCATORS.
2. WARNING TAPE NOT REQUIRED IN SECTIONS OF HORIZONTALLY DIRECTIONAL DRILLING.

HORIZONTAL BORING DETAIL (2)
NOT TO SCALE (M-2)



BOLLARD DETAIL (3)
NOT TO SCALE (M-2)

CONVEYANCE PIPE CROSS-SECTIONS



ARCADIS OF MICHIGAN, LLC.

RACER TRUST
PONTIAC NORTH CAMPUS

GENERAL

ARCADIS Project No.
20042811.000007
Date
MAY 2020
ARCADIS
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON
SQUARE, STE 310
LANSING, MICHIGAN 48203

M-2

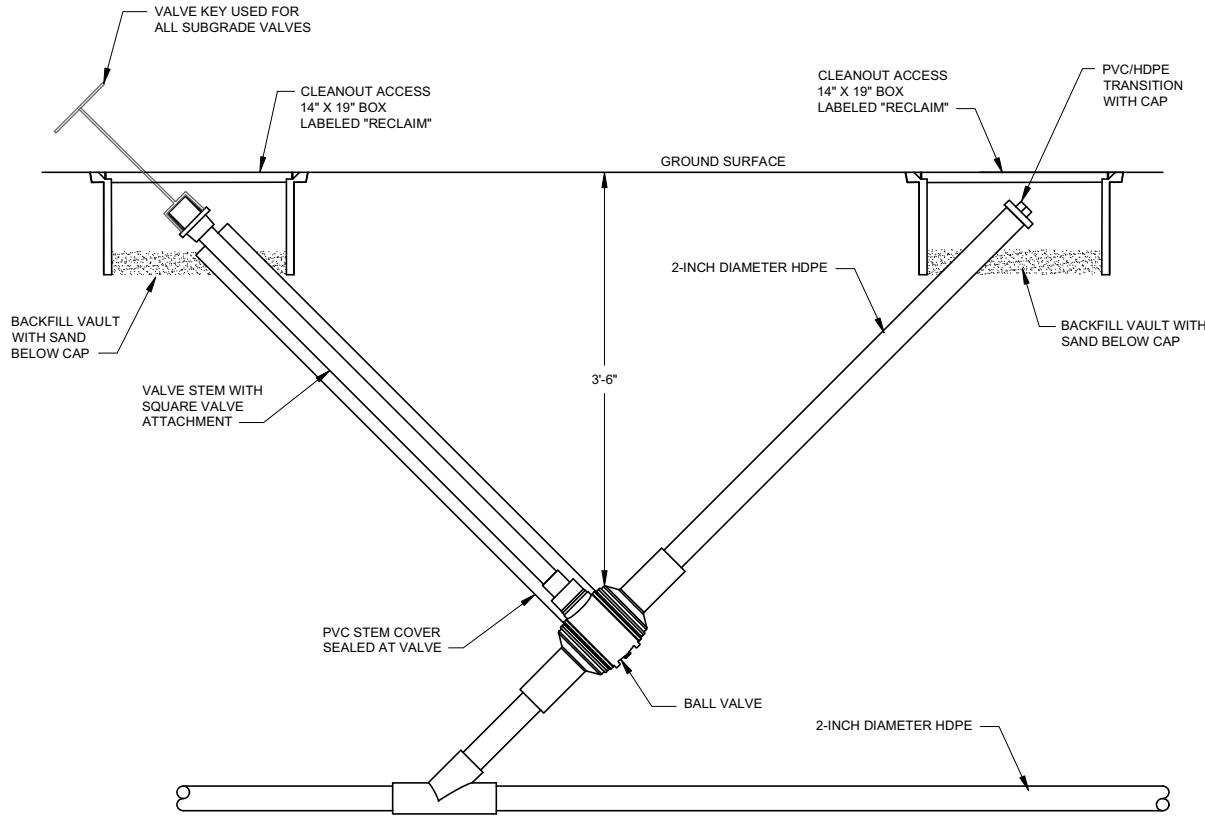
NO.	DATE	DESCRIPTION	BY	CHKD
1	05/26/20	General revisions to all sheets. Removed Sheet M-2	TRY	MW
2	04/30/2020	As-Built Drawing Set Revisions	TRY	MW

USE TO VERIFY
PREPARE
REPRODUCTION
SCALE

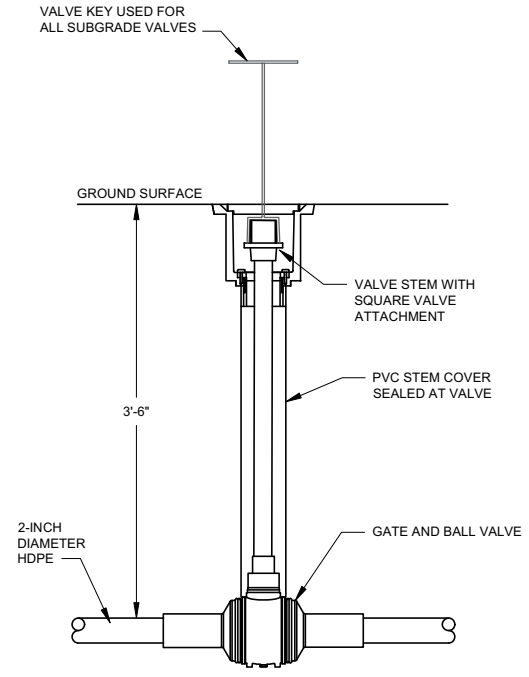
THIS DRAWING IS THE PROPERTY OF THE ARCHADIS OF MICHIGAN, LLC. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREIN. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.

THIS DRAWING IS THE PROPERTY OF THE ARCHADIS OF MICHIGAN, LLC. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREIN. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.

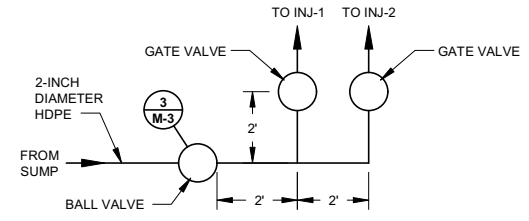
CITY: DW/GRPUP: /Mason/Location/Company/PontiacNorthCampus/CAO/Jean.Storvick/Design/Detail/AsBuilt/PNC_01_Site/ugp/01.dwg LAYOUT: 14.3 SAVED: 5/27/2020 5:08 PM ACADIVER: 20.05 (LMS TECH) PAGES: 209 OF 210 PLOTTED: 5/26/2020 12:22 PM BY: VAS/MS/01/01



CONVEYANCE PIPE CLEANOUT DETAIL (TYP)
NOT TO SCALE 1 M-3



SUBGRADE VALVE DETAIL (TYP)
NOT TO SCALE 3 M-3



DISTRIBUTION VALVES LAYOUT
NOT TO SCALE 2 M-3

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE.

No.	Date	Revisions	By	Check
1	07/26/18	General revisions to all sheets. Removed Sheet M-5	TRY	MW
2	04/30/2020	As-Built Drawing Set Revisions	TRY	MW

Project Mgr: BS
Designed by: DMS
Drawn by: TRY
Checked by: MRW

ARCADIS

ARCADIS OF MICHIGAN, LLC.

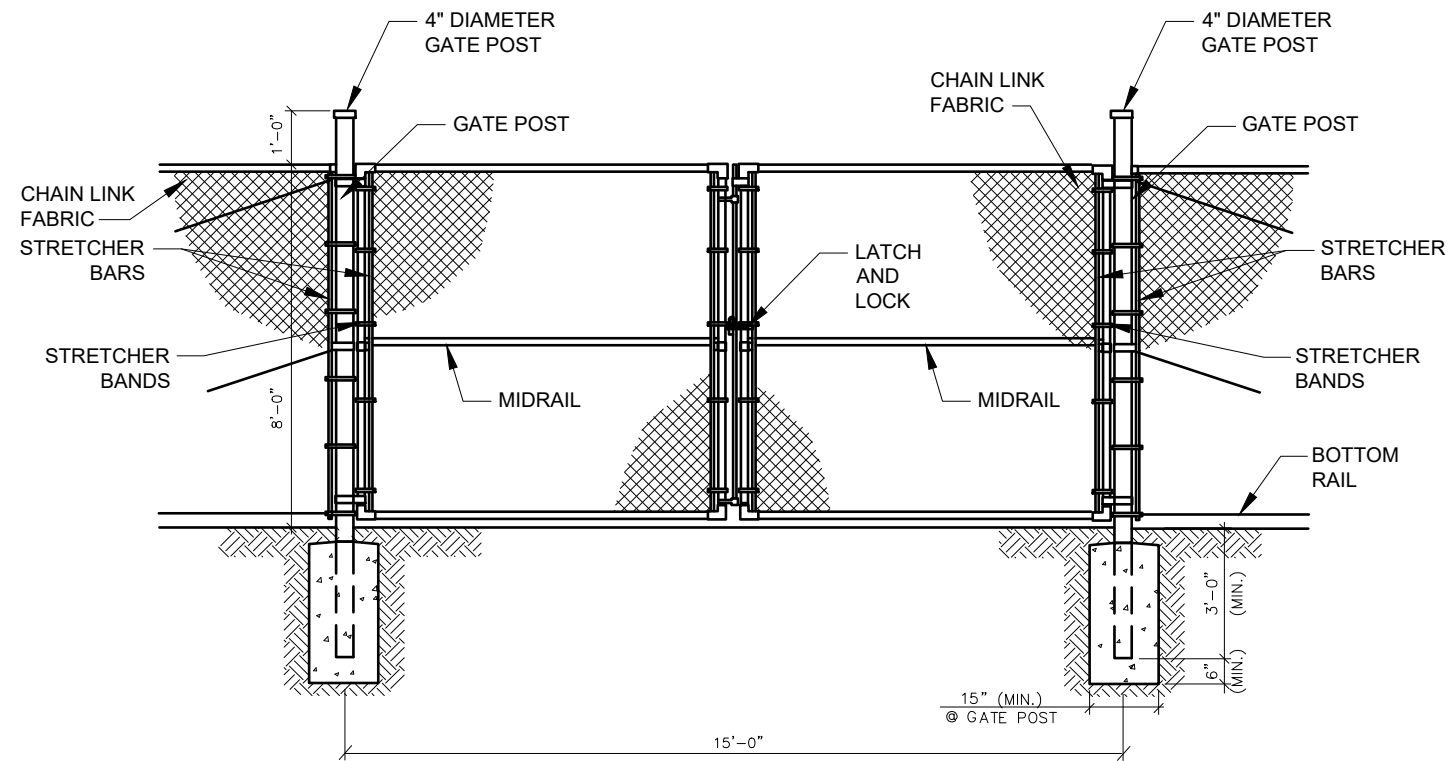
CLEANOUT AND DISTRIBUTION VALVE DETAILS

RACER TRUST
PONTIAC NORTH CAMPUS

ARCADIS Project No. 30042811.00007
Date: MAY 2020
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON SQUARE, STE 315
LANSING, MICHIGAN 48933

M-3

CITY: DIV/GRUP: DB: LD: PIC: PM: TM: LVR:ON=OFF=REF- D:\GIS\Project Files\MotorsLiquidation\Company\PontiacNorthCampus\CAD_Data\StormDesign\AsBuilt\AsBuilt_PNC_01_SteelLayout.dwg LAYOUT: M-X ACADVER: 23.05 (LMS TECH) PAGESETUP: PLOTSTYLETABLE: ARCADIS NOVICTB PLOTTED: 6/11/2020 11:37 AM BY: YARBROUGH, TOBI



DOUBLE SWING GATE DETAIL

CHAIN-LINK FENCE DETAILS

- CHAIN LINK FABRIC SHALL BE 9 GA. KT CHAIN LINK FABRIC WITH 2" MESH.

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
3	06/10/2020	Addition of Gate Detail Sheet	TRY	MW
2	04/30/2020	As-Built Drawing Set Revisions	TRY	MW
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRY	MW

THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REUSED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAME.

Project Mgr.
BS
Designed by
DMS
Drawn by
TRY
Checked by
MRW



RACER TRUST
PONTIAC NORTH CAMPUS

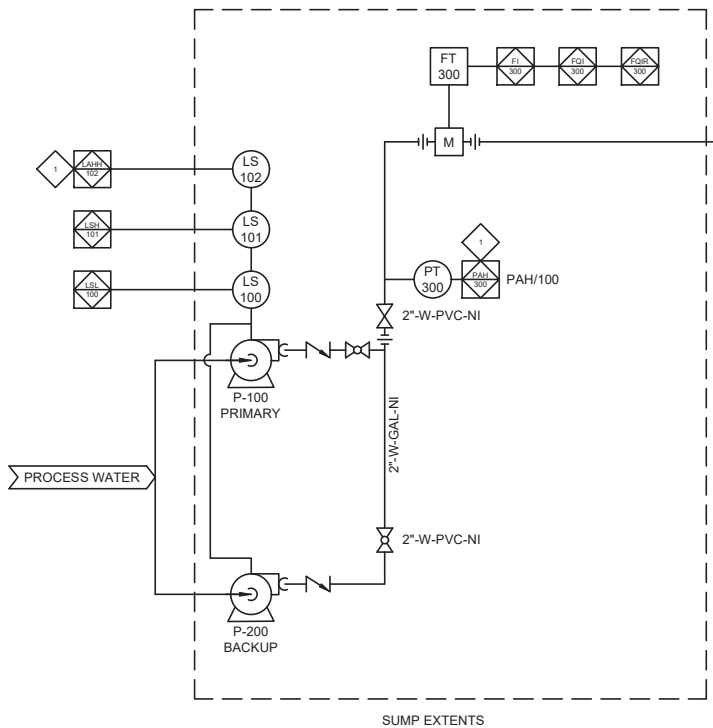
FENCE GATE DETAIL

GENERAL

ARCADIS Project No.
30042811.00007
Date
JUNE 2020
ARCADIS
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON
SQUARE, STE 315
LANSING, MICHIGAN 48933

M-5

CITY: D:\GROUP - DB - ID: PC - TM - LVR-DNS-OFF-REF- D:\GIS\Project Files\Motor Liquidation\Company\Plant\NorthCampus\CAD - Detail\StormDesign\PNC_of_Site\Layout.dwg LAYOUT P-1 - SAVED: 8/16/2018 12:26 PM ACADVER: 21.06 (MS TECH) PAGERSETUP - PLOTTED: 8/16/2018 12:31 PM BY: YARBROUGH, TOBI



P&ID
NO SCALE

LEGEND

- PROCESS PIPE/LINE
- LIMIT OF SUMP
- LINE NUMBER BREAK
- ⊗ BALL VALVE
- ∇ CHECK VALVE
- ⊗ GATE VALVE
- ∪ UNION
- △ REDUCER
- ⊙ CENTRIFUGAL PUMP
- M METER
- ⊠ LOCAL PROGRAMMABLE LOGIC CONTROLLER

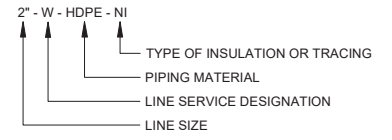
INSTRUMENT SYMBOLS AND NOTES

- INSTRUMENT LOCALLY MOUNTED

ABBREVIATIONS

- FT FLOW TRANSMITTER
- FI FLOW INDICATOR
- FQI FLOW QUANTITY INDICATOR
- FQIR FLOW QUANTITY INDICATING RECORDER
- LAH LEVEL ALARM HIGH
- LS LEVEL SWITCH
- LI LEVEL TRANSMITTER
- LIR LEVEL INDICATOR RECORDER
- LSH LEVEL SWITCH HIGH
- LSL LEVEL SWITCH LOW
- PAH PRESSURE ALARM HIGH
- P PUMP
- PT PRESSURE TRANSMITTER

LINE NUMBER CODE



1 PUMPS P-100 AND P-200 WILL OPERATE CONTINUOUSLY UNLESS ANY OF THE FOLLOWING INITIATING INTERLOCK CONDITIONS DEVELOP. ALARM CONDITIONS INITIATING INTERLOCK 1 SHALL BE LATCHED UNTIL CLEARED BY A PRESCRIBED SET OF INSTRUMENT CONDITIONS.

IF THE CONDITIONS BELOW EXIST, INITIATE INTERLOCK 1:

1. IF THE WATER LEVEL IN THE SUMP RISES ABOVE HIGH HIGH LEVEL SET POINT LAHH-102
2. IF THE PRESSURE AT PT-300 RISES ABOVE PAH-300.
3. IF THE WATER LEVEL IN THE INJECTION WELLS RISES ABOVE HIGH LEVEL SET POINT LAH-400 OR LAH-401

PIPING NUMBERING CODE

- HDPE HIGH DENSITY POLYETHYLENE
- PVC POLY VINYL CHLORIDE
- LINE SERVICE
- W WATER

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	TRV	MW	CHK
1	7/5/2018	General revisions to all sheets, Removed Sheet M-5	TRV	MW	CHK

Project Mgr. BS
Designed by DMS
Drawn by TRV
Checked by MRW

ARCADIS

ARCADIS OF MICHIGAN, LLC.

RACER TRUST
PONTIAC NORTH CAMPUS

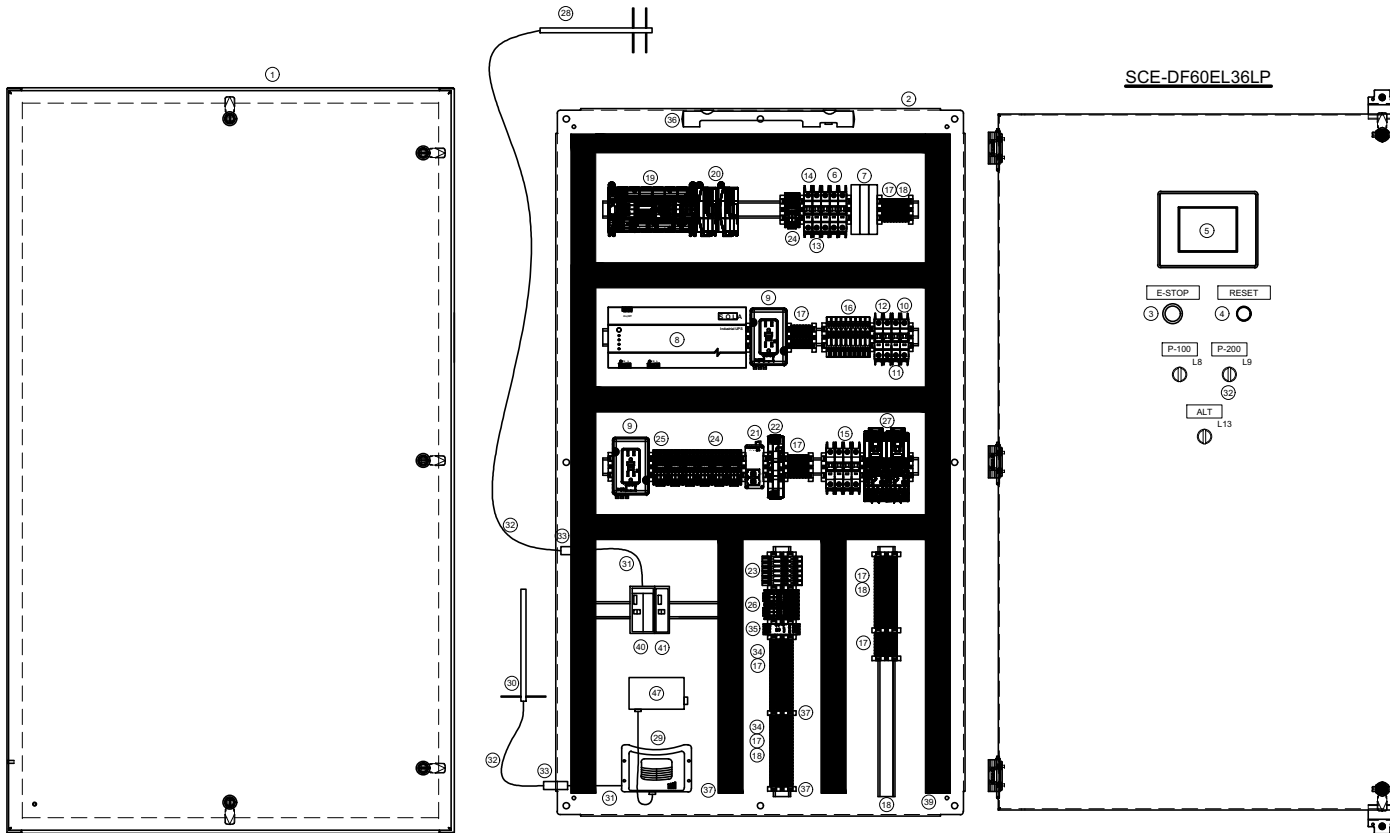
PIPING AND INSTRUMENTATION DIAGRAM

GENERAL

ARCADIS Project No. B0064607 2018.00007
Date: JULY 2018
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON SQUARE, STE 315 LANSING, MICHIGAN 48933

P-1

CITY: DW\GROUP: 030808\location\Company\PortMacNorthCampus\CAD_data\BomDesign\adalt\adalt\pacer\PCB\PCB.dwg LAYOUT-1.d SAVED 3/26/2020 2:57 PM ACADVER: 23.05 (MS TECH) PAGESETUP - PLOTSTYLETABLE: ARCADIS.NWI(CTB) PLOTTED: 5/29/2020 1:10 PM BY: VASANTHARAJAN, TDR



SCE-DF60EL36LP

LEGEND

- DENOTES TERMINAL BLOCK CONNECTION
- DASHED LINES DENOTES WIRING TO FIELD DEVICES
- DASHED WITH PATTERN DENOTES DEVICES IN REMOTE LOCATIONS

LINE NUMBER DESCRIPTION

0000
 WIRING DIAGRAM SHEET LINE NUMBER (ALWAYS 2 DIGITS)

WIRE NUMBER DESCRIPTION

00000
 WIRE NUMBER (ALWAYS 1 DIGIT)
 LINE NUMBER (ALWAYS 2 DIGITS)

TB TERMINAL BLOCK

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE.

No.	Date	Revisions	By	Chg
1	11/25/2018	General revisions to all specs. Removed Sheet M-5	TRY	MW
2	04/30/2020	As-Built Drawing Set Revisions	TRY	MW

Project Mgr. BS
 Designed by DMS
 Drawn by TRY
 Checked by MRW



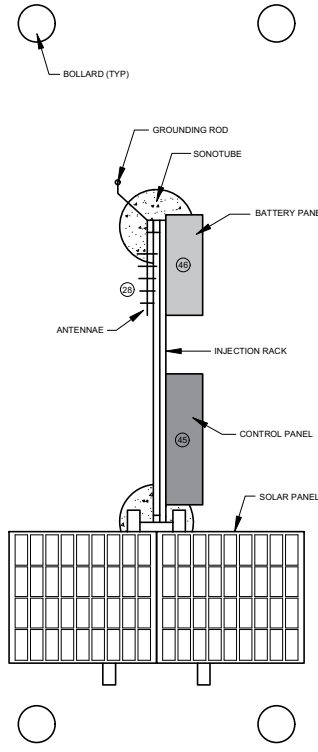
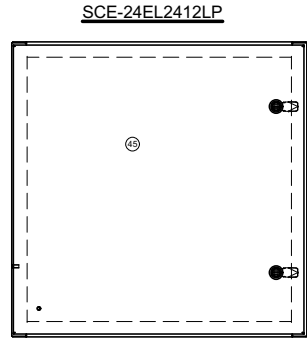
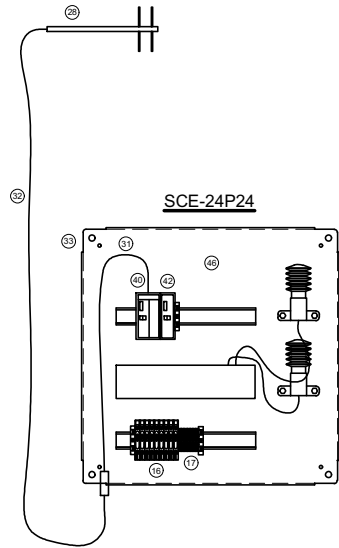
ARCADIS OF MICHIGAN, LLC.

RACER TRUST
 PONTIAC NORTH CAMPUS

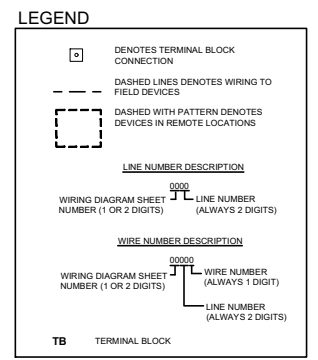
MCP PUMP PANEL LAYOUT

ARCADIS Project No. 30042811.00007
 Date MAY 2020
 ARCADIS OF MICHIGAN, LLC.
 300 S. WASHINGTON SQUARE, STE 315
 LANSING, MICHIGAN 48933

CITY: DW/GRPUB - Missouri, Location: Company/Port/Address/Building - RACER TRUST 23.05 DMS TECH - PAGESETUP - PLOTSTYLETABLE: ARCADIS.MOVICTB - PLOTTED: 5/29/2020 11:11 PM BY: VAS/000001



TAG	QTY	SUB	DESCRIPTION	MANUFACTURER	CATALOG #
1	1		WALL MOUNT STEEL ENCLOSURE 60X36X12	SCE	SCE-60EL3612LP
2	1		BACK PANEL FOR ENCLOSURE	SCE	SCE-60P24
3	1		RED MUSHROOM HEAD ESTOP TWIST RELEASE	AB	800T-MT-14
4	1		22.5MM PB BASE MOUNT, SCREW CONTACT BLOCK, 1 IN.D.	AB	800F-BK01
4	1		BLACK, 22 MM, MOMENTARY PUSH BUTTON	AB	800FP-F2PX-20
5	1		6" G. MORIE COLOR TOUCH PANEL	AUTOMATION DIRECT	EAG-TBCL-R
6	1		60 AMP, 3 POLE, MINIATURE CIRCUIT BREAKER (240 VAC)	AB	1483-M3C60
7	1		120 VAC SURGE PROTECTION DEVICE (60A)	AB	1483-1S120-403
8	1		1PSS, 300 KVA	SOLA	1S1690
9	1		MOUNTING BRACKET FOR UPS	SOLA	81X-PM58K
9	2		DUAL GFCI RECEPTACLE	AB	1482-REC16G
10	1		2 AMP MINIATURE CIRCUIT BREAKER (1 POLE, 120 VAC)	AB	1483-M1C320
11	1		7 AMP MINIATURE CIRCUIT BREAKER (1 POLE, 120 VAC)	AB	1483-M1C370
12	2		8 AMP MINIATURE CIRCUIT BREAKER (1 POLE, 120 VAC)	AB	1483-M1C380
13	1		10 AMP MINIATURE CIRCUIT BREAKER (1 POLE, 120 VAC)	AB	1483-M1C400
14	1		15 AMP MINIATURE CIRCUIT BREAKER (1 POLE, 120 VAC)	AB	1483-M1C150
15	2		20 AMP MINIATURE CIRCUIT BREAKER (2 POLE, 240 VAC)	AB	1483-M1C200
16	9		120 VAC FUSE BLOCKS	AB	1482-WF84256
16	4		2 A, 250 V, TIME DELAY 5 X 20 MM FUSES	BUSSMANN	5506-2-R
16	5		1 A, 250 V, TIME DELAY 5 X 20 MM FUSES	BUSSMANN	5506-1-R
17	TBD		120 VAC TERMINAL BLOCK	AB	1482-J3
18	TBD		120 GROUND TERMINAL BLOCK	AB	1482-J0
19	1		MICROLOGIX 1400 PLC (20) 24 VDC IN, 12 OUT, 110 AC PWR	AB	1765-1325WA
20	2		4 CHANNEL CURRENT/VOLTAGE ANALOG INPUT MODULE	AB	1763-1F4
21	1		4 PORT ETHERNET SWITCH	NETRON	784-TX
22	1		24 VDC POWER SUPPLY (120 W)	AB	1482-XLE120E
23	6		24 VDC FUSE BLOCKS	AB	1482-WF8424
23	1		5 A, 250 V, TIME DELAY 5 X 20 MM FUSES	BUSSMANN	5506-5-R
23	5		2 A, 250 V, TIME DELAY 5 X 20 MM FUSES	BUSSMANN	5506-2-R
24	6		RELAY - 2 POLE, 120 VAC	AB	700-HC22A1
25	1		RELAY - 4 POLE, 120 VAC	AB	700-HC24A1
26	2		RELAY - 2 POLE, 24VDC	AB	700-HC22Z24
26	9		RELAY SOCKET (14 PIN)	AB	700-HN104
27	2		NON-REVERSING E-COMBO STARTER FOR 3 HP MOTOR WITH 120 VAC COIL	AB	309-AOD-EEE
28	1		DIRECTIONAL YAGI - 5db GAIN ANTENNA	TBD	
29	1		SIERRA MODEM	SIERRA	9504-50
30	1		OMNI DIRECTIONAL LTE/CELLULAR PCS COMBO ANTENNA	TBD	
31	2		COAXIAL CABLE - N MALE TO N MALE	TBD	
32	2		COAXIAL CABLE - SMA MALE TO N MALE	TBD	
33	2		RF COAXIAL SURGE PROTECTOR	AB	
34	17		120 VAC TERMINAL BLOCK WITH PLUG IN FUSE	AB	1482-J0P
34	17		FUSE PLUG 10-38 V WITH BLOW FUSE INDICATION	AB	1482-PPK224
35	11		0.50 A, 250 V, TIME DELAY 5 X 20 MM FUSES	BUSSMANN	5506-500-R
35	6		0.25 A, 250 V, TIME DELAY 5 X 20 MM FUSES	BUSSMANN	5506-250-R
36	1		DUAL CHANNEL, AUTO/MANUAL RESET, 24V AC/DC SAFETY RELAY	AB	140R-142117
36	1		BACK PANEL LIGHT	AUTOMATION DIRECT	26401-00
37	TBD		CONNECTION CABLE 2 X 16 AWG WITH INPUT CONNECTOR	AUTOMATION DIRECT	264-381
38	TBD		END BARRIERS	TBD	
39	TBD		DIN RAIL	TBD	
39	TBD		WIRING DUCT	TBD	
40	2		RAD-300-1FS	POWERMATION	2601540
41	1		RAD-411FS	POWERMATION	2601538
42	1		RAD104-1FS	POWERMATION	2601537
43	2		T-Bus Connector	POWERMATION	2709561
44	1		Tyson Power Systems	NEOBITS	RPSST2424-50-150
45	1		WALL MOUNT STEEL ENCLOSURE 24X36	SCE	SCE-24EL248LP
46	1		BACKPANEL 24X34	SCE	SCE-24P24
47	1		ROUTER	ISTRADILINX	HSE-SL3011-WF



Project Mgr.		BS
Designed by		DMS
Drawn by		TRY
Checked by		MRW
Project No.		3042811.00007
Revision		1
Date		04/30/2020
Description		As-Built Drawing Set Revisions
Revision		2
Date		04/30/2020
Description		General revisions to all sheets. Removed Sheet M-5



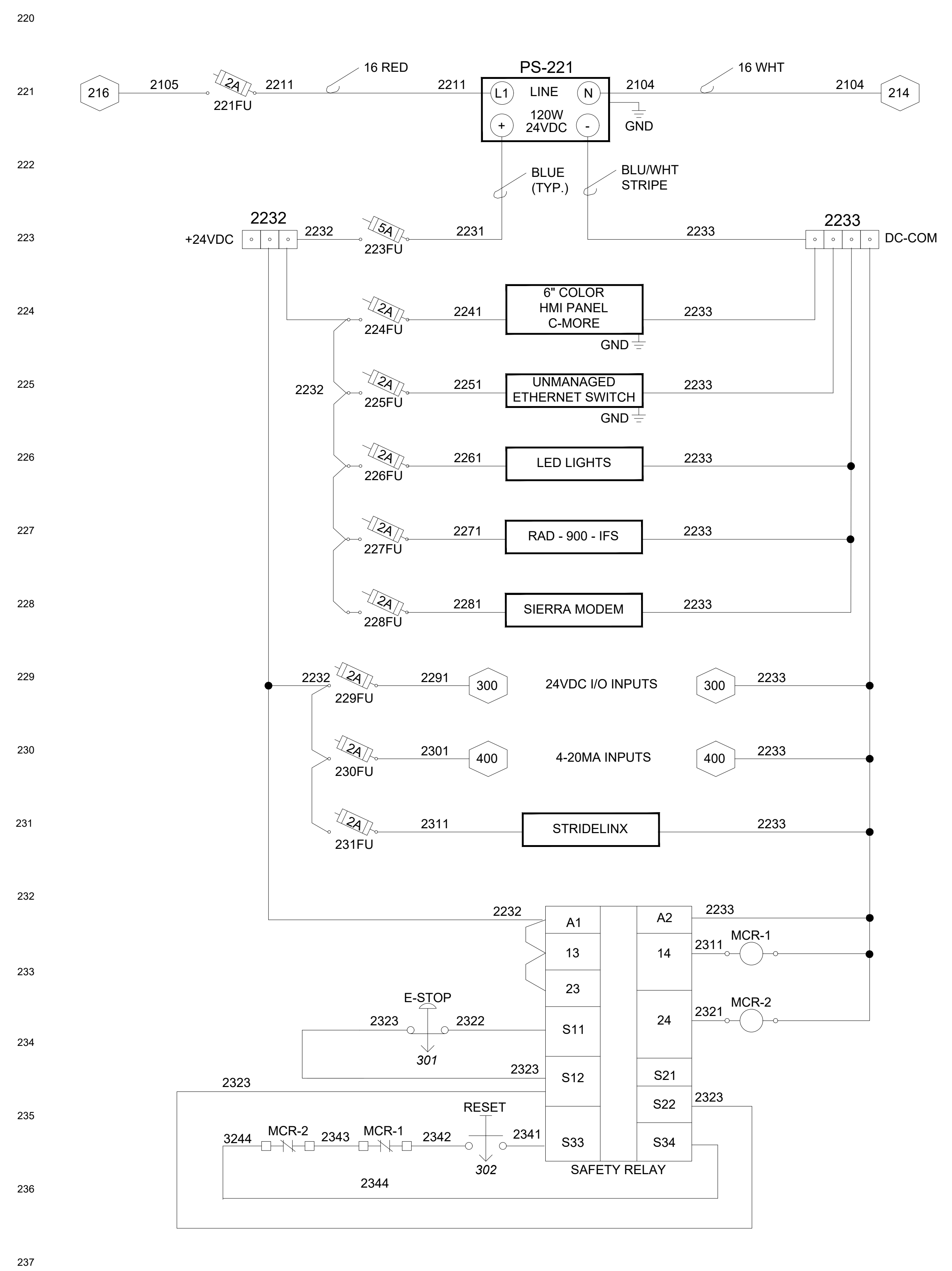
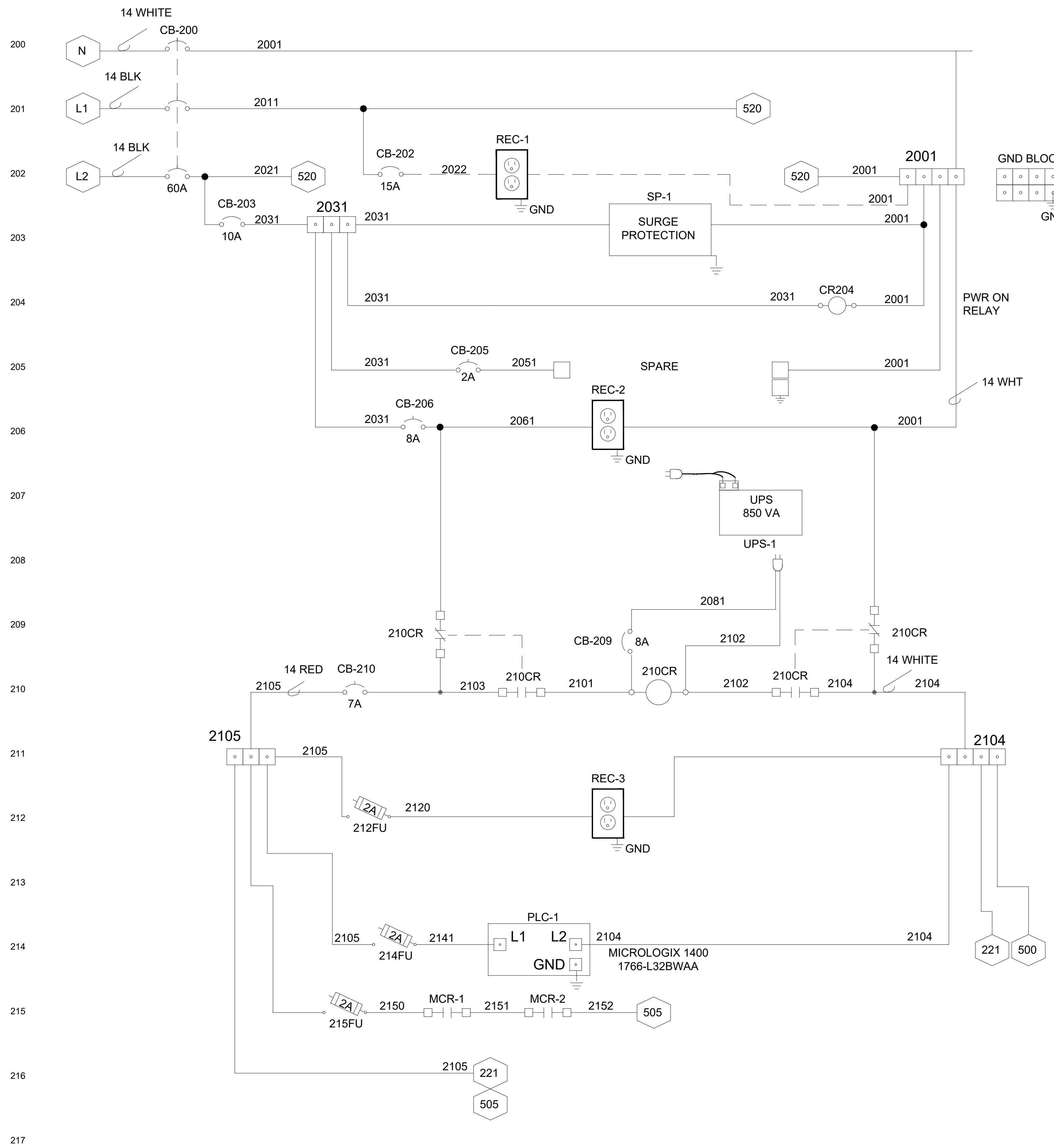
INJECTION PANEL LAYOUT

RACER TRUST
PONTIAC NORTH CAMPUS

ARCADIS Project No.
3042811.00007
Date
MAY 2020
ARCADIS
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON
SQUARE, STE 315
LANSING, MICHIGAN 48933

I-1A

CITY:SYRACUSE,NY DIV:GROUP:ENV DBA:SANCHEZ, I.D.A.S. PIC: PM: TM: LYRON+OFF=REF+ C:\Users\laronson\OneDrive - ARCADIS\Desktop\Work\Racear PNC\Drawings\CAD\Racear PNC\RACER FCN MCP.dwg LAYOUT:1-2 ACADVER:20.1S (LMS TECH) PAGESETUP: PLOTSTYLETABLE: PLOTTED:6/12/2020 8:44 AM BY:LARSON,DUANE



DRAWING NOT TO SCALE
 SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REUSED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAME.

Professional Engineer's Name		
Professional Engineer's No.		
State	Date Signed	Project Mgr.
MI		BS
Designed by	Drawn by	Checked by
D.LARSON	dll	XXX

H:\Stamp\Sea\JosephCorrado.TIF

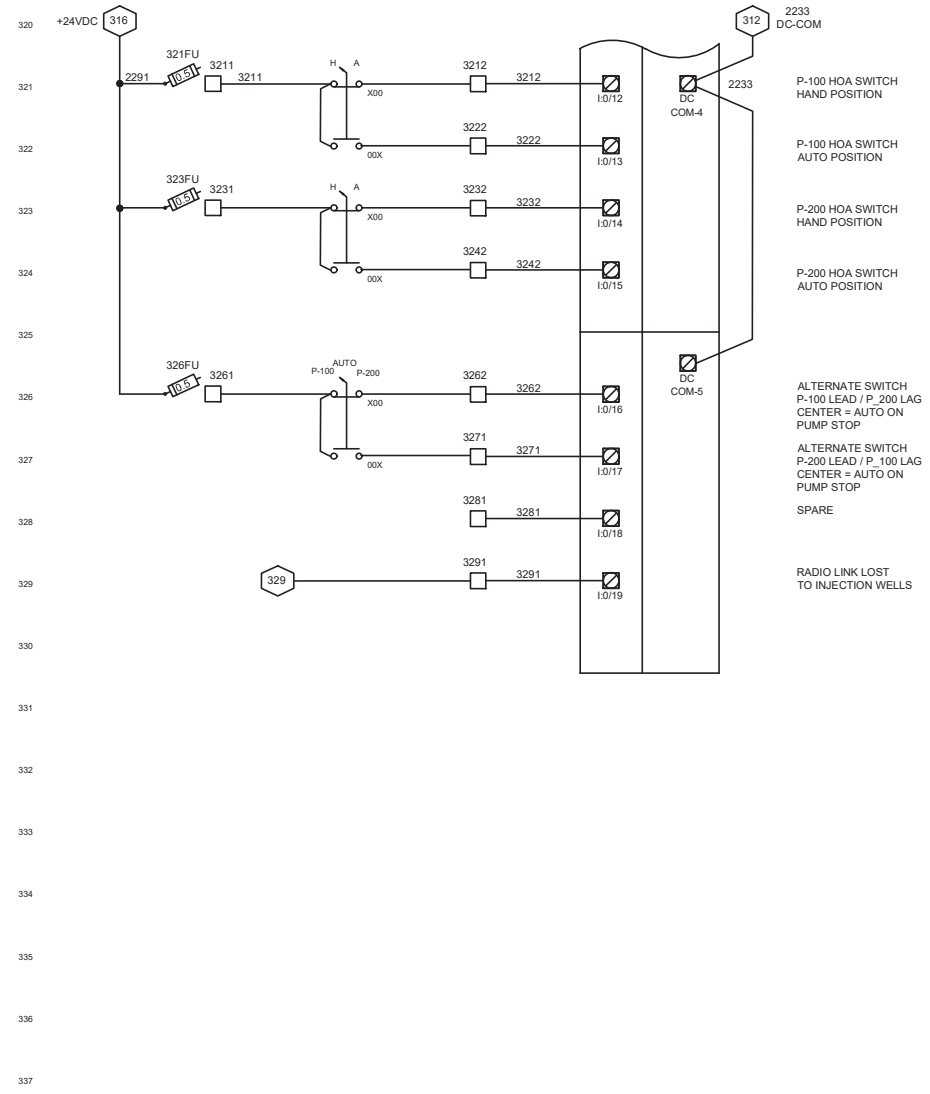
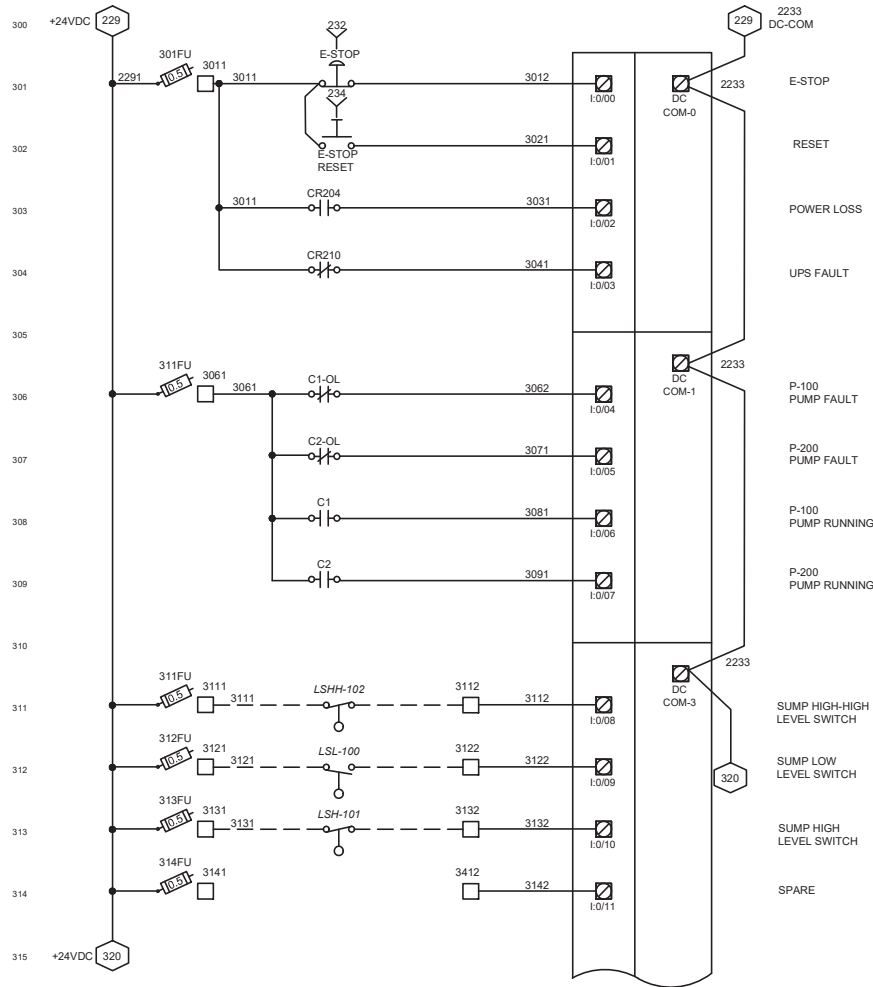
ARCADIS
 ARCADIS OF MICHIGAN, LLC
 LANSING, MICHIGAN

RACER TRUST • PONTIAC NORTH CAMPUS • PONTIAC, MICHIGAN
 SUMP WATER TREATMENT SYSTEM

DEWATERING PUMP PANEL POWER DISTRIBUTION

ARCADIS Project No. B0064607.2018.00007
Date AUGUST 2018
ARCADIS OF MICHIGAN, LLC 300 S. WASHINGTON SQUARE, STE 315 LANSING, MICHIGAN 48933

CITY: D:\GROUP\DR\LD\PC\TM\LYR\ON*OFF*REF* C:\Users\yananough\appdata\local\temp\Arc-Subst..._1446\RACER PCN MCF.dwg LAYOUT: I-3 - SAVED: 8/16/2018 12:00 PM ACADVER: 21.08 (LMS TECH) PAGES: 1 OF 1 PLOTSTYLE: AEC.ctb PLOTTED: 8/16/2018 12:00 PM BY: YANBROUQH_TOBI



THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING
 USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	CHK
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRY	MRW

Project Mgr. BS
 Designed by DMS
 Drawn by TRY
 Checked by MRW
 Project Mgr. BS
 Designed by DMS
 Drawn by TRY
 Checked by MRW

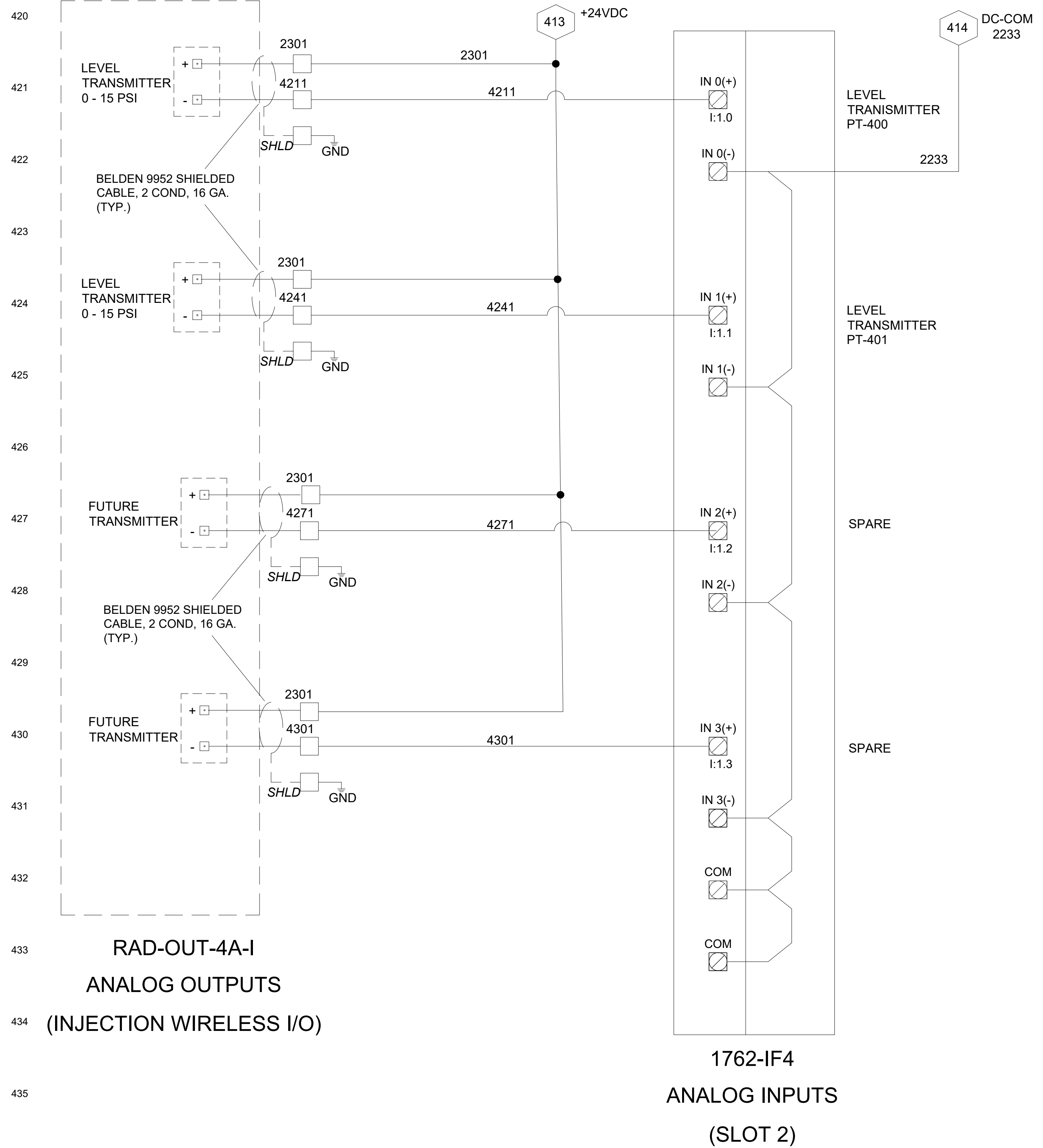
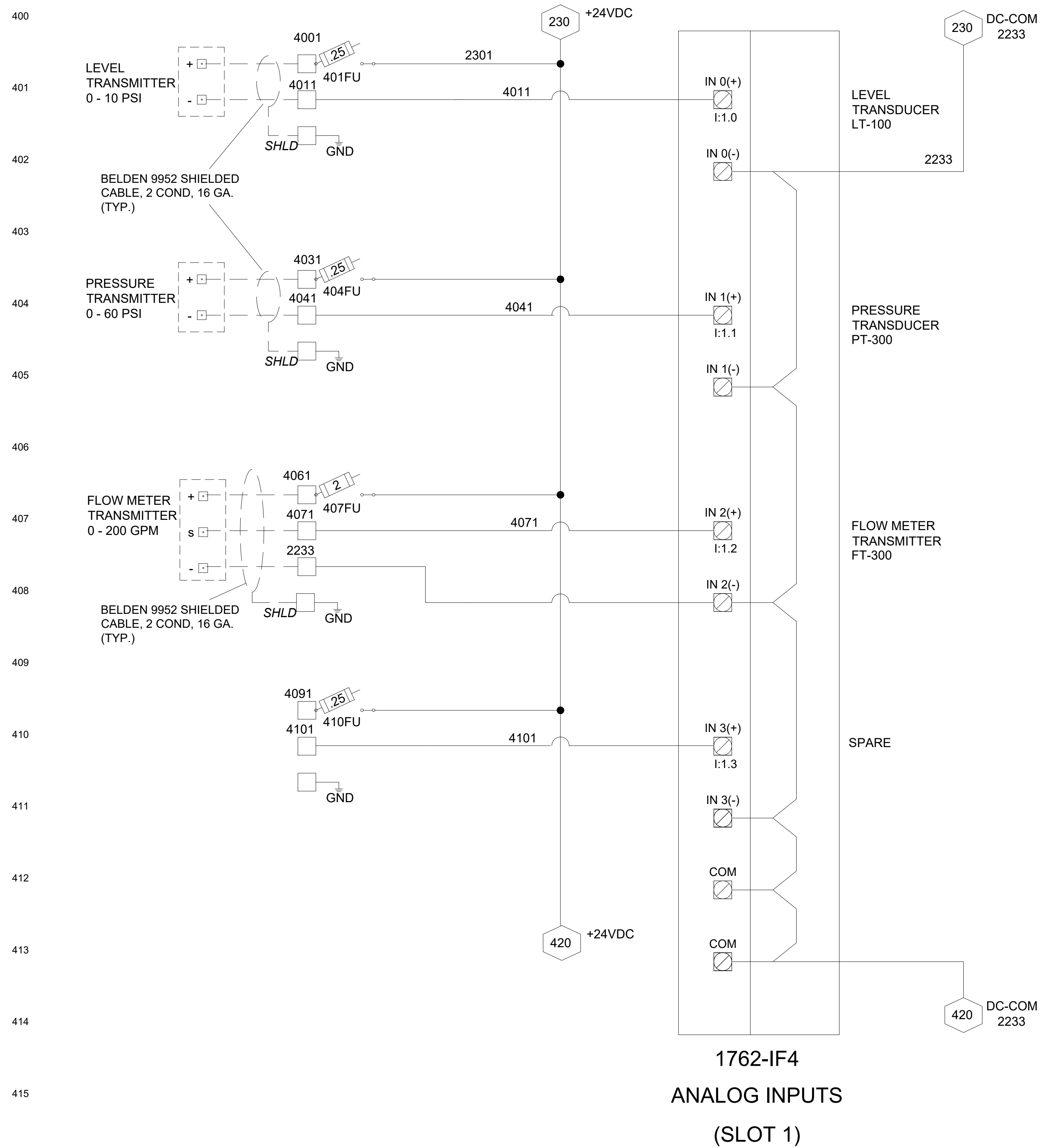


ARCADIS OF MICHIGAN, LLC.

RACER TRUST
 PONTIAC NORTH CAMPUS
DEWATERING PUMP PANEL
MICROLOGIX 24VDC INPUTS

ARCADIS Project No. B0064607 2016.00007
 Date: JULY 2018
 ARCADIS
 ARCADIS OF MICHIGAN, LLC.
 300 S. WASHINGTON SQUARE, STE 315
 LANSING, MICHIGAN 48933

CITY: SYRACUSE, NY; DIV: GROUP ENV; DB: A.SANCHEZ; L.D.A.S.; PIC: PM; TM: LYRON; OFF: REF; PLOT: 6/12/2020 8:44 AM BY: LARSON, DUANE
 C:\Users\larson\OneDrive - ARCADIS\Desktop\Work\Racer PNC\Racer PNC\IDwg\CAD\Racer PNC\MCP.dwg LAYOUT: I-4; ACADVER: 20.1S (LMS TECH); PAGES: 20; PLOTSTYLE: ARCADIS.ctb; PLOT: 6/12/2020 8:44 AM; ACADVER: 20.1S (LMS TECH); PAGES: 20; PLOTSTYLE: ARCADIS.ctb; PLOT: 6/12/2020 8:44 AM BY: LARSON, DUANE



DRAWING NOT TO SCALE
SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REUSED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAME.

Professional Engineer's Name			
Professional Engineer's No.			
State	Date Signed	Project Mgr.	
MI		BS	
Designed by	Drawn by	Checked by	
D.LARSON	dll	XXX	

H:\Stamp\Seaf\JosephCorrado.TIF



RACER TRUST • PONTIAC NORTH CAMPUS • PONTIAC, MICHIGAN
SUMP WATER TREATMENT SYSTEM

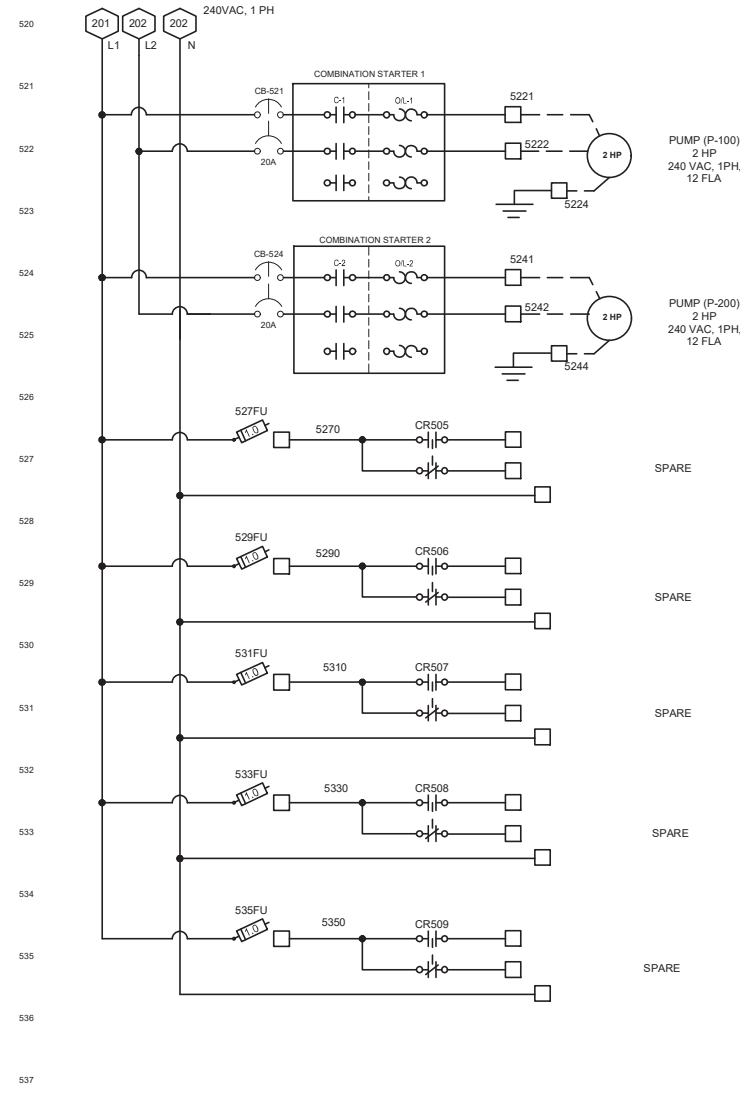
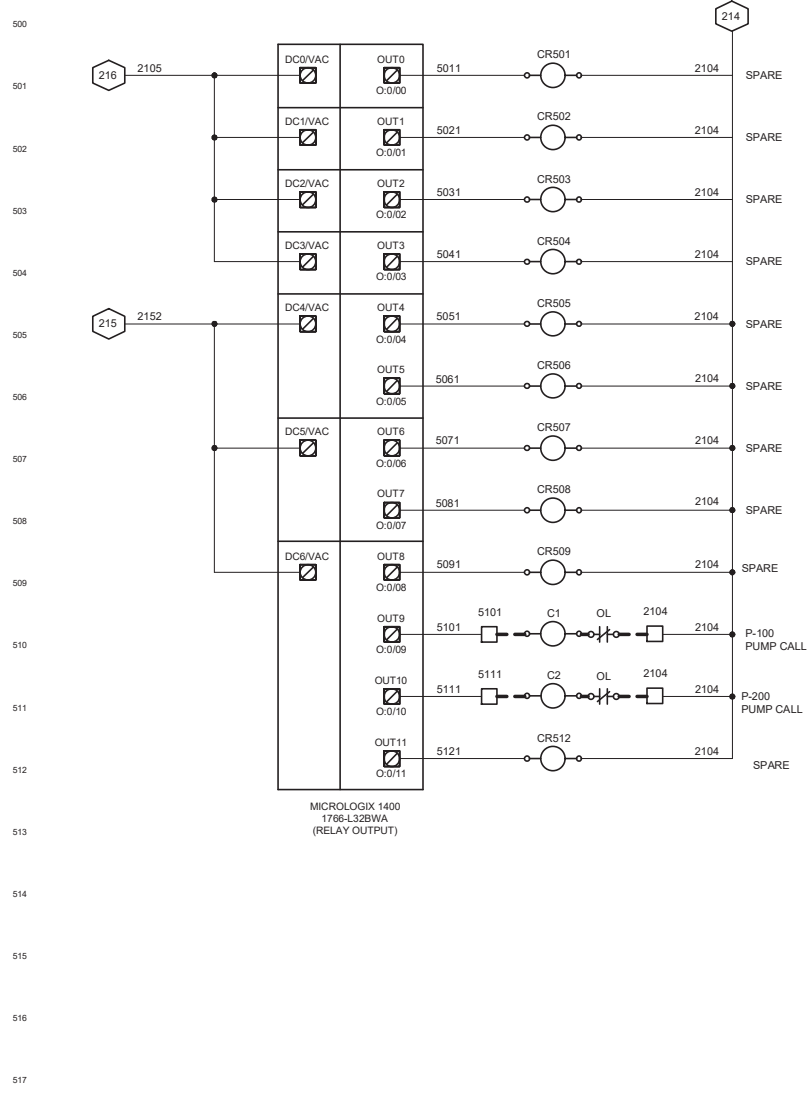
DEWATERING PUMP PANEL LAYOUT MICROLOGIX ANALOG INPUTS

ARCADIS Project No.
B0064607.2018.00007

Date
AUGUST 2018

ARCADIS
ARCADIS OF MICHIGAN, LLC
300 S. WASHINGTON
SQUARE, STE 315
LANSING, MICHIGAN 48933

CITY: D:\GROUP: DB: LD: PC: TM: LVR ON* OFF* REF*
 C:\Users\mynough\appdata\local\temp\Arc-Pub\Pub_1446\ARCISER PCN MCF.dwg LAYOUT: 1:5 SAVED: 8/16/2018 12:00 PM ACADVER: 21.05 (LMS TECH) PAGES: 1 OF 1 PLOT SETUP: ... PLOT STYLE: TABLE.ARCADIS.DWG PLOT: 8/16/2018 12:00 PM BY: YARBROUGH, TOBI



THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	TRV	MMU	CHK
1	7/5/2018	General revisions to all sheets. Removed Sheet M-5	TRV	MMU	CHK

Project Mgr. BS
 Designed by DMS
 Drawn by TRV
 Checked by MRW

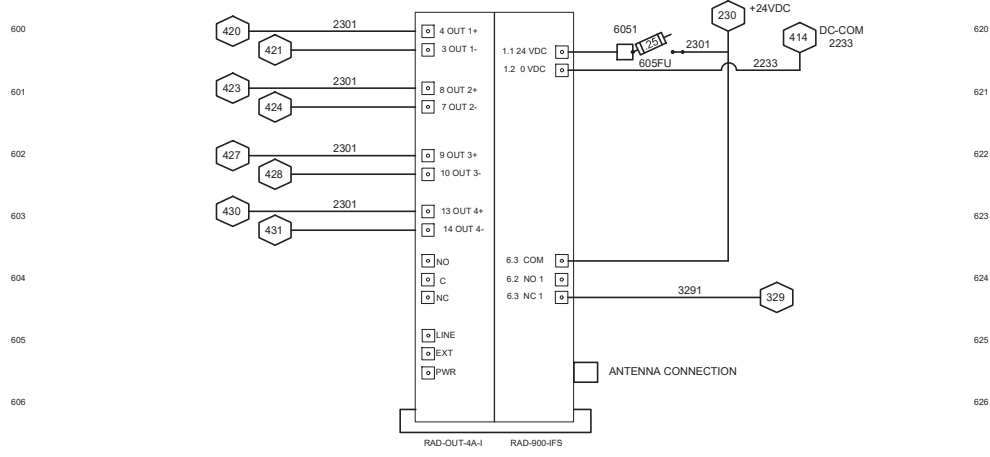


RACER TRUST
 PONTIAC NORTH CAMPUS

DEWATERING PUMP PANEL MICROLOGIX OUTPUTS

ARCADIS Project No. B0064607 2016.00007
 Date: JULY 2018
 ARCADIS
 ARCADIS OF MICHIGAN, LLC.
 300 S. WASHINGTON SQUARE, STE 315
 LANSING, MICHIGAN 48933

CITY: D:\GROUP - DB: LD: PC: PM: TM: LVR ON*OFF*REF* C:\Users\mbarough\appdata\local\temp\ArcPublish_1446\ARCACER PCN MCP.dwg LAYOUT: 1-6 SAVED: 8/16/2018 12:00 PM ACADVER: 2.105 (LMS TECH) PAGES: 17 PLOT: 17 PLOT DATE: 8/16/2018 12:00 PM BY: YARBROUGH, TOBI



Input	Output signal	DI Switch			
		1	2	3	4
Analog OUT1	RESET	OFF			
	HELD	ON			
Analog OUT2	RESET		OFF		
	HELD		ON		
Analog OUT3	RESET			OFF	
	HELD			ON	
Analog OUT4	RESET				OFF
	HELD				ON

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE.

No.	Date	Revisions	TRV	MMU	CHK
1	7/2/2018	General revisions to all sheets. Removed Sheet M-5	TRV	MMU	CHK

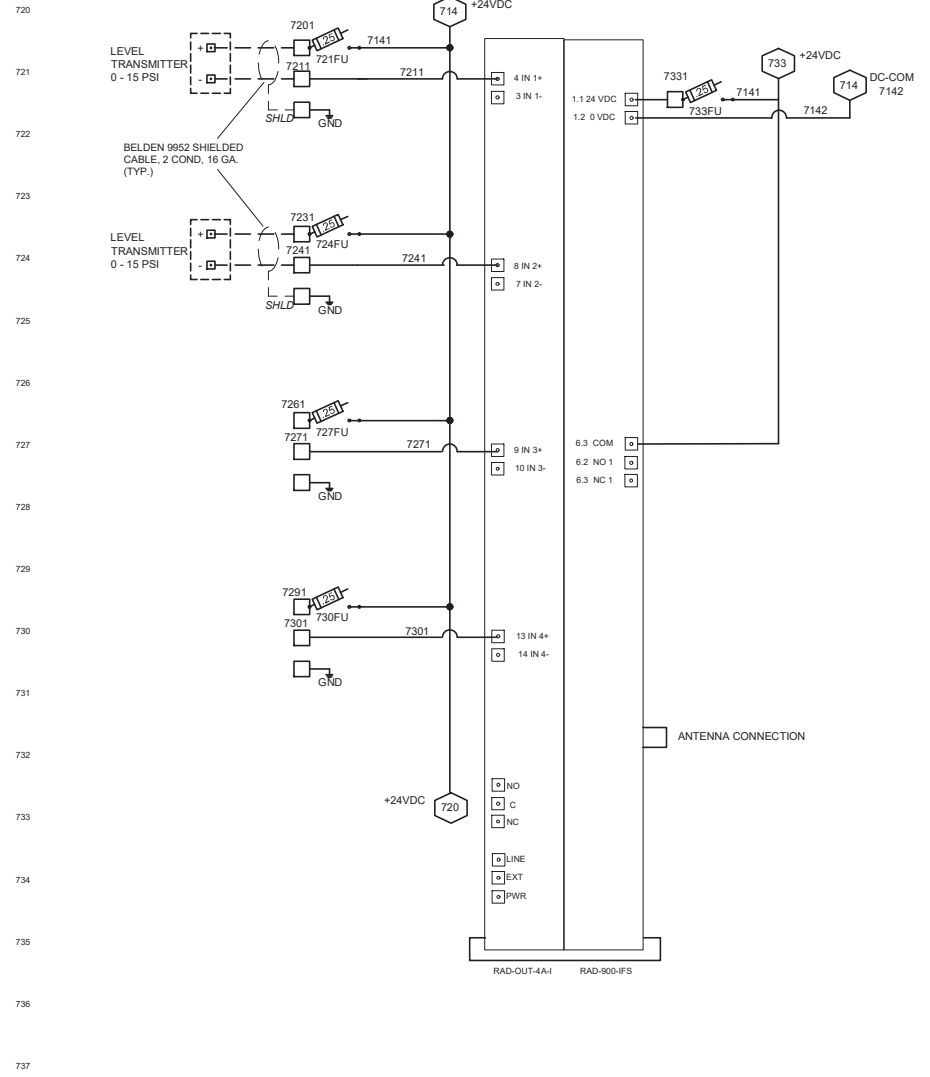
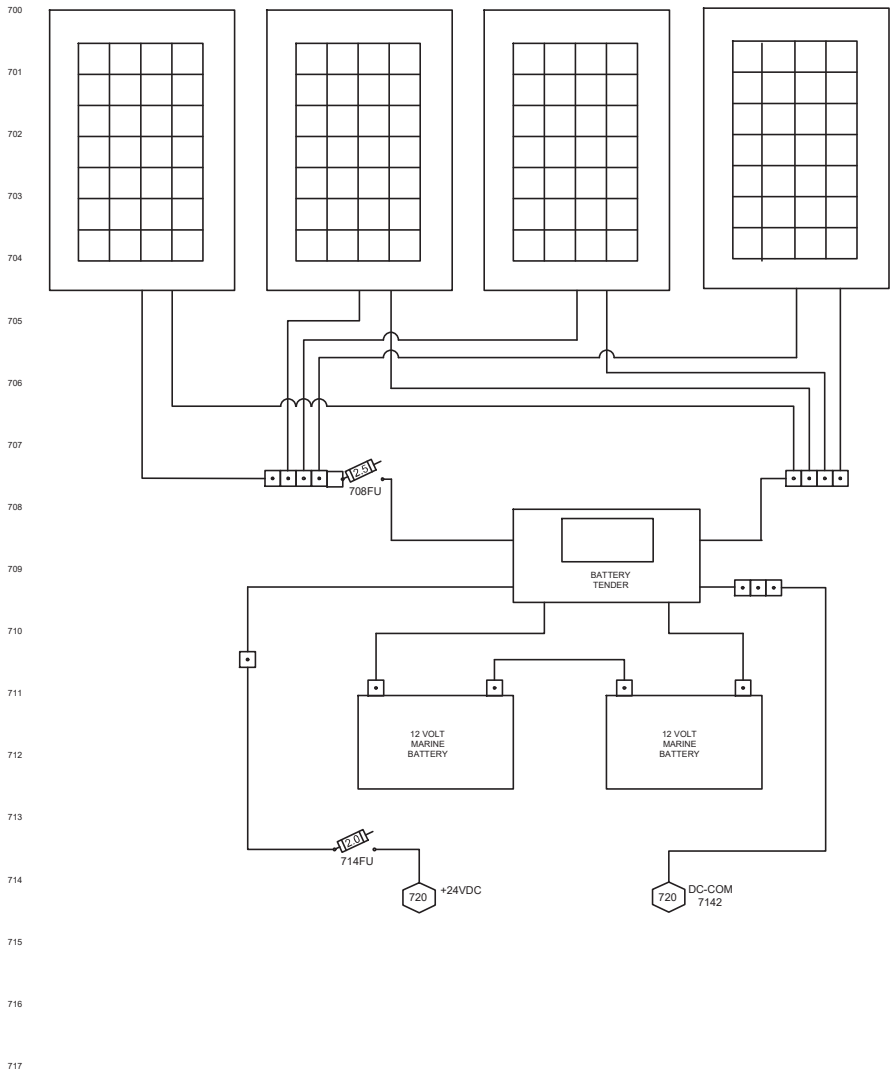
Project Mgr. BS
 Designed by DMS
 Drawn by TRV
 Checked by MRW
 ARCADIS OF MICHIGAN, LLC.



RACER TRUST
 PONTIAC NORTH CAMPUS
MCP TELEMTRY TO INJECTION WELLS

ARCADIS Project No. B0064607.2018.00007
 Date: JULY 2018
 ARCADIS OF MICHIGAN, LLC.
 300 S. WASHINGTON SQUARE, STE 315 LANSING, MICHIGAN 48933

CITY: DAYGROUP; DR: LD; PC: TM; LVR ON: OFF; REF: C:\Users\yananough\appdata\local\temp\Arc-Substall\446\ARCER PCN MCP.dwg; LAYOUT: I-7; SAVED: 8/16/2018 12:00 PM; ACADVER: 2.105 (LMS TECH); PAGES: 17; PLOTTED: 8/16/2018 12:00 PM; BY: YANBROUQH; TOBI



THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING

REVISIONS	
No.	Date
1	7/5/2018

Project Mgr.
BS
Designed by
DMS
Drawn by
TRY
MNU
By
CMA
Checked by
MRW



ARCADIS OF MICHIGAN, LLC.

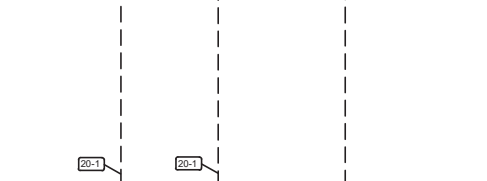
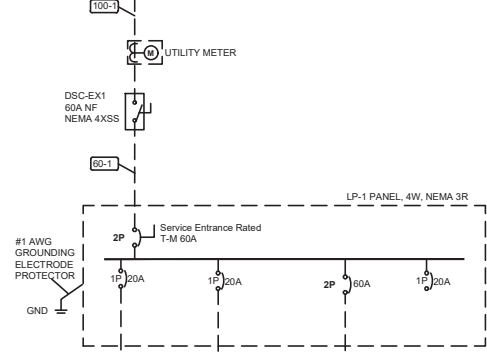
RACER TRUST
PONTIAC NORTH CAMPUS
**INJECTION PANEL
WIRING DIAGRAM**

ARCADIS Project No.
B0064607 2018.00007
Date
JULY 2018
ARCADIS
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON
SQUARE, STE 315
LANSING, MICHIGAN 48933

CITY: D:\MGRUPP - DB - LD - RC - PM - TM - LVR-DNS-OFF-REF- Project Files\Arcadis\Projects\RCACER\RCACER\CON.MCP.dwg LAYOUT: 1-8 SAVED: 8/16/2018 11:35:AM ACADVER: 21.05 (LMS TECH) PAGES: 1 OF 1 BY: YARBROUCH, TOBI

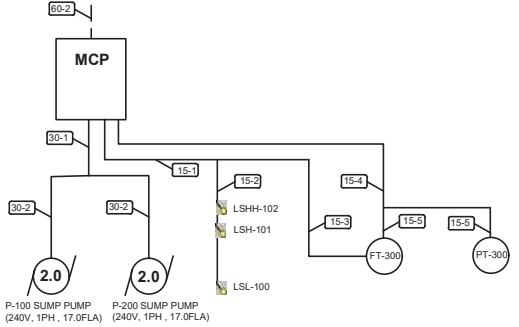
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817

SOURCE: UTILITY POWER by others,
240V, 1PH, 4-Wire
FROM OVERHEAD TRANSFORMER

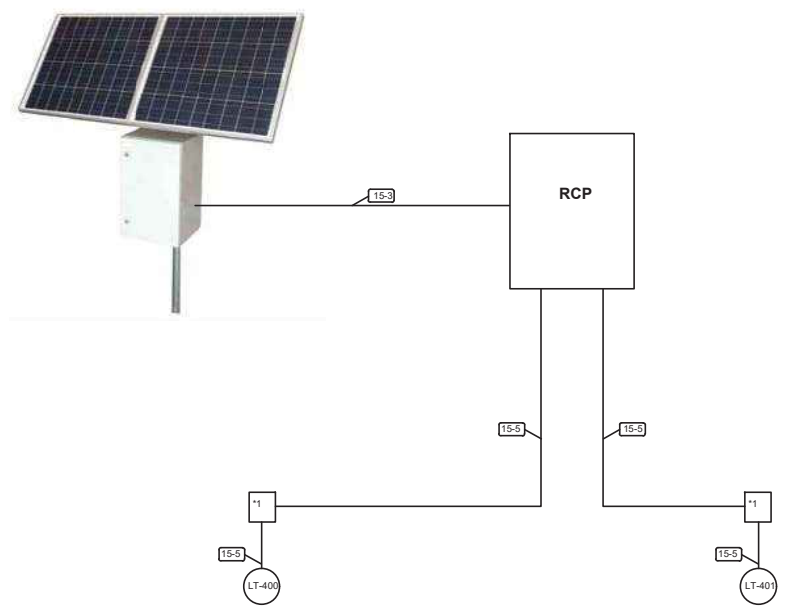


CONDUIT SCHEDULE				
CONDUIT NUMBER	CONDUIT SIZE	AWG WIRE	CONTENTS	GROUND
100-1	2"	USE, RHW	(3) # 1	(3) # 2
60-1	1 1/4"	THHW	(3) # 4	(3) # 6
60-2	1 1/4"	THHW	(3) # 4	(1) # 6
30-1	1 1/4"	THHW	(6) # 10	(2) # 12
30-2	1"	THHW	(3) # 10	(1) # 12
20-1	3/4"	THHW	(2) # 12	(1) # 12
15-1	3/4"	THHW	(8) # 14	(2) # 16
15-2	3/4"	THHW	(4) # 14	(1) # 16
15-3	3/4"	THHW	(2) # 14	(1) # 16
15-4	3/4"	BELDEN	(2) # 18	*
15-5	3/4"	BELDEN	(1) # 18	*

* Belden Shielded Twisted Pair #1048A



820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837



*1 = 6" x 6" x 6"
NEMA 4x
FIBERGLASS ENCLOSURE
W/ BACKPANEL AND TERMINALS
FOR CONNECTION

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING

USE TO VERIFY FOUR REPRODUCTION SCALE

No.	Date	Revisions	TRV	MW	CHK	TRV
1	7/2/2018	General revisions to all sheets. Removed Sheet M-5	TRV	MW	CHK	TRV

Project Mgr. BS
Designed by DMS
Drawn by TRV
Checked by MRW

ARCADIS

ARCADIS OF MICHIGAN, LLC.

RACER TRUST
PONTIAC NORTH CAMPUS

ONE-LINE DIAGRAM

ARCADIS Project No. B0064607 2018.00007
Date: JULY 2018
ARCADIS
ARCADIS OF MICHIGAN, LLC.
300 S. WASHINGTON SQUARE, STE 315
LANSING, MICHIGAN 48933

ATTACHMENTS



ATTACHMENT A

Injection Well Logs



Date Start: 10/17/17
Date Finish: 10/18/17
Drilling Company: Stearns
Driller's Name: B. Marshal, B. Graham, Z. Galvanek
Drilling Method: Hand Auger, Sonic
Sampling Method: 5.0'/10.0' Core barrel, Continuous
Rig Type: Sonic
Water Level Start (ft. bgs.): 15.0
Water Level Finish (ft. btoc.):

Northing:
Easting:
Casing Elevation:
Borehole Depth (ft. bgs.): 35.0
Surface Elevation:
Descriptions By: Kaitlyn Voet

Well/Boring ID: INJ-01-17
Client: RACER
Location: RACER PNC
Weather Conditions: Sunny and windy, 60 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0 - 0.3') TOPSOIL, grass.		
		1	0.0-5.0	HA	3.3			(0.3 - 5.0') SAND, fine to medium, subrounded; and SILT, medium plasticity, no dilatancy; some large pebbles to small cobbles, subrounded to subangular; poorly sorted; dry; dark brown (10YR 3/3). Note: Fill.		Backfill sand (0.6-4.5' bgs)
					2.6			Note: Slight to moderate odors and gray discoloration from 2.0-5.0' bgs. Note: Concrete and brick pieces from 2.5-5.0' bgs.		
					8.3					
					8.8					
					6.9					
5	-5	2	5.0-10.0	2.75	0.0			(5.0 - 10.0') SAND, fine to medium, subrounded; and SILT, medium plasticity, slow to no dilatancy; trace granules, subangular; poorly sorted; dry; medium stiff; dark grayish brown (10YR 4/2).		4" sch 40 pvc (0.0-15.0' bgs) Neat Cement Seal (4.5-12.0' bgs)
					0.0					
					0.1					
					0.4					
10	-10				1.1			(10.0 - 15.0') CLAY, little silt, medium to low plasticity, rapid dilatancy; and SAND, very fine to fine, subangular; poorly sorted; moist; soft; very dark gray (10YR 3/1).		#6 Filter Pack sand (12.0-14.0' bgs)
					0.6			Note: Medium stiff and black (10YR 2/1) from 12.0-13.0' bgs.		
					0.6					
					0.8			(15.0 - 15.5') SAND, medium, subrounded; little silt; well sorted; wet; dark gray (10YR 4/1).	15.0	#5 Filter Pack sand (14.0-15.5' bgs)
15	-15	3	10.0-20.0	10.0	0.4			(15.5 - 19.0') CLAY, medium plasticity, slow dilatancy; some very fine sand, subrounded; moist to wet; soft; dark yellowish brown (10YR 4/4).		#6 Filter Pack sand (15.5-19.0' bgs)
					0.4					
					0.4					
					0.3					
					0.3					

Remarks: bgs = below ground surface
 NA = not applicable
 btoc = below top of casing
 Hand auger to 5.0' bgs.
 Groundwater encountered at 15.0' bgs.



Date Start: 10/17/17 Date Finish: 10/18/17 Drilling Company: Stearns Driller's Name: B. Marshal, B. Graham, Z. Galvanek Drilling Method: Hand Auger, Sonic Sampling Method: 5.0'/10.0' Core barrel, Continuous Rig Type: Sonic Water Level Start (ft. bgs.): 15.0 Water Level Finish (ft. btoc.):	Northing: Easting: Casing Elevation: Borehole Depth (ft. bgs.): 35.0 Surface Elevation: Descriptions By: Kaitlyn Voet	Well/Boring ID: INJ-01-17 Client: RACER Location: RACER PNC Weather Conditions: Sunny and windy, 60 F
--	--	--

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20	-20				0.3			(19.0 - 20.0') SAND, very fine to medium, subrounded; little silt; trace granules, subangular to subrounded; poorly sorted; moist to wet; dark yellowish brown (10YR 4/6).		 #5 Filter Pack sand (19.0-21.5' bgs) #6 Filter Pack sand (21.5-24.0' bgs) #5 Filter Pack sand (24.0-26.0' bgs) 4" Stainless Steel, 10 slot screen (15.0-35.0' bgs) #6 Filter Pack sand (26.0-35.0' bgs)
					0.1		(20.0 - 21.5') SAND, fine to coarse, subangular to subrounded; and PEBBLES, granule to large, subrounded; trace silt; poorly sorted; wet; dark yellowish brown (10YR 3/4).			
					0.1		(21.5 - 24.0') SILT, some clay, medium plasticity, no dilatancy; and SAND, very fine; poorly sorted; dry; very stiff; dark grayish brown (10YR 4/2).			
25	-25	4	20.0-30.0	10.0	0.0			(24.0 - 26.0') SAND, fine to medium, subrounded; little medium to large pebbles, subrounded; poorly sorted; wet; dark yellowish brown (10YR 3/4). Note: Small cobble, subrounded at 26.0' bgs.		
					0.0			(26.0 - 35.0') SILT, some clay, medium plasticity, no dilatancy; little very fine sand; poorly sorted; dry to moist; very dark gray (10YR 3/1).		
30	-30				0.0					
		5	30.0-35.0	5.0	0.0					
35	-35				0.0			End of boring at 35.0' bgs.		

	Remarks: bgs = below ground surface NA = not applicable btoc = below top of casing Hand auger to 5.0' bgs. Groundwater encountered at 15.0' bgs.
--	---

Date Start: 8/13/18
Date Finish: 8/14/18
Drilling Company: Stearns
Driller's Name: B. Graham, Z. Galvanek, T. Verritt
Drilling Method: Hand Auger, Hollow Stem Auger
Sampling Method: 2' Split Spoon, Continuous
Rig Type: Hollow Stem Auger
Water Level Start (ft. bgs.): 17.2
Water Level Finish (ft. btoc.):

Northing:
Easting:
Casing Elevation:
Borehole Depth (ft. bgs.): 37.0
Surface Elevation:
Descriptions By: Kaitlyn Voet

Well/Boring ID: INJ-02-18
Client: RACER
Location: RACER PNC
Weather Conditions: Sunny, 80 F

DEPTH (feet bgs.)	ELEVATION	Blow Counts	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0 - 0.3') TOPSOIL, grass.		
			0.0-5.0	HA	3.3			(0.3 - 5.0') SAND, very fine to fine, subrounded; little silt; nonplastic, rapid dilatancy; some small to medium pebbles, subrounded to subangular; poorly sorted; dry; dark brown (10YR 3/3). Note: Fill.		Backfill sand (0.6-6.0' bgs)
					0.7			Note: Slight odors at 4.0' bgs.		
5	-5	4-4	5.0-7.0	2	10.8			(5.0 - 5.5') SAND, fine, subrounded; and SILT, nonplastic, slow dilatancy; trace granules, subangular; dry; soft; very dark gray (10YR 3/1).		
		5-4			12.4			(5.5 - 6.7') SAND, very fine; well sorted; moist; dark gray (10YR 4/1).		
		2-1	7.0-9.0	2	1.7			(6.7 - 12.2') CLAY, trace silt, medium plasticity, slow dilatancy; some very fine to fine sand; moist; medium stiff to soft; very dark gray (10YR 3/1).		6" sch 40 pvc (0.0-17.0' bgs)
		2-2			0.8					Neat Cement Seal (6.0-14.0' bgs)
10	-10	0-1	9.0-11.0	2	0.3					
		2-2			0.3					
		1-1	11.0-13.0	1	0.3					
		1-2			0.8			(12.2 - 14.9') SAND, fine to medium; well sorted; moist; dark grayish brown (10YR 4/2).		
		2-2	13.0-15.0	2	1.4					
		2-3			0.3					
15	-15	1-2	15.0-17.0	2	0.3			(14.9 - 17.2') SAND, very fine; and CLAY, low plasticity, rapid dilatancy; poorly sorted; moist; soft; dark gray (10YR 4/1).		#6 Filter Pack sand (14.0-18.5' bgs)
		2-5			0.3					
		1-2	17.0-19.0	2	0.3			(17.2 - 18.5') CLAY, medium plasticity, rapid dilatancy; trace very fine sand; wet; soft; dark gray (10YR 4/1).	17.2	
		6-9			0.3					
		4-7			0.3			(18.5 - 21.0') SAND, medium to coarse, subangular; trace granules to small pebbles, subrounded; poorly sorted; wet; dark gray (10YR 4/1).		

Remarks: bgs = below ground surface
 NA = not applicable
 btoc = below top of casing
 Hand auger to 5.0' bgs.
 Groundwater encountered at 17.2' bgs.



Date Start: 8/13/18
Date Finish: 8/14/18
Drilling Company: Stearns
Driller's Name: B. Graham, Z. Galvanek, T. Verritt
Drilling Method: Hand Auger, Hollow Stem Auger
Sampling Method: 2' Split Spoon, Continuous
Rig Type: Hollow Stem Auger
Water Level Start (ft. bgs.): 17.2
Water Level Finish (ft. btoc.):

Northing:
Easting:
Casing Elevation:
Borehole Depth (ft. bgs.): 37.0
Surface Elevation:
Descriptions By: Kaitlyn Voet

Well/Boring ID: INJ-02-18
Client: RACER
Location: RACER PNC
Weather Conditions: Sunny, 80 F

DEPTH (feet bgs.)	ELEVATION	Blow Counts	Sample/Int/Type	Recovery (feet)	PID Headpace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
10-10		10-10	19.0-21.0	2	0.3	X	[Symbol]			#5 Filter Pack sand (18.5-22.0' bgs)
8-9					0.2		[Symbol]	(21.0 - 22.0') SAND, very fine to fine; trace very coarse sand; well sorted; wet; dark yellowish brown (10YR 4/6).		
10-12			21.0-23.0	2	0.1		[Symbol]	(22.0 - 23.0') CLAY, some silt, medium plasticity, no dilatancy; little very fine sand; moist; very stiff; dark yellowish brown (10YR 4/6).		#6 Filter Pack sand (22.0-23.0' bgs)
4-4					0.1		[Symbol]	(23.0 - 24.5') SAND, very fine to fine; trace granules, subrounded; well sorted; wet; dark yellowish brown (10YR 4/6).		
10-17			23.0-25.0	2	0.1		[Symbol]	(24.5 - 24.8') CLAY, some silt, medium plasticity, no dilatancy; little very fine sand; moist; very stiff; dark yellowish brown (10YR 4/6).		#5 Filter Pack sand (23.0-25.0' bgs)
5-12					0.1		[Symbol]	(24.8 - 25.0') SAND, fine, subrounded; well sorted; wet; dark yellowish brown (10YR 4/6).		#6 Filter Pack sand (25.0-25.3' bgs)
23-15			25.0-27.0	2	0.1		[Symbol]	(25.0 - 25.3') CLAY, trace silt, low plasticity, slow dilatancy; and SAND, very fine; wet; soft; dark yellowish brown (10YR 4/6).		#5 Filter Pack sand (25.3-26.8' bgs)
5-5					0.2		[Symbol]	(25.3 - 26.8') SAND, very fine to fine; little silt; trace small to medium pebbles, subangular to subrounded; poorly sorted; wet; dark yellowish brown (10YR 4/6).		6" Stainless Steel, 20 slot screen (17.0-37.0' bgs)
7-8			27.0-29.0	2	0.2		[Symbol]	(26.8 - 31.5') SAND, very fine; and CLAY, nonplastic to low plasticity, slow dilatancy; poorly sorted; wet; very stiff; dark gray (10YR 4/1).		#6 Filter Pack sand (26.8-31.5' bgs)
5-6					0.2		[Symbol]	NOTE: Trace very coarse sand to granules, subrounded to subangular from 29.0-31.5' bgs.		
6-6			29.0-31.0	2	0.1		[Symbol]	(31.5 - 31.7') SAND, medium to coarse, subangular to subrounded; some very fine to fine sand; poorly sorted; wet; dark gray (10YR 4/1).		#5 Filter Pack sand (31.5-31.7' bgs)
5-7					0.1		[Symbol]	(31.7 - 37.0') CLAY, medium plasticity, rapid dilatancy; and SAND, very fine; wet; stiff to very stiff; dark gray (10YR 4/1).		
7-6			31.0-33.0	2	0.1		[Symbol]	NOTE: Medium stiff to soft from 35.0 to 37.0' bgs.		#6 Filter Pack sand (31.7-37.5' bgs)
3-5					0.1		[Symbol]			
6-7			33.0-35.0	2	0.1		[Symbol]			#6 Filter Pack sand (31.7-37.5' bgs)
2-3					0.1		[Symbol]			
7-6			35.0-37.0	2	0.1		[Symbol]			
								End of boring at 37.0' bgs.		6" Stainless Steel End Cap

Remarks: bgs = below ground surface
 NA = not applicable
 btoc = below top of casing
 Hand auger to 5.0' bgs.
 Groundwater encountered at 17.2' bgs.



ATTACHMENT B

Soil Analytical Laboratory Reports





Analytical Laboratory Report

Report ID: S93049.01(01)
Generated on 08/27/2018

Report to

Attention: Brad Saunders
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 810-225-1904 FAX: 248-994-2241
Email: brad.saunders@arcadis.com

Additional Contacts: Matthew Williams

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S93049.01-S93049.02
Project: Racer PNC
Collected Date: 08/13/2018
Submitted Date/Time: 08/14/2018 15:00
Sampled by: Kaitlyn Voet
P.O. #: B0064607.2018.00007

Table of Contents

Cover Page (Page 1)
General Report Notes (Page 2)
Report Narrative (Page 2)
Laboratory Certifications (Page 3)
Qualifier Descriptions (Page 3)
Glossary of Abbreviations (Page 3)
Method Summary (Page 4)
Sample Summary (Page 5)

Maya Murshak
Technical Director



Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report



Analytical Laboratory Report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Analytical Laboratory Report

Method Summary

Method	Version
SM2540B	Standard Method 2540 B 2011
SW3050B	SW 846 Method 3050B Revision 2 December 1996
SW3546	SW 846 Method 3546 Revision 0 February 2007
SW5035A/8260B	SW 846 Method 8260B Revision 2 December 1996 / 5035A Revision 1 July 2002
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW7471B	SW 846 Method 7471B Revision 2 February 2007
SW8082A	SW 846 Method 8082A Revision 1 February 2007
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs
SW8270D	SW 846 Method 8270D Revision 4 February 2007



Analytical Laboratory Report

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S93049.01	INJ-02-18_(16-17)	Soil	08/13/18 17:05
S93049.02	INJ-02-18_(20-21)	Soil	08/13/18 17:15



Analytical Laboratory Report

Lab Sample ID: S93049.01

Sample Tag: INJ-02-18_(16-17)

Collected Date/Time: 08/13/2018 17:05

Matrix: Soil

COC Reference: 113361

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	MeOH	Yes	4.8	IR
1	4oz Glass	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	08/22/18 10:30	JRH	
BNA Extraction*	Completed	SW3546	08/22/18 10:30	ANW	
Extraction, PCB*	Completed	SW3546	08/22/18 10:30	PLB	
Mercury Digestion	Completed	SW7471B	08/22/18 10:30	CCM	

Inorganics

Method: SM2540B, Run Date: 08/15/18 09:05, Analyst: JBL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1	1	%	1		

Metals

Method: SW6020A, Run Date: 08/23/18 13:41, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	Not detected	1.15		mg/kg	1130	7782-49-2	

Method: SW6020A, Run Date: 08/23/18 13:43, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.50		mg/kg	226	7440-36-0	
Arsenic	2.53	0.20		mg/kg	226	7440-38-2	
Barium	43.7	1.0		mg/kg	226	7440-39-3	
Beryllium	0.25	0.20		mg/kg	226	7440-41-7	
Cadmium	0.23	0.20		mg/kg	226	7440-43-9	
Chromium	11.1	0.50		mg/kg	226	7440-47-3	
Cobalt	6.16	0.50		mg/kg	226	7440-48-4	
Copper	7.27	0.50		mg/kg	226	7440-50-8	
Lead	5.42	0.30		mg/kg	226	7439-92-1	
Manganese	473	0.50		mg/kg	226	7439-96-5	
Nickel	14.8	0.50		mg/kg	226	7440-02-0	
Silver	Not detected	0.20		mg/kg	226	7440-22-4	
Thallium	Not detected	0.20		mg/kg	226	7440-28-0	
Vanadium	10.9	0.50		mg/kg	226	7440-62-2	
Zinc	34.3	0.50		mg/kg	226	7440-66-6	

Method: SW7471B, Run Date: 08/21/18 12:44, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050		mg/kg	60	7439-97-6	

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 08/16/18 17:22, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	1	12674-11-2	



Analytical Laboratory Report

Lab Sample ID: S93049.01 (continued)

Sample Tag: INJ-02-18_(16-17)

PCB List, Method: SW8082A, Run Date: 08/16/18 17:22, Analyst: JANB (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1242	Not detected	330		ug/kg	1	53469-21-9	
PCB-1221	Not detected	330		ug/kg	1	11104-28-2	
PCB-1232	Not detected	330		ug/kg	1	11141-16-5	
PCB-1248	Not detected	330		ug/kg	1	12672-29-6	
PCB-1254	Not detected	330		ug/kg	1	11097-69-1	
PCB-1260	Not detected	330		ug/kg	1	11096-82-5	

Organics - Semi-Volatiles

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 08/25/18 21:38, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	330		ug/kg	10	83-32-9	
Acenaphthylene	Not detected	330		ug/kg	10	208-96-8	
Anthracene	Not detected	330		ug/kg	10	120-12-7	
Benzo(a)anthracene	Not detected	330		ug/kg	10	56-55-3	
Benzo(b)fluoranthene	Not detected	330		ug/kg	10	205-99-2	
Benzo(k)fluoranthene	Not detected	330		ug/kg	10	207-08-9	
Benzo(ghi)perylene	Not detected	330		ug/kg	10	191-24-2	
Benzo(a)pyrene	Not detected	330		ug/kg	10	50-32-8	
bis(2-Chloroethoxy)methane	Not detected	330		ug/kg	10	111-91-1	
bis(2-Chloroethyl)ether	Not detected	330		ug/kg	10	111-44-4	
bis(2-Chloroisopropyl)ether*	Not detected	330		ug/kg	10	108-60-1	
bis(2-Ethylhexyl)phthalate	Not detected	330		ug/kg	10	117-81-7	
4-Bromophenyl phenyl ether	Not detected	330		ug/kg	10	101-55-3	
Butyl benzyl phthalate	Not detected	330		ug/kg	10	85-68-7	
4-Chloroaniline	Not detected	330		ug/kg	10	106-47-8	
2-Chloronaphthalene	Not detected	330		ug/kg	10	91-58-7	
4-Chloro-3-methylphenol	Not detected	280		ug/kg	10	59-50-7	
2-Chlorophenol	Not detected	330		ug/kg	10	95-57-8	
4-Chlorophenyl phenyl ether	Not detected	330		ug/kg	10	7005-72-3	
Chrysene	Not detected	330		ug/kg	10	218-01-9	
p,m-Cresol	Not detected	330		ug/kg	10	3/4-CRESOL	
o-Cresol*	Not detected	330		ug/kg	10	95-48-7	
Dibenzo(ah)anthracene	Not detected	330		ug/kg	10	53-70-3	
Dibenzofuran	Not detected	330		ug/kg	10	132-64-9	
di-n-Butyl phthalate	Not detected	330		ug/kg	10	84-74-2	
1,2-Dichlorobenzene*	Not detected	330		ug/kg	10	95-50-1	
1,3-Dichlorobenzene	Not detected	330		ug/kg	10	541-73-1	
1,4-Dichlorobenzene	Not detected	330		ug/kg	10	106-46-7	
3,3'-Dichlorobenzidine	Not detected	2,000		ug/kg	10	91-94-1	
2,4-Dichlorophenol	Not detected	330		ug/kg	10	120-83-2	
Diethyl phthalate	Not detected	330		ug/kg	10	84-66-2	
2,4-Dimethylphenol	Not detected	330		ug/kg	10	105-67-9	
Dimethyl phthalate	Not detected	330		ug/kg	10	131-11-3	
4,6-Dinitro-2-methylphenol	Not detected	830		ug/kg	10	534-52-1	
2,4-Dinitrophenol	Not detected	830		ug/kg	10	51-28-5	
2,4-Dinitrotoluene	Not detected	330		ug/kg	10	121-14-2	
2,6-Dinitrotoluene	Not detected	330		ug/kg	10	606-20-2	
1,2-Diphenylhydrazine	Not detected	330		ug/kg	10	122-66-7	
di-n-Octyl phthalate	Not detected	330		ug/kg	10	117-84-0	
Fluoranthene	Not detected	330		ug/kg	10	206-44-0	



Analytical Laboratory Report

Lab Sample ID: S93049.01 (continued)

Sample Tag: INJ-02-18_(16-17)

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 08/25/18 21:38, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluorene	Not detected	330		ug/kg	10	86-73-7	
Hexachlorobenzene	Not detected	330		ug/kg	10	118-74-1	
Hexachlorobutadiene	Not detected	330		ug/kg	10	87-68-3	
Hexachlorocyclopentadiene	Not detected	330		ug/kg	10	77-47-4	
Hexachloroethane	Not detected	330		ug/kg	10	67-72-1	
Indeno(1,2,3-cd)pyrene	Not detected	330		ug/kg	10	193-39-5	
Isophorone	Not detected	330		ug/kg	10	78-59-1	
2-Methylnaphthalene	Not detected	330		ug/kg	10	91-57-6	
Naphthalene	Not detected	330		ug/kg	10	91-20-3	
2-Nitroaniline	Not detected	830		ug/kg	10	88-74-4	
3-Nitroaniline	Not detected	830		ug/kg	10	99-09-2	
4-Nitroaniline	Not detected	830		ug/kg	10	100-01-6	
Nitrobenzene	Not detected	330		ug/kg	10	98-95-3	
2-Nitrophenol	Not detected	330		ug/kg	10	88-75-5	
4-Nitrophenol	Not detected	830		ug/kg	10	100-02-7	
N-Nitrosodiphenylamine	Not detected	330		ug/kg	10	86-30-6	
N-Nitrosodi-n-propylamine	Not detected	330		ug/kg	10	621-64-7	
Pentachlorophenol	Not detected	330		ug/kg	10	87-86-5	
Phenanthrene	Not detected	330		ug/kg	10	85-01-8	
Phenol	Not detected	330		ug/kg	10	108-95-2	
Pyrene	Not detected	330		ug/kg	10	129-00-0	
1,2,4-Trichlorobenzene	Not detected	330		ug/kg	10	120-82-1	
2,4,5-Trichlorophenol	Not detected	330		ug/kg	10	95-95-4	
2,4,6-Trichlorophenol	Not detected	330		ug/kg	10	88-06-2	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/22/18 14:14, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	90		ug/kg	88.6	123-91-1	

Volatile Organics, Method: SW5035A/8260B, Run Date: 08/16/18 15:25, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane*	Not detected	90		ug/kg	88.6	76-13-1	
Acetone*	Not detected	900		ug/kg	88.6	67-64-1	
Carbon disulfide*	Not detected	90		ug/kg	88.6	75-15-0	
Methyl Acetate*	Not detected	900		ug/kg	88.6	79-20-9	
tert-Methyl butyl ether (MTBE)*	Not detected	90		ug/kg	88.6	1634-04-4	
2-Butanone (MEK)*	Not detected	900		ug/kg	88.6	78-93-3	
Dichlorodifluoromethane*	Not detected	90		ug/kg	88.6	75-71-8	
Chloromethane*	Not detected	90		ug/kg	88.6	74-87-3	
Vinyl chloride*	Not detected	90		ug/kg	88.6	75-01-4	
Bromomethane*	Not detected	90		ug/kg	88.6	74-83-9	
Chloroethane*	Not detected	90		ug/kg	88.6	75-00-3	
Trichlorofluoromethane*	Not detected	90		ug/kg	88.6	75-69-4	
1,1-Dichloroethene*	Not detected	90		ug/kg	88.6	75-35-4	
Methylene chloride*	Not detected	90		ug/kg	88.6	75-09-2	
trans-1,2-Dichloroethene*	Not detected	90		ug/kg	88.6	156-60-5	
1,1-Dichloroethane*	Not detected	90		ug/kg	88.6	75-34-3	
cis-1,2-Dichloroethene*	Not detected	90		ug/kg	88.6	156-59-2	
Chloroform*	Not detected	90		ug/kg	88.6	67-66-3	



Analytical Laboratory Report

Lab Sample ID: S93049.01 (continued)

Sample Tag: INJ-02-18_(16-17)

Volatile Organics, Method: SW5035A/8260B, Run Date: 08/16/18 15:25, Analyst: JML (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,1-Trichloroethane*	Not detected	90		ug/kg	88.6	71-55-6	
Cyclohexane*	Not detected	900		ug/kg	88.6	110-82-7	
4-Methyl-2-pentanone (MIBK)*	Not detected	900		ug/kg	88.6	108-10-1	
2-Hexanone*	Not detected	900		ug/kg	88.6	591-78-6	
Carbon tetrachloride*	Not detected	90		ug/kg	88.6	56-23-5	
Benzene*	Not detected	90		ug/kg	88.6	71-43-2	
1,2-Dichloroethane*	Not detected	90		ug/kg	88.6	107-06-2	
Trichloroethene*	Not detected	90		ug/kg	88.6	79-01-6	
1,2-Dichloropropane*	Not detected	90		ug/kg	88.6	78-87-5	
Bromodichloromethane*	Not detected	90		ug/kg	88.6	75-27-4	
Methyl cyclohexane*	Not detected	900		ug/kg	88.6	108-87-2	
cis-1,3-Dichloropropene*	Not detected	90		ug/kg	88.6	10061-01-5	
Toluene*	Not detected	90		ug/kg	88.6	108-88-3	
trans-1,3-Dichloropropene*	Not detected	90		ug/kg	88.6	10061-02-6	
1,1,2-Trichloroethane*	Not detected	90		ug/kg	88.6	79-00-5	
Tetrachloroethene*	Not detected	90		ug/kg	88.6	127-18-4	
Dibromochloromethane*	Not detected	90		ug/kg	88.6	124-48-1	
1,2-Dibromoethane*	Not detected	90		ug/kg	88.6	106-93-4	
Chlorobenzene*	Not detected	90		ug/kg	88.6	108-90-7	
1,1,2,2-Tetrachloroethane*	Not detected	90		ug/kg	88.6	79-34-5	
Ethylbenzene*	Not detected	90		ug/kg	88.6	100-41-4	
p,m-Xylene*	Not detected	90		ug/kg	88.6		
o-Xylene*	Not detected	90		ug/kg	88.6	95-47-6	
Styrene*	Not detected	90		ug/kg	88.6	100-42-5	
Isopropylbenzene*	Not detected	90		ug/kg	88.6	98-82-8	
Bromoform*	Not detected	90		ug/kg	88.6	75-25-2	
1,3-Dichlorobenzene*	Not detected	90		ug/kg	88.6	541-73-1	
1,4-Dichlorobenzene*	Not detected	90		ug/kg	88.6	106-46-7	
1,2-Dichlorobenzene*	Not detected	90		ug/kg	88.6	95-50-1	
1,2-Dibromo-3-chloropropane*	Not detected	90		ug/kg	88.6	96-12-8	
1,2,4-Trichlorobenzene*	Not detected	90		ug/kg	88.6	120-82-1	



Analytical Laboratory Report

Lab Sample ID: S93049.02

Sample Tag: INJ-02-18_(20-21)

Collected Date/Time: 08/13/2018 17:15

Matrix: Soil

COC Reference: 113361

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	MeOH	Yes	4.8	IR
1	4oz Glass	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	08/22/18 10:30	JRH	
BNA Extraction*	Completed	SW3546	08/22/18 10:30	ANW	
Extraction, PCB*	Completed	SW3546	08/22/18 10:30	PLB	
Mercury Digestion	Completed	SW7471B	08/22/18 10:30	CCM	

Inorganics

Method: SM2540B, Run Date: 08/15/18 09:05, Analyst: JBL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	90	1	1	%	1		

Metals

Method: SW6020A, Run Date: 08/23/18 13:57, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	1.34	1.15		mg/kg	1105	7782-49-2	

Method: SW6020A, Run Date: 08/23/18 13:52, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.50		mg/kg	221	7440-36-0	
Arsenic	1.45	0.20		mg/kg	221	7440-38-2	
Barium	30.1	1.0		mg/kg	221	7440-39-3	
Beryllium	Not detected	0.20		mg/kg	221	7440-41-7	
Cadmium	Not detected	0.20		mg/kg	221	7440-43-9	
Chromium	3.73	0.50		mg/kg	221	7440-47-3	
Cobalt	2.20	0.50		mg/kg	221	7440-48-4	
Copper	7.98	0.50		mg/kg	221	7440-50-8	
Lead	3.72	0.30		mg/kg	221	7439-92-1	
Manganese	199	0.50		mg/kg	221	7439-96-5	
Nickel	6.54	0.50		mg/kg	221	7440-02-0	
Silver	Not detected	0.20		mg/kg	221	7440-22-4	
Thallium	Not detected	0.20		mg/kg	221	7440-28-0	
Vanadium	6.41	0.50		mg/kg	221	7440-62-2	
Zinc	16.1	0.50		mg/kg	221	7440-66-6	

Method: SW7471B, Run Date: 08/21/18 12:46, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050		mg/kg	57	7439-97-6	

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 08/16/18 17:32, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	1	12674-11-2	



Analytical Laboratory Report

Lab Sample ID: S93049.02 (continued)

Sample Tag: INJ-02-18_(20-21)

PCB List, Method: SW8082A, Run Date: 08/16/18 17:32, Analyst: JANB (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1242	Not detected	330		ug/kg	1	53469-21-9	
PCB-1221	Not detected	330		ug/kg	1	11104-28-2	
PCB-1232	Not detected	330		ug/kg	1	11141-16-5	
PCB-1248	Not detected	330		ug/kg	1	12672-29-6	
PCB-1254	Not detected	330		ug/kg	1	11097-69-1	
PCB-1260	Not detected	330		ug/kg	1	11096-82-5	

Organics - Semi-Volatiles

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 08/25/18 22:08, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	330		ug/kg	10	83-32-9	
Acenaphthylene	Not detected	330		ug/kg	10	208-96-8	
Anthracene	Not detected	330		ug/kg	10	120-12-7	
Benzo(a)anthracene	Not detected	330		ug/kg	10	56-55-3	
Benzo(b)fluoranthene	Not detected	330		ug/kg	10	205-99-2	
Benzo(k)fluoranthene	Not detected	330		ug/kg	10	207-08-9	
Benzo(ghi)perylene	Not detected	330		ug/kg	10	191-24-2	
Benzo(a)pyrene	Not detected	330		ug/kg	10	50-32-8	
bis(2-Chloroethoxy)methane	Not detected	330		ug/kg	10	111-91-1	
bis(2-Chloroethyl)ether	Not detected	330		ug/kg	10	111-44-4	
bis(2-Chloroisopropyl)ether*	Not detected	330		ug/kg	10	108-60-1	
bis(2-Ethylhexyl)phthalate	Not detected	330		ug/kg	10	117-81-7	
4-Bromophenyl phenyl ether	Not detected	330		ug/kg	10	101-55-3	
Butyl benzyl phthalate	Not detected	330		ug/kg	10	85-68-7	
4-Chloroaniline	Not detected	330		ug/kg	10	106-47-8	
2-Chloronaphthalene	Not detected	330		ug/kg	10	91-58-7	
4-Chloro-3-methylphenol	Not detected	280		ug/kg	10	59-50-7	
2-Chlorophenol	Not detected	330		ug/kg	10	95-57-8	
4-Chlorophenyl phenyl ether	Not detected	330		ug/kg	10	7005-72-3	
Chrysene	Not detected	330		ug/kg	10	218-01-9	
p,m-Cresol	Not detected	330		ug/kg	10	3/4-CRESOL	
o-Cresol*	Not detected	330		ug/kg	10	95-48-7	
Dibenzo(ah)anthracene	Not detected	330		ug/kg	10	53-70-3	
Dibenzofuran	Not detected	330		ug/kg	10	132-64-9	
di-n-Butyl phthalate	Not detected	330		ug/kg	10	84-74-2	
1,2-Dichlorobenzene*	Not detected	330		ug/kg	10	95-50-1	
1,3-Dichlorobenzene	Not detected	330		ug/kg	10	541-73-1	
1,4-Dichlorobenzene	Not detected	330		ug/kg	10	106-46-7	
3,3'-Dichlorobenzidine	Not detected	2,000		ug/kg	10	91-94-1	
2,4-Dichlorophenol	Not detected	330		ug/kg	10	120-83-2	
Diethyl phthalate	Not detected	330		ug/kg	10	84-66-2	
2,4-Dimethylphenol	Not detected	330		ug/kg	10	105-67-9	
Dimethyl phthalate	Not detected	330		ug/kg	10	131-11-3	
4,6-Dinitro-2-methylphenol	Not detected	830		ug/kg	10	534-52-1	
2,4-Dinitrophenol	Not detected	830		ug/kg	10	51-28-5	
2,4-Dinitrotoluene	Not detected	330		ug/kg	10	121-14-2	
2,6-Dinitrotoluene	Not detected	330		ug/kg	10	606-20-2	
1,2-Diphenylhydrazine	Not detected	330		ug/kg	10	122-66-7	
di-n-Octyl phthalate	Not detected	330		ug/kg	10	117-84-0	
Fluoranthene	Not detected	330		ug/kg	10	206-44-0	



Analytical Laboratory Report

Lab Sample ID: S93049.02 (continued)

Sample Tag: INJ-02-18_(20-21)

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 08/25/18 22:08, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluorene	Not detected	330		ug/kg	10	86-73-7	
Hexachlorobenzene	Not detected	330		ug/kg	10	118-74-1	
Hexachlorobutadiene	Not detected	330		ug/kg	10	87-68-3	
Hexachlorocyclopentadiene	Not detected	330		ug/kg	10	77-47-4	
Hexachloroethane	Not detected	330		ug/kg	10	67-72-1	
Indeno(1,2,3-cd)pyrene	Not detected	330		ug/kg	10	193-39-5	
Isophorone	Not detected	330		ug/kg	10	78-59-1	
2-Methylnaphthalene	Not detected	330		ug/kg	10	91-57-6	
Naphthalene	Not detected	330		ug/kg	10	91-20-3	
2-Nitroaniline	Not detected	830		ug/kg	10	88-74-4	
3-Nitroaniline	Not detected	830		ug/kg	10	99-09-2	
4-Nitroaniline	Not detected	830		ug/kg	10	100-01-6	
Nitrobenzene	Not detected	330		ug/kg	10	98-95-3	
2-Nitrophenol	Not detected	330		ug/kg	10	88-75-5	
4-Nitrophenol	Not detected	830		ug/kg	10	100-02-7	
N-Nitrosodiphenylamine	Not detected	330		ug/kg	10	86-30-6	
N-Nitrosodi-n-propylamine	Not detected	330		ug/kg	10	621-64-7	
Pentachlorophenol	Not detected	330		ug/kg	10	87-86-5	
Phenanthrene	Not detected	330		ug/kg	10	85-01-8	
Phenol	Not detected	330		ug/kg	10	108-95-2	
Pyrene	Not detected	330		ug/kg	10	129-00-0	
1,2,4-Trichlorobenzene	Not detected	330		ug/kg	10	120-82-1	
2,4,5-Trichlorophenol	Not detected	330		ug/kg	10	95-95-4	
2,4,6-Trichlorophenol	Not detected	330		ug/kg	10	88-06-2	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/22/18 14:34, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	80		ug/kg	79.7	123-91-1	

Volatile Organics, Method: SW5035A/8260B, Run Date: 08/16/18 15:44, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane*	Not detected	80		ug/kg	79.7	76-13-1	
Acetone*	Not detected	800		ug/kg	79.7	67-64-1	
Carbon disulfide*	Not detected	80		ug/kg	79.7	75-15-0	
Methyl Acetate*	Not detected	800		ug/kg	79.7	79-20-9	
tert-Methyl butyl ether (MTBE)*	Not detected	80		ug/kg	79.7	1634-04-4	
2-Butanone (MEK)*	Not detected	800		ug/kg	79.7	78-93-3	
Dichlorodifluoromethane*	Not detected	80		ug/kg	79.7	75-71-8	
Chloromethane*	Not detected	80		ug/kg	79.7	74-87-3	
Vinyl chloride*	Not detected	80		ug/kg	79.7	75-01-4	
Bromomethane*	Not detected	80		ug/kg	79.7	74-83-9	
Chloroethane*	Not detected	80		ug/kg	79.7	75-00-3	
Trichlorofluoromethane*	Not detected	80		ug/kg	79.7	75-69-4	
1,1-Dichloroethene*	Not detected	80		ug/kg	79.7	75-35-4	
Methylene chloride*	Not detected	80		ug/kg	79.7	75-09-2	
trans-1,2-Dichloroethene*	Not detected	80		ug/kg	79.7	156-60-5	
1,1-Dichloroethane*	Not detected	80		ug/kg	79.7	75-34-3	
cis-1,2-Dichloroethene*	Not detected	80		ug/kg	79.7	156-59-2	
Chloroform*	Not detected	80		ug/kg	79.7	67-66-3	



Analytical Laboratory Report

Lab Sample ID: S93049.02 (continued)

Sample Tag: INJ-02-18_(20-21)

Volatile Organics, Method: SW5035A/8260B, Run Date: 08/16/18 15:44, Analyst: JML (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,1-Trichloroethane*	Not detected	80		ug/kg	79.7	71-55-6	
Cyclohexane*	Not detected	800		ug/kg	79.7	110-82-7	
4-Methyl-2-pentanone (MIBK)*	Not detected	800		ug/kg	79.7	108-10-1	
2-Hexanone*	Not detected	800		ug/kg	79.7	591-78-6	
Carbon tetrachloride*	Not detected	80		ug/kg	79.7	56-23-5	
Benzene*	Not detected	80		ug/kg	79.7	71-43-2	
1,2-Dichloroethane*	Not detected	80		ug/kg	79.7	107-06-2	
Trichloroethene*	Not detected	80		ug/kg	79.7	79-01-6	
1,2-Dichloropropane*	Not detected	80		ug/kg	79.7	78-87-5	
Bromodichloromethane*	Not detected	80		ug/kg	79.7	75-27-4	
Methyl cyclohexane*	Not detected	800		ug/kg	79.7	108-87-2	
cis-1,3-Dichloropropene*	Not detected	80		ug/kg	79.7	10061-01-5	
Toluene*	Not detected	80		ug/kg	79.7	108-88-3	
trans-1,3-Dichloropropene*	Not detected	80		ug/kg	79.7	10061-02-6	
1,1,2-Trichloroethane*	Not detected	80		ug/kg	79.7	79-00-5	
Tetrachloroethene*	Not detected	80		ug/kg	79.7	127-18-4	
Dibromochloromethane*	Not detected	80		ug/kg	79.7	124-48-1	
1,2-Dibromoethane*	Not detected	80		ug/kg	79.7	106-93-4	
Chlorobenzene*	Not detected	80		ug/kg	79.7	108-90-7	
1,1,2,2-Tetrachloroethane*	Not detected	80		ug/kg	79.7	79-34-5	
Ethylbenzene*	Not detected	80		ug/kg	79.7	100-41-4	
p,m-Xylene*	Not detected	80		ug/kg	79.7		
o-Xylene*	Not detected	80		ug/kg	79.7	95-47-6	
Styrene*	Not detected	80		ug/kg	79.7	100-42-5	
Isopropylbenzene*	Not detected	80		ug/kg	79.7	98-82-8	
Bromoform*	Not detected	80		ug/kg	79.7	75-25-2	
1,3-Dichlorobenzene*	Not detected	80		ug/kg	79.7	541-73-1	
1,4-Dichlorobenzene*	Not detected	80		ug/kg	79.7	106-46-7	
1,2-Dichlorobenzene*	Not detected	80		ug/kg	79.7	95-50-1	
1,2-Dibromo-3-chloropropane*	Not detected	80		ug/kg	79.7	96-12-8	
1,2,4-Trichlorobenzene*	Not detected	80		ug/kg	79.7	120-82-1	

Merit Laboratories Login Checklist

Lab Set ID:S93049

Client:ARCADIS_NOVI (ARCADIS U.S., Inc.)

Project: Racer PNC

Submitted:08/14/2018 15:00 Login User: MMC

Attention: Brad Saunders

Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 810-225-1904 FAX: 248-994-2241

Email: brad.saunders@arcadis.com

Selection	Description	Note
-----------	-------------	------

Sample Receiving

- | | | |
|-----|--|--|
| 01. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # IR 4.8 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |

Chain of Custody

- | | | |
|-----|--|--|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC |
| 09. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: |

Preservation

- | | | |
|-----|--|---|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation |
| 11. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab? |

Bottle Conditions

- | | | |
|-----|--|---|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Do water VOC or TOX bottles contain headspace |

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

113361

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME Brad Saunders / Matt Williams
 COMPANY Arcadis
 ADDRESS 28550 Cabot Drive STE500
 CITY Novi STATE MI ZIP CODE 48377
 PHONE NO. 248 994 2240 FAX NO. 248 994 2241 P.O. NO. 80004607.2018.00007
 E-MAIL ADDRESS matthew.williams@arcadis.com; brad.saunders@arcadis.com QUOTE NO.

CONTACT NAME Brad Saunders SAME
 COMPANY
 ADDRESS
 CITY STATE ZIP CODE
 PHONE NO. E-MAIL ADDRESS brad.saunders@arcadis.com

PROJECT NO./NAME RACER PNC SAMPLER(S) - PLEASE PRINT/SIGN NAME Kaitlyn Voet / Kaitlyn Voet
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	VOCs	SVOCs, PCBs, Metals	Total Solids	HOLD	Certifications
	DATE	TIME															
93049.01	8/13/18	1705	INJ-02-18-(16-17)	S	2	1							1	1			<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water
02	8/13/18	1715	INJ-02-18-(20-21)	S	2	1							1	1			<input type="checkbox"/> DoD <input type="checkbox"/> NPDES
93050.01	8/13/18	1720	INJ-02-18-(4-5)	S	2	1							1	1	X		Project Locations <input type="checkbox"/> Detroit <input type="checkbox"/> New York <input checked="" type="checkbox"/> Other <u>Pontiac</u>
																	Special Instructions *See attached VOC <u>KV=101</u>

RELINQUISHED BY: Kaitlyn Voet Arcadis Sampler DATE 8/13/18 TIME 1900
 RECEIVED BY: Novi Cold Storage DATE 8/13/18 TIME 1900
 RELINQUISHED BY: Matt Williams DATE 8-14-18 TIME 1130
 RECEIVED BY: [Signature] DATE 8-14-18 TIME 1120

RELINQUISHED BY: [Signature] DATE 8-14-18 TIME 1500
 RECEIVED BY: [Signature] DATE 8/14/18 TIME 1500
 SEAL NO. SEAL INTACT YES NO INITIALS
 SEAL NO. SEAL INTACT YES NO INITIALS
 NOTES: TEMP. ON ARRIVAL 4.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Table 4
 Summary of Groundwater Analytical Results
 RACER Trust Pontiac North Campus
 Pontiac, Michigan

PNC VOC Analyte List - 8260C		
Volatile Organic Compounds		
VOC	Acetone	1
VOC	Benzene	1
VOC	Bromodichloromethane	1
VOC	Bromoform	1
VOC	Bromomethane	1
VOC	2-Butanone	1
VOC	Carbon Disulfide	1
VOC	Carbon Tetrachloride	1
VOC	Chlorobenzene	1
VOC	Chloroethane	1
VOC	Chloroform	1
VOC	Chloromethane	1
VOC	Cumene	1
VOC	Cyclohexane	1
VOC	1,2-Dibromo-3-chloropropane	1
VOC	Dibromochloromethane	1
VOC	1,2-Dibromoethane	1
VOC	1,2-Dichlorobenzene	1
VOC	1,3-Dichlorobenzene	1
VOC	1,4-Dichlorobenzene	1
VOC	Dichlorodifluoromethane	1
VOC	1,1-Dichloroethane	1
VOC	1,2-Dichloroethane	1
VOC	1,1-Dichloroethene	1
VOC	cis-1,2-Dichloroethene	1
VOC	trans-1,2-Dichloroethene	1
VOC	1,2-Dichloropropane	1
VOC	1,3-Dichloropropene (summed)	1
VOC	Ethyl Benzene	1
VOC	2-Hexanone	1
VOC	Methyl Acetate	1
VOC	Methyl tert-butyl ether	1
VOC	4-Methyl-2-pentanone	1
VOC	Methylcyclohexane	1
VOC	Methylene Chloride	1
VOC	Styrene	1
VOC	1,1,2,2-Tetrachloroethane	1
VOC	Tetrachloroethene	1
VOC	Toluene	1
VOC	1,2,4-Trichlorobenzene	1
VOC	1,1,1-Trichloroethane	1
VOC	1,1,2-Trichloroethane	1
VOC	Trichloroethene	1
VOC	Trichlorofluoromethane	1
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	1
VOC	Vinyl Chloride	1
VOC	Xylenes (total)	1

Plus 1, 4 Dioxane 8260C SIMS



Analytical Laboratory Report

Report ID: S93050.01(01)
Generated on 08/27/2018

Report to

Attention: Brad Saunders
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 810-225-1904 FAX: 248-994-2241
Email: brad.saunders@arcadis.com

Additional Contacts: Matthew Williams

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S93050.01
Project: Racer PNC
Collected Date: 08/13/2018
Submitted Date/Time: 08/14/2018 15:00
Sampled by: Kaitlyn Voet
P.O. #: B0064607.2018.00007

Table of Contents

- Cover Page (Page 1)
- General Report Notes (Page 2)
- Report Narrative (Page 2)
- Laboratory Certifications (Page 3)
- Qualifier Descriptions (Page 3)
- Glossary of Abbreviations (Page 3)
- Method Summary (Page 4)
- Sample Summary (Page 5)

Maya Murshak
Technical Director



Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report



Analytical Laboratory Report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Analytical Laboratory Report

Method Summary

Method	Version
SM2540B	Standard Method 2540 B 2011
SW3050B	SW 846 Method 3050B Revision 2 December 1996
SW3546	SW 846 Method 3546 Revision 0 February 2007
SW5035A/8260B	SW 846 Method 8260B Revision 2 December 1996 / 5035A Revision 1 July 2002
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW7471B	SW 846 Method 7471B Revision 2 February 2007
SW8082A	SW 846 Method 8082A Revision 1 February 2007
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs
SW8270D	SW 846 Method 8270D Revision 4 February 2007



Analytical Laboratory Report

Sample Summary (1 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S93050.01	INJ-02-18_(4-5)	Soil	08/13/18 17:20



Analytical Laboratory Report

Lab Sample ID: S93050.01

Sample Tag: INJ-02-18_(4-5)

Collected Date/Time: 08/13/2018 17:20

Matrix: Soil

COC Reference: 113361

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	MeOH	Yes	4.8	IR
1	4oz Glass	None	Yes	4.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	08/22/18 10:30	JRH	
BNA Extraction*	Completed	SW3546	08/22/18 10:30	ANW	
Extraction, PCB*	Completed	SW3546	08/22/18 10:30	PLB	
Mercury Digestion	Completed	SW7471B	08/22/18 10:30	CCM	

Inorganics

Method: SM2540B, Run Date: 08/15/18 14:15, Analyst: JBL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	90	1	1	%	1		

Metals

Method: SW6020A, Run Date: 08/23/18 14:02, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.50		mg/kg	217	7440-36-0	
Arsenic	2.04	0.20		mg/kg	217	7440-38-2	
Barium	56.1	1.0		mg/kg	217	7440-39-3	
Beryllium	0.36	0.20		mg/kg	217	7440-41-7	
Cadmium	Not detected	0.20		mg/kg	217	7440-43-9	
Chromium	11.6	0.50		mg/kg	217	7440-47-3	
Cobalt	4.29	0.50		mg/kg	217	7440-48-4	
Copper	12.8	0.50		mg/kg	217	7440-50-8	
Lead	22.6	0.30		mg/kg	217	7439-92-1	
Manganese	246	0.50		mg/kg	217	7439-96-5	
Nickel	10.8	0.50		mg/kg	217	7440-02-0	
Selenium	Not detected	0.40		mg/kg	217	7782-49-2	
Silver	Not detected	0.20		mg/kg	217	7440-22-4	
Thallium	Not detected	0.20		mg/kg	217	7440-28-0	
Vanadium	12.1	0.50		mg/kg	217	7440-62-2	
Zinc	36.9	0.50		mg/kg	217	7440-66-6	

Method: SW7471B, Run Date: 08/21/18 12:47, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.149	0.050		mg/kg	56	7439-97-6	

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 08/16/18 17:43, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	10	12674-11-2	
PCB-1242	Not detected	330		ug/kg	10	53469-21-9	
PCB-1221	Not detected	330		ug/kg	10	11104-28-2	
PCB-1232	Not detected	330		ug/kg	10	11141-16-5	



Analytical Laboratory Report

Lab Sample ID: S93050.01 (continued)

Sample Tag: INJ-02-18_(4-5)

PCB List, Method: SW8082A, Run Date: 08/16/18 17:43, Analyst: JANB (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1248	Not detected	330		ug/kg	10	12672-29-6	
PCB-1254	Not detected	330		ug/kg	10	11097-69-1	
PCB-1260	Not detected	330		ug/kg	10	11096-82-5	

Organics - Semi-Volatiles

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 08/25/18 22:38, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	830		ug/kg	30	83-32-9	X
Acenaphthylene	Not detected	830		ug/kg	30	208-96-8	X
Anthracene	1,000	830		ug/kg	30	120-12-7	X
Benzo(a)anthracene	Not detected	830		ug/kg	30	56-55-3	X
Benzo(b)fluoranthene	Not detected	830		ug/kg	30	205-99-2	X
Benzo(k)fluoranthene	Not detected	830		ug/kg	30	207-08-9	X
Benzo(ghi)perylene	Not detected	830		ug/kg	30	191-24-2	X
Benzo(a)pyrene	Not detected	830		ug/kg	30	50-32-8	X
bis(2-Chloroethoxy)methane	Not detected	830		ug/kg	30	111-91-1	X
bis(2-Chloroethyl)ether	Not detected	830		ug/kg	30	111-44-4	X
bis(2-Chloroisopropyl)ether*	Not detected	830		ug/kg	30	108-60-1	X
bis(2-Ethylhexyl)phthalate	Not detected	830		ug/kg	30	117-81-7	X
4-Bromophenyl phenyl ether	Not detected	830		ug/kg	30	101-55-3	X
Butyl benzyl phthalate	Not detected	830		ug/kg	30	85-68-7	X
4-Chloroaniline	Not detected	830		ug/kg	30	106-47-8	X
2-Chloronaphthalene	Not detected	830		ug/kg	30	91-58-7	X
4-Chloro-3-methylphenol	Not detected	830		ug/kg	30	59-50-7	X
2-Chlorophenol	Not detected	830		ug/kg	30	95-57-8	X
4-Chlorophenyl phenyl ether	Not detected	830		ug/kg	30	7005-72-3	X
Chrysene	1,080	830		ug/kg	30	218-01-9	X
p,m-Cresol	Not detected	830		ug/kg	30	3/4-CRESOL	X
o-Cresol*	Not detected	830		ug/kg	30	95-48-7	X
Dibenzo(ah)anthracene	Not detected	830		ug/kg	30	53-70-3	X
Dibenzofuran	Not detected	830		ug/kg	30	132-64-9	X
di-n-Butyl phthalate	Not detected	830		ug/kg	30	84-74-2	X
1,2-Dichlorobenzene*	Not detected	830		ug/kg	30	95-50-1	X
1,3-Dichlorobenzene	Not detected	830		ug/kg	30	541-73-1	X
1,4-Dichlorobenzene	Not detected	830		ug/kg	30	106-46-7	X
3,3'-Dichlorobenzidine	Not detected	2,000		ug/kg	30	91-94-1	
2,4-Dichlorophenol	Not detected	830		ug/kg	30	120-83-2	X
Diethyl phthalate	Not detected	830		ug/kg	30	84-66-2	X
2,4-Dimethylphenol	Not detected	830		ug/kg	30	105-67-9	X
Dimethyl phthalate	Not detected	830		ug/kg	30	131-11-3	X
4,6-Dinitro-2-methylphenol	Not detected	830		ug/kg	30	534-52-1	
2,4-Dinitrophenol	Not detected	830		ug/kg	30	51-28-5	
2,4-Dinitrotoluene	Not detected	830		ug/kg	30	121-14-2	X
2,6-Dinitrotoluene	Not detected	830		ug/kg	30	606-20-2	X
1,2-Diphenylhydrazine	Not detected	830		ug/kg	30	122-66-7	X
di-n-Octyl phthalate	Not detected	830		ug/kg	30	117-84-0	X
Fluoranthene	1,950	830		ug/kg	30	206-44-0	X
Fluorene	1,300	830		ug/kg	30	86-73-7	X
Hexachlorobenzene	Not detected	830		ug/kg	30	118-74-1	X

X-Elevated reporting limit due to matrix interference



Analytical Laboratory Report

Lab Sample ID: S93050.01 (continued)

Sample Tag: INJ-02-18_(4-5)

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 08/25/18 22:38, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hexachlorobutadiene	Not detected	830		ug/kg	30	87-68-3	X
Hexachlorocyclopentadiene	Not detected	830		ug/kg	30	77-47-4	X
Hexachloroethane	Not detected	830		ug/kg	30	67-72-1	X
Indeno(1,2,3-cd)pyrene	Not detected	830		ug/kg	30	193-39-5	X
Isophorone	Not detected	830		ug/kg	30	78-59-1	X
2-Methylnaphthalene	Not detected	830		ug/kg	30	91-57-6	X
Naphthalene	Not detected	830		ug/kg	30	91-20-3	X
2-Nitroaniline	Not detected	830		ug/kg	30	88-74-4	
3-Nitroaniline	Not detected	830		ug/kg	30	99-09-2	
4-Nitroaniline	Not detected	830		ug/kg	30	100-01-6	
Nitrobenzene	Not detected	830		ug/kg	30	98-95-3	X
2-Nitrophenol	Not detected	830		ug/kg	30	88-75-5	X
4-Nitrophenol	Not detected	830		ug/kg	30	100-02-7	
N-Nitrosodiphenylamine	Not detected	830		ug/kg	30	86-30-6	X
N-Nitrosodi-n-propylamine	Not detected	830		ug/kg	30	621-64-7	X
Pentachlorophenol	Not detected	830		ug/kg	30	87-86-5	X
Phenanthrene	3,470	830		ug/kg	30	85-01-8	X
Phenol	Not detected	830		ug/kg	30	108-95-2	X
Pyrene	3,330	830		ug/kg	30	129-00-0	X
1,2,4-Trichlorobenzene	Not detected	830		ug/kg	30	120-82-1	X
2,4,5-Trichlorophenol	Not detected	830		ug/kg	30	95-95-4	X
2,4,6-Trichlorophenol	Not detected	830		ug/kg	30	88-06-2	X

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 08/22/18 14:54, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	60		ug/kg	61.8	123-91-1	

Volatile Organics, Method: SW5035A/8260B, Run Date: 08/16/18 16:05, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane*	Not detected	60		ug/kg	61.8	76-13-1	
Acetone*	Not detected	600		ug/kg	61.8	67-64-1	
Carbon disulfide*	Not detected	60		ug/kg	61.8	75-15-0	
Methyl Acetate*	Not detected	600		ug/kg	61.8	79-20-9	
tert-Methyl butyl ether (MTBE)*	Not detected	60		ug/kg	61.8	1634-04-4	
2-Butanone (MEK)*	Not detected	600		ug/kg	61.8	78-93-3	
Dichlorodifluoromethane*	Not detected	60		ug/kg	61.8	75-71-8	
Chloromethane*	Not detected	60		ug/kg	61.8	74-87-3	
Vinyl chloride*	Not detected	60		ug/kg	61.8	75-01-4	
Bromomethane*	Not detected	60		ug/kg	61.8	74-83-9	
Chloroethane*	Not detected	60		ug/kg	61.8	75-00-3	
Trichlorofluoromethane*	Not detected	60		ug/kg	61.8	75-69-4	
1,1-Dichloroethene*	Not detected	60		ug/kg	61.8	75-35-4	
Methylene chloride*	Not detected	60		ug/kg	61.8	75-09-2	
trans-1,2-Dichloroethene*	Not detected	60		ug/kg	61.8	156-60-5	
1,1-Dichloroethane*	Not detected	60		ug/kg	61.8	75-34-3	
cis-1,2-Dichloroethene*	Not detected	60		ug/kg	61.8	156-59-2	
Chloroform*	Not detected	60		ug/kg	61.8	67-66-3	
1,1,1-Trichloroethane*	Not detected	60		ug/kg	61.8	71-55-6	

X-Elevated reporting limit due to matrix interference



Analytical Laboratory Report

Lab Sample ID: S93050.01 (continued)

Sample Tag: INJ-02-18_(4-5)

Volatile Organics, Method: SW5035A/8260B, Run Date: 08/16/18 16:05, Analyst: JML (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cyclohexane*	Not detected	600		ug/kg	61.8	110-82-7	
4-Methyl-2-pentanone (MIBK)*	Not detected	600		ug/kg	61.8	108-10-1	
2-Hexanone*	Not detected	600		ug/kg	61.8	591-78-6	
Carbon tetrachloride*	Not detected	60		ug/kg	61.8	56-23-5	
Benzene*	Not detected	60		ug/kg	61.8	71-43-2	
1,2-Dichloroethane*	Not detected	60		ug/kg	61.8	107-06-2	
Trichloroethene*	Not detected	60		ug/kg	61.8	79-01-6	
1,2-Dichloropropane*	Not detected	60		ug/kg	61.8	78-87-5	
Bromodichloromethane*	Not detected	60		ug/kg	61.8	75-27-4	
Methyl cyclohexane*	Not detected	600		ug/kg	61.8	108-87-2	
cis-1,3-Dichloropropene*	Not detected	60		ug/kg	61.8	10061-01-5	
Toluene*	Not detected	60		ug/kg	61.8	108-88-3	
trans-1,3-Dichloropropene*	Not detected	60		ug/kg	61.8	10061-02-6	
1,1,2-Trichloroethane*	Not detected	60		ug/kg	61.8	79-00-5	
Tetrachloroethene*	Not detected	60		ug/kg	61.8	127-18-4	
Dibromochloromethane*	Not detected	60		ug/kg	61.8	124-48-1	
1,2-Dibromoethane*	Not detected	60		ug/kg	61.8	106-93-4	
Chlorobenzene*	Not detected	60		ug/kg	61.8	108-90-7	
1,1,2,2-Tetrachloroethane*	Not detected	60		ug/kg	61.8	79-34-5	
Ethylbenzene*	Not detected	60		ug/kg	61.8	100-41-4	
p,m-Xylene*	Not detected	60		ug/kg	61.8		
o-Xylene*	Not detected	60		ug/kg	61.8	95-47-6	
Styrene*	Not detected	60		ug/kg	61.8	100-42-5	
Isopropylbenzene*	Not detected	60		ug/kg	61.8	98-82-8	
Bromoform*	Not detected	60		ug/kg	61.8	75-25-2	
1,3-Dichlorobenzene*	Not detected	60		ug/kg	61.8	541-73-1	
1,4-Dichlorobenzene*	Not detected	60		ug/kg	61.8	106-46-7	
1,2-Dichlorobenzene*	Not detected	60		ug/kg	61.8	95-50-1	
1,2-Dibromo-3-chloropropane*	Not detected	60		ug/kg	61.8	96-12-8	
1,2,4-Trichlorobenzene*	Not detected	60		ug/kg	61.8	120-82-1	

Merit Laboratories Login Checklist

Lab Set ID:S93050

Client:ARCADIS_NOVI (ARCADIS U.S., Inc.)

Project: Racer PNC

Submitted:08/14/2018 15:00 Login User: MMC

Attention: Brad Saunders

Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 810-225-1904 FAX: 248-994-2241

Email: brad.saunders@arcadis.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 4.8
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to:
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

113361

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME Brad Saunders / Matt Williams
 COMPANY Arcadis
 ADDRESS 28550 Cabot Drive STE500
 CITY Novi STATE MI ZIP CODE 48377
 PHONE NO. 248 994 2240 FAX NO. 248 994 2241 P.O. NO. 800(4607.2018.0000)
 E-MAIL ADDRESS matthew.williams@arcadis.com; brad.saunders@arcadis.com

CONTACT NAME Brad Saunders SAME
 COMPANY _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP CODE _____
 PHONE NO. _____ E-MAIL ADDRESS brad.saunders@arcadis.com

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME RACER PNC SAMPLER(S) - PLEASE PRINT/SIGN NAME Kaitlyn Voet / Kaitlyn Voet
 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=WIFE A=AIR W=WASTE

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other Pontiac
 Special Instructions

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	VOCs	SVOCs, PCBs, Metals	Total Solids	HOLD	X
	DATE	TIME															
93049.01	8/13/18	1705	INJ-02-18-(16-17)	S	2	1					1		1	1			
02	8/13/18	1715	INJ-02-18-(20-21)	S	2	1					1		1	1			
93050.01	8/13/18	1720	INJ-02-18-(4-5)	S	2	1					1		1	1			

RELINQUISHED BY: Kaitlyn Voet Arcadis Sampler DATE 8/13/18 TIME 1900
 RECEIVED BY: Novi Cold Storage DATE 8/13/18 TIME 1900
 RELINQUISHED BY: Matt Williams DATE 8-14-18 TIME 1130
 RECEIVED BY: Mrs DATE 8-14-18 TIME 1120

RELINQUISHED BY: Mrs G-M DATE 8-14-18 TIME 1500
 RECEIVED BY: M. Calcaterra DATE 8/14/18 TIME 1500
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 NOTES: TEMP. ON ARRIVAL 4.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Table 4
 Summary of Groundwater Analytical Results
 RACER Trust Pontiac North Campus
 Pontiac, Michigan

PNC VOC Analyte List - 8260C	
Volatile Organic Compounds	
VOC Acetone	1
VOC Benzene	1
VOC Bromodichloromethane	1
VOC Bromoform	1
VOC Bromomethane	1
VOC 2-Butanone	1
VOC Carbon Disulfide	1
VOC Carbon Tetrachloride	1
VOC Chlorobenzene	1
VOC Chloroethane	1
VOC Chloroform	1
VOC Chloromethane	1
VOC Cumene	1
VOC Cyclohexane	1
VOC 1,2-Dibromo-3-chloropropane	1
VOC Dibromochloromethane	1
VOC 1,2-Dibromoethane	1
VOC 1,2-Dichlorobenzene	1
VOC 1,3-Dichlorobenzene	1
VOC 1,4-Dichlorobenzene	1
VOC Dichlorodifluoromethane	1
VOC 1,1-Dichloroethane	1
VOC 1,2-Dichloroethane	1
VOC 1,1-Dichloroethene	1
VOC cis-1,2-Dichloroethene	1
VOC trans-1,2-Dichloroethene	1
VOC 1,2-Dichloropropane	1
VOC 1,3-Dichloropropene (summed)	1
VOC Ethyl Benzene	1
VOC 2-Hexanone	1
VOC Methyl Acetate	1
VOC Methyl tert-butyl ether	1
VOC 4-Methyl-2-pentanone	1
VOC Methylcyclohexane	1
VOC Methylene Chloride	1
VOC Styrene	1
VOC 1,1,2,2-Tetrachloroethane	1
VOC Tetrachloroethene	1
VOC Toluene	1
VOC 1,2,4-Trichlorobenzene	1
VOC 1,1,1-Trichloroethane	1
VOC 1,1,2-Trichloroethane	1
VOC Trichloroethene	1
VOC Trichlorofluoromethane	1
VOC 1,1,2-Trichloro-1,2,2-trifluoroethane	1
VOC Vinyl Chloride	1
VOC Xylenes (total)	1

Plus 1, 4 Dioxane 8260C SIMS

ATTACHMENT C

City of Pontiac Electrical Permit



Permit Details: PE180553Property Address: 200 E MONTCALM, Pontiac, MI 48342 | Parcel: [64-14-20-426-005](#)**Property Owner:** RACER PROPERTIES LLC**Summary Information**

> 1 Inspection(s) Found

Permit Information

Number	PE180553	Category	Electrical - Com
Type	Electrical	Status	EXPIRED
Applied Date	10/29/2018	Expire Date	04/27/2019
Issue Date	10/29/2018	Finaled Date	No Data to Display
Work Description	PERMANENT SERVICE FOR ONE PHASE, 4 CIRCUITS FOR TOE DRAIN PUMP		
Stipulations	No Data to Display		

Amount Due

Permit - Electrical	\$0.00
Total	

Inspection Information

Inspection Type	Inspector	Status	Scheduled Date	Completed Date	Result	
SERVICE	JOHN DANIC	Completed	12/18/2018	12/19/2018	Partially Approved	View

Violations

Show All

[Collapse All]

Title	Violation Type	Date Found	Corrected	Date Corrected	Inspection	
No records to display.						

Fees & Payments

Date	Action	Qty	Description	Billed	Paid
10/29/2018	Invoice Item	4.00	Standard Item: EACH CIRCUIT (Invoice Number: 00082448)	\$60.00	
10/29/2018	Invoice Item	1.00	ELECTRICAL PERMIT FEE: 1 PHASE PERM SVS 100-OR LESS AMP (Invoice Number: 00082448)	\$37.00	
10/29/2018	Invoice Item	1.00	ELECTRICAL PERMIT FEE: APPLICATION FEE (Invoice Number: 00082448)	\$35.00	
10/29/2018	Transaction		Transaction Number: 00070929		\$0.00

Contractor Information

Address	MOTOR CITY ELECTRIC CO 9440 GRINNELL ST. DETROIT, MI 48213		
Phone	No Data to Display	Fax	No Data to Display
Mobile	No Data to Display	Other Phone	No Data to Display

Applicant Information

Address	STEPHEN J FRANTZ 9440 GRINNELL ST. DETROIT, MI 48213		
Phone	No Data to Display	Fax	No Data to Display
Mobile	No Data to Display	Other Phone	No Data to Display

Owner Information

Address	RACER PROPRERITE 500 WOODWARD AVE STE 2650 DETROIT, MI 48226-3416		
Phone	<i>No Data to Display</i>	Fax	<i>No Data to Display</i>
Mobile	<i>No Data to Display</i>	Other Phone	<i>No Data to Display</i>

Licensee Information

Address			
Phone	<i>No Data to Display</i>	Fax	<i>No Data to Display</i>
Mobile	<i>No Data to Display</i>	Other Phone	<i>No Data to Display</i>

****Disclaimer:** BS&A Software provides BS&A Online as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

ATTACHMENT D

Photo Log



Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 1

Date:

October 22, 2018

Description:

Brush hog toe drain area
along Montcalm St. facing
west

Location:

Toe Drain Area



Photo: 2

Date:

October 23, 2018

Description:

Pothole gas line to prepare
for horizontal boring 2"
HDPE conveyance line.
Located at 2' 4" bgs.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 3

Date:

October 23, 2018

Description:

Brush hog proposed path of horizontal boring.

Location:

USPS Property



Photo: 4

Date:

October 23, 2018

Description:

Dewatering toe drain excavation upgradient to the north into the USPS field.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 5

Date:

October 24, 2018

Description:

Fence gate installed at North Saginaw St entrance off of Montcalm St to provide lockable access to toe drain area.

Location:

USPS Property



Photo: 6

Date:

October 24, 2018

Description:

Toe drain east of abandoned sump located and exposed to allow for toe drain alteration.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 7

Date:

October 24, 2018

Description:

Toe drain west of abandoned sump located and exposed to allow for toe drain alteration.

Location:

Toe Drain Area



Photo: 8

Date:

October 25, 2018

Description:

Jetting out the toe drain to clear any obstructions or blockages. At the completion of activities, the toe drain was confirmed to be clean of detectable obstructions and allowing for flow from both ends.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 9

Date:

October 26, 2018

Description:

Pothole electrical line on north side of USPS property to prepare for horizontal boring 2" HDPE conveyance line. Located at 3' 10" bgs.

Location:

USPS Property



Photo: 10

Date:

October 29, 2018

Description:

Begin horizontal boring 2" HDPE conveyance line with tracer wire from clean out #2 toward clean out #1.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 11

Date:

October 20, 2018

Description:

2" HDPE conveyance line with tracer wire exposed at clean out #1.

Location:

USPS Property



Photo: 12

Date:

October 31, 2018

Description:

2" HDPE conveyance line with tracer wire exposed sump/toe drain location.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 13

Date:

November 1, 2018

Description:

Larger excavator brought onsite to break up concrete pad encountered at clean out #3.

Location:

USPS Property



Photo: 14

Date:

November 1, 2018

Description:

Horizontal boring 2" HDPE conveyance line with tracer wire from excavated area at clean out #3 toward clean out #4.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 15

Date:

November 2, 2018

Description:

Fusing 2" HDPE conveyance pipe together at clean out locations.

Location:

USPS Property



Photo: 16

Date:

November 2, 2018

Description:

Fusing 2" HDPE conveyance pipe together at clean out locations.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 17

Date:

November 5, 2018

Description:

Concrete base pad delivered
for sump installation.

Location:

USPS Property



Photo: 18

Date:

November 5, 2018

Description:

Pre-fabricated sump
exterior.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 19

Date:

November 5, 2018

Description:

Pre-fabricated sump interior with initial installation of plumbing and pump rails.

Location:

USPS Property



Photo: 20

Date:

November 5, 2018

Description:

Delivery of sump pumps.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 21

Date:

November 7, 2018

Description:

2" HDPE conveyance line
clean out #2 installed with
ball valve and tracer wire.

Location:

USPS Property



Photo: 22

Date:

November 8, 2018

Description:

Toe drain alteration trench
excavated and ready for
installation of alteration
piping.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 23

Date:

November 8, 2018

Description:

6" corrugated, perforated piping with silt sock installed in toe drain alteration trench with geotextile and 21AA stone.

Location:

Toe Drain Area



Photo: 24

Date:

November 9, 2018

Description:

Placing 6" 21AA stone base with concrete sump base on top.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 25

Date:

November 13, 2018

Description:

Fusing the valves at the
Conveyance line T together.

Location:

USPS Property



Photo: 26

Date:

November 13, 2018

Description:

“T” fitting with ball valve
installed at injection wells

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 27

Date:

November 13, 2018

Description:

Trenching at the injection wells.

Location:

USPS Property



Photo: 28

Date:

November 14, 2018

Description:

Pressure testing conveyance line start at 50 psi, 12:21 pm. Pressure maintained +/- 10% (5 psi) of the pressure test set point throughout the duration (30 minutes) of the testing.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 31

Date:

November 15, 2018

Description:

Pitless adapter for injection well.

Location:

Injection Well Area



Photo: 32

Date:

November 15, 2018

Description:

Electrofused couplings at injection well connected to pitless adapter.

Location:

Injection Well Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 33

Date:

November 26, 2018

Description:

JSS attempts to uncover exposed end of abandoned 4" gas line after Utility Underground locate.

Location:

Toe Drain Area



Photo: 34

Date:

November 27, 2018

Description:

Installed new 2" conveyance pipe port into sump structure.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 35

Date:
November 28, 2018

Description:
Sump internal plumbing.

Location:
Toe Drain Area



Photo: 36

Date:
November 28, 2018

Description:
Sump flow meter and
pressure transducer.

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI

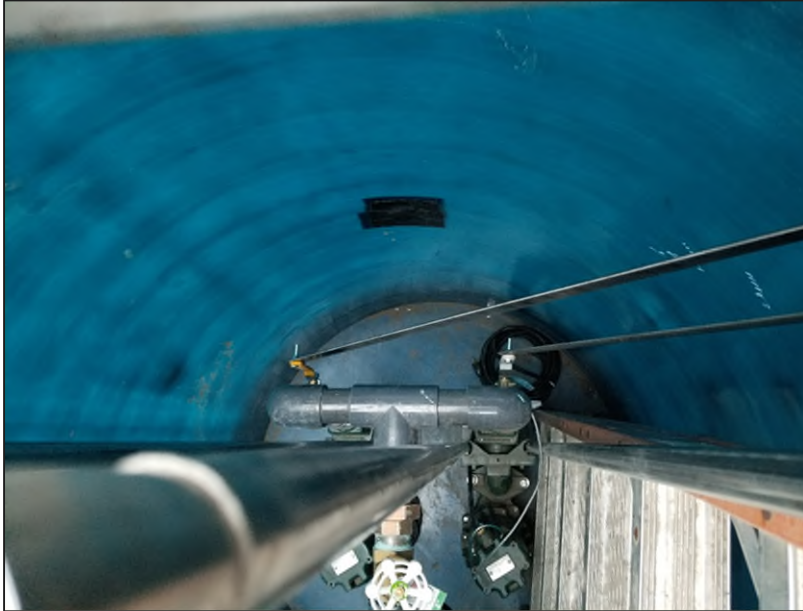


Photo: 37

Date:

November 28, 2018

Description:

Access rods attached to ball valves at each pump.

Location:

Toe Drain Area



Photo: 38

Date:

November 30, 2018

Description:

Placing sump structure into excavation.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 39

Date:

November 30, 2018

Description:

Sump structure placed in excavation at grade and level

Location:

Toe Drain Area



Photo: 40

Date:

November 30, 2018

Description:

Conveyance pipe installed to sump structure.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 41

Date:
November 30, 2018

Description:
Backfill around sump and
sump entrance.

Location:
Toe Drain Area



Photo: 42

Date:
November 30, 2018

Description:
Backfill around sump.

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 43

Date:

December 3, 2018

Description:

Generator brought in to power submersible pump.

Location:

Toe Drain Area



Photo: 44

Date:

December 4, 2018

Description:

Backfilling electrical conduit trench with warning tape placed above conduit.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 45

Date:

December 5, 2018

Description:

Strainer cleanout at sump being finished to grade with 6"x8" transition and vault

Location:

Toe Drain Area



Photo: 46

Date:

December 5, 2018

Description:

Vaults at cleanouts installed.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 47

Date:

December 5, 2018

Description:

Soils graded and cleanout vaults installed at sump.

Location:

Toe Drain Area



Photo: 48

Date:

December 6, 2018

Description:

Sono tubes placed for electrical rack at sump.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 49

Date:

December 6, 2018

Description:

Vaults at cleanouts installed with surrounding grading.

Location:

USPS Property



Photo: 50

Date:

December 11, 2018

Description:

Interior of sump with temporary submersible pump operating.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 51

Date:

December 13, 2018

Description:

Barricaded generator and auxiliary fuel tank with secondary containment beneath connection and emergency spill kit supplies.

Location:

USPS Property



Photo: 52

Date:

December 14, 2018

Description:

Electrical rack under construction. Motor City completed conduit run and mounted equipment to rack.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 53

Date:
December 18, 2018

Description:
Completed electrical rack at sump with City of Pontiac permit.

Location:
Toe Drain Area



Photo: 54

Date:
December 18, 2018

Description:
City of Pontiac Electrical Permit (#PE180553).

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 55

Date:

December 26, 2018

Description:

Dewatering pump
temporary discharge
location in USPS west field

Location:

USPS Property



Photo: 56

Date:

January 16, 2019

Description:

Katz Excavating installed
wire conductors from
electrical pole to electric
meter.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 57

Date:

January 21, 2019

Description:

Sump partially filled with water.

Location:

Toe Drain Area



Photo: 58

Date:

January 21, 2019

Description:

Sump control panel mounted.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 59

Date:
January 21, 2019

Description:
Electrical components in
sump control panel.

Location:
Toe Drain Area



Photo: 60

Date:
January 21, 2019

Description:
Electrical components in
sump control panel.

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI

Photo: 61

Date:

January 21, 2019

Description:

Electrical components in sump control panel.

Location:

Toe Drain Area

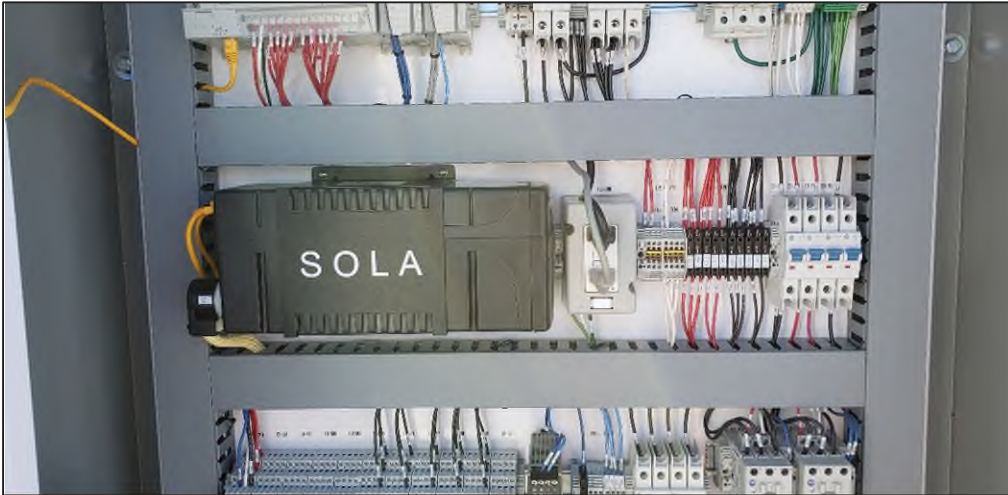


Photo: 62

Date:

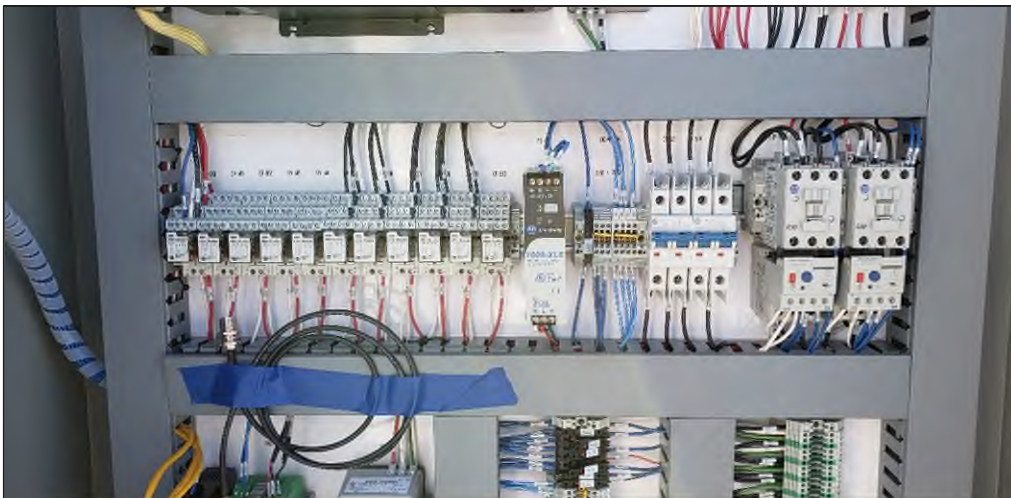
January 21, 2019

Description:

Electrical components in sump control panel.

Location:

Toe Drain Area



Project Photographs

RACER Pontiac North Campus
Pontiac, MI

Photo: 63

Date:

January 21, 2019

Description:

Electrical components in sump control panel.

Location:

Toe Drain Area



Photo: 64

Date:

January 21, 2019

Description:

Adjustment of junction box location in sump based on actual sump water levels, with wiring extending directly back to panel.

Location:

Toe Drain Area



Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 65

Date:

January 22, 2019

Description:

Injection well pole with mounted equipment.

Location:

USPS Property



Photo: 66

Date:

February 15, 2019

Description:

Steel filters installed in the toe drain cleanouts.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI

Photo: 67

Date:

March 25, 2019

Description:

Back of sump control panel with electrical meter, on/off switch, and breaker box.

Location:

Toe Drain Area



Photo: 68

Date:

March 25, 2019

Description:

Inside breaker box

Location:

Toe Drain Area



Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 69

Date:

May 14, 2019

Description:

Panel rack with solar panel in injection area.

Location:

USPS Property



Photo: 70

Date:

May 14, 2019

Description:

Pump heads replaced after servicing for routine maintenance.

Location:

Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 71

Date:
May 15, 2019

Description:
Pump placed back in sump after servicing for maintenance.

Location:
Toe Drain Area



Photo: 72

Date:
May 15, 2019

Description:
Second conduit at sump added for pump power supply wiring.

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 73

Date:
May 21, 2019

Description:
Injection panel with valve pad in foreground.

Location:
USPS Property



Photo: 74

Date:
May 21, 2019

Description:
Sump pad area regraded with gravel base to provide for drainage.

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 75

Date:
May 23, 2019

Description:
Sump and cleanouts with finished concrete pad.

Location:
Toe Drain Area

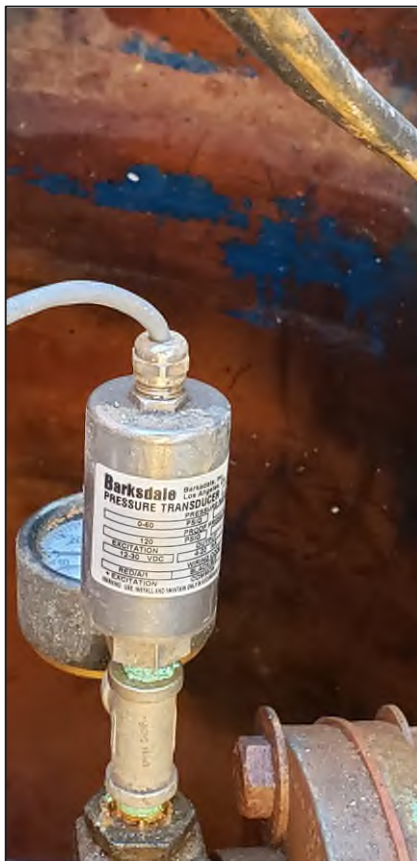


Photo: 76

Date:
May 23, 2019

Description:
Pressure transducer in sump.

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 77

Date:

May 23, 2019

Description:

Sump control panel with straw mat cover down during final restoration.

Location:

Toe Drain Area



Photo: 78

Date:

May 24, 2019

Description:

Straw mat laid along bank upgradient from Montcalm St.

Location:

Toe Drain area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 79

Date:
May 24, 2019

Description:
Concrete pads installed at all
cleanouts

Location:
USPS Property



Photo: 80

Date:
June 18, 2019

Description:
Display screen on sump
control panel.

Location:
Toe Drain Area

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 81

Date:

June 18, 2019

Description:

McCrometer display in sump control panel.

Location:

Toe Drain Area



Photo: 82

Date:

June 19, 2019

Description:

Electrical components in injection well control panel.

Location:

USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 83

Date:
June 19, 2019

Description:
Electrical components in
Injection well control panel.

Location:
USPS Property



Photo: 84

Date:
June 19, 2019

Description:
Electrical components in
Injection well control panel.

Location:
USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI

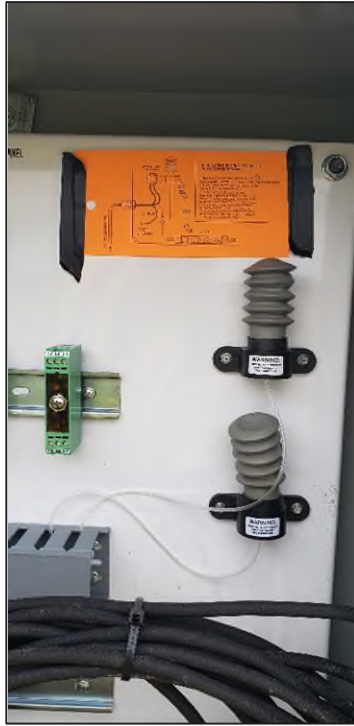


Photo: 85

Date:
June 19, 2019

Description:
Electrical components in
Injection well control panel.

Location:
USPS Property



Photo: 86

Date:
June 19, 2019

Description:
Electrical components in
Injection well control panel.

Location:
USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 87

Date:
June 19, 2019

Description:
Electrical components in
Injection well control panel.

Location:
USPS Property



Photo: 88

Date:
June 19, 2019

Description:
Electrical components in
Injection well control panel.

Location:
USPS Property

Project Photographs

RACER Pontiac North Campus
Pontiac, MI



Photo: 89

Date:

June 19, 2019

Description:

Solar panel at Injection well
control panel.

Location:

USPS Property

ATTACHMENT E

Weekly Work Reports



Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
10/22/18 through 10/26/18	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
35 - 55	2 - 14 mph majority of week	Sunny, Overcast

Personnel Onsite			
Name	Hours	Location	Notes:
Cooper Zilio	47	All	Project Oversight & Documentation
Brad Saunders	3	All	Project Management
Arcadis Personnel Hours		50	
Subcontractors	Tom Holdeman	3	JSS Project Manager
	Don Winchell	46.5	JSS Superintendent
	Christ Alamteoff	46.5	JSS Laboror
	Sean Wilkes	4	Midland Fence Fencing
	Matthew Erskine	4	Midland Fence Fencing
	Bill Page	1	USIC Utility Locate
	Mike Garcia	6.5	GPRS Utility Locate
	Cody Yocom	2	SSI Surveyors
	Nick Rashotte	2	SSI Surveyors
	Clayton Smith	9	Monchilov Sewer Crew
	Nathan Bristol	9	Monchilov Sewer Crew
	Subcontractor Hours		133.5

Visitors:		
Name	Company	Business

Summary of Week's Work:	
Area	Description
	<p>10/22/18 - Walk over area SOW, attempt to locate toe drain cleanouts and sump. Succesfully located west cleanout. Unable to locate east cleanout or sump. Will attempt this afternoon. Midland Fence set 4" fencing post for gates and close up fence opening.</p> <p>10/22/18 - Bill Page with USIC onsite to locate gas line. GPRS onsite to locate utilities along boring path.</p> <p>10/22/18 - Sunbelt arrives with equipment. Unload mini-excavator, brush hog attachment, and skidsteer</p> <p>10/22/18 - Brushhog the toe drain SOW area.</p> <p>10/23/18 - SSI to complete list of items described by B. Saunders email sent to T. Holdeman dated October 18, 2018. GPRS onsite to utility locate toe drain area and conveyance pipe route. JSS brush hog conveyance pipe route for GPRS to locate.</p> <p>10/23/18 - JSS began locating old pump station. Located between MW-MD-02 and MW-MD-03. Large concrete pad ~1.5 bgs. Chased east edge, found pieces of east toe drain. Looks damaged. Excavator uncovering pieces of it. Pump couldn't keep up with ground water infiltration. JSS aquiring heavy duty gas powered pump. Backfill excavation.</p> <p>10/23/18 - Gas line located and potholed to 2'4" bgs along conveyance pipe route on north end of property. GPRS complete utility locate.</p> <p>10/24/18 - ETNA onsite to deliver geotextile fabric, conveyance pipe, 6" piping for toe drain rehab and fittings. Stage up on USPS property.</p> <p>10/24/18 - Continue locating east toe drain on east side of pump station concrete pad. Begin dewatering excavation diverting water up over the hill into the monitoring well field. Uncovering conduit/piping possibly associated with old pump station. Also uncovered old clay tile storm drain. Could be associated with abandoned old storm system.</p> <p>10/24/18 - Midland Fence complete with gate install.</p> <p>10/24/18 - Continue to dewater excavation. Locate north edge of pumping station concrete pad. Should be able to reroute toe drain without abandoning MW-MD-03. Locate east toe drain ~6' bgs. Black corrugated perforated pipe with silt sock. Locate west toe drain ~6' bgs. Same black corrugated perforated pipe with silt sock.</p> <p>10/25/18 - Significant amount of water coming out of east and west toe drain tie in points at excavation. Monchilov attempt to send camera in but could not get a clear picture with the water in the pipe. Spoke with B.Saunders about water issue. Camera not as important. Verify east toe drain has no obstructions from our tie in point to east cleanout by jetting it. Confirm not obstructions by jetting on west toe drain portion as well.</p> <p>10/25/18 - Jet from east cleanout toward excavation. Jet stopped at round stainless steel vault east of excavation. Toe drain ties in here. Will jet from this location to the east and to the west to confirm no obstructions.</p>

10/25/18 - Jetting from both ends inside stainless steel vault confirmed no obstructions on east portion of the toe drain.
 10/25/18 - Jet west portion of toe drain from cleanout point to excavation to confirm no obstructions.
 10/25/18 - Jetting from west clean out confirmed no obstructions on west portion of the toe drain.
 10/26/18 - Electric line located to 4" bgs by potholeing.
 10/26/18 - Attempt to locate/pothole electric line that supplies light pole on the north side of the property in the path of the horizontal drilling.
 10/26/18 - Housekeeping. Stage equipment.

Materials / Equipment Delivered to Site

Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
2" PVC Conveyance Pipe				
6" PVC Perforated Toe Drain Pipe				
Geotextile				
4" Deisel Dewatering Pump				
6" Black Corregated Pipe				

Equipment / Drain Line / Piping Installed

Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Material Removed from Site

Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment

Item	Model	Description	In Use	Locations/Working for:
Sunbelt Mini-Excavator	G-30	Excavator 24" Bucket	Yes	Toe Drain
Brush Hog Attachment		60" Brush Hog Attachment	Yes	Toe Drain
Sunbelt Skidsteer	325G	Rubber Track Skidsteer	Yes	Toe Drain
Airknife		Airknife for locating utilities	Delivered	Staged by Injection Wells
Vac Truc Jetting			Yes	Toe Drain
Dewatering Pump		4" Deisel Dewatering Pump	Delivered	Staged by injection wells

Photos Taken (Location):

Area	Description
10/22/18 - Fence location off Saganaw Rd / Brush Hogging Toe Drain Area	

10/23/18 - Locate and pothole gas line on north end of property. 2' 4" bgs



10/23/18 - Conveyance pipe route brush hogged and ready for utility locate.



10/24/18 - Gate installed at toe drain access.



10/24/18 - Dewatering excavation.



10/25/18 - Jetting from round stainless steel vault.

10/25/18 - Exposed end of east toe drain. No obstructions observed.



10/26/18 - Electrical line servicing light pole potholed and located at 4' bgs.



Prepared by

Cooper Zilio

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
10/29/18 through 11/02/18	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
38-54	1 - 20 mph majority of week	Wet conditions, Rain, Overcast

Personnel Onsite					
Name	Hours	Location	Notes:		
Cooper Zilio	36	Conveyance Line	Project Oversight & Documentation		
Brad Saunders	1	Conveyance Line	Project Management		
Matt Williams	8.5	Conveyance Line	Project Oversight & Documentation		
Arcadis Personnel Hours		45.5			
Subcontractors	Aaron Mosciski	39.5	Conveyance Line	JSS Superintendant	
	Michael Patterson	37	Conveyance Line	A-1 Horizontal Boring	
	Henny Patterson	37	Conveyance Line	A-1 Horizontal Boring	
	Jeff Blackme	37	Conveyance Line	A-1 Horizontal Boring	
	Mike Patterson	6	Conveyance Line	A-1 Horizontal Boring	
	Subcontractor Hours		156.5		

Visitors:		
Name	Company	Business
--	CRC	Pickup breaker excavator attachment.

Summary of Week's Work:	
Area	Description
	10/29/18 - A-1 Underground begins horizontal drilling 2" conveyance pipe on north side of property at clean out #2 toward injection wells.
	10/30/18 - Boring complete from clean out #2 to clean out #1 at injection wells. Begin pulling 2" conveyance pipe with tracer wire.
	10/30/18 - 2" conveyance pipe fed from clean out #1 to clean out #2. Start bore from cleanout #3 north toward clean out #2.
	10/30/18 - Boring complete from clean out #5 toward clean out #4. Begin pulling 2" conveyance PVC pipe with tracer wire.
	10/30/18 - 2" conveyance pipe installed from clean out #5 to clean out #4.
	10/31/18 - Bore complete underneath the USPS drive. Install 2" conveyance line from clean out #4 to the north side of drive right on other side of fence. JSS will complete this full run from clean out #4 to clean out #3 once they have the right equipment to break up the concrete at clean out #3.
	10/31/18 - 2" conveyance pipe with tracer wire installed from north side of drive to clean out #4.
	10/31/18 - 2" PVC conveyance pipe with tracer wire installed from toe drain to just south of clean out #5
	11/1/18 - Complete clean out #5 to toe drain run. Break up concrete at clean out #3 and complete 2" PVC conveyance pipe run from clean out #4 to clean out #3 to clean out #2.
	11/1/18 - 2" PVC conveyance pipe pulled from starting point to clean out #5. 2" PVC conveyance pipe installed from clean out #5 to toe drain.
	11/1/18 - 2" PVC conveyance line installed from clean out #3 to clean out #4. Fuse pipes together at location just north of the fence.
	11/2/18 - Bore complete from clean out #2 to clean out #3.
	11/2/18 - 2" HDPE conveyance pipe and tracer pulled from clean out #3 to clean out #2. HDPE had to be fused approximately 55' north of clean out #

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
2" PVC Conveyance Pipe		~1600		

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Breaker Excavator Attachment		1.00		

Equipment				
Item	Model	Description	In Use	Locations/Working for:
Sunbelt Mini-Excavator	G-30	Excavator 24" Bucket	Yes	Conveyance Line
Brush Hog Attachment		60" Brush Hog Attachment	No	Staged at access gate.
Sunbelt Skidsteer	325G	Rubber Track Skidsteer	Yes	Toe Drain
Airknife		Airknife for locating utilities	No	Staged by Injection Wells
Dewatering Pump		4" Deisel Dewatering Pump	Yes	Toe Drain
Ditch Witch	J20	Horizontal Drill Rig	Yes	Conveyance Line
Komatsu Excavator	PC200	Excavator with Hammer Attachment	Yes	Conveyance Line

Photos Taken (Location):

Area	Description
10/29/18 - Horizontal boring north toward the injection wells.	

10/30/18 - 2"
conveyance pipe
installed from clean out
#2 to clean out #1 at
injection wells.



10/31/18 -
Pulling 2" PVC
conveyance pipe with
tracer wire from the
north side of the fence,
underneath the USPS
drive, to clean out #4.



11/1/18 - Feeding
remaining pipe from toe
drain to clean out #5..



11/2/18 - HDPE pipe
fused



Prepared by
Matt Williams

Date: 11/05/18 through 11/09/18	RACER TRUST - PONTIAC NORTH CAMPUS SITE
	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
31 - 52	2 - 20 mph majority of week	Overcast, Cloudy/Wind, Partly Cloudy, Snow

Personnel Onsite				
Name	Hours	Location	Notes:	
Cooper Zilio	35.5	All	Project Oversight & Documentation	
Matt Williams	7	Toe Drain	Project Oversight & Documentation	
Arcadis Personnel Hours		42.5		
Subcontractors	Aaron Mosciski	22.5	Toe Drain	JSS Superintendent
	Don Winchell	43.5	Toe Drain	JSS Superintendent
	Chris Alamteoff	47.5	Toe Drain	JSS Laboror
	Justin Schmidt	43.5	Toe Drain	JSS Laboror
	Subcontractor Hours		157	

Visitors:		
Name	Company	Business

Summary of Week's Work:	
Area	Description
	<p>11/05/18 - JSS brings excavator down to toe drain, begins digging out toe drain on the eastern connection point.</p> <p>11/05/18 - Review piping alterations needed for sump with JSS, disassemble slide tracks and sump piping. JSS reviews cleanout wye assemblies, will require electro fusion coupling equipment to keep valve below frost line.</p> <p>11/05/18 - JSS finished excavating dewatering sump prior to eastern toe drain connection. Dewatering pump bringing water level down.</p> <p>11/06/18 - JSS to start opening excavations at clean out #2 and clean out #3 to prepare from clean out installation.</p> <p>11/06/18 - Aaron Mosciski with JSS onsite. Begin making modifications to sump to accommodate design specs.</p> <p>11/07/18 - Clean out #2, #3, #4, and #5 installed. Access vaults will be installed when they arrive onsite.</p> <p>11/08/18 - Trench excavated and both ends of existing toe drain exposed and ready to attach 6" corrugated perforated pipe with silt sock.</p> <p>11/08/18 - Continue working on toe drain alteration. Confirm 0.5% slope. Lay geotextile fabric, with 6" 21AA stone base and place toe drain pipe alteration in trench. Begin backfill.</p> <p>11/08/18 - Sump excavation exposed and ready for placing 21AA stone base and concrete cookie.</p> <p>11/09/18 - Stone and concrete cookie placed in excavation and leveled. JSS clean up areas of expose dirt and touch up areas around the clean outs.</p> <p>11/09/18 - Sump clean out fittings assembled. JSS load up equipment. C. Alamteoff (JSS) will remain onsite until 1630 to periodically check on dewatering pump and fuel it at the end of the day. Dewatering pump will run throughout the weekend on low idle.</p>

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Stone	40 YDS	40 YDS		
Sump	1.00	1.00		

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Toe Drain Alteration	50.00	50.00	100.00	

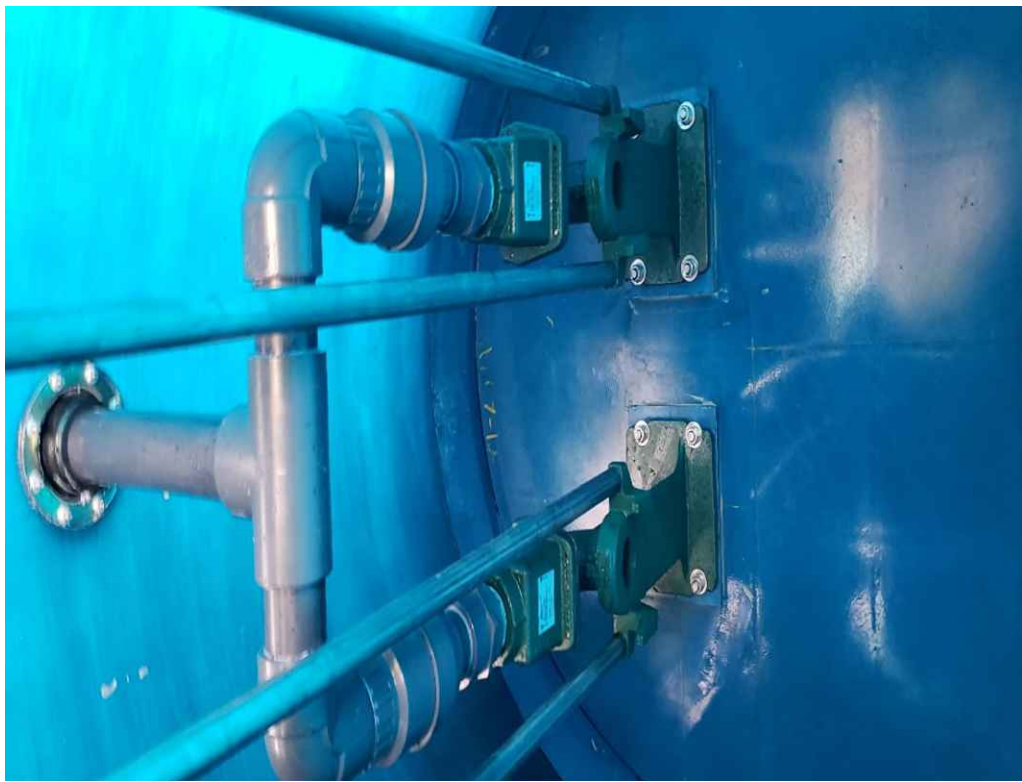


Material Removed from Site

Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment

Item	Model	Description	In Use	Locations/Working for:
Sunbelt Mini-Excavator	G-30	Excavator 24" Bucket	Yes	Conveyance Line
Brush Hog Attachment		60" Brush Hog Attachment	No	Staged at access gate.
Sunbelt Skidsteer	325G	Rubber Track Skidsteer	Yes	Conveyance Line
Airknife		Airknife for locating utilities	No	Staged by Injection Wells
Dewatering Pump		4" Diesel Dewatering Pump	Yes	Toe Drain
Komatsu Excavator	PC200	Excavator with Bucket	Yes	Toe Drain

Photos Taken (Location):

Area	Description
<p>11/05/18 - Sump exterior.</p> <p>11/05/18 - Sump interior.</p>	 
<p>11/06/18 - Prepping clean out #3 for install.</p> <p>11/06/18 - Prepping clean out #2 for install.</p>	 

11/07/18 - Clean out #2 installed.

11/07/18 - Clean out #3 installed.



11/08/18 - Both end of toe drain expose to attach toe drain alteration.

11/08/18 - Old pump station pad. Trench excavated to install toe drain alteration.



11/09/18 - Placing 6"
21AA stone base with
concrete cookie on top.



Prepared by

Cooper Zilio

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
11/12/18 through 11/16/18	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
20 - 37	0 - 12 mph majority of week	Overcast, Cloudy, Sunny, Snow

Personnel Onsite				
Name	Hours	Location	Notes:	
Cooper Zilio	26.5	All	Project Oversight & Documentation	
Matt Williams	8	Injection Wells	Project Oversight & Documentation	
Brad Saunders	6.5	Sump, Toe Drain	Project Oversight & Documentation	
Arcadis Personnel Hours		41		
Subcontractors	Andrew Lowe	27.5	All	JSS Superintendent
	Eric Spaulding	26.5	All	JSS Superintendent
	Taylor Spaulding	44.5	All	JSS Laboror
	Chris Alamteoff	45.5	All	JSS Laboror
	Justin Schmidt	45.5	All	JSS Laboror
	Tom Holdeman	3.5	All	JSS Project Manager
	Curt	11.5	All	JSS Operator
	Subcontractor Hours		204.5	

Visitors:		
Name	Company	Business
Representative	USIC	Private Utility Locating subcontractor to JSS

Summary of Week's Work:	
Area	Description
	<p>11/12/18 - JSS focus on taking inventory of parts/equipment onsite, reorganizing/cleaning job trailer, installing clean out #1 near the injection wells.</p> <p>11/12/18 - Clean out #1 installed. Focus on tying conveyance pipe into injection wells tomorrow (11/13/18) and possibly pressure test line Wednesday. Began housekeeping and loading up equipment. Fence off excavation.</p> <p>11/13/18 - Continue working on making conveyance line tie in's at the injection wells. Install ball valve and gate valves to each injection well. Install pitless adaptors when they arrive onsite.</p> <p>11/13/18 - Ball valve and T installed to make connections to injections wells. JSS begin cleaning up work area, loading up equipment and fencing off excavation.</p> <p>11/14/18 - Begin pressue test conveyance line at 50 psi. Pressure must maintain +/-10% (5 psi) of the pressure test set point throughout the duration (30 minutes) of the testing.</p> <p>11/14/18 - Complete pressure test conveyance line at 46.5 psi. Pressure test conveyance line PASS.</p> <p>11/15/18 - Discuss drop pipe elevation with JSS. Call Brad Saunders to discuss. Update design so that bottom of drop pipe is 20' below ground surface. Drawings show it at 15'.</p> <p>11/15/18 - JSS resumes installing pitless adaptors. Spacing issue on 4" diameter INJ-01. Pitless adapter takes up too much space in the annular space of the riser, can't get 1" transducer stabilization pipe off to the side of it. JSS plans tried use 3/4" pipe instead but can't get that to bypass the pitless either. No stabilization pipe will be used for now.</p> <p>11/15/18 - JSS begins backfilling INJ-02 and connecting tracer wire to INJ-01 wellhead. Weld connections to injection wells and backfill. Vaults at Cleanout 1 roughed in.</p> <p>11/16/18 - Corr w JSS re: 4" gas line check w privte utility locator and Consumers. Review Sump cookie/basin and toe drain elevations versus drawing specifications. Identification of elevation issue where sump would be set 18-24 inched too high. Correspondences w JSS Project manager (Holdeman) and on-site supervisor (Spaulding) regarding action plan for activities.</p> <p>11/16/18 - USIC locator confirms additional information that active gas line in ROW was installed in 1981, still no confirmed information on other 4" gas line within fence line. Observations in area indicate potential pieces of 4" pipe observed broken up, but no confirmation on gas line being de-pressurized and completely isolated from active line. To treat as pressurized.</p>

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Sump Flow Meter	1.00	1.00		
3/4" PVC pipe for drop legs	40 Ft	40 Ft		
Gravel	50 tons	50 tons		

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Clean out	1.00	5.00		
Pitless Adapters	2.00	2.00		
Conveyance piping	15.00	15.00		
Cleanout 1 vaults	2.00	2.00		
Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Equipment				
Item	Model	Description	In Use	Locations/Working for:
Sunbelt Mini-Excavator	G-30	Excavator 24" Bucket	Yes	Conveyance Line
Brush Hog Attachment		60" Brush Hog Attachment	No	Staged at access gate.
Sunbelt Skidsteer	325G	Rubber Track Skidsteer	Yes	Conveyance Line
Dewatering Pump		4" Diesel Dewatering Pump	Yes	Toe Drain
Komatsu Excavator	PC200	Excavator with Bucket	Yes	Toe Drain

Photos Taken (Location):

Area	Description
<p>11/12/18 - Uncovering conveyance line at clean out #1 near injection wells.</p> <p>11/12/18 - Clean out #1 connections.</p>	 
<p>11/13/18 - Trenching at the injection wells.</p>	 

11/14/18 - Pressure test start at 50 psi, 12:21pm.

11/14/18 - Pressure test finish at 46.5 psi, 12:51pm.



11/15/18 - Pitless adapter.

11/15/18 - Pitless adapter connected to injection well.



Prepared by

Cooper Zilio

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
11/26/18 through 11/30/18	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
27 - 39	2 - 19 mph majority of week	Snow/Sleet, Overcast, Cloudy

Personnel Onsite				
Name	Hours	Location	Notes:	
Cooper Zilio	39.5	Toe Drain, Sump	Project Oversight & Documentation	
Brad Saunders	5.5	Toe Drain	Project Management	
Arcadis Personnel Hours		45		
Subcontractors	Howard Evans	39.5	Toe Drain, Sump	JSS Superintendent
	John Gardner	39.5	Toe Drain, Sump	JSS Operator
	Justin Spaulding	39.5	Toe Drain, Sump	JSS Laboror
	Tom Holdeman	8	Toe Drain	JSS Project Manager
	Alan Andrew	2.5	Toe Drain	Utility Underground Locator
Subcontractor Hours		129		

Visitors:		
Name	Company	Business

Summary of Week's Work:	
Area	Description
	<p>11/26/18 - A. Andrew with Underground Utility able to attach onto and locate extents of suspect abandoned gas line - one on RACER side of fence, one crosses and parallel to existing active gas line. JSS performed at the extent of the located line on RACER property, but unable to identify end point given that it appeared to run under the toe drain at that point. B. Saunders confirmed we could removed from sump excavation.</p> <p>11/27/18 - Focus on plumbing sump for install into excavation at toe drain. JSS recommends not cutting 8" contingency sewer connection at this time to limit the amount of holes in the sump structure. B. Saunders agreed given that locating of hole in future should be tied to surveying in relevant sewer connection, and structure will be dug out and exposed at that time anyway for tie in. JSS will store inside the sump for future use if/when neccessary.</p> <p>11/27/18 - JSS running into plumbing concerns with the amount of room inside the sump. Ball valves will not be accesible by hand and have to run verticle rather than horizontal. JSS proposes using lead free brass ball valves with a rod attached to be able to turn them on an off from the surface. Confirm with B. Saunder and M. Williams. JSS will install with brass valves.</p> <p>11/27/18 - Plumbing in sump almost complete. JSS plans to attach flow meter, ball valve access rods, 6" toe drain collar points and install electrical junction box (float switches, pressure transducer, pump and flow meter power cords) tomorrow morning. Once internal installs are done, they will mob it down to the sump excavation</p> <p>11/28/18 - MWW10-SEN02 purged dry. Mob back over to laydown area to check on sump progress. Flowmeter and pressure transducer installed. JSS installing unistrut to support flowmeter and piping. 6" cast iron toe drain collar arrived onsite. Still waiting on equipment T. Holdeman ordered.</p> <p>11/28/18 - T. Holdeman is going to contact their electrician to find out when they can make it to the site to install electrical components in the sump. JSS would like all the internal components in place before they place the sump in the excavation and attached the toe drains.</p> <p>11/28/18 - Mob down to toe drain excavation and remove concrete cookie to deepen the excavation to bring the toe drain inlets to the right elevation on the sump. Remove frozen mud from skidsteer.</p> <p>11/30/18 - Cookie & Sump placed in excavation above stone succesfully and level. JSS will begin to make connections to toe drains, conveyance pipe and electrical conduit. Spoke with M. Williams to confirm the M-1 drawing regarding backfill material. Drawing does not specify what type of material is used to backfill around sump. M. Williams confirms backfill materials will be dirt with 21a stone around the toe drains. Also confirmed clean outs will have a 2-3' offset from the edge of the sump rather than 5'.</p> <p>11/30/18 - Sump in the ground, all necessary connections made, dewatering directly from sump. Backfill of soil & gravel.</p>

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining


Equipment / Drain Line / Piping Installed

Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment				
Item	Model	Description	In Use	Locations/Working for:
Sunbelt Mini-Excavator	G-30	Excavator 24" Bucket	No	Injection Wells
Brush Hog Attachment		60" Brush Hog Attachment	No	Staged at access gate.
Sunbelt Skidsteer	325G	Rubber Track Skidsteer	Yes	Toe Drain
Dewatering Pump		4" Diesel Dewatering Pump	Yes	Toe Drain
Komatsu Excavator	PC200	Excavator with Bucket	Yes	Toe Drain

Photos Taken (Location):

Area	Description
<p>11/26/18 - Utility Underground located extent of suspect 4" gas line.</p> <p>11/26/18 - JSS attempt to uncover exposed end of suspect 4" gas line.</p>	

<p>11/27/18 - Sump plumbing almost complete.</p> <p>11/27/18 - Installed new 2" conveyance pipe port into sump structure.</p>	
---	--

11/28/18 - Flow meter and pressure transducer.



11/28/18 - Sump internal plumbing.



11/30/18 - Placing sump structure into excavation.



11/30/18 - Sump structure placed in excavation level and at grade.



Prepared by

Cooper Zilio

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
12/03/18 through 12/06/18	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
26 - 36	0 - 12 mph majority of week	Overcast/Intermittent Snow

Personnel Onsite				
Name	Hours	Location	Notes:	
Matt Williams	27	Sump/Toe Drain	Project Oversight & Documentation	
Arcadis Personnel Hours		27		
Subcontractors	John Gardner	30	Sump/Toe Drain	JSS Superintendent
	Ryan Jebesen	29	Sump/Toe Drain	JSS Laboror
	Luis Morua	29	Sump/Toe Drain	JSS Laboror
	Erik Spaulding	2	Sump/Toe Drain	JSS Laboror
	Frank Goodrich	5	Sump/IW's	Motor City Electric Electrician
	NSS	2	Sump/IW's	Contractor to Motor City installing sono tubes
	Subcontractor Hours		97	

Visitors:		
Name	Company	Business
Sue and Scott	WRC Oakland County.	look into valve and observation of water on road along Montcalm

Summary of Week's Work:	
Area	Description
	12/03/18 - Photograph site conditions. Note that dewatering pump is not operating. Contact Brad Saunders and Tom Holdeman. Also note that underground trench for electrical conduit run was not complete despite Saturday and Sunday work efforts due to significant concrete obstructions immediately south-southeast of the sump to the fence. Furthermore, significant mud and silt was starting to migrate onto Montcalm Street from the trenching work efforts.
	12/03/18 - JSS onsite and installs 3" submersible pump in sump, powered by generator.
	12/04/18 - JSS finishes removing concrete on north side of fence. Begin digging out trench underneath fence, sidewalk section pulled out beneath 6" of stone. Ryan runs to store for electrical warning tape.
	12/04/18 - Conduit installed beneath the fence, area south of fence restored to original condition. Sidewalk section place back in. Begin trenching remainder of trench to sump. Depth of installation approximately 24". Conduit runs west to the sump 10' offset to the north of the fence.
	12/04/18 - Trench backfilled. Conduit left about 5' capped and unglued to the southeast of the sump. Final connection to be made by electrician.
	12/05/18 - Discuss electrical and pole installation by injection wells with Motor City Electric. Sono tube will be installed for pole. Review proximity to other infrastructure and storm sewer.
	12/05/18 - JSS works on installing conveyance line cleanout vault covers. JSS completed installation of cleanout #2 and cleanout #3.
	12/06/18 - Submersible pump ran overnight. JSS installing cleanout covers at #4 and #5. NSS installing sonotubes for racks for Motor City.
	12/06/18 - JSS finishes cleanout cover installations. In spring, some will have to be slightly repositioned when final grading is completed. Holes on the sides need to be sealed to prevent soil filling over time. Motor City Electric offsite.
	12/06/18 - Sue and Scott with Oakland County WRC onsite to investigate valve along Montcalm. They suspect it is an issue beneath road on the 12" service to Pontiac Schools building across the road. They will begin digging to explore issue but are working to mark utilities first.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Generator	1.00	1.00		
Submersible Pump	1.00	1.00		

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Electrical Conduit to Sump	1.00	1.00		
Cleanout covers	4.00	6.00		4.00

Valve covers	2.00	2.00		1.00

Material Removed from Site

Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment

Item	Model	Description	In Use	Locations/Working for:
Sunbelt Mini-Excavator	G-30	Excavator 24" Bucket	Yes	Toe Drain
Generator		Sunbelt	Yes	Sump
Sunbelt Skidsteer	325G	Rubber Track Skidsteer	Yes	Toe Drain
Komatsu Excavator	PC200	Excavator	Yes	Toe Drain, removed from site
3" Submersible Pump			Yes	Sump

Photos Taken (Location):

Area	Description
------	-------------

12/03/18 - Generator brought in to power submersible pump.
12/03/18 - Sump dewatered in afternoon.



12/04/18 - Breaking up concrete for electrical conduit installation to sump.



12/05/18 - Strainer cleanout at sump being finished to grade with 6"x8" transition and vault



12/06/18 - Sono tubes placed for electrical rack at sump



Prepared by
Cooper Zilio

--	--

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
12/10/2018 through 12/14/2018	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
20s - 30s	<10 mph typically	Overcast, intermittent light snow

Personnel Onsite			
Name	Hours	Location	Notes:
Matt Williams	8	Sump/Toe Drain	Project Oversight & Documentation
Arcadis Personnel Hours		8	
Subcontractors	Frank Goodrich	8	Sump/Toe Drain
			Motor City Electric Electrician
	Subcontractor Hours		8

Visitors:		
Name	Company	Business
Multiple Tracey Neubacher	WRC Oakland County USPS	Repair of leak beneath road at observation of water along Montcalm Observed fuel loading of double walled 500 gallon tank on 12/11/18

Summary of Week's Work:	
Area	Description
	12/11/18 - 0900-Arcadis onsite. Atlas oil onsite for fuel delivery. 500 gallons diesel added to double wall tank and generator topped off 10 gallons. Meet with Tracey N. (USPS) to monitor fueling process.
	12/11/18 - 1130-Arcadis offsite. Notify USPS that gate is closed and locked.
	12/13/18 - 0730 - Motor City Electric onsite. Begins work on electrical rack installation at sump.
	12/13/18 - 0900-Arcadis onsite. Review SOW and H&S with Motor City Electric. WRC onsite at water main for repairs, saw cutting road underway.
	12/13/18 - 1000- Arcadis installs spill containment beneath generator tie in. Notify JSS about emergency spill kit protection need.
	12/13/18 - 1115- Arcadis and Motor City offsite. Notify USPS that gate is closed and locked.
	12/14/18 - 0730 - Motor City Electric onsite. Begins work on conduit into electrical rack at sump.
	12/14/18 - 0945-Arcadis onsite. Review SOW and H&S with Motor City Electric. WRC onsite at water main area flushing nearby fire hydrant. WRC representative indicated repair was likely completed overnight.
	12/14/18 - 1030 - Motor City Electric offsite. They installed fish tape and pull wire in conduit and made interconnections between equipment on the rack. Arcadis talks to John Wood with Rivore about NAPL recovery area and their development plans after rail ties were observed partially removed from the ground in the vicinity.
	12/14/18 - 1100 - Arcadis offsite. Notify USPS that gate is closed and locked.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Auxiliary fuel tank	1.00	1.00		Atlas Oil Co. delivered tank, fueled it, and made connection to generator.
Disconnect, breaker box, meter box	1 each	1 each		

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Auxiliary fuel tank	1.00	1.00		Atlas Oil Co. delivered tank, fueled it, and made connection to generator.
Disconnect, breaker box, meter box	1 each	1 each		

Material Removed from Site

Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment

Item	Model	Description	In Use	Locations/Working for:
Generator w/ aux tank		Sunbelt / Atlas Oil	Yes	Sump, top of hill in SW corner of USPS lot.


Notable Events that Occurred Today:

Area	Description
Toe Drain USPS Parking Lot Montcalm St	Motor city installed electrical rack at sump and mounted meter, break box, and disconnect. Pull wire installed with fish tape back to pole. Installed 500 gallon double walled auxiliary fuel tank and connected it to generator. WRC repaired water main leak.

Schedule of Work for Tomorrow:

Motor City Electric will be onsite next week to work on sump panel rack.

Photos Taken (Location):

Area	Description
12/11/18 - Interior of sump with temporary submersible pump operating	
12/13/18 - Barricaded generator and auxiliary fuel tank with secondary containment beneath connection and emergency spill kit supplies.	

12/13/18 - Oakland County Water Resource Commission saw cutting at suspected Montcalm water main leak location.



12/14/18 - Oakland County Water Resource Commission patched road and work area along Montcalm at water main leak location.



12/14/18 - Electrical rack under construction. Motor city completed conduit run, and mounted equipment to rack.



Prepared by
Matt Williams

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
12/17/2018 through 12/21/18	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
20s - 30s	<10 mph typically	Mixture of Overcast, Rain and light snow

Personnel Onsite				
Name	Hours	Location	Notes:	
Matt Williams	4	Sump/Toe Drain	Project Oversight & Documentation - Electrical	
Brad Saunders	6	Property-Wide	Final Survey Guidance, Oversight, Sump Electrical	
Arcadis Personnel Hours		10		
Subcontractors	Frank Goodrich	12	Sump/Toe Drain	Motor City Electric Electrician
	Tom Holdeman	6	Property-Wide	JSS Project Manager
	Nicholas Rashotte	5	Property-Wide	SSI Surveying
	Brian Bartlett	5	Property-Wide	SSI Surveying
	Subcontractor Hours		28	

Visitors:		
Name	Company	Business
Inspector Outside/Extranl Survey Crew	City of Pontiac USPS	Inspecting and Issuing Permit for Electrical Service at Sump Conducting Surveying Activities for Other Party

Summary of Week's Work:	
Area	Description
	12/17/18 - 0730-Arcadis & Motor City Electric Onsite for Electrical work at rack / sump. Dewatering ongoing at sump location.
	12/17/18 - 0830-Motor City Off-site, Arcadis offsite. Notify USPS that gate is closed and locked.
	12/17/18 - 0930-Arcadis offsite. Notify USPS that gate is closed and locked.
	12/18/18 - 0730-Motor City, JSS and Arcadis onsite. Motor City completing electrical work at sump / rack location.
	12/18/18 - 0830 - SSI Surveying onsite. Arcadis, JSS and SSI commence shooting final survey points starting at south portion of property.
	12/18/18 - 1330- SSI, Arcadis and JSS complete final survey tour, offsite.
	12/18/18 - 0230 - City of Pontiac onsite to conduct inspection, results pass.
	12/18/18 - 0300- City of Pontiac offsite.
	12/18/18 - 0330 - Motor City Electric offsite.
	12/19/18-12/20/18 - Fuel tank conencted to generator & dewatering pump filled / topped off. Oakland County WRC conducted surface restoration where water line repair work occurred along Montcalm Street.
	12/21/18 - 0900- 1000 - Arcadis Onsite to check conditions and operation of dewatering pump at sump. Arcadis off-site.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Disconnect, breaker box, meter box	1 each	1 each		

Material Removed from Site

Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment

Item	Model	Description	In Use	Locations/Working for:

Notable Events that Occurred Today:

Area	Description
Toe Drain Property Wide	Motor city compelled installation and connections at electrical rack, City of Pontiac issued electrical permit. Compelled as-built final survey for Montcalm re-injection system components and other select site features.

Schedule of Work for Tomorrow:

Request placed to DTE to schedule site visit, observe setup, take measurements & submit quote to JSS.

Photos Taken (Location):

Area	Description
------	-------------

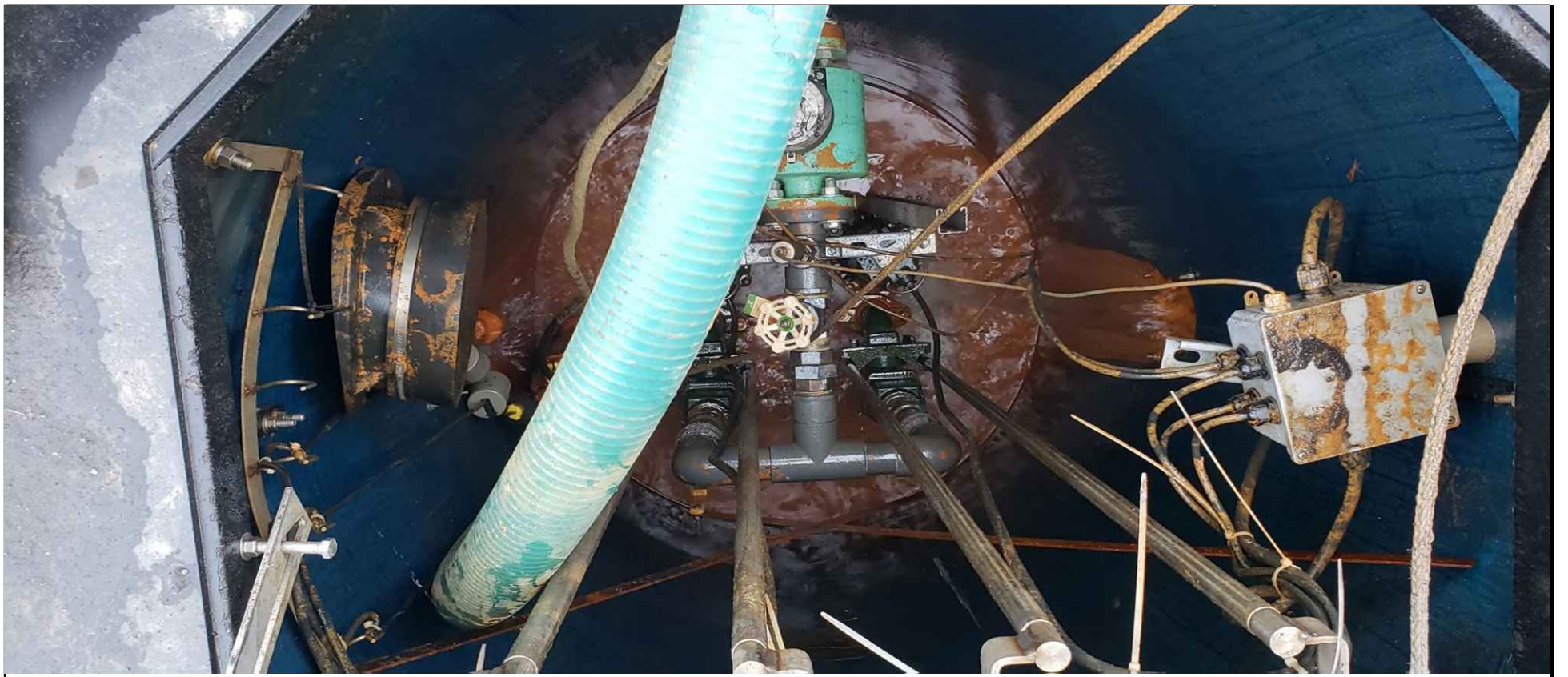
12/18/18 - Compelled electrical rack at sump with City of Pontiac permit.



12/18/18 - City of Pontiac Permit - # PE180553 (12-12-2018)



12/21/18 - Inside of Dewatering sump.



12/21/18 - Photo of isolated area along Montcalm St. where Oakland County WRC water line repair work was conducted.



12/21/18 - Photo of dewatering pump generator and fuel tank.



Prepared by
Brad Saunders

Date: 12/24/2018 through 12/28/18	RACER TRUST - PONTIAC NORTH CAMPUS SITE
	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI B0064607.2018.00007

Weather		
Temperature (F)	Wind	Weather Notes:
20s - 50s	< 10 mph majority of week, up to 25 mph Thur afternoon/evening.	Mixture of Clear, Overcast, Rain and light snow

Personnel Onsite			
Name	Hours	Location	Notes:
Brad Saunders	2	Sump/Generator	Project site check - dewatering operation, sump conditions,
Arcadis Personnel Hours		2	
Subcontractors	None		
	Subcontractor Hours	0	

Visitors:		
Name	Company	Business
None		

Summary of Week's Work:	
Area	Description
	12/26/18 - 0815-Arcadis Onsite. Site check.
	12/26/18 - 1015-Arcadis Off-site

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment				
Item	Model	Description	In Use	Locations/Working for:

Notable Events that Occurred Today:	
Area	Description
Fuel Tank/Generator	Diesel fuel tank gauge slightly above 3/4 full. Generator operations sound.

Sump / Toe Drain
Dewatering Discharge

Sump effectively being dewatered. East toe drain intake flow approx 3-4 times that of west flow (west flow decreased from prior weeks)
Dewatering discharge dispersing from west of PCB excavation area migrating northeast into area. Minor ponding but soaking into ground.

Schedule of Work for Tomorrow:

DTE scheduled to visit site on Jan 3 or 4 to inspect electric rack at sump and measure electrical run for quotation.

Photos Taken (Location):

Area	Description
12/26/18 - Fuel tank 3/4 full	
12/26/18 - Generator Operation Sound.	

12/26/18 - Inside of Dewatering sump.



12/26/18 - Photo of dewatering pump discharge location in USPS west field.



12/26/18 - Photo of Saginaw Entrance at Montcalm facing east (Oaklan County WRC cones remain at location of water main repair)



Prepared by

Brad Saunders

Date: 12/29/2018 through 1/4/19	RACER TRUST - PONTIAC NORTH CAMPUS SITE
	Montcalm Seep Re-Injection System Installation & Startup
	Pontiac, MI
Project Number:	B0064607.2019.00007

Weather		
Temperature (F)	Wind	Weather Notes:
20s - 40s	< 10 mph majority of week	Mixture of Clear, Overcast, Rain and light snow

Personnel Onsite			
Name	Hours	Location	Notes:
Matt Williams	1	Sump/Generator	Project site check - dewatering operation, sump conditions, dewatering location discharge conditions
		Dewater Ditch	
Arcadis Personnel Hours	1		
Subcontractors	None		
	Subcontractor Hours	0	

Visitors:		
Name	Company	Business
Sebastian Sarkissian	DTE	Service drop inspection, measurements for installation

Summary of Week's Work:	
Area	Description
	1/4/19 - 1200-Arcadis Onsite. Site check. Meet up with Sebastian (DTE)
	1/4/19 - 1240-Arcadis inspects sump, generator, fuel levels, and discharge hose. No standing water along Montcalm Road.
	1/4/19 - 1300-Arcadis Off-site

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining



Equipment				
Item	Model	Description	In Use	Locations/Working for:

Notable Events that Occurred Today:

Area	Description
Fuel Tank/Generator	Diesel fuel tank gauge slightly below 3/4 full. Generator operations sound.
Sump / Toe Drain	Sump effectively being dewatered. East toe drain intake flow approx 3-4 times that of west flow.
Dewatering Discharge	Dewatering discharge dispersing from west of PCB excavation area migrating northeast into area. Minor ponding but soaking into ground.

Schedule of Work for Tomorrow:

Photos Taken (Location):

Area	Description
<p>1/4/19 - Fuel tank 3/4 full</p>	
<p>1/4/19 - Generator Operation Sound.</p>	

1/4/19 - Inside of
Dewatering sump.



1/4/19 - Photo of
Montcalm Road facing
east (Oakland County
WRC repair area in
foreground)



Prepared by

Matt Williams

Date: 1/5/2019 through 1/11/19	RACER TRUST - PONTIAC NORTH CAMPUS SITE
	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2019.00007

Weather		
Temperature (F)	Wind	Weather Notes:
20s - 40s	< 10 mph majority of week	Mixture of Clear, Overcast, Rain and light snow

Personnel Onsite				
Name	Hours	Location	Notes:	
Matt Williams	1	Sump/Generator	Project site check - dewatering operation, sump conditions,	
		Dewater Ditch	dewatering location discharge conditions	
Arcadis Personnel Hours	1			
Subcontractors	Frank - Motor City Electric	5	Sump	1/8/19 - Modified meter to accommodate DTE requests
	Subcontractor Hours	5		

Visitors:		
Name	Company	Business

Summary of Week's Work:	
Area	Description
	1/8/19 - Motor City onsite to revise conduit and grounding connections on meter panel per DTE request
	1/11/19 - 1400-Arcadis Onsite. Site check.
	1/11/19 - 1410-Arcadis inspects sump, generator, fuel levels, and discharge hose. Some standing water/ice along Montcalm Road.
	1/11/19 - 1500-Arcadis Off-site

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment				
Item	Model	Description	In Use	Locations/Working for:

--	--	--	--

Notable Events that Occurred Today:

Area	Description
Fuel Tank/Generator Sump / Toe Drain Dewatering Discharge	Diesel fuel tank gauge slightly below 1/2 full. Generator operations sound. Sump effectively being dewatered. East toe drain intake flow approx 4 times that of west flow. Dewatering discharge dispersing from west of PCB excavation area migrating northeast into area. Minor ponding but soaking into ground.

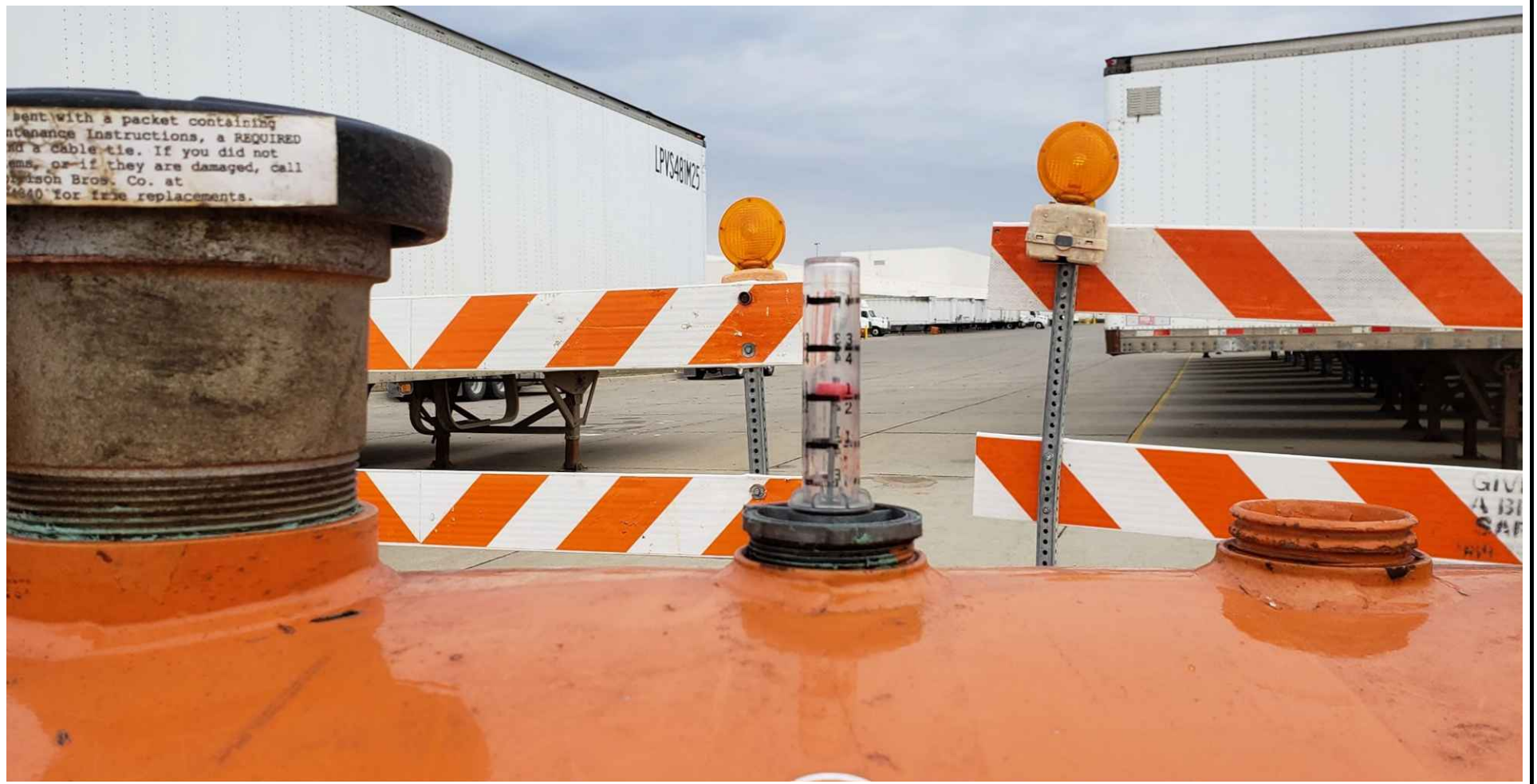
Schedule of Work for Tomorrow:

--	--

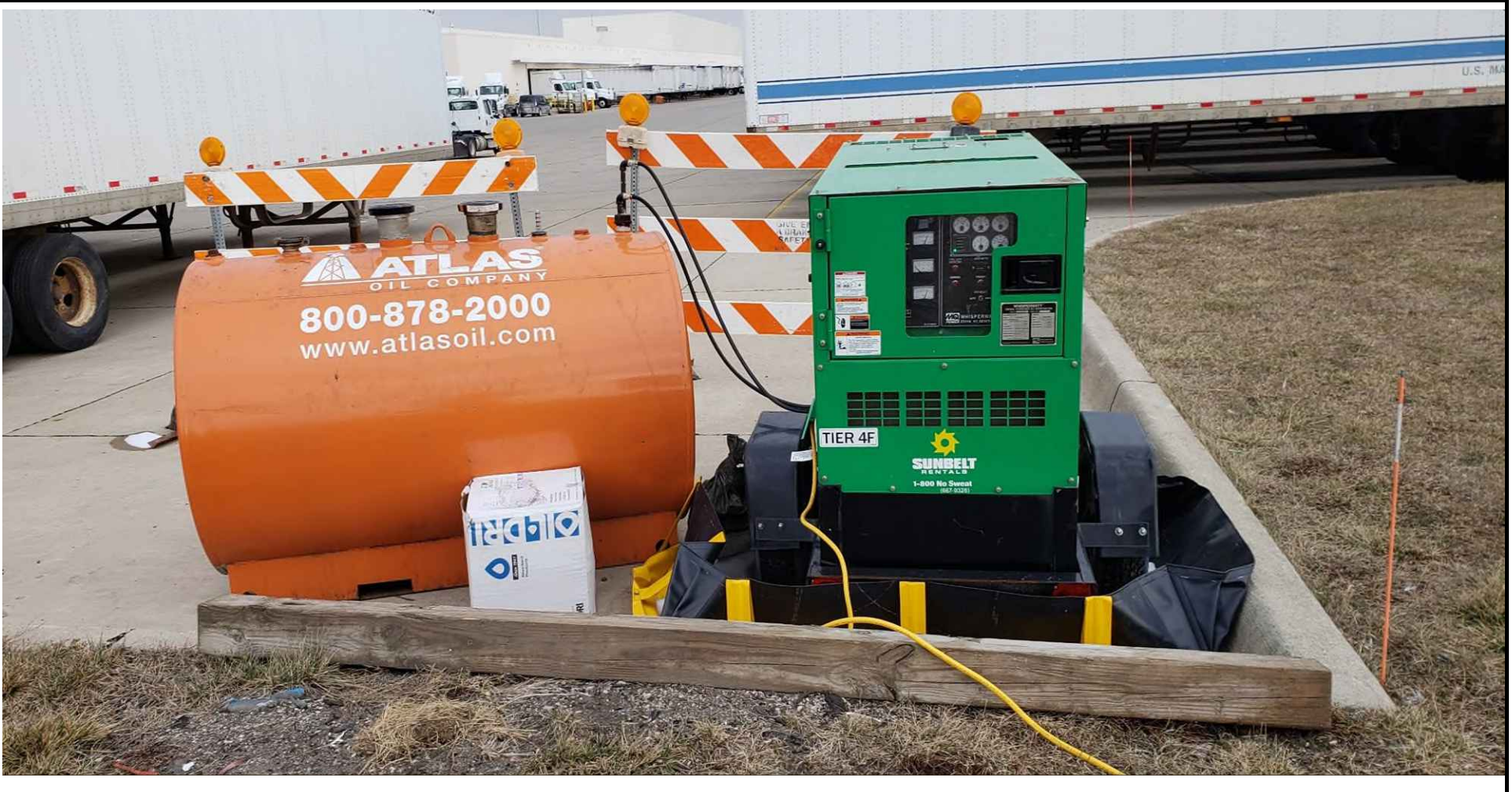
Photos Taken (Location):

Area	Description
------	-------------

1/11/19 - Fuel tank 1/2 full



1/11/19 - Generator Operation Sound.



1/11/19 - Meter revisions completed.



1/11/19 - Inside of Dewatering sump.



1/11/19 - Photo of Montcalm Road facing east (Oakland County WRC repair area in foreground)



Prepared by

Matt Williams

Date: 1/12/2019 through 1/18/19	RACER TRUST - PONTIAC NORTH CAMPUS SITE
	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2019.00007

Weather		
Temperature (F)	Wind	Weather Notes:
20s - 40s	< 10 mph majority of week	Mixture of Overcast and light snow

Personnel Onsite				
Name	Hours	Location	Notes:	
Matt Williams	1	Sump/Generator	Project site check - dewatering operation, sump conditions. Service installation.	
		Dewater Ditch	dewatering location discharge conditions	
Arcadis Personnel Hours	1			
Subcontractors	Katz Excavating (Brian and Kevin)	2	Sump	1/16/19 - Installed 3 phase 3/0 conductors from pole to meter
	Subcontractor Hours	2		

Visitors:		
Name	Company	Business

Summary of Week's Work:	
Area	Description
	1/16/19 - 0900 Arcadis onsite, Katz was onsite at 0800 but DTE didn't notify Arcadis until 0745 that they would be onsite today. Review scope (installing wire conductors from pole to meter with Katz) and H&S. USPS maintenance unlocced gate.
	1/16/19 - 0920-Arcadis inspects sump, generator, fuel levels, and discharge hose. Some standing water/ice along Montcalm Road.
	1/16/19 - 0945-Katz finishes conductor installation.
	1/16/19 - 1000-Arcadis Off-site. Lock gate and notify USPS.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
3/0 conductors	100'			

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment				
Item	Model	Description	In Use	Locations/Working for:

--	--	--	--

Notable Events that Occurred Today:

Area	Description
Fuel Tank/Generator Sump / Toe Drain Dewatering Discharge	Diesel fuel tank gauge 3/8 full. Generator operations sound. Sump effectively being dewatered. East toe drain intake flow approx 4 times that of west flow. ~10 gpm total. Dewatering discharge dispersing from west of PCB excavation area migrating northeast into area. Minor ponding but soaking into ground.

Schedule of Work for Tomorrow:

--	--

Photos Taken (Location):

Area	Description
------	-------------

1/16/19 - Fuel tank 3/8 full



1/16/19 - Generator Operation Sound.



1/16/19 - Wire pulled to meter from pole.



1/16/19 - Inside of Dewatering sump.



1/16/19 - Photo of Montcalm Road facing east (Oakland County WRC repair area in foreground)



Prepared by

Matt Williams

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
1/19/2019 through 1/25/19	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2019.00007

Weather		
Temperature (F)	Wind	Weather Notes:
0 - 30s	0-30 mph	Mixture of overcast, freezing rain, and snow

Personnel Onsite				
Name	Hours	Location	Notes:	
Matt Williams	5	Sump/Generator	Project site check - dewatering operation, sump conditions. Control panel install.	
		Dewater Ditch	dewatering location discharge conditions	
Brad Saunders	5	Inj Wells	Injection panel installation	
Arcadis Personnel Hours	10			
Subcontractors	Motor City Electric (Frank)	9	Various	1/21/19, 1/22/19, 1/25/19 - Control panel installations, wiring connections
	JSS (Justin)	5	Various	
	Sunbelt	2	Generator	
	Subcontractor Hours	16		

Visitors:		
Name	Company	Business

Summary of Week's Work:	
Area	Description
	1/21/19 - 0900 Arcadis (M. Williams) onsite, Motor City and JSS was onsite at 8 installing sump control panel. Review scope and H&S. Sump pump not running due to generator issue. Sump had filled to ~2' below ground surface. JSS coordinating with Sunbelt for generator service call.
	1/21/19 - 1000-Arcadis takes photographs of equipment installation. Motor City offsite.
	1/21/19 - 1100 - Sunbelt onsite for generator service. Ice observed in fuel filter. Sunbelt recirculates fuel pump and adds Diesel 911 to fuel tank. Generator idles for 1/2 hour and then runs normally for another 1/2 hour. Sump dewatering, discharge inspection good. Tank is 3/4 full of fuel.
	1/21/19 - 1230 - Arcadis off-site. Lock gate and notify USPS.
	1/22/19 - 0800 Arcadis (B. Saunders) onsite, Motor City installs strut and control panel, solar, battery housing at injection wells. Review scope and H&S. Sump pump running. Discharge location in good condition.
	1/22/19 - 1300 - Arcadis and Motor City off-site.
	1/25/19 - 0800 - Motor City onsite for panel wiring.
	1/25/19 - 0900 - Motor City offsite, too cold for scope of work. Solar panel pole observed to have fallen down. Motor City contacts JSS.
	1/25/19 - 1400 - Arcadis onsite, picks up solar panels and injection pole mounted equipment and stages it near parking lot for JSS to pick up. Equipment was frozen to ground but appears to be in working condition. Concrete sonotube snapped about 8" down near ground level.
	1/25/19 - 1400 - Arcadis offsite, coordinate pickup of equipment with JSS and notify B. Saunders and USPS.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Sump control panel (1/21/19)	1.00			
Injection control panel, battery housing, solar panel (1/22/19)	1 each			

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Sump control panel (1/21/19)	1.00			

Injection control panel, battery housing,	1 each			

Material Removed from Site

Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment

Item	Model	Description	In Use	Locations/Working for:


Notable Events that Occurred Today:

Area	Description
Fuel Tank/Generator Sump / Toe Drain Dewatering Discharge	Diesel fuel tank gauge 3/4 full. Generator repaired/restarted on 1/21/19. Ran remainder of week. Sump effectively being dewatered after generator restart. Dewatering discharge dispersing from west of PCB excavation area migrating northeast into area. Minor ponding but soaking into ground or freezing

Schedule of Work for Tomorrow:

--

Photos Taken (Location):

Area	Description
1/21/19 - Fuel tank 3/4 full	

1/21/19 - Sump filled with water.



1/21/19 - Sump control panel mounted, exterior door open.



1/22/19 - Injection well pole mounted equipment.



1/25/19 - Injection well pole mounted equipment that fell over.



Prepared by
Matt Williams

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
Friday, February 15, 2019	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2019.00007

Weather		
Temperature (F)	Wind	Weather Notes:
8 a.m. 32	15-20 mph SE	Overcast Morning/Sunny Afternoon
12:00 p.m. 27	15-20 mph SSE	
4 p.m. 25	15-20 mph SSE	

Personnel Onsite				
Name	Hours	Location	Notes:	
Cooper Zilio	10	Injection Wells	Project Oversight & Documentation	
Arcadis Personnel Hours		10		
Subcontractors	Roger Bahling	7.5	Injection Wells	JSS Superintendant
	Jake Schmidt	7.5	Injection Wells	JSS Operator
	Frank Goodrich	0.5	Toe Drain	Motor City Electric
Subcontractor Hours		15.5		

Visitors:		
Name	Company	Business


Summary of Today's Work:	
Area	Description
	0700 - Arcadis onsite. Review HASP and perform H&S Tailgate form. Mob to recovery well shed to compile list of supplies to install skimmer and pump. Mob to Home Depot to grab supplies.
	0745 - Return from Home Depot. Begin recovery well install. Upon opening the RW vault, the top of the well casing had a 6" coupler on it. The cap would not fit without install 6" PVC piping. Mob to Home Depot to pick up 6" PVC. Home Depot does not carry 6" PVC. Was able to find 6" PVC onsite near the Saganaw gate.
	0915 - Check generator, sump and control panel. Generator running and still dewatering sump. The control panel appears to have power to it.
	0945 - JSS onsite. Discuss H&S and scope of work for the day. Install 4' x 12" Sono tubes on the SW side of the injection wells. Trench conduit from injection wells to Sono Tubes where panel will be install.
	1030-JSS begin trenching in conduit from the injection wells to the location where the Sono Tubes will be installed for the control panel.
	1115 - Frank with Motor City Electric onsite to disconnect dewatering pump from the generator and hook up to power at the toe drain panel.
	1130 - Frank offsite for the day. Frank notify that he will not be back onsite today to complete his scope of work. Let B. Sanders know. Parts and equipment JSS has for Motor City Electric will be left in the RW shed.
	1200 - JSS having difficulty removing frost layer from soils with excavator and smooth blade bucket. Jake with JSS mob to Sunbelt to pick up Tooth bucket. Roger continue scrapping frost layer with smooth bucket.
	1300 - Jake with JSS back onsite with toothed bucket. Bucket he brought back is the wrong size bucket for the mini-excavator. They are going to remove the flat blade from the current bucket they are using.
	1340 - Frank with Motor City Electric onsite to pick up parts and equipment from JSS.
	1345 - Frank offsite.
	1430 - Flat blade removed from bucket. JSS attempt to removed frost line at injection wells to install sono tubes and concrete.
	1600 - JSS couldn't get past the frost line with the equipment onsite. Begin packing up equipment and housekeeping. No progress made on Sono tubes, concrete or trenches.
	1630 - JSS install steel filters in the cleanouts at the toe drain.
	1700-JSS, Arcadis offsite. Lock gate. Notify USPS.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Equipment				
Item	Model	Description	In Use	Locations/Working for:
Sunbelt Mini-Excavator	G-30	Excavator 24" Bucket	Yes	Injection Wells
Excavator Attachment	--	Auger for Sono Tubes	Yes	Injection Wells

Notable Events that Occurred Today:	
Area	Description
Toe Drain	Power at panel energized. Hooked up dewatering pump in sump and shut off generator.

Schedule of Work for Tomorrow:

Photos Taken (Location):	
Area	Description
JSS attempting to remove frost layer to auger in Sono Tubes.	

Power on at toe drain sump.

Steel filter for clean outs at toe drain.



Prepared by

Cooper Zilio

--	--

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
05/13/19 through 05/17/19	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2019.00007

Weather		
Temperature (F)	Wind	Weather Notes:
43 - 73	0 - 10 mph majority of week	Overcast, Sunny

Personnel Onsite					
Name	Hours	Location	Notes:		
Matt Williams	31	Entire Site	Project Oversight & Documentation		
Gary Schafer	49	Entire Site	Project Oversight & Documentation		
Arcadis Personnel Hours		80			
Subcontractors	Tom Holdeman	4	Entire Site	JSS Project Manager	
	Howard Evans	49.5	Entire Site	JSS Superintendent	
	Brent McBride	49.5	Entire Site	JSS Technician	
	Jason Swealinger	49.5	Entire Site	JSS Laboror	
	Christ Alamanteoff	10	Entire Site	JSS Laboror	
	Subcontractor Hours		162.5		

Visitors:		
Name	Company	Business
Mark and Mellisa	AECOM	Geotechnical borings for parking lot work
	Materials Testing Consultant	Geotechnical borings for parking lot work
	Mateco Drilling	Geotechnical borings for parking lot work
	--	Concrete Truck
	JSS	H&S site check

Summary of Week's Work:	
Area	Description
	05/13/19 - JSS digs trenches for transducer cables.
	05/13/19 - JSS assembles injection equipment rack.
	05/13/19 - JSS runs conduit for transducer cables in trenches. Backfill trenches.
	05/14/19 - Discuss confined space entry work required for instrumentation installation. Junction box inside the sump will be removed. Review installation of a drainage pipe for surface water accumulating near sump. Arcadis extends discharge hose approximately 200' NNW of light tower in center of field to the north of the sump. Electrician (Motor City) onsite to install solar panels, and battery/injection well panels.
	05/14/19 - JSS inserts plugs with new pneumatic connections. Water flow into the sump is stopped. Sump vault dewatered and sediment observed on bottom. JSS buckets approximately 1/3 to 1/2 CY of soil/sediment out of the vault.
	05/14/19 - JSS removes plugs and drains water back into the sump, removing residual sediment with temporary dewatering pump at the same time.
	05/15/19 - JSS continues removing wiring associated with flow meter, floats, and pressure sensor. JSS also works on grading soils at cleanout locations
	05/15/19 - JSS onsite, installs second conduit for sump to panel connections. JSS continues grading in disturbed areas.
	05/15/19 - JSS runs wire through new conduit. Installs one float (high/high), but needs to check on addiional floats with adequate cable length. Remaining 2 floats are too short to reach panel or junction box above grade. All floats were tested and operated as normal open.
	05/16/19 - JSS continues wiring associated with flow meter, floats, and pressure sensor and making control panel connections.
	05/16/19 - Resume work on form preparation, grading for disturbed areas prior to seeding, and control panel connections.
	05/16/19 - JSS/Arcadis troubleshoot pump inoperation, confirm adequate amperage going to pumps and controls are not preventing operation. Determine pumps will have to be pulled and replaced with backups to verify inoperation is not an issue with refurbished pumps.
	05/17/19 - Arcadis gauges wells between injection area and sump for baseline water level documentation.
	05/17/19 - Concrete truck onsite for pad pours, JSS uses skid steer to load concrete back to pad area. JSS sets 3 bollards around the injection panel. JSS finishes pad surfaces.
	05/17/19 - JSS decides to attempt pump removal. Confined space entry planning conducted. 10 % LEL observed at water level so air movement with fan required for entry. Upon entry, pump adapter connection loosened with lever/screwdriver and pumps are able to be removed. No weep hole observed on pipe, so a 3/16" hole is drilled beneath check valve. Weep hole appears to resolve pump startup challenges, pressure observed on line.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Mini Excavator	1.00	1.00	1.00	NA
Mini Dozer	1.00	1.00	1.00	
Skidsteer	1.00	1.00	1.00	NA
Concrete Truck	~2 CY	~2 CY	2 CY	quantity estimated

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Pressure Sensor	1.00	1.00	1.00	
Repaired sump pumps	2.00	2.00	2.00	
Float Switch (HH)	1.00	3.00	1.00	2 - terminations on all still need to be made
Pads north of USPS access road	9 pads	9 pads	9 pads	Pads south of access road

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Equipment				
Item	Model	Description	In Use	Locations/Working for:
Mini-Excavator	35G	Deere 35G Mini Excavator	Yes	Injection area
Mini Dozer	21P	Komatsu Mini Dozer	Yes	No
3" Submersible Pump			Yes	Sump
Skidsteer	T740	Sunbelt bobcat skidsteer	Yes	

Photos Taken (Location):

Area	Description
------	-------------

05/13/19 - Baseline Conditions, Sump



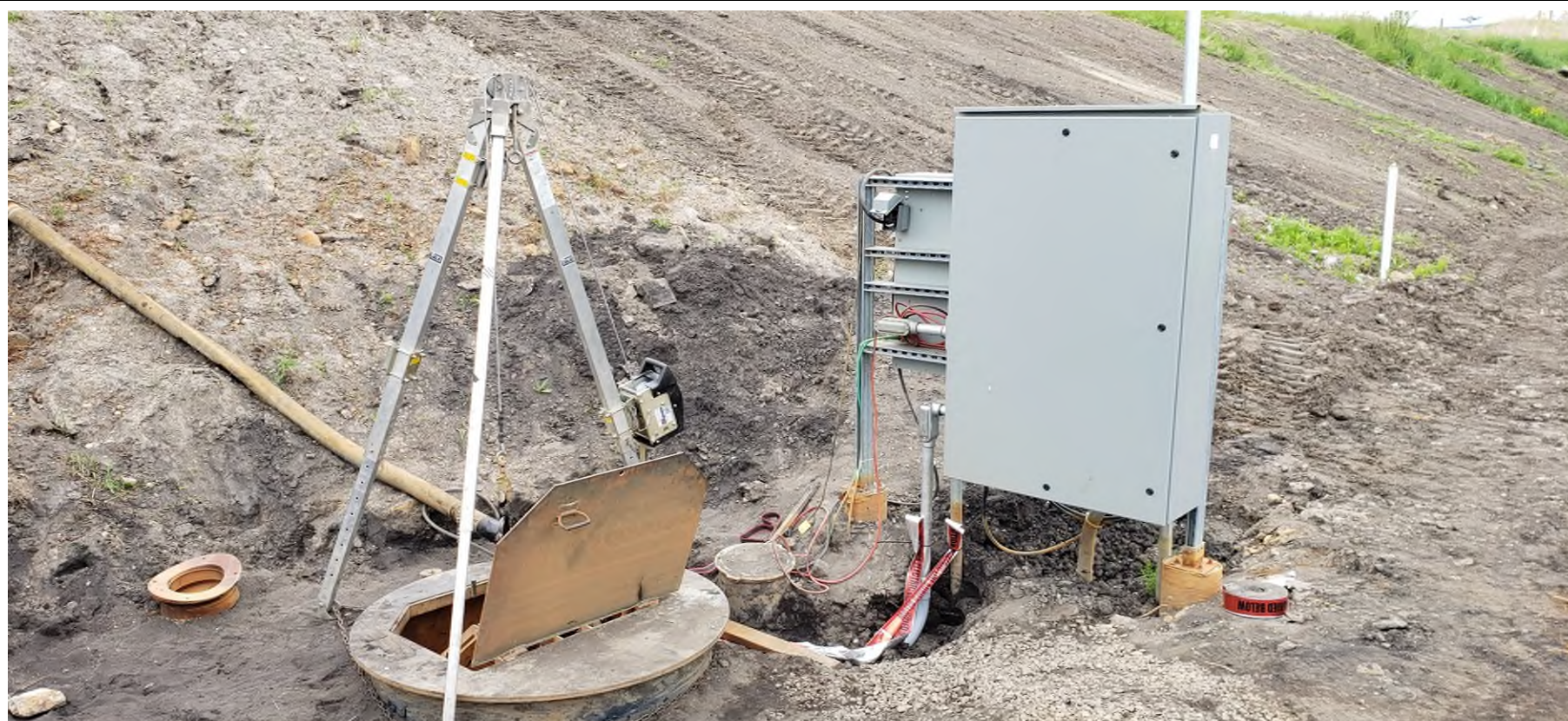
05/14/19 - Panel Rack with Solar Panel, Injection Area



05/15/19 - Second conduit at sump added for pump power supply wiring, Sump



05/17/19 - Tripod and lifting setup at sump



Prepared by
Cooper Zilio

Date:	RACER TRUST - PONTIAC NORTH CAMPUS SITE
05/21/19 through 05/24/19	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2019.00007

Weather		
Temperature (F)	Wind	Weather Notes:
50 - 75	0 - 20 mph majority of week	Overcast, Sunny, Windy

Personnel Onsite				
Name	Hours	Location	Notes:	
Matt Williams	15.5	Entire Site	Project Oversight & Documentation	
Arcadis Personnel Hours		15.5		
Subcontractors	Howard Evans	30	Entire Site	JSS Superintendent
	Brent McBride	30	Sump	JSS Technician
	Jesus	30	Entire Site	JSS Laboror
	Christ Alamanteoff	30	Entire Site	JSS Laboror
	Mark	10	Entire Site	JSS H&S
Subcontractor Hours		130		

Visitors:		
Name	Company	Business

Summary of Week's Work:	
Area	Description
	<p>05/21/19 - JSS has form set at sump. Drain installed on west side of sump from gravel at surface down to gravel bedding for toe drain to handle surface drainage around sump.</p> <p>05/21/19 - Pump 100 runs for approximately 2.5 hours while site staff gauges mounding response. See separate gauging sheet for tabulated water level data. Pump 100 operates with approximately 53 psi on gauge in sump, no transmitter or flow meter output on HMI or in control panel.</p> <p>05/21/19 - Switch operation to Pump 200, similar mounding response and operating pressure observed. Turn off pumping to injection wells.</p> <p>05/21/19 - Pump operational programming tested with floats. Determine pump alternation sequence requires adjustment (only pump 100 operates with floats). HH float alarm amended. JSS coordinates with programmer. Programmer indicates 4-20mA output device required to calibrate pressure transmitter.</p> <p>05/23/19 - Review work completed yesterday/today. Photograph seeded areas and straw blanket positioned. Check in with Brent on control panel functionality. A fuse was identified earlier today that needs to be replaced.</p> <p>05/23/19 - JSS tested pressure transmitter output with loop simulator, observable readings on HMI. Negative output when connected to pressure transmitter in sump.</p> <p>05/24/19 - JSS works on straw mat placement. Brent works on control panel and reviews with Ian (programmer).</p> <p>05/24/19 - JSS set up fourth bollard location with auger and set cover over the hole. Equipment owner had to come to site to repair electrical connection on skidsteer.</p> <p>05/24/19 - JSS completes restoring seeded areas with straw mat on all disturbed areas.</p>

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
2 floats (Arcadis purchased)	2.00	3.00	2.00	

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining

Material Removed from Site				
Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Dozer	1.00	1.00	1.00	Removed from site
Skidsteer	1.00	1.00	1.00	Removed from site

Equipment				
Item	Model	Description	In Use	Locations/Working for:
Mini-Excavator	35G	Deere 35G Mini Excavator	Yes	Injection area
Mini Dozer	21P	Komatsu Mini Dozer	Yes	No
3" Submersible Pump			Yes	Sump
Skidsteer	T740	Sunbelt bobcat skidsteer	Yes	

Photos Taken (Location):

Area	Description
05/24/19 - Injection panel with valve pad in foreground	

05/24/19 - Sump pad prepared area	
-----------------------------------	--

05/23/19 - Injection panel with straw mat cover down.



05/24/19 - Straw mat by injection panel



Prepared by
Cooper Zilio

Date: Friday, June 7, 2019	RACER TRUST - PONTIAC NORTH CAMPUS SITE
	Montcalm Seep Re-Injection System Installation & Startup
Project Number:	Pontiac, MI
	B0064607.2019.00005/00007

Weather		
Temperature (F)	Wind	Weather Notes:
8 a.m. 58	Minimal	Sun, clear
12:00 p.m. 70	Minimal	
4 p.m. 78	Minimal	

Personnel Onsite				
Name	Hours	Location	Notes:	
Matt Williams	10	Entire Site	Pump startup and controls troubleshooting, project documentation	
Gary Schafer	10			
Arcadis Personnel Hours		20		
Subcontractors	Howard Evans	8	Injection Area	JSS Superintendant
	Brent McBride	10	Entire Site	JSS Technician
	Ross Klein	10	Entire Site	Serve Electric
	Subcontractor Hours		28	

Visitors:		
Name	Company	Business

Summary of Today's Work:	
Area	Description
	0715- Arcadis onsite. Review scope of work and H&S with JSS/Serve Electric. Contact USPS for reminder on gate access needs. Brent gets Ross setup to work through control panel punch list. Brent works on installation of injection well transducers.
	0800-Arcadis inventories manholes along Montcalm across from Duck Pond.
	1030 - Arcadis checks in on JSS transducer installation. Howard onsite to install 4th bollard. Brent has aneroid bellows installed for transducers in control panel and transducers partially installed.
	1100 - Serve Electric works on instrumentation outputs and scaling. HMI screen updated so virtual HOAs are now switch indicator status outputs.
	1230 - Pressure transmitter determined to not have power supply. Wiring on the terminal board reversed, and pressure transmitter begins ouputting signal. Flow meter scale match was off, adjusted so readings match on the controller and HMI. Transducer max was set to 10 psi, should be 15 psi, adjusted.
	1530 - Test injection well transducers to verify output and calibrate levels. Scale adjusted so that transducers output in feet above mean sea level. Water injected into wells and wells were gauged to match change in elevation to the output on the HMI. Solar panel transducers had to be reversed, INJ-01 was reading INJ-02 water levels, corrected. Set high level alarm setpoints. INJ-01 set to 963.50, INJ-02 set to 964.50.
	1645 - Low sump pressure alarm eliminated.
	1745 - Review remaining punch list. Serve elevtric to work on alternator switch programming updates remotely.
	1830 - Pack up equipment. Howard (JSS) already offsite and bollard was installed.
	1700 - Arcadis/JSS offsite. All gates locked, notify USPS.

Materials / Equipment Delivered to Site				
Material/Equipment	Daily Quantity	Total Quantity	Approved Quantity	Remaining
--				

Equipment / Drain Line / Piping Installed				
Description	Daily Quantity	Total Quantity	Approved Quantity	Remaining
Injection well transducers	2.00	2.00	2.00	0.00

Material Removed from Site

Material	Daily Quantity	Total Quantity	Approved Quantity	Remaining
--				

Equipment Onsite

Item	Model	Description	In Use	Locations/Working for:
JSS Truck		Fleet Vehicle	Yes	
JSS Truck		Fleet Vehicle	Yes	
3" Submersible Pump			Yes	Sump

Notable Events that Occurred Today:

Area	Description
Sump Site Wide	Pump operational troubleshooting Seeding/straw mat placement.

Schedule of Work for Tomorrow:

--

Photos Taken (Location):

Area	Description
Grass growing north of fence along Saginaw Rd access drive.	
Grass growing on the bank by the control panel	

Injection control panel



Prepared by

Matt Williams

--	--

ATTACHMENT F

Equipment Specification Sheets



BASIN BUILDER



PROJECT INFORMATION

Project Name	Arcadis (cover modified)
Contact Info	

Prepackaged Duplex Basin System, Pre-Plumbed, w/ Rail Systems
(Stainless Steel Pump Lifting Cables Included)

BASIC SYSTEM INFORMATION

Build	Prepackaged
Type	Duplex
Discharge Exit	Side

Ball Valves &
Check Valves
Installed

Approx. Weight: 830 lbs

INTENDED PUMP DATA

Pump Division	Zoeller Pump
Pump Family	190, X190
Pump Discharge	2" Vertical

No Vent Holes
in Cover

BASIN SIZE PREFERENCES

Diameter	48 "
Height	84 "

COVER PREFERENCES

Surface	Standard Hatch
Material	Steel
Vent Quantity	None

PLUMBING PREFERENCES

Inlet Hub	6" Cast Iron
Discharge Piping	2 "
Discharge Depth	48 "
Pipe Material	Sch. 80 PVC
Shutoff Valve	Ball Valve

DISCONNECT PREFERENCES

Class	Stainless Steel
Rail Material	Stainless Steel

DESIGN AIDS

Hub Invert Depth ¹	18 "
Gallons / Inch	7.83 Gal / In
Working Volume ²	329.0 Gallons

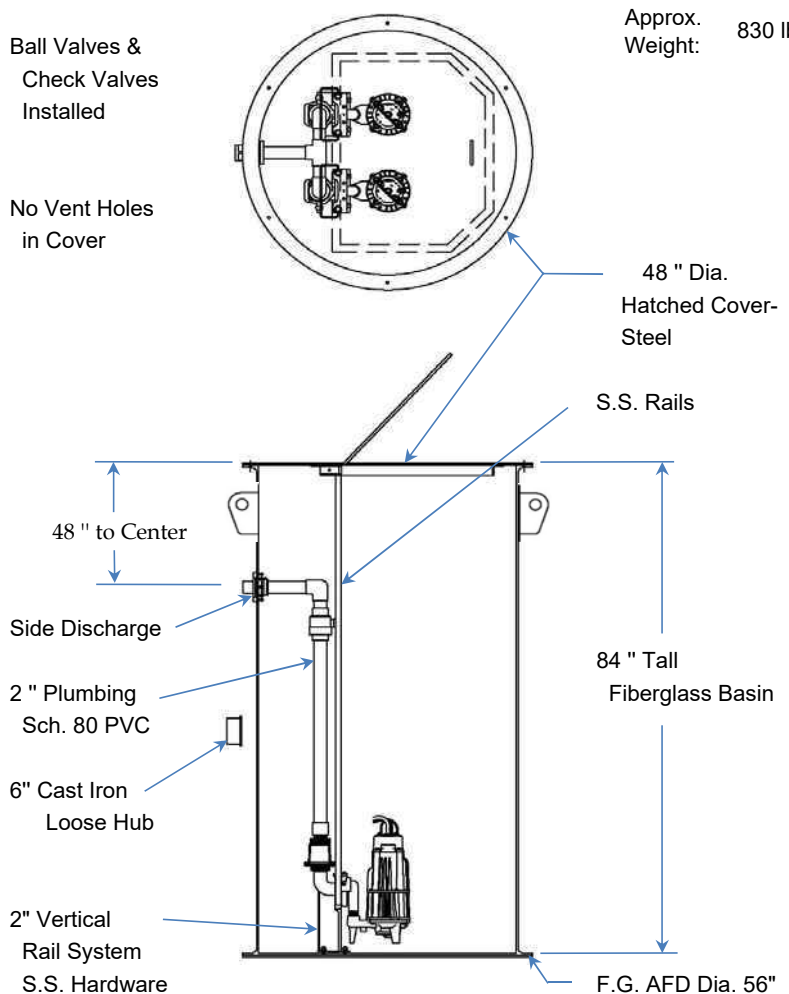
- Hub is field installed. Depth is used to compute working volumes.
- Usable volume between inlet invert and minimum water level.

Pricing

Yes

\$ LIST

Date of Quote 7/6/2018
Quote valid until 9/4/2018 (60 days)



ACCESSORIES

Lifting Lugs	Yes
Electrical Coupling	Loose x2

NOTES: DRAWING IS NOT TO SCALE.

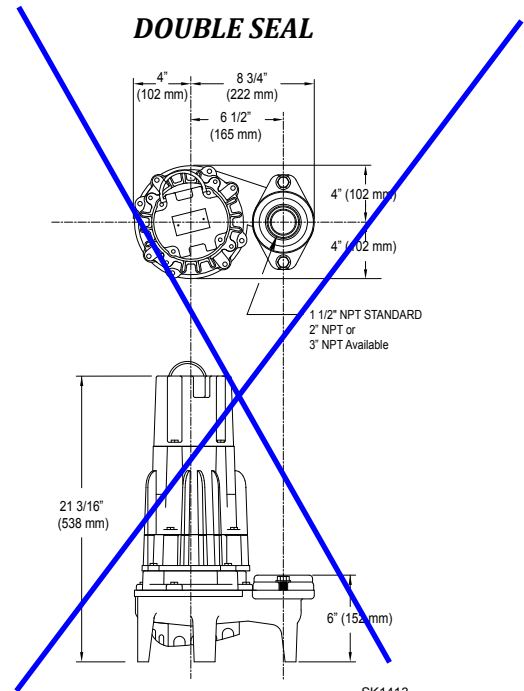
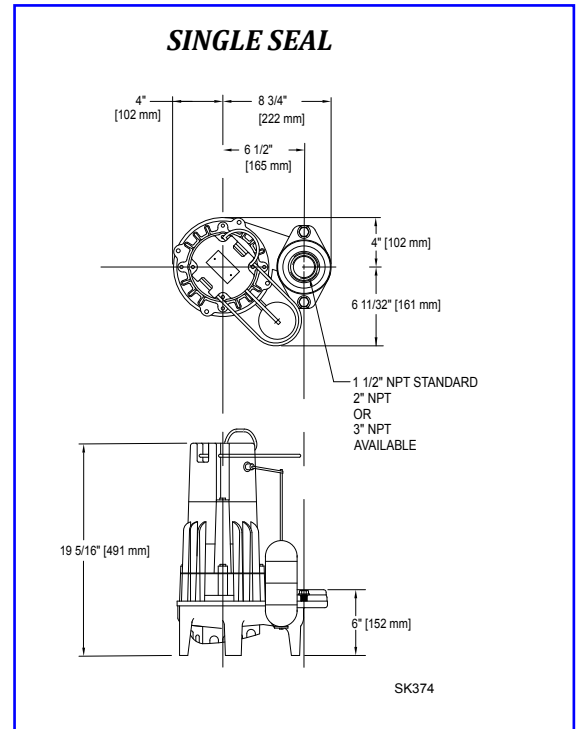
PUMPS NOT INCLUDED - Pumps shown only for reference. Systems include check valves and disconnects as selected. Individual components may differ from those shown. Customer is wholly responsible for verifying code compliance. Consult factory for basins larger than 72" dia. or 144" tall. This Builder is valid for use until 8/1/2018.

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

TECHNICAL DATA SHEET
HIGH HEAD FLOW-MATE SERIES
Models 185/4185, 186/4186, 188/4188, 189/4189, 191
Submersible Effluent Pumps

PRODUCT SPECIFICATIONS

MOTOR	Horse Power	1 - 2 HP
	Voltage	200 - 575
	Phase	1 or 3 Ph
	Hertz	60 Hz
	RPM	3450
	Type	Permanent split capacitor or 3 Ph
	Insulation	Class B/185 & 4185 , Class F/186-191 & 4186-4189
	Amps	3.3 - 20.5
PUMP	Operation	Automatic or nonautomatic
	Auto On/Off Points	15-3/4" (400 mm) / 5-1/4" (133 mm)
	Discharge Size	1-1/2" NPT (optional 2" or 3" flange)
	Solids Handling	3/4", 5/8" (model 191) (19 mm 15 mm) spherical solids
	Cord Length	20' (6 m) standard
	Cord Type	1 Ph: UL listed 3-wire neoprene cord & plug or 3 Ph: 4-wire with no plug
	Max. Head	137' (42 m)
	Max. Flow Rate	145 GPM (549 LPM)
	Max. Operating Temp.	130° F (54° C) (model WD189 120°F [49°C])
	Cooling	Oil filled
	Motor Protection	Auto reset thermal overload (1 Ph)
MATERIALS	Upper Bearing	Ball bearing
	Lower Bearing	Ball bearing
	Mechanical Seals	Stainless steel, carbon and ceramic
	Impeller Type	Non-clogging vortex
	Impeller	Bronze
	Hardware	Stainless steel
	Motor Shaft	SAE 1117 carbon steel or 416 stainless steel*
	Gasket	Neoprene square ring & gasket



*Single seal models are built with a carbon steel motor shaft, and double seal models are built with a stainless steel motor shaft.

All Class 30 cast iron construction.

NOTE: The sizing of effluent systems normally requires variable level float(s) controls and properly sized basins to achieve required pumping cycles or dosing timers with nonautomatic pumps.

NOTE: See model comparison chart for specific details.

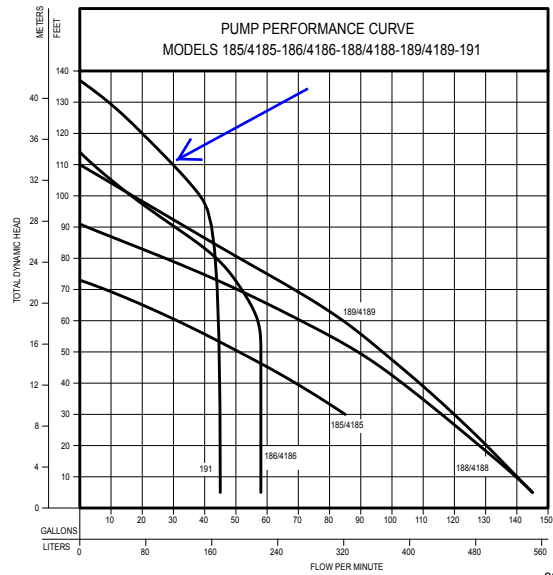


TOTAL DYNAMIC HEAD FLOW PER MINUTE

MODELS		185/4185		186/4186		188/4188		189/4189		191	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters	Gal.	Liters	Gal.	Liters
5	1.5	--	--	58	220	145	549	145	549	45	170
10	3.0	--	--	58	220	140	530	140	530	45	170
20	6.1	--	--	58	220	128	484	130.5	494	45	170
30	9.1	85	322	58	220	116	439	120	454	45	170
40	12.2	70	265	58	220	103.5	392	109	413	45	170
50	15.2	51	193	58	220	90	341	97	367	45	170
60	18.3	32	121	58	220	71	269	85	322	45	170
70	21.3	9	34	52	197	51	193	69	261	45	170
80	24.4	--	--	45	170	28	106	51	193	45	170
90	27.4	--	--	30.5	115	2	8	34	129	45	170
100	30.5	--	--	16	60	--	--	17	64	40	151
110	32	--	--	4	15	--	--	--	30	114	
120	36.6	--	--	--	--	--	--	--	20	76	
130	39.6	--	--	--	--	--	--	--	10	38	
Shut-off Head		73 ft. (22m)		114 ft. (35m)		91 ft. (28m)		110 ft. (34m)		137 ft. (42m)	

NOTE: No UL listing for 200/208 single phase pumps, model 186 & 191, or double seal series.

CAUTION: Model 185 should not be subjected to heads less than 30' (9 m) TDH.



009903

Model	MODEL COMPARISON											CERTIFICATIONS	
	Seal	Mode	Volts	Ph	Amps	HP	Hz	Lbs	Kg	Simplex	Duplex	cCSAus	UL
D185 / * H185	Single	Auto	230 / 200	1	9.8 / 11.5	1	60	85 / 86	38 / 39	1	---	Y	Y ⁽⁴⁾
E185 / E4185	Single / Dbl	Non	230	1	9.8	1	60	85 / 92	38 / 41	2 or 3	4	Y	Y
* I185 / * I4185	Single / Dbl	Non	200	1	11.5	1	60	85 / 92	38 / 41	2 or 3	4	Y	N
* F185 / * F4185	Single / Dbl	Non	230	3	7.4	1	60	85 / 92	38 / 41	3 & 5	4 & 5	Y	Y
* J185 / * J4185	Single / Dbl	Non	200	3	7.5	1	60	85 / 92	38 / 41	3 & 5	4 & 5	Y	Y
BE185	Single	Auto	230	1	9.5	1	60	87	39	---	---	Y	Y
* G185 / * G4185	Single / Dbl	Non	460	3	3.7	1	60	85 / 92	38 / 41	3 & 5	4 & 5	Y	Y
* BA185	Single	Non	575	3	3.3	1	60	85	38	3 & 5	4 & 5	Y	N
D186 / * H186	Single	Auto	230 / 200	1	13.7 / 17.2	1-1/2	60	91	41	1	---	Y	N ⁽⁴⁾
E186 / E4186	Single / Dbl	Non	230	1	13.7	1-1/2	60	90 / 97	40 / 43	2 or 3	4	Y	N
* I186 / * I4186	Single / Dbl	Non	200	1	17.2	1-1/2	60	90 / 97	40 / 43	2 or 3	4	Y	N
* F186 / * F4186	Single / Dbl	Non	230	3	9.2	1-1/2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	N
* J186 / * J4186	Single / Dbl	Non	200	3	10.3	1-1/2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	N
BE186	Single	Auto	230	1	13.7	1	60	92	42	---	---	Y	N
* G186 / * G4186	Single / Dbl	Non	460	3	4.6	1-1/2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	N
* BA186 / * BA4186	Single / Dbl	Non	575	3	3.6	1-1/2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	N
*D188 / H188	Single	Auto	230 / 200	1	14.0 / 16.8	1-1/2	60	91	41	1	---	Y ⁽²⁾	Y ^(1, 4)
E188 / E4188	Single / Dbl	Non	230	1	14.0	1-1/2	60	90 / 97	40 / 43	2 or 3	4	Y	N ⁽¹⁾
* I188 / * I4188	Single / Dbl	Non	200	1	16.8	1-1/2	60	90 / 97	40 / 43	2 or 3	4	Y	N
* F188 / * F4188	Single / Dbl	Non	230	3	8.9	1-1/2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	Y
* J188 / * J4188	Single / Dbl	Non	200	3	10.3	1-1/2	60	90	40 / 43	3 & 5	4 & 5	Y	Y
BE188	Single	Auto	230	1	14.0	1-1/2	60	92	42	---	---	Y	N
* G188 / * G4188	Single / Dbl	Non	460	3	4.6	1-1/2	60	95 / 97	43 / 43	3 & 5	4 & 5	Y	Y
* BA188	Single	Non	575	3	3.5	1-1/2	60	90	40	3 & 5	4 & 5	Y	N
D189 / * H189	Single	Auto	230 / 200	1	17.1 / 20.5	2	60	91	41	1	---	Y ⁽²⁾	Y ^(1, 4)
E189 / E4189	Single / Dbl	Non	230	1	17.1	2	60	90 / 97	40 / 43	2 or 3	4	Y ⁽²⁾	Y ⁽¹⁾
* I189 / * I4189	Single / Dbl	Non	200	1	20.5	2	60	90 / 97	40 / 43	2 or 3	4	Y	N
* F189 / * F4189	Single / Dbl	Non	230	3	11.2	2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	Y
* J189 / * J4189	Single / Dbl	Non	200	3	13.2	2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	Y
* G189 / * G4189	Single / Dbl	Non	460	3	6.0	2	60	90 / 97	40 / 43	3 & 5	4 & 5	Y	Y
* BA189	Single	Non	575	3	5.8	2	60	90	40	3 & 5	4 & 5	Y	N
*WD189 / WD4189	Single / Dbl	Auto	230	1	17.1	2	60	93 / 100	42 / 45	1	4	N	N
E191	Single	Non	230	1	14.5	2	60	87	39	2 or 3	4	Y	N

* no molded plug (1) UL listed unit available with 20 Amp plug. (2) CSA approval with 20 Amp plug. (3) 20 Amp outlet, P/N 10-0060 must be used. (4) H models are not UL listed.

NOTE: WD models are controlled by an integral variable level pump switch. H, I, J, F, G and BA models do not have a molded plug. Additional cord lengths are available in 25' (8 m) 35' (11 m) and 50' (15 m).

SELECTION GUIDE

1. Integral float operated mechanical switch, no external control required.
2. For automatic use single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. See FM1228 for correct model of simplex control panel.
4. See FM0712 for correct model of duplex control panel.
5. Variable level control switch 10-0743 used as a control activator, specify simplex (3) float or duplex (4) float system. Refer to FM0526.

CAUTION All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

© Copyright 2015 Zoeller® Co. All rights reserved.

502-778-2731 | 800-928-7867 | 3649 Cane Run Road | Louisville, KY 40211-1961 | www.zoeller.com

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.



MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
TEL: (502) 778-2731 • 1 (800) 928-PUMP • FAX: (502) 774-3624

Visit our web site:
zoellerpumps.com

REPLACEMENT PARTS LIST FOR MODELS:

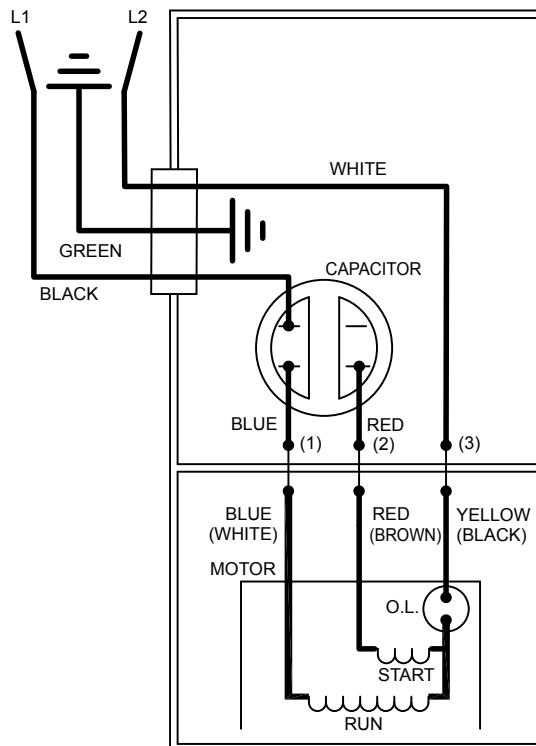
E191 NONAUTOMATIC 230V/1PH

Consult factory for all other models

TO ORDER REPLACEMENT PARTS:

PLEASE FURNISH THE FOLLOWING INFORMATION:

- Model Number.
- Part Number of Pump.
- Part Number and Description of part.



002397

WIRING DIAGRAM FOR MODELS
"E191"
6/95 thru Current

REPLACEMENT PARTS LIST FOR MODEL "E191".

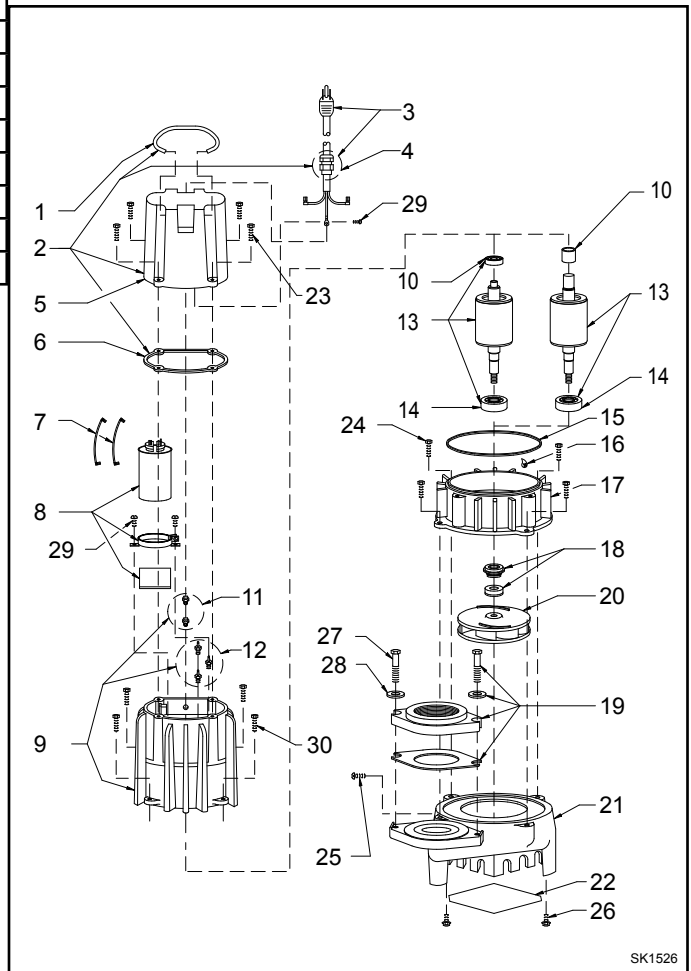
REF NO.	DESCRIPTION	QTY	NOTES	MODEL:	
				E191-A	E191-B
				6/95 thru 5/08	6/08 thru Current
1	• Handle	1		217069	217069
2	Cover & Cord 230V/1P	1	2	004097	014162
3	Cord Term. & Seal 20'/230V/20a/Na	1	2	004376	014175
4	• Seal, Cord-Asm. & Str. Rif. 14ga	1		004375	015634
5	Cover-Mach. 14ga Cd.	1		004372	014150
6	• Gasket, Case/Cover	1		001011	001011
7	• Wire Pkg. (5) Wires 1.5/2 HP	1		004751	004751
8	• Capacitor & Clamp Asm. 35UF	1		006135	006135
9	Housing, Mtr. & Str. 230/1P/1.5-2HP	1	1	004993	019233
10	Bearing, Upper Sleeve	1		001012	NA
	• Bearing, Upper Ball			NA	006703
11	• Plug, Test-White	2		034090	034090
12	• Seal, Thru Wall Term.	3		003402	003402
13	Rotor & Brg. Asm. 230/1P/1.5-2HP	1		004994	019646
14	• Bearing, Radial	1		009861	009861
15	• Seal, Mtr. Hsg.	1		001014	001014
16	• Oil, Dielectric-(38 Oz Can)	1		002383	011066
17	Adapter-Mach.	1		001003	001003
18	• Seal, Shaft	1		002430	002430
19	Flange Pkg. 2" NPT	1		10-1305	10-1305
	Flange Pkg. 3" NPT			10-1306	10-1306
20	Impeller Br. "191"	1	2	009862	009862
21	Housing, Pump-Mach.	1		009863	009863
22	Strainer Plate	1		137008	137008
23	• Screw, .25-20 X .75 HHm-SS	4		001916	001916
24	• Screw, .313-18 X 1"HH Cap-SS	4		002608	002608
25	• Screw, #10-24 X.375 RHM-SI SS	1		001883	001883
26	• Screw, 10-24x.375HH-SI Tc .688 Wash.	2		002000	002000
27	• Screw, .5-13 X 2 HH Cap-SS	2		001909	001909
28	• Washer, SS-1.25" OD x.562" ID x.078	2		002115	002115
29	• Screw, #6-32x.25RHM SI Tc Stlgr	3		001877	001877
30	• Screw, .25-20x1" HHM-SS	4		007790	007790
□	Rebuild Kit			004753	019649

014175 Cord and seal \$149.00
 001011 Gasket \$4.00
 006135 Capacitor Assm \$29.00

Option new case with the cord installed at the factory

014162 Case and Cord Assembly \$314.20

REPLACEMENTS PARTS ILLUSTRATION FOR MODEL "E191"



• Items included in Rebuild Kit.

□ Not Shown in Illustration.

NOTES:

- 1) Mtr. Hsg., Brg., Stator & Term. (Item 9) is pre-assembled at the factory and must be replaced as a unit. Stator is permanently attached to the Motor Housing. Plug (Item 11); Seal, Thru Wall Term. (Item 12) and Bearing -Upper (Item 10) are replaceable.
- 2) If an "X" follows Model No., or Date Mfg. on ID tag, consult factory for ordering any parts.
- 3) See FM0160 Parts Price Sheet for listing of parts prices.
- 4) "NA" indicates, not applicable.

SK1526

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.



MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
 SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
 TEL: (502) 778-2731 • 1 (800) 928-PUMP • FAX: (502) 774-3624

Visit our web site:
zoellerpumps.com

COMPARE THESE FEATURES

- Float is constructed of durable PVC/polypropylene encasing variable level switch
- Standard mechanical variable level control switches are rated for 115/230 V, 5 Amps
- Low current mechanical variable level control switches are rated for 125 VAC/30 VDC, 0.1 Amps
- 18/2 Type SJOW CPE cord standard
- Cords are available in 15-25-35-50 foot lengths
- Temperature rating of 140°F (60°C)
- Approximately 1.5" liquid level differential in switching action

Variable Level Control Switch is normally open when hanging vertically above liquid level. Switch closes when it reaches a few degrees above the horizontal position.

APPLICATIONS

- Switch for simplex or duplex pump control and high level alarm on electrical alternating control panel systems for dewatering, effluent and sewage applications.
- Switch for APak® (use low current models)
- High level alarm switch

ADJUSTABLE WEIGHT: (P/N 10-0689) provides an accurate pivot point for suspended float switches.

- Gripper teeth on clip and weight channel securely lock float cable into place.
- Cable weight can be adjusted without the use of tools.

HOUSING: 1lb 12oz. (0.8 kg) 2.8" x 3.3" (7.1 cm x 8.4 cm)
 Impact-resistant & non-corrodible, PVC housing for liquids up to 140° F (60° C)

CLIP: injection-molded acetal plastic

WIRE/CABLE ACCOMODATED: SJOW, SJTW, 18/2, 18/3, 16/3, 14/2, 14/3

SHIP WEIGHT: 2 lbs. (32 oz)

VARIABLE LEVEL CONTROL SWITCHES



CLAMP TYPE



ADJUSTABLE WEIGHT TYPE

May not be exactly as pictured. See back for application drawings.



FLOAT SWITCHES

Mechanical		Cord Length	Mounting Method
Standard P/N*	Low Current P/N**		
10-0743	10-2060	15	Clamp
10-0744	10-2061	20	Clamp
10-1877	10-2062	25	Clamp
10-1878	10-2063	35	Clamp
10-1879	10-2064	50	Clamp
10-1880	10-2065	15	Adjustable Weight
10-1881	10-2066	25	Adjustable Weight
10-1882	10-2067	35	Adjustable Weight
10-1883	10-2068	50	Adjustable Weight

FLOAT SWITCH TREES

Mechanical		Cord Length	Mounting Method
Standard P/N*	Intrinsically Safe P/N**		
10-1456	10-1456	---	Tree Only
10-1886	10-2069	15	(3) 15' Floats & Tree
10-1887	10-2070	15	(4) 15' Floats & Tree

* Do not use with intrinsically safe control systems.

** For use with intrinsically safe control systems only.

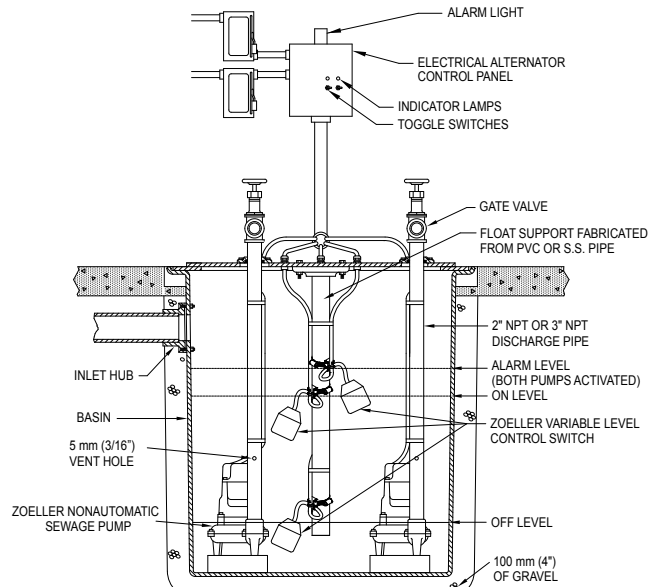
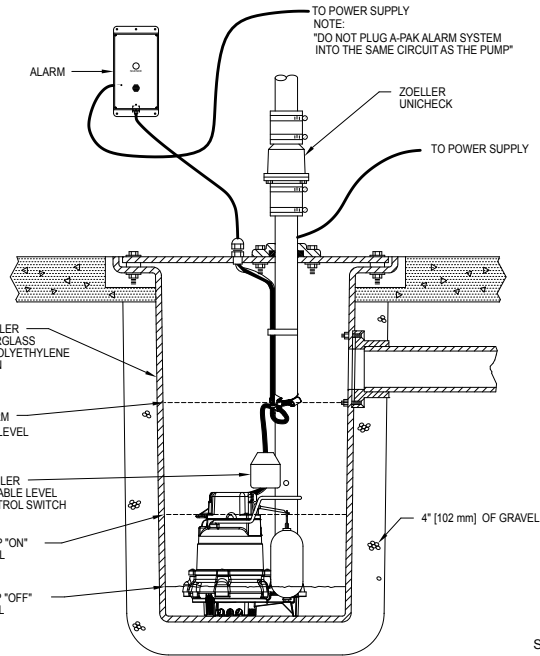
TYPICAL APPLICATIONS

SIMPLEX SYSTEM

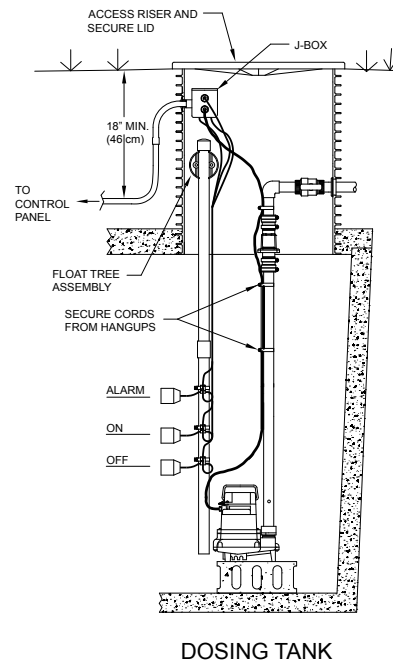
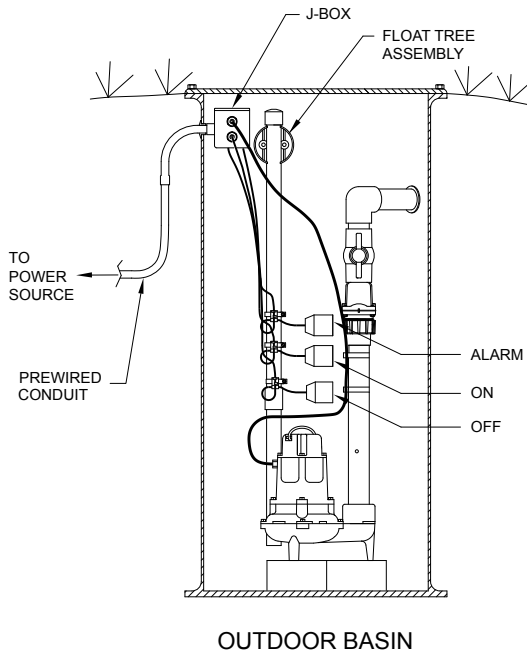
Switch for APak®, High Level Alarm Switch.

Voltage	APak®	Variable Level Control Switch
115 V	10-4012	10-0743

DUPLEX ELECTRICAL ALTERNATING SYSTEM



FLOAT TREE ASSEMBLIES



For information on additional Zoeller products refer to catalog on Electrical Alternator, FM0486; Single Phase Simplex Control/Alarm Systems, FM0732; and Simplex Controller, FM0731.



WARNING All electrical systems must be installed by a qualified licensed electrician according to the National Electrical Code.

ZOELLER 
PUMP COMPANY

MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

Trusted. Tested. Tough.™

Visit our web site:
zoellerpumps.com

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

PUMP COMPANY

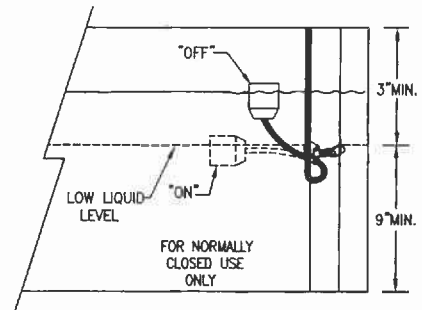
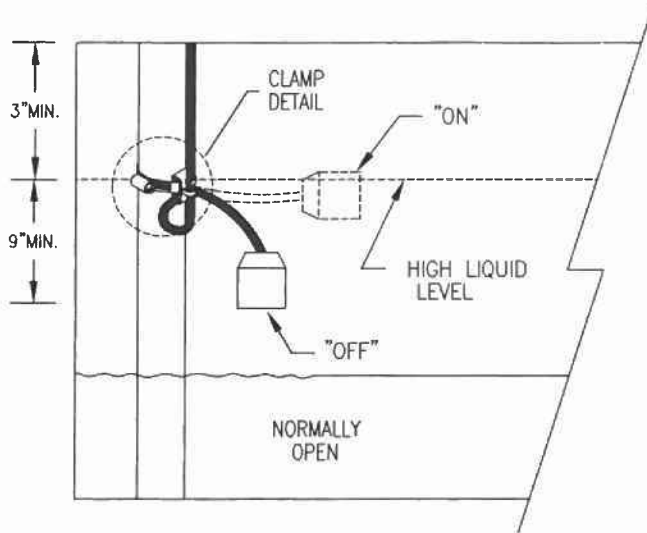
Zoeller Family of Water Solutions™

MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
 SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
 (502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

visit our web site:
www.zoeller.com

INSTALLATION INSTRUCTIONS FOR VARIABLE LEVEL CONTROL SWITCHES

NOTE: Switch not for use for direct "on/off" pump operation. Must be used with control panel.



SK1445

WARNING To avoid electrical shock always disconnect power supply before handling or making adjustments to the variable control switch.

INSTALLATION INSTRUCTIONS

WARNING

All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed in addition to the most recent National Electric Code and the Occupational Safety and Health Act (OSHA).

1. Determine your "on" level. (See illustration above) For pump down (NORMALLY OPEN) application: The variable level control switch closes (turns on) when the float tips a few degrees above the horizontal position and opens (turns off) when the float drops a few degrees below the horizontal position. This mode is regularly used on pump applications.

For normally closed applications only: The variable level control switch closes (turns on) when the float drops a few degrees below the horizontal position and opens (turns off) when the float tips a few degrees above the horizontal position. This mode is used to maintain a specific fluid level in container when pumping from another source. (i.e. stock watering tank)

2. If cable weights are not being used, strap variable level control switch to discharge pipe or similar mounting at determined on-off level. (See sketch #1) **NOTE:** Do not install cord under hose clamp. **NOTE:** Be sure float is positioned so that it will not be restricted in its movement by any item in the pit. The strap clamp should be a minimum of 3" from any top restriction (pit cover) or 9" from any bottom restriction (floor, pump, etc.).

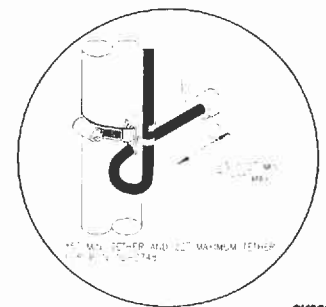
3. If cable weights are used, adjust tether as shown in sketch. (See sketch #2)

NOTICE: Do not adjust "OFF" level below discharge on pump. Use Control Switch in panel controlled pump applications only.

CABLE WEIGHT (See Sketch #2)

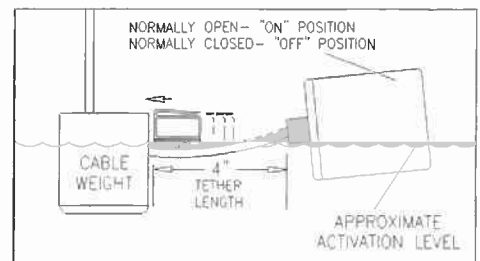
1. Lay cable in weight channel.
2. Align clip with weight groove and slide towards cable.
3. Snap clip snugly up to cable, manually moving clip to the tightest possible position.
4. Wire cable leads directly into control device.
5. Suspend unit at desired activation level.

CLAMP DETAIL
 (Tether Length non-adjustable)



SK305C

SKETCH #1



SK1301A

SKETCH #2



KPSI 320

- ◆ Submersible level transducer
- ◆ Small bore, 0.75" diameter
- ◆ $\pm 0.25\%$ FSO static accuracy
- ◆ Two year warranty

The KPSI 320 is a submersible hydrostatic level transducer specifically designed for small bore applications and to meet the rigorous environments encountered in ground water level measurements. This transducer provides repeatable, precision depth measurement under most adverse conditions.

Every KPSI Transducer utilizes a highly accurate pressure sensor assembly specifically designed for hostile fluids and gases. The assembly is integrated with supporting electronics in a durable waterproof housing constructed of 316 stainless steel or titanium. The attached electrical cable is custom manufactured and includes para-aramid synthetic fiber members to prevent errors due to cable elongation, and a unique water block feature that self-seals in the event of accidental cuts to the cable. Each vented reference transducer is shipped with our SuperDry Vent Filter that prevents moisture from entering the vent tube for at least one year without maintenance, even in the most humid environments.

Features

- ◆ Custom polyurethane or ETFE cable lengths
- ◆ Welded 316SS or titanium body
- ◆ Custom level ranges up to 700 ft. (210 m) H₂O
- ◆ Multiple analog outputs
- ◆ Ported nose cap
- ◆ Optional lifetime lightning protection
- ◆ Long life vent filter or aneroid bellows
- ◆ Available molded cable seal

Applications

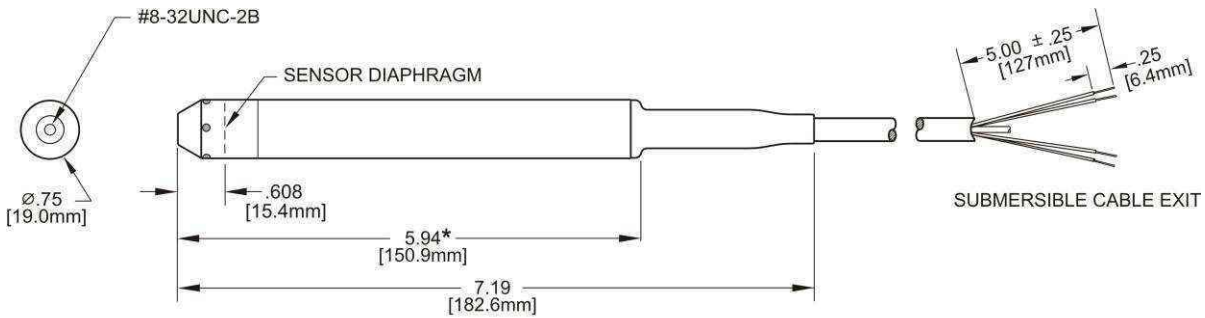
- ◆ Surface water monitoring
- ◆ Well monitoring
- ◆ Groundwater monitoring
- ◆ Pump control
- ◆ Slug tests
- ◆ Level control
- ◆ Ballast tank control

Specifications

PARAMETER	COMMENT	
LEVEL RANGES		
Full scale level ranges (Intermediate level ranges are available)	5 thru 700 ft. H ₂ O, (1.5 thru 210 m H ₂ O)	Vented gage reference
	10 thru 700 ft. H ₂ O, (3 thru 210 m H ₂ O)	Sealed gage reference
	35 thru 700 ft. H ₂ O, (10 thru 210 m H ₂ O)	Absolute gage reference
Proof pressure	1.5 x FS	
Burst pressure	2.0 x FS	
STATIC PERFORMANCE		
Static accuracy (Combined effects of non-linearity, hysteresis and repeatability, best fit straight line method)	$\pm 0.25\%$ FSO	BFSL method
Resolution	+0.0001% FS	

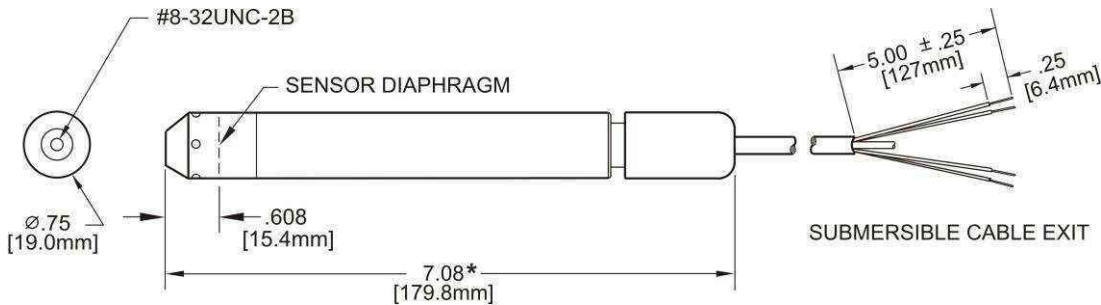
ENVIRONMENTAL		
Wetted materials	316 SS or titanium; FKM; Polyurethane or ETFE	
Compensated temp range	0 to 50°C	
Thermal error (Maximum allowable deviation from the Best Fit Straight Line due to a change in temperature)	±0.05% FSO/°C ±0.1% FSO/°C	Worse case over compensated temperature range for ranges < 12 ft. (4 m) H ₂ O
Operating temp range	-20 to 60 °C	When attached to polyurethane cable
Protection rating	IP 68, NEMA 6P	
ELECTRICAL		
Excitation	9-28 V – VDC output 9-28 V – mA output 15-28 V – VDC output 10-28 V – VDC output	0-5 V, 0-2.5 V, 0-4 V 4-20 0-10 V 1.5-7.5 V
Input current	20 mA max., 3.5 mA max.	For mA output, for VDC output
Output	4-20 mA, 0-5 VDC, 0-2.5 VDC, 0-4 VDC, 0-10 VDC, 1.5-7.5 VDC	For ranges < 5 ft. (1.5 m) H ₂ O, only 4-20 mA output is available
Zero offset	±0.25 mA for mA output < 0.25 VDC for VDC output	
Output impedance	See loop diagram for mA output 20 ohm for VDC output	
Insulation resistance	100 mega ohm at 50 VDC	
Circuit protection	Polarity, surge/shorted output	
CERTIFICATIONS		
	CE compliant	EN 61326-1:2013 and 61326-2-3:2013
	UL, CUL and FM	Class I, II, III, Div. 1, Groups A,B,C,D,E,F&G
	WEEE/RoHS	Waste from Electrical and Electronic Equipment (WEEE) and Restrictions on the use of Hazardous Substances (RoHS)
PHYSICAL		
Approximate weight	0.47 lbs. (224 g) transducer 0.05 lbs./ft. (79 g/m) cable	
Cable jacket material	Polyurethane (standard), ETFE (optional)	
Cable pull strength	200 lbs. (90 kg)	Polyurethane
Cable number of conductors	4	
Cable conductor size	22 AWG	
Cable seal	Molded polyurethane FKM Gland	For polyurethane cable For ETFE cable
LIGHTNING PROTECTION (Power supply needs to be limited to 150mA to avoid lock up of the gas tube after a suppression event)		
Life expectancy	>1,000 operations	
Peak clamping voltage	36 volts	
Response time	<10 nsecs	
Shunts	20,000 amperes	

Dimensions



*ADD 5.00" FOR LIGHTNING PROTECTION OPTION

Molded Cable Seal Configuration for Polyurethane Cable

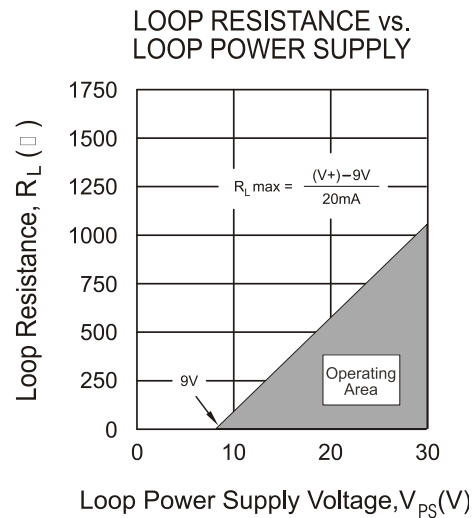


*ADD 5.00" FOR LIGHTNING PROTECTION OPTION

Gland Cable Seal Configuration for ETFE Cable

Electrical Termination

ELECTRICAL TERMINATION		
22AWG CONDUCTORS IN A SHIELDED CABLE WITH VENT TUBE		
4-20 mA	RED BLACK	+ EXCITATION - EXCITATION
0-5 VDC	RED BLACK WHITE	+ EXCITATION - EXCITATION + SIGNAL
ALL	DRAIN WIRE	SHIELD



Ordering Information

MODEL		SUBMERSIBLE LEVEL TRANSDUCER	
3	2	0	±0.25% FSO Static Accuracy
↓	↓	↓	
MATERIAL			
S Stainless Steel			
T Titanium			
↓			
REFERENCE FORMAT			
1 Vented gage			
3 Sealed gage			
4 Absolute			
↓			
OUTPUT			
3 0-5 VDC			
F 0-2.5 VDC			
G 0-4 VDC			
H 0-10 VDC			
J 1.5V-7.5 VDC			
4 4-20 mA			
↓			
PRESSURE CONNECTION			
B Ported nose cap			
↓			
ELECTRICAL CONNECTION			
0 Molded cable seal			
A Gland cable seal			
↓			
LIGHTNING PROTECTION			
A None			
B Full Lightning Protection			
↓			
LEVEL RANGE (at MAX output)¹			
#	#	#	#
↓	↓	↓	↓
LEVEL RANGE (at MIN output)¹			
#	#	#	#
↓	↓	↓	↓
MOISTURE PROTECTION			
A None (sealed/absolute only)			
B Vent Filter			
C Aneroid Bellows			
D Stainless Steel Vent Filter			
↓			
CABLE TYPE			
1 Polyurethane			
2 ETFE (Electrical Connection "A" Only)			
↓			
CABLE LENGTH			
#	#	#	# (in feet)
↓	↓	↓	↓
LABEL²			
A psi			
B ft H ₂ O			
C m H ₂ O			
↓			
3	2	0	B

- Notes: 1 The part number requires two level range limits, corresponding to the maximum and minimum analog outputs of the transducer, to be specified in **pounds per square inch (psi)** to three decimal places. The lower level range is typically 000.000 unless otherwise required. For reverse output requirements, enter the lower level range for the maximum output signal and the upper range for the minimum output. Use the following conversion factors: **Ft. H₂O / 2.3073 = psi // m H₂O / 0.703265 = psi**
Examples: 10 ft. H₂O / 2.3073 = 4.334 psi (Enter 004.334 in the part number), 10 m H₂O / 0.703265 = 14.219 psi (Enter 014.219 in the part number)
 For sealed gage reference add local atmosphere when converting to psi. Contact PSI for assistance.
Example: 10 ft. H₂O / 2.3073 +14.7 = 19.034 psi (Enter 019.034 in the part number)
- 2 Units of measure on standard MEAS label. Contact Measurement Specialties if private labeling is required.

NORTH AMERICA

Measurement Specialties, Inc.,
 a TE Connectivity company
 Tel : 1-800-522-6752
 Email: customercare.hmpt@te.com

EUROPE

Measurement Specialties (Europe), Ltd.,
 a TE Connectivity company
 Tel : +33 (0) 800-440-5100
 Email: customercare.dtmd@te.com

ASIA

Measurement Specialties (China), Ltd.,
 a TE Connectivity company
 Tel : +86 755 3330 5088
 Email: customercare.shzn@te.com

te.com/sensorsolutions

Measurement Specialties Inc., a TE Connectivity company.

Measurement Specialties (MEAS), American Sensor Technologies (AST), TE Connectivity, TE Connectivity (logo) and EVERY CONNECTION COUNTS are trademarks. All other logos, products and/or company names referred to herein might be trademarks of their respective owners.

The information given herein, including drawings, illustrations and schematics which are intended for illustration purposes only, is believed to be reliable. However, TE Connectivity makes no warranties as to its accuracy or completeness and disclaims any liability in connection with its use. TE Connectivity's obligations shall only be as set forth in TE Connectivity's Standard Terms and Conditions of Sale for this product and in no case will TE Connectivity be liable for any incidental, indirect or consequential damages arising out of the sale, resale, use or misuse of the product. Users of TE Connectivity products should make their own evaluation to determine the suitability of each such product for the specific application.

© 2016 TE Connectivity Ltd. family of companies All Rights Reserved.

KPSI™ Transducers



Pressure Systems, Inc. offers an extensive line of accessories and options to augment the functionality of our KPSI™ Level and Pressure Transducers. These enhancements can be specified with the instrument's order or, in many cases, can be retrofitted in the field. Our Accessories and Options include 1-4 day expedited shipping service, lifetime lightning protection, and a variety of pressure connections to suit almost any installation. Industry-leading performance and reliability, combined with short lead times, responsive, knowledgeable Customer Service personnel, and our ability to customize KPSI transducers to meet virtually any requirement give us our competitive advantage. For trouble-free, cost-effective level and pressure monitoring instrumentation, contact our Sales or Customer Service Team today.

Sensing the Environment™

34 Research Drive
Hampton, VA 23666
USA

www.PressureSystems.com

ISO-9001:2000 Certified

Order on-line!

www.LevelandPressure.com

Phone: 757-865-1243
Toll Free: 800-328-3665
Fax: 757-865-8744
E-mail: sales@PressureSystems.com

INSTALLATION HARDWARE

Pressure Systems offers an extensive array of hardware to facilitate the installation of KPSI Transducers into almost any application. Contact our Technical Support staff for assistance in selecting the hardware that may best suit your application or if you have unique requirements that may require a custom solution.

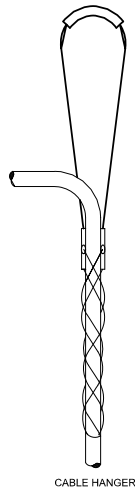
Anti-Snag Cone

Anti-Snag Cones are designed to fit over the cable end of either 1.0" or 0.75" diameter transducers to prevent the transducers from getting hung on obstacles when pulling the cable. The cones are constructed of PVC and come in separate sizes for the two diameters.



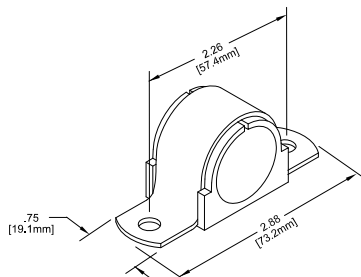
Cable Hanger

The *Cable Hanger* is used to suspend the transducers in the liquid media. The hanger slides onto the cable from the unterminated end and is easily positioned while pushing the ends of the hanger together. As the hanger expands from the weight of the transducer, it grips the cable by the sheath. The cable hanger is 6.0 in (15.3 cm) long and is constructed of 304 stainless steel. **The cable hanger is not recommended for cable lengths in excess of 500 ft (150 m) as it does not take advantage of the Kevlar® strength members in the cable.**



Mounting Clamp

The *Mounting Clamp* is used to secure 1.0" diameter transducers to a bulkhead. The clamp consists of a 304 stainless steel bracket with a thermoplastic insert that holds the transducer housing.

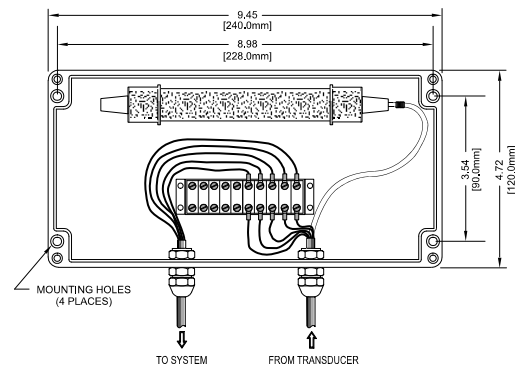


Well Caps

Locking *Well Caps* enable transducers to be suspended within the well while providing security. The vented orange PVC caps are 2" or 4" ID and come with a 304 stainless steel dock (ring and threaded quick-link) to support a cable hanger. The dual-hinge locking lid uses a Buna-N/Nitril o-ring for a watertight seal. The black triangle warning label on the lid can be marked for well identification.

Junction Box

The *Junction Box* provides a water-resistant enclosure for electrically connecting the transducer cable to the users system via a terminal strip. The enclosure also provides convenient location for terminating the vent tube on vented gage transducers. The enclosure can be ordered with either a vent filter or an aneroid bellows. The enclosure is constructed of polycarbonate with a clear top incorporating a neoprene seal. The junction box is rated IP66 and measures 9.45" L x 6.30" W x 4.72" H. Mounting screws are provided.



Identification Tags

Identification Tags are available to attach to the transducer cable to provide easy identification in the field. User-specified information is laser engraved onto the 1.0" square tag, which is constructed of 304 stainless steel.

Cable Splice Kit

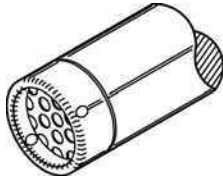
The *Cable Splice Kit* provides a waterproof connection to extend or repair Pressure Systems submersible cables. In many cases, the cable splice kit is a more economical alternative for repairing damaged cable. The kit includes all necessary items to electrically connect and insulate the conductors, couple the vent tubes, and seal the 316 stainless steel housing to either polyurethane and ETFE cable. Assembly instructions are also included.

REPLACEABLE AND INTERCHANGEABLE NOSE CAPS

Submersible transducers having 1.0" diameter housings are shipped with replaceable nose caps of the requested variety at no additional cost when ordered. The nose caps screw on to the front of the transducer housing via a 7/8"-20 UNEF thread with an o-ring seal. Spare or alternative nose caps may be ordered separately.

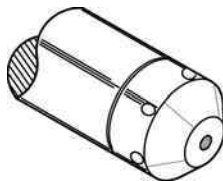
Open-face Nose Cap

The *Open-face Nose Cap* offers the best resistance to clogging. This single-piece nose cap provides maximum exposure of the sensing diaphragm to the liquid media through a protective perforated screen on the front. The open-face nose cap is constructed from molded Delrin®.



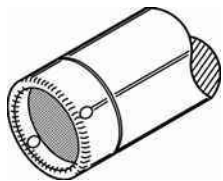
Ported Nose Cap

The *Ported Nose Cap* offers the best protection against damage to the sensing diaphragm. This single-piece nose cap allows the liquid media to enter through 6ea 1/8" holes around the outside and includes a #8-32 UNC-2B threaded hole on the front. The closed-face nose cap is constructed of molded Delrin®.



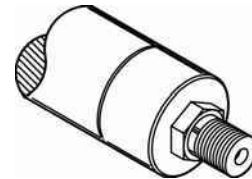
Piezometer Nose Cap

The *Piezometer Nose Cap* offers the best alternative for burying the transducer in the ground without risk to the sensing diaphragm. This two-piece nose cap allows the liquid media to enter through a permeable 40 micron centered stainless steel mesh filter at the front of the cap. The piezometer nose cap is constructed of Delrin®.



Male NPT Nose Cap

The *Male NPT Pressure Nose Cap* offers the best alternative for installing the transducer on a pipe. This single-piece nose cap incorporates a 1/4"-18 or a 1/2"-14 MNPT fitting on the front for connection. The male NPT nose cap is constructed of stainless steel or titanium, as required.

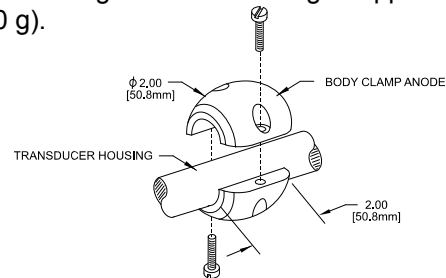


CORROSION PROTECTION

KPSI Transducers are available with optional wetted materials to maintain compatibility with a variety of caustic liquid media. Stainless steel or titanium construction, Viton® seals, and polyurethane or ETFE cable permit the transducers to operate in most liquid environments. In the event galvanic corrosion is anticipated, PSI offers two self-sloughing sacrificial anodes that attach to 1.0" diameter transducers.

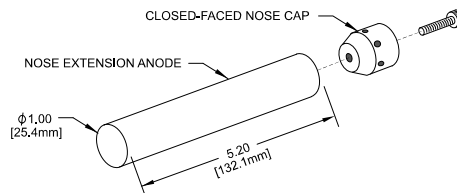
Body Clamp Anode

The *Body Clamp Anode* is a 2.2 in (5.6 cm) diameter zinc sphere of which the two halves bolt on to the transducer housing. The anode weighs approximately 13 oz (370 g).



Nose Extension Anode

The *Nose Extension Anode* is a 5.25 in (13.34 cm) long by 1.0" diameter zinc cylinder that attaches to a closed-face nose cap via an 8-32 threaded hole in the front of the nose cap. The anode weighs approximately 15 oz (417 g) and is shipped with an attached stainless steel closed-face nose cap.

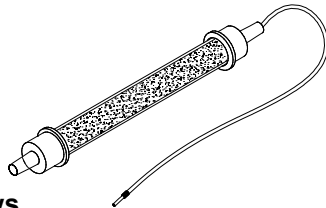


MOISTURE PROTECTION

Two solutions are offered to provide protection against moisture incursion on transducers with vented gage reference pressure format. The choice of which solution to utilize depends on the ability to provide periodic maintenance and the accuracy required for level measurement.

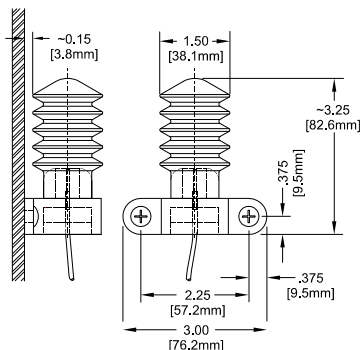
Vent Filter

Vent Filters provide the highest accuracy capability and utilize indicating desiccant to prevent moisture from entering the vent tube and damaging transducers with vented gage reference pressure format. The desiccant will turn from blue to pink when exposed to moisture indicating the need for maintenance. All vented gage transducers are shipped with our SuperDry™ Vent Filter. This latest vent filter design prevents moisture from entering the vent tube **for at least one year without maintenance**, at no additional cost. Spare filters may be ordered. The vent filters are 6.0 in (15.3 cm) long with a 0.75" diameter.



Aneroid Bellows

The *Aneroid Bellows* is a maintenance-free alternative to desiccant filters for moisture protection on vented gage transducers. Made of flexible neoprene material attached to a polycarbonate mounting bracket, the bellows fluctuates with changes in atmospheric pressure maintaining a constant barometric reference. Note that the use of the bellows results in a closed reference pressure system subject to zero shift errors induced by changing temperatures of up to 0.003 psi/°C. The bellows is not recommended for use with accuracy requirements of $\pm 0.25\%$ FS or better, nor for ranges < 2 psi..



DIGITAL DISPLAYS

Pressure Systems offers two types of Display Meters to provide a visual readout of a single KPSI transducer having mA or VDC output. Both varieties utilize a red 0.54" LED display with 4 active characters to indicate a numeric range of -1999 to 9999. The units operate from VAC power and provide a 24 VDC supply for power to the transducer.

The Model 3019 Digital Readouts provide a sophisticated display of the transducer output with six 14-segment LED's for display of true alphanumeric characters; the last two used for process descriptors. These readouts offer programmable input configuration, isolated transducer power supply, selectable 2-point scaling or up to 17-point linearization, optional 4-20 mA retransmission, and two or four optional 10-amp SPDT alarm contacts for control. The 3019 has a NEMA 4X front panel with a polycarbonate bezel and a 1/8 DIN aluminum housing measuring 1.9375" H x 3.75" W x 6.5" D.

The Model 3620 Pump Controllers provide a more rugged package specifically designed to operate external pumps via two 10-amp SPDT alarm contacts. The 3620 provides front panel scaling, operates from -20 to 70°C, and uses 120 or 240 VAC. The NEMA 4X rated enclosure can be surface or panel mounted and measures 3.2" H x 5.5" W x 2.7" D.

Model 3019 Digital Readout	Model 3620 Pump Controller
6 digit 14 segment 0.54" red LED	4 digit 7 segment 0.54" red LED
NEMA 4X front panel	NEMA 4X enclosure
Polycarbonate bezel, 1/8 DIN aluminum housing	Surface or panel mountable polycarbonate housing
Programmable mA or VDC input configuration	Fixed mA or VDC input configuration
Isolated 24 VDC @ 100 A power supply	Regulated 24 VDC @ 25A power supply
0 to 70°C operation	-20 to 70°C operation
20 bit A/D resolution	16 bit A/D resolution
90 to 140 VAC, 50/60 Hz power	Selectable 120/240 VAC, 50/60 Hz power
Plug-in terminal block electrical connections	Screw clamp terminal electrical connections
Selectable flashing display and/or horn alarm notification	Flashing display alarm notification
Optional 2ea or 4ea 10 amp, 250 VAC SPDT contacts	Standard 2 or optional 3ea 10 amp, 250 VAC SPDT contacts
Optional 4-20 mA retransmission	N/A

EXPEDITE SHIPMENT SERVICE

Standard lead times for many of Pressure Systems' line of KPSI Level and Pressure Transducers are 5 working days. At a premium, PSI offers an *Expedite Shipment Service* in order to ship transducers within 1-4 working days. This service includes requirements for custom pressure ranges within the limits of the relevant transducer models as well as custom cable lengths. Expedite shipment service is available on most models. Consult our Customer Service staff for availability.

REFERENCE PRESSURE FORMAT

KPSI Transducers are available in three different *Reference Pressure Formats* to meet varying requirements. The format indicates whether the sensor is referenced to atmospheric pressure (vented gage), a hard vacuum (absolute), or a simulated atmospheric pressure (sealed gage).

Vented gage reference is usually used in lower full-scale range transducers where the sensor must track changes in atmosphere to maintain stated accuracy. Care must be taken to employ appropriate moisture protection to prevent humidity from entering the transducer via the vent tube.

Sealed gage and absolute reference is typically used when the full-scale range is above 700 ft (210 m) H₂O. Changes in atmospheric pressure have negligible impact on the accuracy of transducers at that range and moisture protection is not a concern since no vent tube is required. Sealed gage units are absolute units that are electrically adjusted to simulate reference to the atmospheric pressure at site of the installation. Base elevation with respect to sea level of the site must therefore be specified when ordering sealed gage transducers. Consult our Technical Support staff if you need assistance in choosing the reference pressure format.

TRANSDUCER OUTPUT

A variety of electrical *Transducer Output* signals are available to facilitate interfacing to almost any system. The most popular output signal is 4-20 mA, which is transmitted over two wires along with power for the transducer. Transducers with this output are typically referred to as transmitters and interface with almost any data logger or PLC

Amplified voltage output is also commonplace requiring three wires for power and output signal. Most common is 0-5 VDC, but the full-scale voltage output can be factory-adjusted to as much as 2.5 VDC less than the anticipated excitation voltage supply. Specify the voltage range required when ordering VDC output transducers.

ELECTRICAL CONNECTION

Two basic *Electrical Connection* options are offered to facilitate submerged use in different environments.

The standard connection is a submersible cable exit using a factory molded polyurethane seal to the transducer housing. This provides the best water ingress protection. As an option, a compressed gland seal is offered to facilitate field attachment but requires considerable care in assembly to insure water-proof integrity.

An optional ½"-14 male NPT conduit fitting can also be specified for a more rugged and protected connection. This configuration also employs the standard molded cable seal or the optional gland cable seal.

TEMPERATURE SENSE OUTPUT

As an option, a precision silicon temperature sensor can be installed within the transducer to provide a separate 4-20 mA temperature measurement output over the range of -20 to 60°C. The accuracy of the temperature measurement is ±4°C.

WETTED MATERIALS

Optional *Wetted Materials* are offered for both the transducer and the cable to enable compatibility with a wide range of liquid media.

Transducer Housing Assemblies

The transducer assemblies are most commonly made from 316 stainless steel, which offers good compatibility for most water and hydrocarbon liquid applications. Alternatively, the transducer assembly can be made from titanium, which offers superior compatibility to salt water and chemical liquid applications.

Cable Seals

The molded cable seal is KPSI's standard offering and provides a very reliable injection molded polyurethane seal. The gland cable seal is primarily used for ETFE cable and incorporates a compressed Viton® gland.

Transducer Cable

The jacket on our transducer cable is typically constructed from polyurethane, which provides excellent general-purpose use and reliability with good flexibility and economy. For liquid media such as hydrocarbons and other chemicals, ETFE can be specified providing excellent compatibility and maintaining all the features of the polyurethane though somewhat less flexible and more expensive.

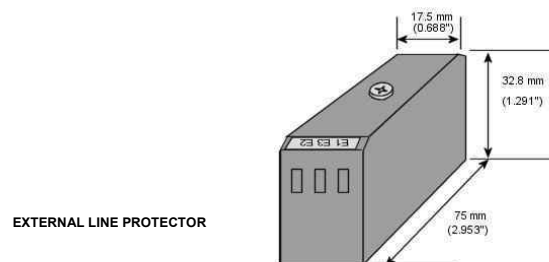
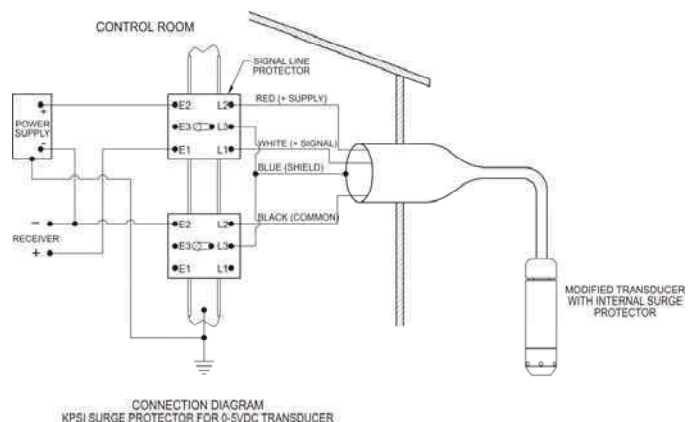
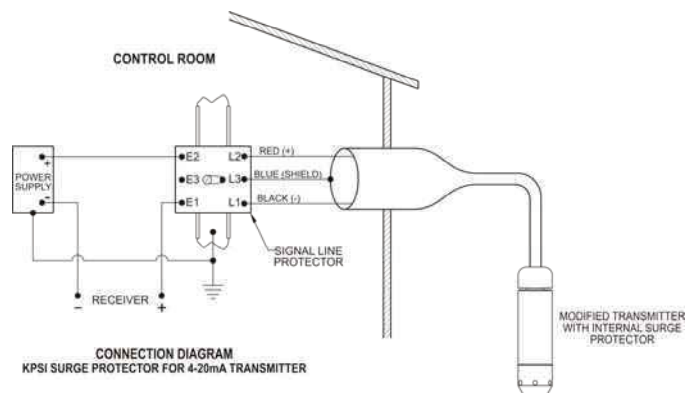
Consult our Technical Support staff for the material best suited for the anticipated media.

LIGHTNING PROTECTION

Lightning Protection is designed to protect KPSI Level and Pressure Transducers from damaging surge voltage and current. The protection is offered for 2-wire 4-20 mA output as well as 3-wire VDC and digital output configurations. This circuit is capable of protecting against fast rising voltage transients as well as current surges associated with lightning discharges. The protectors are a multi-stage design, with a solid-state section that intercepts the leading edge of the surge within nanoseconds. The second stage of the design contains a gas discharge tube which crowbars up to 20,000 ampere currents to ground. The tube remains in the crowbar state until the surge has passed, then automatically resets the line to normal operation without the need to reset a circuit breaker. Each circuit consists of two parts. One is housed integral to

the transducer via a factory-installed extension to the end of the housing while the other is installed by the user between the transducer wiring and the system. External line protection must be used at all times to ensure lifetime warranty coverage. The protectors are FM/UL/CUL Intrinsic Safety rated for use in hazardous environments when used with an appropriate Intrinsic Safety barrier. The transducer carries a **lifetime warranty for damage due to lightning or voltage spikes** when this 2-part option is properly installed. It is not warranted against continuous over voltage. This option is not available for the Series 300DS.

Note: For 4-20 mA output transducers the supply voltage must be at least 15 VDC when Lightning Protection is installed. Lightning Protection is available as an option on all new units.



Installation Hardware

PN: 42-01-66181	Anti-Snag Cone for 1.0" diameter for use with molded cable seal
PN: 42-01-64134	Anti-Snag Cone for 1.0" diameter for use with gland cable seal
PN: 42-01-64136	Anti-Snag Cone for 0.75" diameter for use with gland cable seal
PN: 12-90-0931	Cable Hanger
PN: 49-06-00PC	Mounting Clamp
PN: 840	Junction Box with Vent Filter
PN: 845	Junction Box with Aneroid Bellows
PN: 36-05-1540T79	Identification Tags
PN: 830	Cable Splice Kit
PN: 861-2A	2" vented locking well cap with dock
PN: 861-2B	2" vented locking well cap
PN: 861-2C	2" well dock
PN: 861-4A	4" vented locking well cap with dock
PN: 861-4B	4" vented locking well cap
PN: 861-4C	4" well dock

Replaceable/Interchangeable Nose Caps

PN: 42-30-6659	Open-face Nose Cap
PN: 42-01-1314A	Closed-face Nose Cap
PN: 42-30-6676S	Piezometer Nose Cap
PN: 42-01-64154	Stainless Steel 1/4"-18 Male NPT Nose Cap
PN: 42-01-64154T	Titanium 1/4"-18 Male NPT Nose Cap
PN: 42-02-64180	Stainless Steel 1/2"- 14 Male NPT Nose Cap
PN: 42-02-64180T	Titanium 1/2"-14 Male NPT Nose Cap

Corrosion Protection

PN: 820	Body Clamp Anode
PN: 825	Nose Extension Anode

Moisture Protection

PN: 810	Vent Filter
PN: 815	Aneroid Bellows

Digital Displays

PN: D3019-2-420	Digital Readout, two SPDT 10A control relays, 4-20 retransmission
PN: D3019-4	Digital Readout, four SPDT 10A control relays
PN: D3019-4-420	Digital Readout, four SPDT 10A control relays, 4-20 retransmission
PN: D3620	Digital Readout, NEMA 4X rated, two SPDT 10A control relays
PN: D3621	Digital Readout, NEMA 4X rated, three SPDT 10A control relays

Lightning Protection

PN: 809	External line protector
---------	-------------------------



Ultra Mag And SIGNAL CONVERTER



DESCRIPTION

MODELS UM06 AND UM08 FLANGED TUBE *ULTRA MAG* meters are manufactured to the highest standard available for magmeters. They incorporate microprocessor technology to offer very low flows and broad range ability. The flanged end tube design permits use in a wide range of applications with up to 300 PSI working pressure. Flanged ends are:

- Steel AWWA Class "D" flat face flanges (150 PSI) for UM06
- Steel AWWA Class "F" raised face flanges (300 PSI) for UM08 (2", 3", and ≥14")
- Steel ANSI 300 lb. Raised Face Flanges for UM08 (4" - 12")

The fabricated tube is stainless steel with steel or stainless steel flanges and is lined with UltraLiner™, an NSF approved, fusion bonded epoxy material.

INSTALLATION is made similar to placing a short length of flanged end pipe in the line. The meter can be installed vertically, horizontally, or inclined on suction or discharge lines. The meter must have a full pipe of liquid for proper operation. Fluid must be grounded to the downstream flange of the sensor either via internal grounding electrodes (4 - 12") or using McCrometer 316 SS Grounding Rings. For best performance, grounding rings are recommended for all sizes. Any 90 or 45 degree elbows, valves, partially opened valves, etc. should not be placed closer than one pipe diameters upstream and zero pipe diameters downstream. All blending and chemical injection should be done early enough so the flow media is thoroughly mixed prior to entering the measurement area.

SIGNAL CONVERTER: The signal converter is the reporting, input and output control device for the sensor. The converter allows the measurements, functional programming, control of the sensor and data recording to be communicated through the display and inputs/outputs. The microprocessor-based signal converter has a curve-fitting algorithm to improve accuracy, dual 4-20mA analog outputs, an optional RS485 communication port, an 8 line graphical backlit LCD display with 3-key touch programming, and a rugged enclosure that meets IP67. In addition to a menu-driven self-diagnostic test mode, the converter continually monitors the microprocessor's functionality. The converter will output rate of flow and total volume. The converter also comes standard with password protection and many more features.

ISOLATED POWER AND SIGNAL: The power and signal between the converter and sensor are isolated and placed in separate cables giving superior resistance to electrical signal noise compared to single cable designs. An added benefit from the dual cable design is a maximum cable length of up to 500ft.

OPTIONAL:

- DC powered converter (10-35 VDC, 21 W)
- Meter mounted converter
- Extended warranty
- Hastelloy® electrodes
- ANSI or DIN flanges
- Quick Connect cable fittings
- Special lay lengths, including ISO standard lay lengths
- Converter sun shield
- Modbus Protocol RS485 converter; HART® Converter; Profibus Converter (No Dual 4-20mA on HART & Profibus); Smart Output™ (Sensus or Itron compatible); Panel mount converter (Not CSA approved); Battery or battery-solar powered converter (Not CSA approved, ±1% accuracy)

MODEL UM06 AND UM08

ULTRA MAG® ELECTROMAGNETIC FLOW METER

150 PSI FLANGED TUBE METER, SIZES 2" thru 48"
300 PSI FLANGED TUBE METER, SIZES 2" thru 48"

SPECIFICATIONS

WARRANTY: 2 Years

ACCURACY TESTS: 5-point wet flow calibration of every complete flow tube with its signal converter. If desired, the tests can be witnessed by the customer. The McCrometer test facilities are traceable to the National Institute of Standards & Technology. Uncertainty relative to flow is ±0.15%

ACCURACY: Plus or minus 0.5% of actual flow (battery powered is ±1% of flow)

IMPORTANT NOTICE ON FLOW METER ACCURACY: The flow meter, the cable and the electronics are factory calibrated for accuracy as a single unit. Changing the cable length with the Splice Kit changes the accuracy of the meter and invalidates the calibration certificate.

REPEATABILITY: ±0.05% or ±0.008ft/s (±0.25mm/s), whichever is greater

HEAD LOSS: None. No obstruction in line and no moving parts

PRESSURE RANGE: 150 PSI maximum working pressure (UM06); 300 PSI maximum working pressure (UM08)

TEMPERATURE RANGE: Sensor Operating: -10 to 77°C (14 to 140°F)

Sensor Storage: -15 to 77°C (5 to 140°F)

Electronics: Operating and storage temperature:

-4° to 140° F (-20° to 60° C)

VELOCITY RANGE: .2 to 32 FPS

BI-DIRECTIONAL FLOW: Forward and reverse flow indication and forward, reverse, net totalization are standard with all meters

CONDUCTIVITY: 5 µs/cm

LINER: UltraLiner NSF approved, fusion bonded epoxy

ELECTRODES: Type 316 stainless steel, others optional

POWER SUPPLY: AC: 100-240VAC/45-66 Hz (20W/25VA), DC: 10-35VDC (21W), battery (four lithium D cell batteries), five-year estimated life, solar (5W panel). AC, DC, battery, or battery & solar must be specified at time of ordering.

OUTPUTS: Dual 4-20mA Outputs (Not available for Profibus, HART, or battery converters); Galvanically isolated and fully programmable for zero and full scale (0-22mA).

Four separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.

- Volumetric Pulse
- Flow Rate (Frequency)
- Directional Indication
- High/Low Flow Alarms
- Hardware Alarm
- Empty Pipe
- Range Indication

SENSOR CABLE:

Standard: 25' McCrometer supplied submersible cable with each remote mount unit.

Optional: Up to 500 feet, or 50 feet max for battery powered.

Quick connect: Available in standard cable lengths: 25'; 50'; 75'; 100'; 125'; 150'; 175'; 200'; and 500'. Custom cable lengths at additional cost.

CONVERTER/SENSOR SEPARATION: ≤ 500 feet; for longer lengths consult factory

EMPTY PIPE SENSING: Zero return when electrodes are uncovered

ALARMS: Programmable alarm outputs

DIGITAL TOTALIZER: Cubic Meter; Cubic Centimeter; Milliliter; Liter; Cubic Decimeter; Decaliter; Hectoliter; Cubic Inches; US Gallons; Imperial Gallons; Cubic Feet; Kilo Cubic Feet; Standard Barrel; Oil Barrel; US Kilogallon; Ten Thousands of Gallons; Imperial Kilogallon; Acre Feet; Megagallon; Imperial Megagallon; Hundred Cubic Feet, Megaliters

RATINGS: Metering Tube: NEMA 6P/IP68 with remote converter; submersible with a standard quick-connect cable to 6 ft. and optional strain relief at 30 ft. Die cast aluminum converter: IP67; Panel mount converter: IP65

CERTIFICATIONS:

- CE Certified (Converter only)
- Listed by CSA to 61010-1: Certified by CSA to UL 61010-1 and CSA C22.2 No.61010-1-04
- ISO 9001:2015 certified quality management system



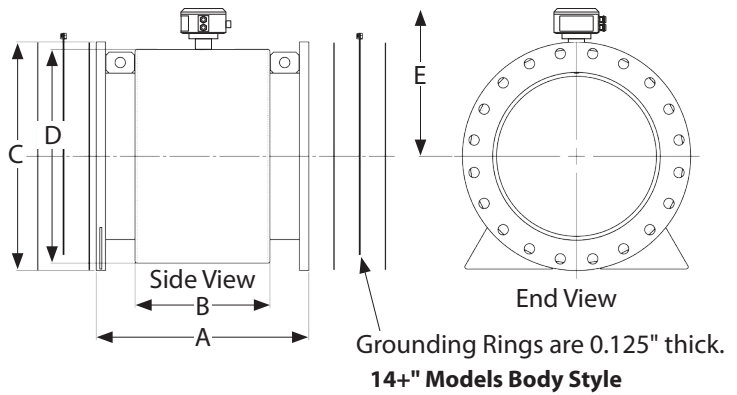
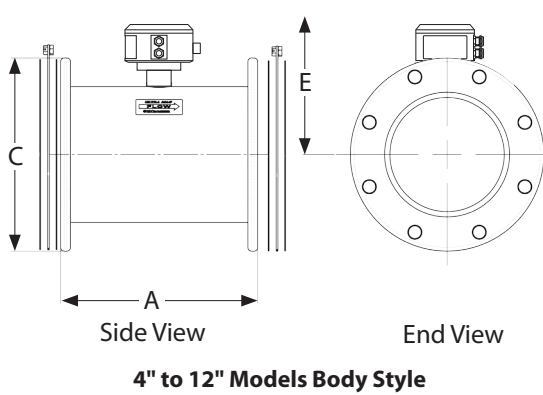
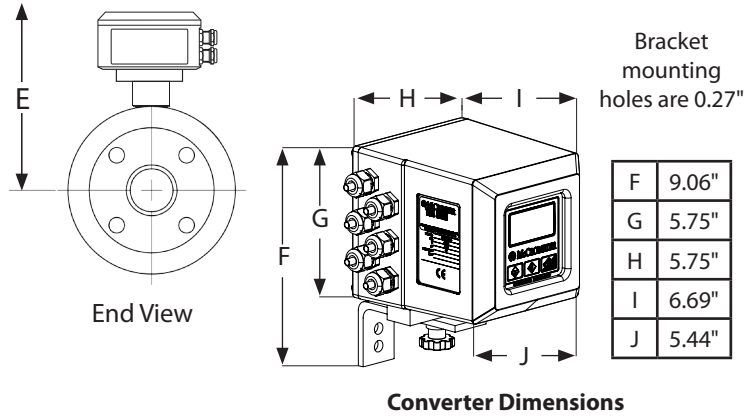
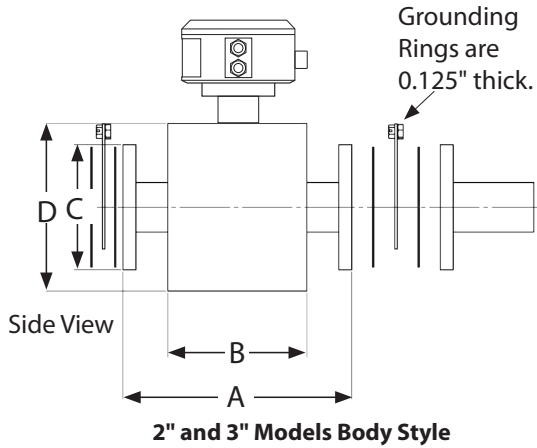
3255 WEST STETSON AVENUE • HEMET, CALIFORNIA 92545 USA

TEL: 951-652-6811 • 800-220-2279 • FAX: 951-652-3078 Printed In The U.S.A. Lit. # 30107-09 Rev. 4.7 / 5-31-18

Copyright © 2003-2016 McCrometer, Inc. All printed material should not be changed or altered without permission of McCrometer. Any published technical data and instructions are subject to change without notice. Contact your McCrometer representative for current technical data and instructions.



MODEL UM06 AND UM08
ELECTROMAGNETIC FLOW METER



Pipe Size (Nominal)	Meter Pipe ID	Flow Ranges GPM Standard .2 to 32 FPS Min - Max	DIMENSIONS (Lay Lengths)								Estimated Shipping Weight (lbs.)	
			A*		B	C		D	E	UM06	UM08	
			UM06	UM08		UM06	UM08					
2"	2.117	2 - 340	11.00	11.00	6.70	6.00	6.50	7.90	9.26	93	107	
3"	3.220	5 - 730	13.40	13.40	6.70	7.50	8.25	9.40	10.01	97	111	
4"	3.720	8 - 1,140	13.40	13.40	n/a	9.00	10.00	n/a	8.06	78	108	
6"	5.692	19 - 2,660	14.60	14.60	n/a	11.00	12.50	n/a	9.06	82	138	
8"	7.692	33 - 4,870	16.10	17.25	n/a	13.50	15.00	n/a	10.06	115	195	
10"	9.682	52 - 7,670	18.50	18.50	n/a	16.00	17.50	n/a	10.46	144	247	
12"	11.682	74 - 11,180	19.70	19.70	n/a	19.00	20.50	n/a	12.31	193	342	
14"	13.440	90 - 16,070	21.70	22.75	12.00	21.00	23.00	20.30	15.46	321	476	
16"	15.440	118 - 20,900	23.60	25.25	14.20	23.50	25.50	21.10	16.21	390	645	
18"	17.440	150 - 26,480	23.60	25.25	14.20	25.00	28.00	21.10	17.21	446	750	
20"	19.440	185 - 32,720	25.60	28.25	16.20	27.50	30.50	24.80	18.26	588	874	
24"	23.440	270 - 47,180	30.70	35.75	21.70	32.00	36.00	29.60	20.11	769	1,568	
30"	29.190	420 - 73,620	35.80	41.75	26.50	38.75	43.00	35.90	23.26	1,261	2,317	
36"	35.190	610 - 105,930	46.10	46.10	28.20	46.00	50.00	42.70	26.66	1,696	2,915	
42"	41.190	830 - 144,370	48.05	**	32.10	52.75	**	48.35	29.99	**	**	
48"	47.190	1,080 - 188,430	50.00	**	36.00	59.50	**	54.00	33.31	**	**	

* Laying lengths for meters with ANSI Class 150 Flanges are equal to UM08 laying lengths

** Consult factory



3255 WEST STETSON AVENUE • HEMET, CALIFORNIA 92545 USA

TEL: 951-652-6811 • 800-220-2279 • FAX: 951-652-3078 Printed In The U.S.A. Lit. # 30107-09 Rev. 4.7 / 5-31-18

Copyright © 2003-2016 McCrometer, Inc. All printed material should not be changed or altered without permission of McCrometer. Any published technical data and instructions are subject to change without notice. Contact your McCrometer representative for current technical data and instructions.



Iron Pipe Size (IPS) and Dimension Data

PE4710

DriscoPlex[®] Pipe for Municipal and Industrial Applications

Pressure Ratings are calculated using 0.63 design factor for HDS at 73°F as listed in PPI TR-4 for PE 4710 materials. HDPE can accommodate up to 1.5 times the pipe pressure rating for a recurring surge and up to 2.0 times the pipe pressure rating for an occasional surge. Temperature, Chemical, and Environmental use considerations may require use of additional design factors.

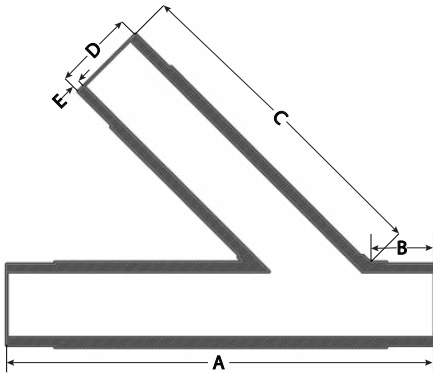
Pressure Rating		317 psi DR 7.3			250 psi DR 9.0			200 psi DR 11.0			160 psi DR 13.5			Nominal Pipe Size
Nominal Pipe Size	IPS OD (in)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	
1 1/4"	1.660	0.227	1.179	0.45	0.184	1.270	0.37	0.151	1.340	0.31	0.123	1.399	0.26	1 1/4"
1 1/2"	1.900	0.260	1.349	0.59	0.211	1.453	0.49	0.173	1.533	0.41	0.141	1.601	0.34	1 1/2"
2"	2.375	0.325	1.686	0.92	0.264	1.815	0.77	0.216	1.917	0.64	0.176	2.002	0.53	2"
3"	3.500	0.479	2.485	1.99	0.389	2.675	1.66	0.318	2.826	1.39	0.259	2.951	1.16	3"
4"	4.500	0.616	3.194	3.29	0.500	3.440	2.75	0.409	3.633	2.31	0.333	3.794	1.92	4"
6"	6.625	0.908	4.700	7.12	0.736	5.065	5.96	0.602	5.349	5.00	0.491	5.584	4.15	6"
8"	8.625	1.182	6.119	12.07	0.958	6.594	10.11	0.784	6.963	8.47	0.639	7.270	7.04	8"
10"	10.750	1.473	7.627	18.75	1.194	8.219	15.70	0.977	8.679	13.16	0.796	9.062	10.93	10"
12"	12.750	1.747	9.046	26.38	1.417	9.746	22.08	1.159	10.293	18.51	0.944	10.749	15.38	12"
14"	14.000	1.918	9.934	31.81	1.556	10.701	26.63	1.273	11.301	22.32	1.037	11.802	18.54	14"
16"	16.000	2.192	11.353	41.55	1.778	12.231	34.78	1.455	12.915	29.15	1.185	13.488	24.22	16"
18"	18.000	2.466	12.772	52.58	2.000	13.760	44.02	1.636	14.532	36.89	1.333	15.174	30.65	18"
20"	20.000	2.740	14.191	64.91	2.222	15.289	54.34	1.818	16.146	45.54	1.481	16.860	37.84	20"
22"	22.000	3.014	15.610	78.55	2.444	16.819	65.75	2.000	17.760	55.10	1.630	18.544	45.79	22"
24"	24.000	3.288	17.029	93.48	2.667	18.346	78.25	2.182	19.374	65.58	1.778	20.231	54.49	24"
26"	26.000				2.889	19.875	91.84	2.364	20.988	76.96	1.926	21.917	63.95	26"
28"	28.000				3.111	21.405	106.51	2.545	22.605	89.26	2.074	23.603	74.17	28"
30"	30.000				3.333	22.934	122.27	2.727	24.219	102.47	2.222	25.289	85.14	30"
32"	32.000				3.556	24.462	139.12	2.909	25.833	116.58	2.370	26.976	96.87	32"
34"	34.000				3.778	25.991	157.05	3.091	27.447	131.61	2.519	28.660	109.36	34"
36"	36.000				4.000	27.520	176.07	3.273	29.061	147.55	2.667	30.346	122.60	36"
42"	42.000							3.818	33.906	200.84	3.111	35.405	166.88	42"
48"	48.000													48"
54"	54.000													54"

This size and dimension chart is intended for reference purposes. It should not be used in place of the advice from a licensed Professional Engineer. Pipe weights are calculated in accordance with PPI TR-7. Average inside diameter is calculated using IPS OD and Minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimension and tolerances in the applicable pipe manufacturing specification.

Visit www.performancepipe.com for the most current literature.



Molded Butt Fusion Wyes



SDR 11 (Standard Dimension Ratio) 200 PSI (Working Pressure at 73.4° F)

Nominal IPS Pipe Size	A inches	B inches	C inches	D inches	E inches	Weight	Item Code
2"	23.74	5.28	13.10	2.38	0.22	2.6	WYEBI-020I-11
3"	24.56	5.90	13.10	3.50	0.32	5.3	WYEBI-030I-11
4"	28.50	5.70	20.60	4.50	0.41	10.6	WYEBI-040I-11
6"	34.45	5.52	26.00	6.63	0.60	32.0	WYEBI-060I-11
8"	37.40	5.70	27.56	8.63	0.79	54.8	WYEBI-080I-11





PE3408 / PE4710 / PE100 HDPE Fittings Specifications

IntegriFuse fittings are manufactured with black high density bimodal polyethylene copolymer designed for use in, but not limited to, potable water, natural gas, industrial, landfill, oil & gas, and mining applications.

Fittings meet AWWA and ASTM-D2513 & ASTM-D3261 requirements. IntegriFuse fittings are manufactured with resin having a material designation code of PE 3408, PE3608, PE 4710, and PE 100.

Physical Properties	Metric	English	Comments
Density	.959 g/cm ³	0.0346 lb/in	Black: ASTM D4883
Environmental Stress Crack Resistance	>= 5000 hour	>= 5000 hour	Condition C; ASTM D1693
Carbon Black Loading	2.30%	2.30%	ASTM D1603
Melt Flow	8.00 g/10 min @Load 21.6 kg, Temperature 190 °C	8.00 g/10 min @Load 47.6 lb, Temperature 374 °F	ASTM D1238
Mechanical Properties	Metric	English	Comments
PENT	>= 10000 hour	>= 10000 hour	Notched Tensile; ASTM F1473
Hardness, Shore D	66.0	66.0	ASTM D2240
Tensile Strength at Break	37.9 MPa	5500 PSI	2 in/min; ASTM D638
Tensile Strength Yield	24.99 MPa	3625 PSI	2 in/min; ASTM D638
Elongation at Break	>= 600%	>= 600%	2 in/min; ASTM D638
Flexural Modulus	1.03 GPa	150 KSI	2% Secant-Method; ASTM D790
Izod Impact, Notched	4.81 J/cm	9.00 ft-lb/in	ASTM D256
Hydrostatic Design Basis	6.89 MPa	1000 PSI	At 60 °C; ASTM D2837
	11.0 MPa	1600 PSI	Room Temp; ASTM D2837
Thermal Properties	Metric	English	Comments
Vicat Softening Point	126 °C	259 °F	ASTM D1525
Brittleness Temperature	,= -118 °C	<= -180 °F	ASTM D746
Decomposition Temperature	>= 220 °C	>= 428 °F	Thermal Stability; ASTM D2513
Descriptive Properties	Metric	English	Comments
Cell Classification		445574C	ASTM D3350
Process		Injection Molding	



**1101 McKinley Street
Anoka, MN 55303
Phone (763) 786-6682
Fax (763) 786-2167**

Part Name: Male thread HDPE Transition Fitting
Series 710 Carbon Steel, T304, T316, Stainless Steel

Threaded Transitions

The POLY-CAM Threaded Transition Adaptors is a multi-level mechanical transition fitting, protected under patent number 5,211,429, which is hydraulically compressed unto the polyethylene or pipe quality copolymer material.

Design

The relaxation creates a seal to prevent leakage. Under pressure, the internal pressure within the pipe increases the sealing surface area on the barb. Under zero internal pressure, the compression strain and tensional strain created by the compression of the multi-level barbs is greater than the stress created by relaxation and/or thermal expansion and contraction. As the internal pressure increases the joining of the polyethylene or copolymer and the coupling increases.

Sizes range from .5" to 12" NPT. All National Pipe Threads are made to ANSI/ASME B1.20-1983 R 1992.

System Performance

The transition fitting is designed to handle the pressure rating of the HDPE pipe with a 2:1 safety factor at 73.40 degrees Fahrenheit with a minimum 50 year design life.

Quality Assurance

The transition fitting shall be manufactured by Poly-Cam, Inc. Poly-Cam, Inc. shall provide quality assurance with regards to proper installation, compatibility, performance, and acceptance. Transition joint meets or exceeds the requirements of ASTM D2513 Category 3. Upon request Poly-cam can install a stainless steel insert to meet ASTM 2513 Category 1. All Fittings meet ARRA requirements. Manufactured in the United States.

Installation

HDPE pipe end: Install transition fitting so as to comply with the pipe manufacturer's recommended procedures. All field welds shall be accomplished in accordance with Plastic Pipe Institute's welding procedure for butt fusion.

Threaded Fitting: When installing the transition fitting one should always use pipe joint sealant or Teflon tape. Always use strap wrenches. **Do not use pipe wrench. Always use 2 wrenches when connecting, Over tighten may cause ovality or damage. Always pressure test for leaks before backfilling.** Backfill and compact carefully around transition and service line to prevent ground shifts which could damage the valve and/or transition fitting.

Material

The POLY-CAM Threaded Transition is manufactured of Carbon Steel (A53 or A106 grade) Type 304 or Type 316 (ASTM A249 or ASTM A269) and or ERW pipe (ASTM SA-312) and incorporated with the transition manufactured of HDPE (cell class 345454c) or pipe quality Copolymer material. (pe3408, pe3608 and pe4710). All pipe meets ASTM 3035 and ASTM 714. It complies AWWA C-901, C906 and NSF 61. All certification will be submitted upon request.

The **epoxy coating** (IF 194T Red Iron Oxide) is fusion bonded to the metal. It has approvals NSF 61, FDA 175.300, AWWA C116-01,C213-01, UL 262 and FM 1120/1130
The carbon steel epoxy POLY-CAM threaded transition fitting complies with AWWA and NSF 61 material requirements.

Warranty

Warranty period is one year after date of substantial completion of installation.

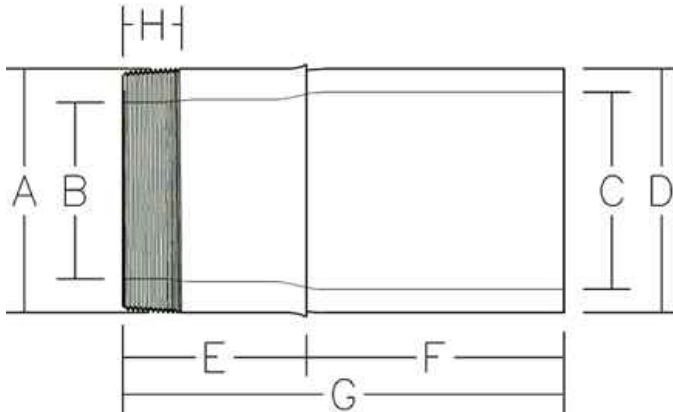
Series 710 Transition with Male NPT



POLY-CAM Male Threaded Transition Adaptors (710 Series) is a multi-level mechanical transition fitting, patent number 5,211,429. The POLY-CAM Threaded Transition is manufactured to the following;

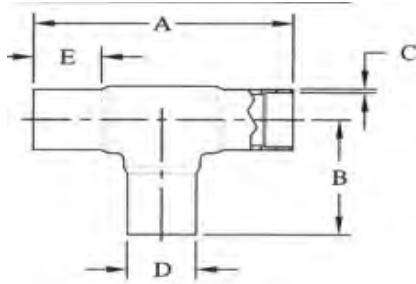
- Carbon Steel Epoxy Coated, 304 and 316 Stainless Steel
- Other steel materials can be made depending on availability.
- Sizes range from .5 to 12" NPT
- Meets ANSI/ASME B1.20-1983 R 1992
- All materials comply with AWWA and NSF 61 Meets ASTM 2513 Category 3. Upon request Poly-cam can install a stainless steel insert to meet ASTM 2513 Category 1

SDR 7	SDR 9	SDR 11	SDR 17						
NOMINAL SIZE INCHES	COUPLING O.D. "A"	PRESSED SDR11 PE PIPE I.D. "B"	EXPOSED SDR11 PE PIPE I.D. "C"	EXPOSED PE PIPE O.D. "D"	COUPLING LENGTH "E"	EXPOSED PE PIPE LENGTH "F"	OVERALL LENGTH "G"	THREAD LENGTH "H"	
0.5	1.000	~0.625	0.67	0.840	1.6	6.4	8	0.64	
0.75	1.250	~0.79	0.84	1.050	1.8	6.2	8	0.7	
1	1.315	~0.84	1.05	0.315	2	6	8	0.99	
1.25	1.660	~1.06	1.34	1.660	2.6	5.4	8	1.01	
1.5	1.900	~1.28	1.53	19.000	2.6	5.4	8	1.03	
2	2.375	~1.64	1.92	2.375	3	5	8	1.06	
2.5	2.875	~1.99	2.31	2.875	3.5	4.5	8	1.25	
3	3.500	~2.42	2.83	3.500	4	4	8	1.26	
4	4.500	~3.23	3.63	4.500	4	8	12	1.48	
5	5.563	~4.0	4.49	5.563	5	7	12	1.5	
6	6.625	~4.8	5.35	6.625	5	8	13	1.56	
8	8.625	~6.3	6.96	8.625	7	8	15	1.75	
10	10.750	~7.9	8.68	10.750	8	8	16	1.85	
12	12.750	~9.5	10.29	12.750	9	9	18	2.27	





Molded Butt Fusion Equal Tees



SDR 17 (Standard Dimension Ratio) 125 PSI (Working Pressure at 73.4° F)							
Nominal IPS Pipe Size	A inches	B inches	C inches	D inches	E inches	Weight lbs.	Item Code
3"	11.81	5.91	0.21	3.50	3.54	1.43	TEEBI-3IPS-17
4"	13.78	6.89	0.26	4.50	3.94	2.77	TEEBI-4IPS-17
6"	18.11	9.06	0.39	6.63	4.72	7.72	TEEBI-6IPS-17
8"	23.62	11.81	0.51	8.63	5.71	17.50	TEEBI-8IPS-17
10"	27.56	13.78	0.63	10.75	6.30	28.60	TEEBI-10IPS-17
12"	31.57	15.97	0.75	12.75	7.52	47.10	TEEBI-12IPS-17
SDR 11 (Standard Dimension Ratio) 200 PSI (Working Pressure at 73.4° F)							
Nominal IPS Pipe Size	A inches	B inches	C inches	D inches	E inches	Weight lbs.	Item Code
¾"	6.38	3.19	0.10	1.05	2.14	0.13	TEEBI-0075I-11
1"	6.62	3.31	0.12	1.32	2.18	0.25	TEEBI-010I-11
1 ¼"	6.97	3.48	0.15	1.66	2.15	0.35	TEEBI-0125I-11
1 ½"	7.84	3.92	0.17	1.90	2.37	0.50	TEEBI-0150I-11
2"	8.66	4.33	0.22	2.38	2.48	0.73	TEEBI-02IPS-11
3"	11.81	5.91	0.32	3.50	3.54	2.20	TEEBI-03IPS-11
4"	13.78	6.89	0.41	4.50	3.94	4.11	TEEBI-04IPS-11
6"	18.11	9.06	0.60	6.63	4.72	10.59	TEEBI-06IPS-11
8"	23.62	11.81	0.79	8.63	5.71	22.50	TEEBI-08IPS-11
10"	27.56	13.78	0.98	10.75	6.30	41.10	TEEBI-10IPS-11
12"	31.57	15.97	1.16	12.75	7.52	66.30	TEEBI-12IPS-11





PE3408 / PE4710 / PE100 HDPE Fittings Specifications

IntegriFuse fittings are manufactured with black high density bimodal polyethylene copolymer designed for use in, but not limited to, potable water, natural gas, industrial, landfill, oil & gas, and mining applications.

Fittings meet AWWA and ASTM-D2513 & ASTM-D3261 requirements. IntegriFuse fittings are manufactured with resin having a material designation code of PE 3408, PE3608, PE 4710, and PE 100.

Physical Properties	Metric	English	Comments
Density	.959 g/cm ³	0.0346 lb/in	Black: ASTM D4883
Environmental Stress Crack Resistance	>= 5000 hour	>= 5000 hour	Condition C; ASTM D1693
Carbon Black Loading	2.30%	2.30%	ASTM D1603
Melt Flow	8.00 g/10 min @Load 21.6 kg, Temperature 190 °C	8.00 g/10 min @Load 47.6 lb, Temperature 374 °F	ASTM D1238
Mechanical Properties	Metric	English	Comments
PENT	>= 10000 hour	>= 10000 hour	Notched Tensile; ASTM F1473
Hardness, Shore D	66.0	66.0	ASTM D2240
Tensile Strength at Break	37.9 MPa	5500 PSI	2 in/min; ASTM D638
Tensile Strength Yield	24.99 MPa	3625 PSI	2 in/min; ASTM D638
Elongation at Break	>= 600%	>= 600%	2 in/min; ASTM D638
Flexural Modulus	1.03 GPa	150 KSI	2% Secant-Method; ASTM D790
Izod Impact, Notched	4.81 J/cm	9.00 ft-lb/in	ASTM D256
Hydrostatic Design Basis	6.89 MPa	1000 PSI	At 60 °C; ASTM D2837
	11.0 MPa	1600 PSI	Room Temp; ASTM D2837
Thermal Properties	Metric	English	Comments
Vicat Softening Point	126 °C	259 °F	ASTM D1525
Brittleness Temperature	,= -118 °C	<= -180 °F	ASTM D746
Decomposition Temperature	>= 220 °C	>= 428 °F	Thermal Stability; ASTM D2513
Descriptive Properties	Metric	English	Comments
Cell Classification		445574C	ASTM D3350
Process		Injection Molding	



STRONGBRIDGE
INTERNATIONAL INC.

TEGA IPS SERIES SDR11

ELECTROFUSION COUPLER, DUAL RATED WATER/NATURAL GAS

Water - 200-240 PSI at 73 Deg F Sustainable Maximum Operating Pressure

Gas - 150 PSI at 73 Deg F Sustainable Maximum Operating Pressure

Suitable for Water, Fluids & Slurry's

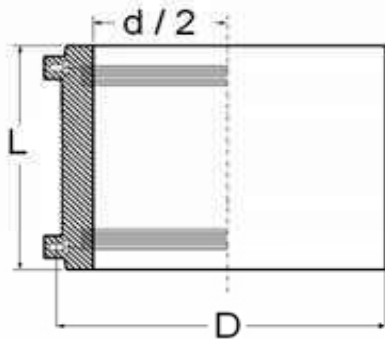
Engineered for PE3408, PE4710 & PE100 HDPE Pipe Systems

Manufactured in accordance with ASTM F-714, ASTM F-1055, ASTM D-2513

ASTM D-3035, ASTM D-3261, ASTM D-3350, AWWA C-901, AWWA C-906

DIN16963, EN1555, EN12201, ISO-9001/2000

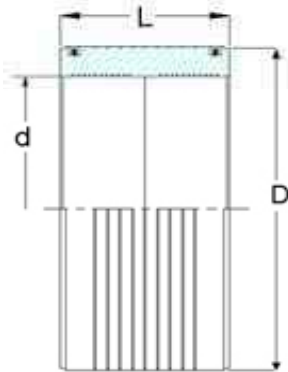
Also suitable for use on IPS SDR13.5, SDR15.5, SDR17 Series HDPE pipe



Style "A"



Style "A"



Style "B"



Style "B"

Nominal Pipe Size	"d & d/2"	"D"	"L"	Unit Weight	Style	Item Code	Note
1/2"	0.840"	1.610"	2.800"	0.060 lbs	A	30.MA1.11.11.0021	
3/4"	1.050"	1.610"	2.800"	0.110 lbs	A	30.MA1.11.11.0026	
1"	1.315"	1.890"	3.230"	0.160 lbs	A	30.MA1.11.11.0033	
1 1/4"	1.660"	2.170"	3.390"	0.180 lbs	A	30.MA1.11.11.0042	
1 1/2"	1.900"	2.640"	3.860"	0.350 lbs	A	30.MA1.11.11.0048	
2"	2.375"	3.150"	4.210"	0.490 lbs	A	30.MA1.11.11.0060	
2 1/2"	2.875"	3.820"	4.645"	0.770 lbs	A	30.MA1.11.11.0073	
3"	3.500"	4.530"	5.910"	1.330 lbs	A	30.MA1.11.11.0088	

4"	4.500"	5.590"	6.690"	1.860 lbs	A	30.MA1.11.11.0114	
5"	5.563"	7.090"	6.730"	3.530 lbs	A	30.MA1.11.11.0141	
6"	6.675"	8.070"	7.280"	5.510 lbs	A	30.MA1.11.11.0169	
7"	7.125"	9.060"	7.560"	5.650 lbs	A	30.MA1.11.11.0180	
8"	8.625"	10.830"	8.030"	8.990 lbs	A	30.MA1.11.11.0219	*
10"	10.750"	13.580"	8.660"	14.990 lbs	B	30.MA1.11.11.0273	
12"	12.750"	15.550"	9.060"	19.530 lbs	B	30.MA1.11.11.0323	*
14"	14.000"	17.520"	10.000"	29.130 lbs	B	30.MA1.11.11.0355	
16"	16.000"	19.490"	11.810"	39.810 lbs	B	30.MA1.11.11.0406	*
18"	18.000"	21.810"	12.600"	52.040 lbs	B	30.MA1.11.11.0457	*
20"	20.000"	24.210"	14.410"	73.070 lbs	B	30.MA1.11.11.0508	*
22"	22.000"	27.170"	15.750"	108.880 lbs	B	30.MA1.11.11.0558	*
24"	24.000"	29.720"	15.750"	131.860 lbs	B	30.MA1.11.11.0609	
26"	26.000"	32.280"	17.320"	132.720 lbs	B	30.MA1.11.11.0660	**
28"	28.000"	34.650"	17.520"	198.580 lbs	B	30.MA1.11.11.0711	**
30"	30.000"	37.010"	17.520"	223.980 lbs	B	30.MA1.11.11.0762	*
32"	32.000"	39.170"	18.500"	257.200 lbs	B	30.MA1.11.11.0812	*
34"	34.000"	42.130"	19.690"	318.260 lbs	B	30.MA1.11.11.0863	
36"	36.000"	44.090"	19.690"	310.570 lbs	B	30.MA1.11.11.0914	*
42"	42.000"	51.180"	19.690"	456.000 lbs	B	30.MA1.11.11.1066	*

These couplers can be fused to SDR9 pipe by using Special Bar Code. Contact Strongbridge before fusing to SDR9 pipe

Reducing Couplers In This Series Available Under Special Request

* 200 psi (240 psi under special order)

** 220 psi (240 psi under special order)

STRONGBRIDGE INTERNATIONAL INC.

10920 Baymeadows Road, Unit 27-302
 Jacksonville, FL 32256
 Phone: (904) 607-6384 Fax:(904) 565-2776
www.strongbridge.us

STRONGBRIDGE INTERNATIONAL (CANADA) INC.

200 North Service Road West, Unit 1 Suite 381
 Oakville, Ontario L6M 2Y1
 Phone (416) 795-8962
www.strongbridgecanada.com

TEGA ELECTROFUSION FITTINGS MAY ONLY BE INSTALLED BY TECHICIANS CERTIFIED BY STRONGBRIDGE INTERNATIONAL INC. OR ITS DESIGNATED AND APPROVED AGENTS. CONTACT STRONGBRIDGE INTERNATIONAL FOR CURRENT CERTIFICATION DETAILS AND REQUIREMENTS.

Copyright 2009 Strongbridge International Inc. All rights reserved. Information subject to change without notice. E. & O.E.
 Subject to Strongbridge International Inc. Limited Warranty, available at www.strongbridge.us

AMERICAN AVK RESILIENT SEATED GATE VALVE, 250 PSI

66/EEN

Meets AWWA C515 where applicable (NRS)

PExPE

- DIPS & IPS Polyethylene Pipe Ends - Valve Sizes 2" through 12"

Use:

For water and neutral liquids to maximum 160°F.

Tests:

Hydraulic test to AWWA C515:

Shell Test: 500 PSI

Seat Test: 250 PSI

Operating Torque Test

Optional Materials:

Stem Bronze

Anti Friction Washers Polyamide - W/ Bronze stem only

Bolts Stainless Steel - 316

Pipe 2"- 3"
SDR 9, SDR 11, SDR 13.5, SDR 17
4"-12"
SDR 9, SDR 11, SDR 13.5
DIPS or IPS. Suitable for butt fusion
or electro fusion joining. Pipe stubs
to AWWA C906.
**Specify IPS or DIPS, and
SDR when placing order.**

Standard Materials:

Body, Gland Flange Ductile iron ASTM A536
Bonnet

Coating Electrostatically applied fusion-
bonded epoxy-resin

Wrench Nut Ductile iron ASTM A536
- painted black for open left,
red for open right.

Stem Standard: Stainless steel ASTM A582

Wedge Ductile iron ASTM A536 encapsulated
with EPDM-rubber compound

Wedge Nut,
Thrust Collar Bronze

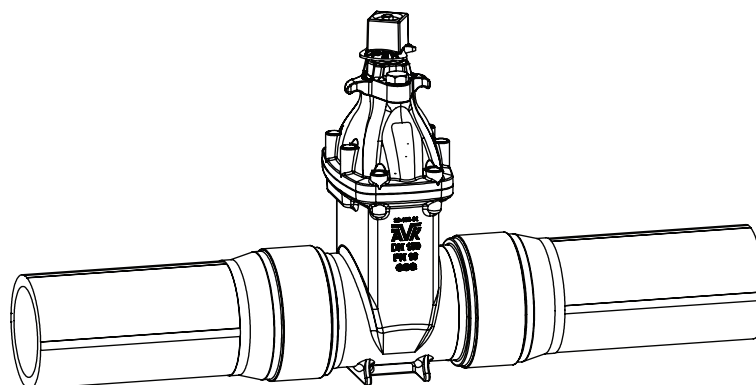
Bolts Stainless Steel -304 sealed with
hot melt

Bonnet Gasket,
Wiper Ring,
O-Ring Stem Seals,
O-Ring Gland Seal ASTM D2000 Buna "N" nitrile
rubber

Pipe PE 3408 or PE 4710. Suitable for butt
fusion or electro fusion joining. Pipe
stubs to AWWA C906

Approvals:

Certified to:
ANSI/NSF 61, ANSI/NSF 372

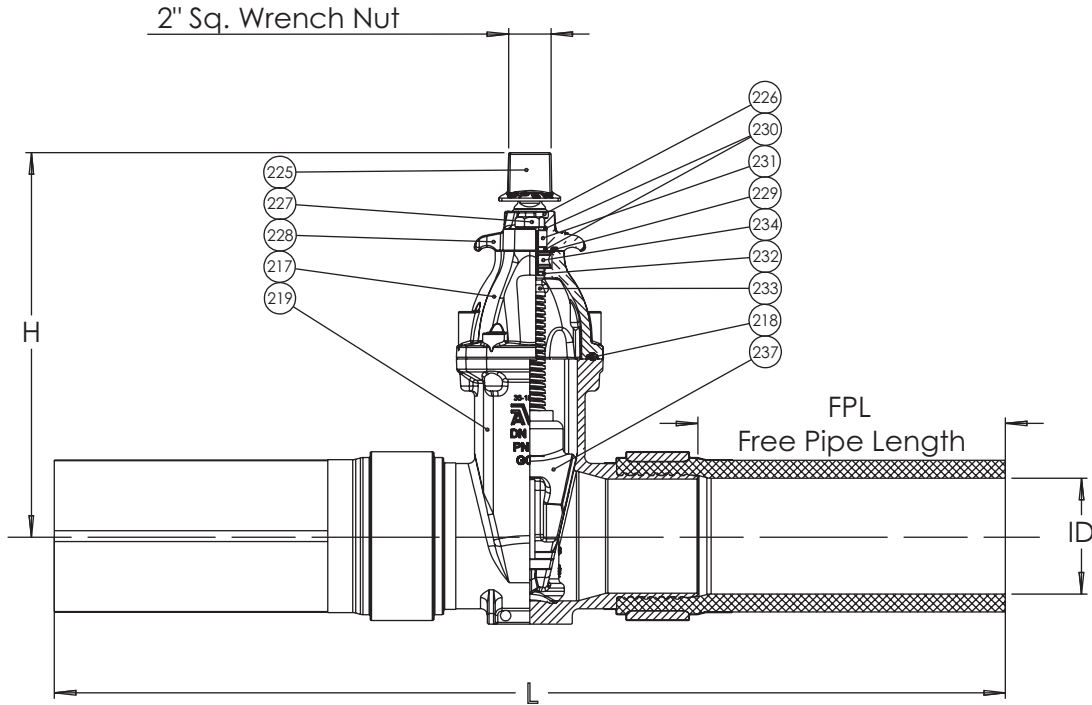


AMERICAN AVK RESILIENT SEATED GATE VALVE, 250 PSI
Meets AWWA C515 where applicable (NRS)
- DIPS & IPS Polyethylene Pipe Ends - Valve Sizes 2" through 12"

66/EEN
PEXPE

Component List:

- | | | |
|--------------------|------------------------------|-----------------------------|
| 217. Bonnet | 227. Gland Flange Bolt | 232. Lower Stem Seal O-Ring |
| 218. Bonnet Gasket | 228. Gland Flange | 233. NRS Stem |
| 219. Body | 229. Gland O-Ring | 234. Thrust Collar |
| 225. Wrench Nut | 230. Upper Stem Seal O-Rings | 237. Wedge |
| 226. Wiper Ring | 231. Stem Seal Bushing | |



Ref. nos.	Size	H	L	FPL Free Pipe Length	Turns to open	Wt. Lbs.
66-050-EEN	2"	11.50"	19.50"	5.10"	11	20
66-080-EEN	3"	15.50"	19.75"	5.20"	12	36
66-100-EEN	4"	17.50"	41.93"	14.92"	14	56
66-150-EEN	6"	22.00"	43.35"	14.00"	21	114
66-200-EEN	8"	27.50"	44.06"	13.04"	26	175
66-250-EEN	10"	31.50"	44.96"	11.25"	32	227
66-300-EEN	12"	37.00"	47.09"	11.14"	38	335

ID*: Refer to Pipe Manufacturers reference tables





Polyvalve®

an ANDRONACO INDUSTRIES company

Applications:

For use in:

- Potable Water
- Water and Wastewater
- Irrigation
- Storm Sewer
- Gravity Sewer
- Geothermal

POLY-WATER® VALVES

POLYETHYLENE VALVES FOR WATER APPLICATIONS

www.PolyvalveUSA.com



Made in the USA



16"

FULL PORT

The Original Is Still The Best!
Over 3,000,000 Sold!

Formerly known as



NORDSTROM®
POLYVALVE®

Nordstrom® is a registered trademark of Flowserve®

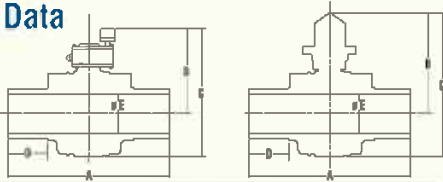


Poly-Valve® Valve Availability

Poly-Valve® Valve Availability Chart (Ball Valves for Potable Water, Wastewater, and Irrigation)

Size (Inches)	Size (Metric)	Body Pieces	Bore	C _v	K _v	Equivalent Feet of Pipe	Available SDRs
1/8	16 - 20	2	full	18	260	2	9, 11
1/4	25	2	full	25	361	3.2	9, 10, 11
1	32	2	full	40	577	3.8	9, 11, 13, 5
1 1/4	40	2	full	-	-	-	9, 10, 11, 13, 5, 17
	40	2	standard	45	649	9.6	9, 10, 11, 13, 5
1 1/2	50	2	full	-	-	-	9, 11, 13, 5, 17
2	55 - 63	3	full	175	2528	3.8	9, 11, 17
	50 - 63	2	standard	110	1586	9.6	9, 11, 17
3	90	3	full	390	5624	5.3	9, 11, 13, 5, 17
	90	3	standard	240	3461	14.1	9, 11, 13, 5, 17
4	100 - 110 - 125	3	full	700	10094	5.8	9, 11, 13, 5, 17
	100 - 110 - 125	3	standard	400	5768	17.8	9, 11, 13, 5, 17
6	150 - 160 - 180	3	full	1800	25957	6.1	9, 11, 13, 5, 17
	160	3	standard	900	12978	24.3	9, 11, 13, 5, 17
8	200 - 225	3	full	3650	52633	5.5	9, 11, 13, 5, 17
	200 - 225	3	standard	1350	19467	40.3	9, 11, 13, 5, 17
10	250 - 280	3	full	-	-	-	9, 11, 13, 5, 17
12	315	3	full	7000	73542	10.6	9, 11, 13, 5, 17
14	355	3	full	-	-	-	11, 13, 5, 17
	355	3	standard	-	-	-	9, 11, 13, 5, 17
16	400	3	full	-	-	-	9, 11, 13, 5, 17
	400	3	standard	-	-	-	9, 11, 13, 5, 17

Dimension Data



Notes:

- C_v in US gal/min @ 1 psi ΔP
- K_v in litres/min @ 1 bar ΔP
- For applications not listed, please contact Polyvalve for valve recommendations.
- Flanges, PUPS, T-Handles, etc., available upon request.

ANSI Valve Dimensions

Size	Port	A	B	C	D	E	Weight (lbs.)
1/8	full	10.0	3.4	4.8	2.8	0.50	1.2
1/4	full	10.0	3.4	4.8	2.8	0.75	1.2
1	full	10.0	3.4	4.8	2.8	0.90	1.2
1 1/4	full	13.0	4.5	6.5	3.7	1.30	3.1
	standard	10.0	3.4	4.8	2.8	0.90	1.2
1 1/2	full	13.0	4.5	6.5	3.7	1.30	3.1
2	full	14.7	6.4	9.1	4.2	1.82	3.8
	standard	13.0	4.5	6.5	3.7	1.30	3.1
3	full	15.0	8.0	11.4	3.5	2.50	8.9
	standard	12.8	6.4	9.1	3.6	1.95	4.5
4	full	20.0	10.4	15.0	3.1	3.62	19.5
	standard	15.0	8.0	11.4	3.8	2.50	8.9
6	full	21.0	12.6	18.6	3.9	5.20	38.0
	standard	20.0	10.4	15.0	5.3	3.62	23.0
8	full	29.0	12.5	19.9	7.0	6.30	61.0
	standard	20.0	12.6	18.6	4.5	4.78	42.5
Gear Operated							
8	full	69.8	14.8	22.2	24.0	6.6	134
10	full	55.25	17.5	27.7	15.75	10	251
12	full	83.8	17.5	27.7	30.0	10	305
14	full	88.3	20.2	32.6	28.0	11.5	365
	standard	55.25	17.5	27.7	15.75	10.0	261
16	full	88.3	20.2	32.6	28.0	11.5	365
	standard	55.25	17.5	27.7	15.75	10.0	275

PRESSURE RATINGS

Pipe SDR	73°F	100°F	120°F	140°F
7	333	280	243	210
9	250	210	183	158
11	200	168	146	126
13.5	160	134	117	101

MATERIALS

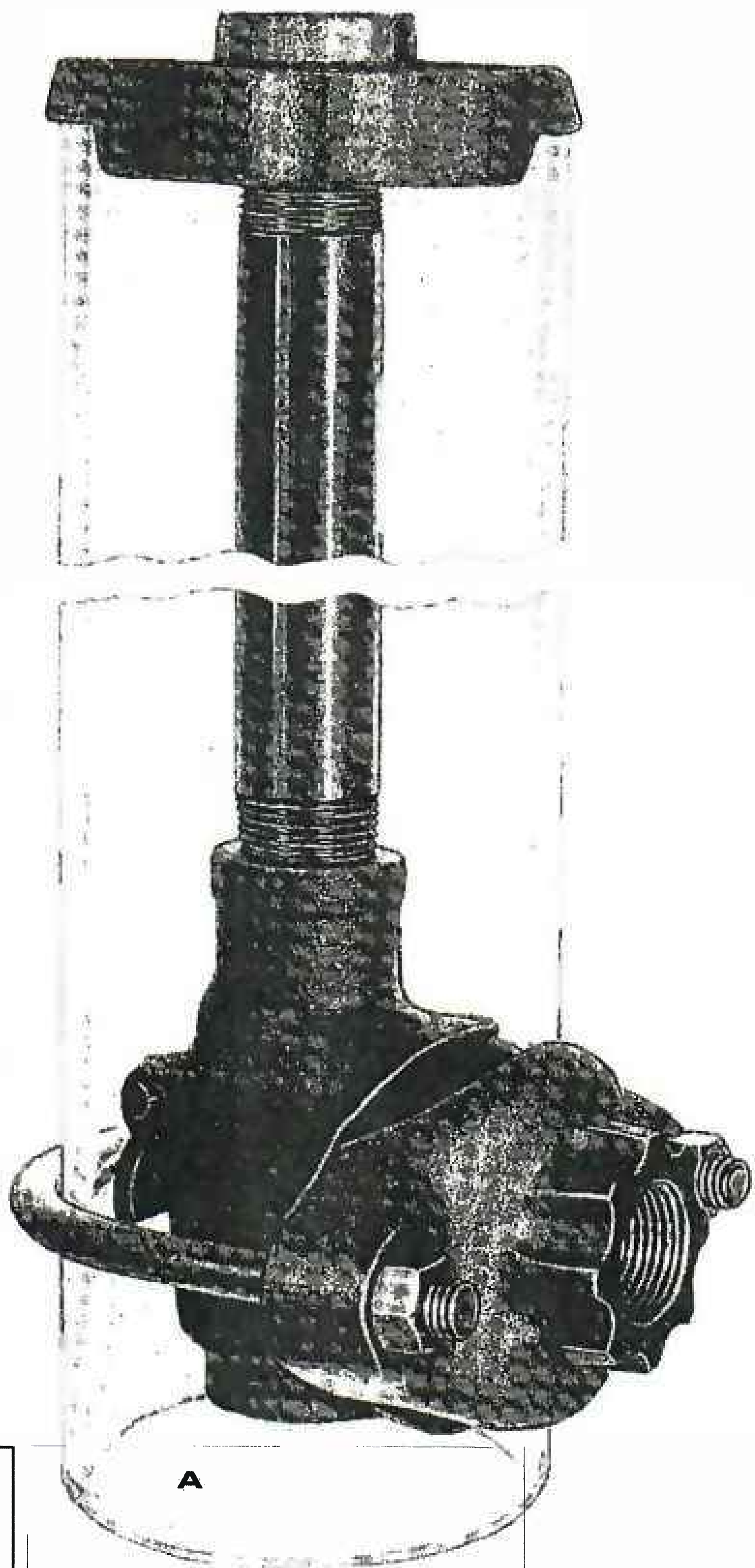
Item	Potable Water NSF / ANSI 61	
	1/2 - 2"	2" - 16"
Body	Polyethylene	
Adapler	Polypropylene	
Ground Water Seal	Neoprene	
Seat & Stem Seal	EPDM	
Ball	Acetal	Polypropylene
Seat Retainer	Acetal	Polypropylene
Stem	Stainless Steel	Modified Phenylene Oxide
Wastewater		
Body	Polyethylene	
Adapler	Polypropylene	
Ground Water Seal	Neoprene	
Seat & Stem Seal	VKM (Viton)	
Ball	Acetal	Polypropylene
Seat Retainer	Acetal	Polypropylene
Stem	Stainless Steel	Modified Phenylene Oxide
Irrigation		
Body	Polyethylene	
Adapler	Polypropylene	
Ground Water Seal	Neoprene	
Seat & Stem Seal	Buna-N	
Ball	Acetal	Polypropylene
Seat Retainer	Acetal	Polypropylene
Stem	Stainless Steel	Acetal





WELLS, INC.

SERIES SAFETY-SEAL (SUBMERSIBLE) PITLESS ADAPTER



A

EASY TO INSTALL

Manufactured to rigid specifications. Constructed of quality brass casting and stainless steel for years of service-free use. Designed to meet and surpass the strictest installation codes. Easy to install... no expensive tools needed. Outstanding features include:

- Positive, sanitary seal under pressure.
- Casing is absolutely clear when pump is pulled.
- No metal to metal freeze-up, regardless of time pump has been installed.
- Support bridge protects against loss of pump.
- Easy guide for reinstallation, no fishing to connect adapter parts.
- Hole in casing wall and I.D. of delivery pipe are same. Eliminates need for cutting larger hole.
- Good for plastic casing — lock lever hits directly across from U Bolt.

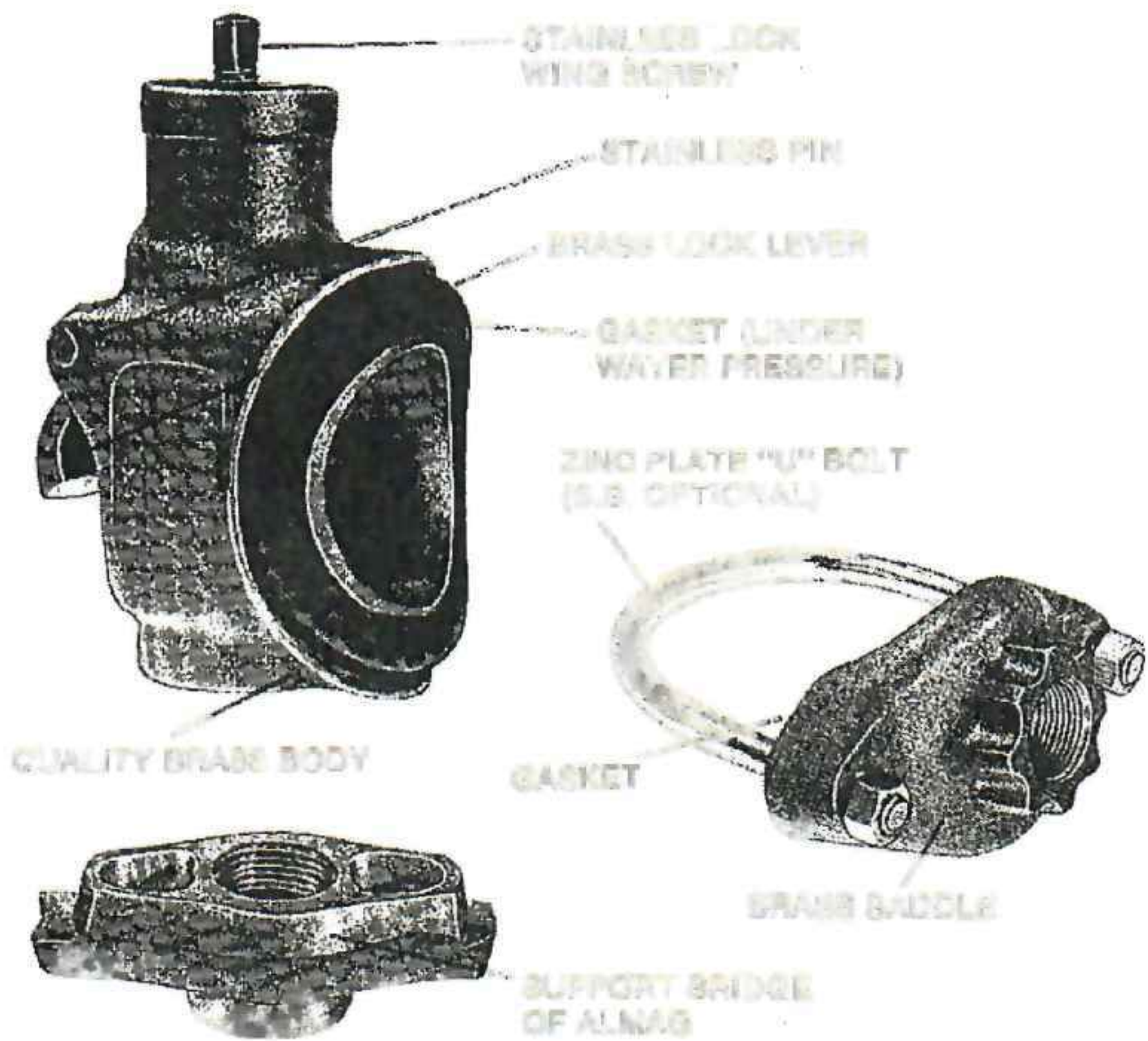


ENVIRONMENTAL

Manufactured to rigid specifications. Constructed of quality brass casting and stainless steel for years of service-free use. Designed to meet and surpass the strictest installation codes. Easy to install... no expensive tools needed. Outstanding features include:

- Positive, sanitary seal under pressure.
- Casing is absolutely clear when pump is pulled.
- No metal to metal freeze-up, regardless of time pump has been installed.
- Support bridge protects against loss of pump.
- Easy guide for reinstallation, no fishing to connect adapter parts.
- Hole in casing wall and I.D. of delivery pipe are same. Eliminates need for cutting larger hole.
- Good for plastic casing — lock lever hits directly across from U Bolt.

SAFETY-SEAL PITLESS ADAPTER (SUBMERSIBLE)



WELL SIZE I.D.	4"	4 1/4"	5"	5 3/8"	6"	6 1/4"
DROP PIPE SIZE	1"	1 1/4"	1 1/2"	1 3/4"	1 3/8"	1 1/2"

FOR MODEL NUMBER, see price list for instructions on how to order.

ALUMINUM WATERTIGHT CONDUIT CAP



E-Z ON ABS SANITARY CONDUIT CAP

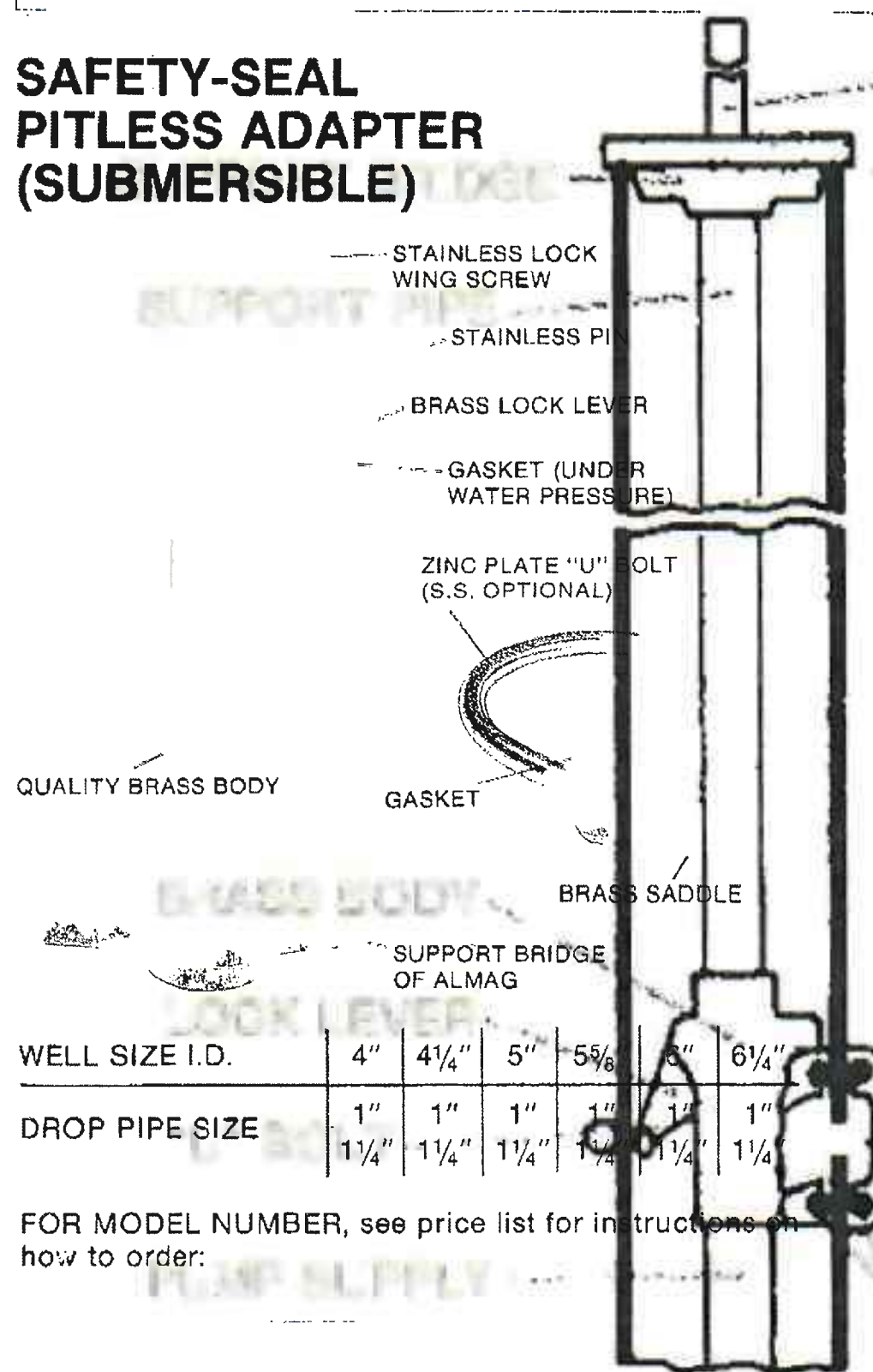


ALUMINUM CONDUIT CAP FOR 1" CONDUIT



SAFETY-SEAL PITLESS ADAPTER (SUBMERSIBLE)

SAFETY-SEAL PITLESS ADAPTER (SUBMERSIBLE)



WELL SIZE I.D.	4"	4 1/4"	5"	5 3/8"	6"	6 1/4"
DROP PIPE SIZE	1"	1 1/4"	1 1/2"	1 3/4"	1 3/8"	1 1/2"

FOR MODEL NUMBER, see price list for instructions on how to order.

ALUMINUM WATERTIGHT CONDUIT CAP



E-Z ON ABS SANITARY CONDUIT CAP



ALUMINUM CONDUIT CAP FOR 1" CONDUIT



3 EASY STEPS

- 1 Cut no larger than 1 1/2" dia. discharge hole in casing.
- 2 File notch in top of casing above discharge hole for alignment of arrow on support bridge and for easy reinstallation if pump must be pulled later.
- 3 Cut 1" galvanized pipe 2 1/2" shorter than dimension "A" (top of casing to center of discharge hole). Thread both ends.
- 4 Assemble pump supply to bottom of brass body, support bridge to top of support pipe. Drop into casing and align into notch.
- 5 Tighten lock lever by using wrench at right. (See FIG. 2)

*This length differs depending on model

WRENCH (1/2" PIPE)

SUPPORT PIPE

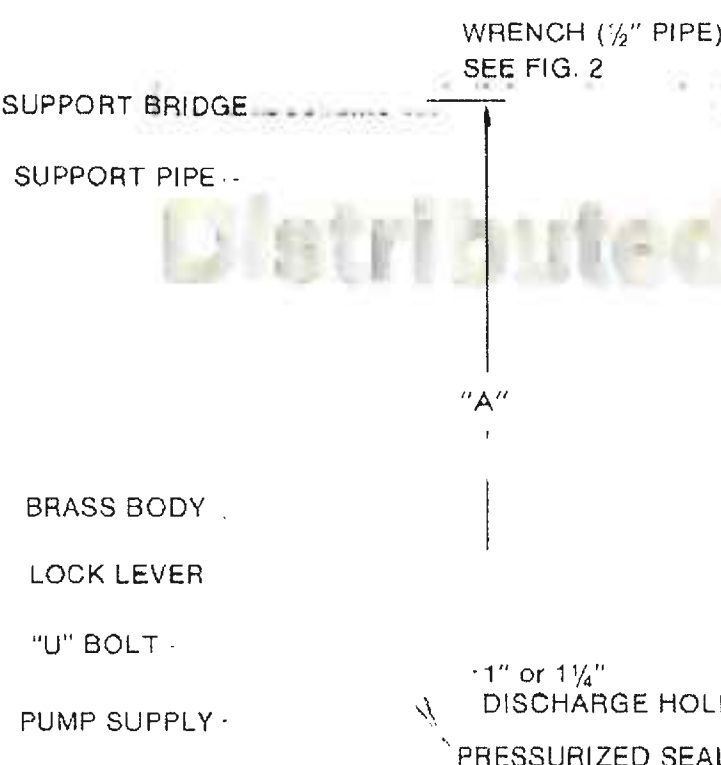
Make your own wrench by cutting 1/2" pipe at least 6" longer than dimension "A" (Figure 1). Use hammer to flatten one end (Figure 3).

Wrench operates inside of support pipe. Turn right to lock unit, turn left to unlock. No problem to engage wing screw. 6" vise grip sufficient to lock unit.

WING SCREW

FIG. 2

SAFETY-SEAL PITLESS ADAPTER (SUBMERSIBLE)



5 EASY STEPS.

- 1 Cut no larger than 1 1/2" dia. discharge hole in casing.
- 2 File notch in top of casing above discharge hole for alignment of arrow on support bridge and for easy reinstallation if pump must be pulled later.
- 3 Cut 1" galvanized pipe 2 1/2" shorter than dimension "A" (top of casing to center of discharge hole). Thread both ends.
- 4 Assemble pump supply to bottom of brass body, support bridge to top of support pipe. Drop into casing and align into notch.
- 5 Tighten lock lever by using wrench at right. (See FIG. 2)

*This length differs depending on model

Make your own wrench by cutting 1/2" pipe at least 6" longer than dimension "A" (Figure 1). Use hammer to flatten one end (Figure 2).

Wrench operates inside of support pipe. Turn right to lock unit, turn left to unlock. No problem to engage wing screw. 6" vise grip sufficient to lock unit.

WING SCREW

FIG. 2

FIG. 1

Distributed by:



RemotePro®

DATA SHEET

Outdoor Remote Power Systems

Features

- Complete Remote Power Solution for Off-Grid operation
- Weatherproof, UV resistant, outdoor enclosures
- Enclosures can be Wall or Pole Mounted
- High Performance Valve Regulated Sealed Lead Acid Batteries
- Advanced battery charge controller protects against overcharge and over discharge

Applications

- Wireless Base Stations and Clients
- Surveillance Cameras
- Wireless Bridge and Repeaters
- Remote Sensors
- Remote Lighting
- Backup Power Systems

Description

The RemotePro® series outdoor power systems are designed for applications that require a primary off-grid power source to run various electronics. The sealed and weatherproof enclosures have extra space available inside for customer electronics.

All enclosures are hinged and gasket sealed. The PL enclosure can accept a padlock or tamper seal. The ST enclosure is equipped with 2 tamper proof closures that are operated by a special key (included).

The enclosures can be mounted to a wall or pole with the included mounting bracket system.

The high quality solar panels have a 25year power output guarantee. The 5W and 10W solar panels are mounted directly to the DC enclosure saving space and making a more convenient assembly. The larger solar panels can be mounted to a 51mm to 101mm (2" to 4") diameter pole or alternately to a wall with the included bracket kit.

Features include an advanced battery charge controller to protect against over-charging or over-discharging of the valve regulated sealed lead acid batteries. Most of the PL and ST systems include a controller with built in POE inserter and DCDC converter to supply up to 48V PoE from the 12V battery system. Enclosures have multiple ports for CAT5 cable, antenna cables/connectors or other cabling. They are vented to prevent residual buildup of hydrogen gas.

Batteries in the DC and PL enclosures are an Advance Glass Matt (AGM) type which have good all temperature performance. The ST enclosure uses a high performance GEL battery which gives the best available deep discharge and temperature performance.



RemotePro®
PL Series

RemotePro® DC
Series



RemotePro®
ST Series

Specifications

	RPDC12-9-05	RPDC12-9-10	RPPL12xx-36-30	RPPL24xx-18-30	RPST12xx-100-70	RPST12xx-100-140	RPST24xx-50-140	RPST24xx-100-280	RPST12-200-280	RPST24-100-280
Rated Power Generation	1.25W	2.5W	8W	8W	17W	25W	25W	50W	50W	50W
Reserve Time @ Rated Power	40hrs	21hrs	27hrs	27hrs	35hrs	24hrs	24hrs	24hrs	24hrs	24hrs
POE Output Voltage (DC)	No POE Out		12V1A 18V1.7A 24V1.2A 48V.62A	24V 1A 48V .62A	12V1A 18V1.7A 24V1.2A 48V.62A	12V1A 18V1.7A 24V1.2A 48V.62A	24V 1A 48V .62A		No POE Out	
Secondary Volts Out (DC)	12V 20A		12V 1.5A	24V 1.5A	12V 1.5A	12V 1.5A	24V 1.5A		12V 20A	24V 20A
Battery Capacity (Amp Hrs)	9Ah		36Ah	18Ah	102Ah	102Ah	51Ah	102Ah	204Ah	102Ah
Battery Voltage (DC)	12V			24V	12V	12V	24V		12V	24V
Battery Type	Valve Regulated Sealed Lead Acid / Absorbent Glass Mat (AGM)				Valve Regulated Sealed Lead Acid GEL					
Battery Life	5 Years									
Controller Type	PWM		Dual Input: Solar/POE, Dual Output: Battery Voltage/POE with DCDC Converter					PWM		
Overcharge Protection	14.4V			28.6V	14.4V	14.4V	28.6V		14.4V	28.6V
Over-discharge protection	11.0V			22.0V	11.0V	11.0V	22.0V		11.0V	22.0V
Over-discharge recovery volts	12.0V			24.8V	12.0V	12.0V	24.8V		12.0V	24.8V
Controller Self Consumption	<0.5W									
Enclosure Type	Die Cast Aluminum		Polycarbonate		Powder Coat Steel					
Enclosure External Size	11 x 8.5 x 3.5" (279x216x89mm)		17.5 x 12.5 x 6" (445x318x152mm)		24 x 15 x 14" (610 x 381 x 356mm)					
Enclosure Internal Size	10 x 7.75 x 3" (254x197x76mm)		14 x 10 x 5" (356x254x127mm)		23 x 14 x 12" (584 x 356 x 305mm)					
Space available for Customer Electronics	7.75 x 5 x 1.25" (197x127x32mm)		3 x 5 x 3" (76x127x76mm)		12 x 12 x 12" (305 x 305 x 305mm)			3" X 10" X 20" (76 X 254 X 508mm)		
Solar Panel Dims	11" X 9" (279 x 228 mm)	14"X12" (355 x 305mm)	21" X 20" (533 x 508mm)		30" X 27" (762 x 686mm)	61" X 27" (1549 x 686mm)		61" X 54" (1549 x 1372mm)		
Operating Temperature	-30°C to +60°C (-22°F to 140°F)									
System Weight (no batteries)	10lb (4.5kg)		22lb (10kg)		84lb (38kg)	105lb (48kg)		131lb (59kg)		
Battery Weight	5.5lb (2.5kg)		22lb (10kg)		78lb (35kg)			156lb (71kg)		
Wind Speed Rating	110MPH (49m/s)					90MPH (40m/s)				
Warranty	3 Years									



System Ordering:

Model #	Continuous Power Generation	Enclosure Type	Battery Voltage	PoE Output Voltage	Battery Capacity	Solar Panel Size
RPDC12-9-05	1.25W	Die Cast	12VDC	---	9Ah	5W
RPDC12-9-10	2.5W	Die Cast	12VDC	---	9Ah	10W
RPPL1212-36-30	8W	Polycarbonate	12VDC	12VDC	36Ah	30W
RPPL1218-36-30	8W	Polycarbonate	12VDC	18VDC	36Ah	30W
RPPL1224-36-30	8W	Polycarbonate	12VDC	24VDC	36Ah	30W
RPPL1248-36-30	8W	Polycarbonate	12VDC	48VDC	36Ah	30W
RPPL2424-18-30	8W	Polycarbonate	24VDC	24VDC	18Ah	30W
RPST1212-100-70	17W	Steel	12VDC	12VDC	102Ah	70W
RPST1218-100-70	17W	Steel	12VDC	18VDC	102Ah	70W
RPST1224-100-70	17W	Steel	12VDC	24VDC	102Ah	70W
RPST1248-100-70	17W	Steel	12VDC	48VDC	102Ah	70W
RPST1212-100-140	25W	Steel	12VDC	12VDC	102Ah	140W
RPST1218-100-140	25W	Steel	12VDC	18VDC	102Ah	140W
RPST1224-100-140	25W	Steel	12VDC	24VDC	102Ah	140W
RPST1248-100-140	25W	Steel	12VDC	48VDC	102Ah	140W
RPST2424-50-140	25W	Steel	24VDC	24VDC	51Ah	140W
RPST2448-50-140	25W	Steel	24VDC	48VDC	51Ah	140W
RPST12-200-280	50W	Steel	12VDC	---	204Ah	280W
RPST24-100-280	50W	Steel	24VDC	---	102Ah	280W
RPST2424-100-280	50W	Steel	24VDC	24VDC	102Ah	280W
RPST2448-100-280	50W	Steel	24VDC	48VDC	102Ah	280W

RPST 12 48-100-70Enclosure Type

DC - Die Cast Aluminum
 PL - Polycarbonate Plastic
 ST - Powder Coat Steel

Battery Voltage

12 - 12V
 24 - 24V

PoE Out Voltage

12 - 12V
 18 - 18V
 24 - 24V
 48 - 48V

Storage Capacity

9 - 9Ah
 36 - 36Ah
 50 - 51Ah
 100 - 102Ah

Solar Panel Output

05 - 5 Watt
 10 - 10 Watt
 30 - 30 Watt
 70 - 70 Watt
 140 - 140 Watt
 280 - 280 Watt

For further information contact:Tyconsystems.com

14641 S 800 W Ste A Bluffdale, UT 84065
 PH: 801-432-0003 FAX: 801-618-4220

Steel Well Seals

Blank - No Tappings - Solid Top

- A36 hot roll steel.
- 3/4" molded rubber, 35 Durometer.
- Zinc plated steel bolts.
- Powder coated polyester finish.
- Individually boxed.

MADE IN U.S.A.



3580A



3580B

Nominal Casing Size	Standard Gasket O.D.	Smaller Gasket O.D.
4	3.95	-
4 1/4 - 4 1/2	4.20	-
5	4.95	4.76
6	5.95	5.72
6 1/4	6.20	5.95
7	6.625	-
8	7.95	7.60
10	9.95	9.75
12	11.95	11.63
14	13.20	-
16	15.20	-

Standard Gasket Part No.	Smaller Gasket Part No.	Well Size I.D.	Cable Hole Tapping	Vent Tapping	Top Plate	Max. Load	Weight Each Lbs.	Carton Quantity
3580A	-	4	3/4	1/2	3/16	2,100	2.2	6
3580B	-	4	-	-	3/16	2,100	2.3	6
3581A	-	4 1/4 -- 4 1/2	3/4	1/2	3/16	2,100	2.3	6
3581B	-	4 1/4 -- 4 1/2	-	-	3/16	2,100	2.4	6
3582A	3582A-T	5	1	1/2	3/16	1,500	3.0	6
3582B	3582B-T	5	-	-	3/16	1,500	3.1	6
3583A	3583A-T	6	1	1/2	3/16	1,100	4.3	6
3583B	3583B-T	6	-	-	3/16	1,100	4.4	6
3584A	3584A-T	6	1	1/2	3/8	9,000	6.1	6
3584B	3584B-T	6	-	-	3/8	9,000	6.3	6
3585A	3585A-T	6 1/4	1	1/2	3/16	1,100	4.3	6
3585B	3585B-T	6 1/4	-	-	3/16	1,100	4.4	6
3586A	3586A-T	6 1/4	1	1/2	3/8	9,000	6.1	6
3586B	3586B-T	6 1/4	-	-	3/8	9,000	6.3	6
3599B	3599B-T	6 5/8	-	-	3/8	9,000	7.2	1
3587A	3587A-T	8	1	1/2	3/8	6,900	10.8	1
3587B	3587B-T	8	-	-	3/8	6,900	11.0	1
3821A	3821A-T	8	1	1/2	5/8	27,000	12.8	1
3821B	3821B-T	8	-	-	5/8	27,000	13.1	1
3588A	3588A-T	10	1	1/2	3/8	3,800	17.6	1
3588B	3588B-T	10	-	-	3/8	3,800	17.8	1
3822A	3822A-T	10	1	1/2	3/4	32,000	20.6	1
3822B	3822B-T	10	-	-	3/4	32,000	21.0	1
3589A	3589A-T	12	1	1/2	3/8	2,800	25.3	1
3589B	3589B-T	12	-	-	3/8	2,800	25.6	1
3823A	3823A-T	12	1	1/2	3/4	22,000	29.3	1
3823B	3823B-T	12	-	-	3/4	22,000	29.8	1
3809A	-	14	1 1/4	1/2	3/4	16,000	49.3	1
3819A	-	16	1 1/4	1/2	3/4	12,500	65.0	1

Special drop pipe sizes, special tappings and eye-bolts available upon request.

SUBMITTAL FOR CHARLOTTE PIPE® PVC SCHEDULE 40 PRESSURE PIPE AND FITTING SYSTEM

Date: _____

Job Name: _____

Location: _____

Engineer: _____

Contractor: _____

► Scope:

This specification covers PVC Schedule 40 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140° F.

► Specification:

Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784.

PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785. Injection molded PVC Schedule 40 fittings shall conform to ASTM D 2466. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. Pipe and fittings shall conform to NSF International Standard 61 or the health-effects portion of NSF Standard 14.

► Installation:

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM F 1668. Solvent cement joints shall be made in a two-step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation. **WARNING!** Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.

► Referenced Standards:

ASTM D 1784: Rigid Vinyl Compounds
 ASTM D 1785: PVC Plastic Pipe, Schedule 40
 ASTM D 2466: PVC Plastic Fittings, Schedule 40
 ASTM D 2564: Solvent Cements for PVC
 Pipe and Fittings

ASTM F 1668: Procedures for Buried Plastic Pipe
 NSF Standard 14: Plastic Piping Components & Related Materials
 NSF Standard 61: Drinking Water System Components –
 Health Effects



Schedule 40 Tapered Socket Dimensions

PVC SCHEDULE 40 - ASTM D 2466

Nominal Size	Schedule 80 and Schedule 40 Socket Diameter			Schedule 80 Socket Length C (Minimum)	Schedule 40 Socket Length C (Minimum)
	Entrance A	Bottom B	Tolerance		
1/2	0.848	0.836	±0.004	0.875	0.688
3/4	1.058	1.046	±0.004	1.000	0.719
1	1.325	1.310	±0.005	1.125	0.875
1 1/4	1.670	1.655	±0.005	1.250	0.938
1 1/2	1.912	1.894	±0.006	1.375	1.094
2	2.387	2.369	±0.006	1.500	1.156
2 1/2	2.889	2.868	±0.007	1.750	1.750
3	3.516	3.492	±0.008	1.875	1.875
4	4.518	4.491	±0.009	2.250	2.000
6	6.647	6.614	±0.011	3.000	3.000
8	8.655	8.610	±0.015	4.000	4.000
10	10.780	10.735	±0.015	5.000	5.000
12	12.780	12.735	±0.015	6.000	6.000

PIPE REFERENCE GUIDE

Product	Sizes Available															
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16
PVC Schedule 40	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Not all fitting patterns shown

SUBMITTAL FOR CHARLOTTE PIPE® PVC SCHEDULE 40 SOLID WALL PIPE AND PVC DWV FITTING SYSTEM

Date: _____

Job Name: _____

Location: _____

Engineer: _____

Contractor: _____

► Scope:

This specification covers PVC Schedule 40 solid wall pipe and **PVC DWV fittings** used in sanitary drain, waste and vent (DWV), sewer and storm drainage applications. This system is intended for use in non-pressure applications where the operating temperature will not exceed 140° F.

► Specification:

Pipe shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784. PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665. Injection molded PVC DWV fittings shall conform to ASTM D 2665. Fabricated PVC DWV fittings shall conform to ASTM F 1866. All pipe and fittings shall be manufactured in the United States. All systems shall utilize a separate waste and vent system. Pipe and fittings shall conform to NSF International Standard 14.

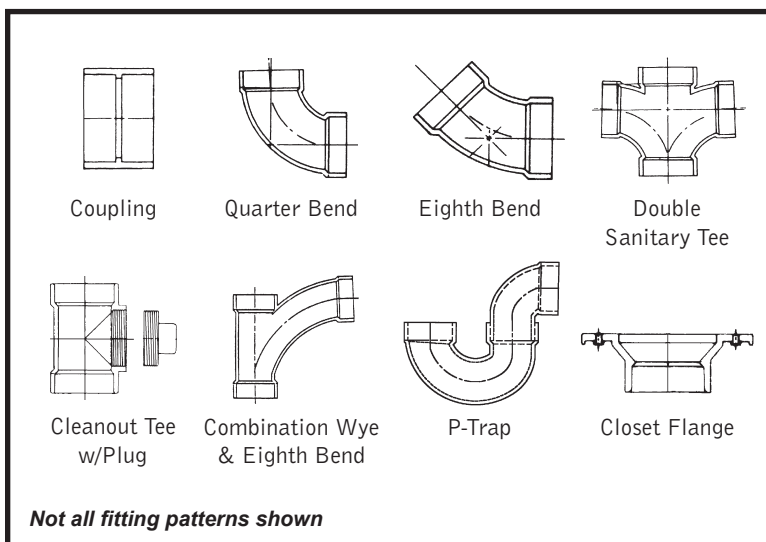
► Installation:

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM D 2321 and ASTM F 1668. Solvent cement joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation.

WARNING! Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.

► Referenced Standards:

- ASTM D 1784: Rigid Vinyl Compounds
- ASTM D 1785: PVC Plastic Pipe, Schedule 40
- ASTM D 2665: PVC Drain, Waste and Vent Pipe and Fittings
- ASTM D 2564: Solvent Cements for PVC Pipe and Fittings
- ASTM D 2321: Underground Installation of Thermoplastic Pipe (non-pressure applications)
- ASTM F 656: Primers for PVC Pipe and Fittings
- ASTM F 1668: Procedures for Buried Plastic Pipe
- ASTM F 1866: Fabricated PVC DWV Fittings
- NSF Standard 14: Plastic Piping Components and Related Materials



PVC Schedule 40 DWV Pipe						
PVC Schedule 40 DWV Pipe (NSF)						
PVC SCHEDULE 40 (WHITE)		PLAIN END		PVC 1120		ASTM D 2665
PART NO.	NOM. SIZE	UPC #	QTY. PER SKID	AVG. OD (IN.)	MIN. WALL (IN.)	WT. PER 100 FT. (LBS.)
PVC 7100*	1 1/4" x 10'	03945	2120'	1.660	.140	42.4
PVC 7100*	1 1/4" x 20'	03946	4240'	1.660	.140	42.4
PVC 7112*	1 1/2" x 10'	03947	1650'	1.900	.145	51.8
PVC 7112*	1 1/2" x 20'	03948	3300'	1.900	.145	51.8
PVC 7200*	2" x 10'	03949	1110'	2.375	.154	69.5
PVC 7200*	2" x 20'	03950	2220'	2.375	.154	69.5
PVC 7300*	3" x 10'	03951	1040'	3.500	.216	144.2
PVC 7300*	3" x 20'	03952	920'	3.500	.216	144.2
PVC 7400†	4" x 10'	03953	600'	4.500	.237	205.5
PVC 7400†	4" x 20'	03954	1200'	4.500	.237	205.5
PVC 7500†	5" x 20'	04837	760'	5.563	.258	272.5
PVC 7600†	6" x 10'	03955	280'	6.625	.280	361.2
PVC 7600†	6" x 20'	03956	560'	6.625	.280	361.2
PVC 7800†	8" x 10'	13087	180'	8.625	.322	543.6
PVC 7800†	8" x 20'	03958	360'	8.625	.322	543.6
PVC 7910†	10" x 20'	03959	220'	10.750	.365	770.7
PVC 7912†	12" x 20'	03961	120'	12.750	.406	1019.0
PVC 7914†	14" x 20'	04862	60'	14.000	.437	1205.0
PVC 7916†	16" x 20'	04918	60'	16.000	.500	1575.7

* Dual Marked ASTM D 1785 & ASTM D 2665.
† Triple Marked ASTM D 1785 & ASTM D 2665 & ASTM F 480.



Performance Engineered & Tested



SPEARS® Schedule 40 PVC fitting designs combine years of proven experience with computer generated stress analysis to yield the optimum physical structure and performance for each fitting. Material reinforcement is uniformly placed in stress concentration areas for substantially improved pressure handling capability. Resulting products are subjected to numerous verification tests to assure the very best PVC fittings available.

Full 1/4" Through 12" Availability

Spears® comprehensive line of PVC fittings offers a variety of injection molded configurations in Schedule 40 sizes 1/4" through 12" conforming to ASTM D 2466.

Exceptional Chemical & Corrosion Resistance

Unlike metal, PVC fittings never rust, scale, or pit, and will provide many years of maintenance-free service and extended system life.

High Temperature Ratings

PVC thermoplastic can handle fluids at service temperatures up to 140°F (60°C), allowing a wide range of process applications, including corrosive fluids.

Lower Installation Costs

Substantially lower material costs than steel alloys or lined steel, combined with lighter weight and ease of installation, can reduce installation costs by as much as 60% over conventional metal systems.

Higher Flow Capacity

Smooth interior walls result in lower pressure loss and higher volume than conventional metal fittings.

Additional Fabricated Configurations through 36"

Extra large, hard-to-find, and custom configurations are fabricated from NSF® Certified pipe. Fittings are engineered and tested to provide full pressure handling capabilities according to Spears® specifications.

PVC Valves

SPEARS® PVC Valve products are available for total system compatibility and uniformity.

Advanced Design Specialty Fittings

Spears® wide range of innovative, improved products include numerous metal-to-plastic transition fittings and unions with Spears® patented special reinforced (SR) plastic threads.

1/2" Through 16" Industrial Pipe Availability

Spears® premium quality Industrial CPVC pipe is offered in Schedule 40 White sizes 1/2" through 16".

Sample Engineering Specifications

All PVC Schedule 40 fittings shall be produced by Spears® Manufacturing Company from PVC Type I cell classification 12454, conforming to ASTM D 1784. All injection molded PVC Schedule 40 fittings shall be Certified for potable water service by NSF International and manufactured in strict compliance to ASTM D 2466. All fabricated fittings shall be produced in accordance with Spears® General Specifications for Fabricated Fittings.



The information contained in this publication is based on current information and Product design at the time of publication and is subject to change without notification. Our ongoing commitment to product improvement may result in some variation. No representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications or results to be obtained therefrom. For verification of technical data or additional information not contained herein, please contact Spears® Technical Services Department [West Coast: (818) 364-1611 — East Coast: (678) 985-1263].

General Information

Recommendations For Installers And Users

Plastic piping systems should be **ENGINEERED, INSTALLED and OPERATED** in accordance with **ESTABLISHED DESIGN AND ENGINEERING STANDARDS AND PROCEDURES** for plastic piping systems. Suitability for the intended service application should be determined by the installer and/or user prior to installation of a plastic piping system. **PRIOR TO ASSEMBLY, all piping system components should be inspected for damage or irregularities. Mating components should be checked to assure that tolerances and engagements are compatible. Do not use any components that appear irregular or do not fit properly. Contact the appropriate manufacturer of the component product in question to determine usability. Consult all applicable codes and regulations for compliance prior to installation.**

Solvent Weld Connections — Use quality solvent cements and primers formulated for the intended service application, pipe size and type of joint. While the pipe and fitting materials may be compatible with the intended medium, the solvent cement may not be. Consult the manufacturers for suitability of use. Read and follow the cement and primer manufacturers' applications and cure time instructions thoroughly. Be sure to use the correct size applicator.

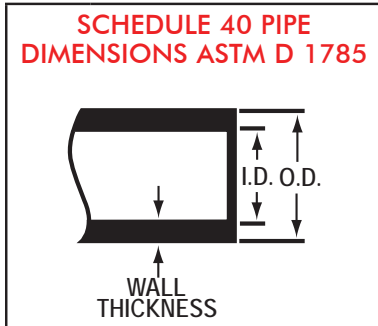
Threaded Connections — Use a quality grade thread sealant. **WARNING: SOME PIPE JOINT COMPOUNDS OR PTFE PASTES MAY CONTAIN SUBSTANCES THAT COULD CAUSE STRESS CRACKING TO PLASTIC.** Spears® Manufacturing Company recommends the use of Spears® **BLUE 75™** Thread Sealant which has been tested for compatibility with Spears® products. Please follow the sealant manufacturers' application / installation instructions. Choice of an appropriate thread sealant other than those listed above is at the discretion of the installer. 1 to 2 turns beyond **FINGER TIGHT** is generally all that is required to make a sound plastic threaded connection. Unnecessary **OVERTIGHTENING** will cause **DAMAGE TO BOTH PIPE AND FITTING.**

"Lead Free" low lead certification – unless otherwise specified, all Spears® Schedule 40 fittings specified here-in are certified by NSF International to ANSI/NSF® Standard 61, Annex G and is in compliance with California's Health & Safety Code Section 116825 (commonly known as AB1953) and Vermont Act 193. Weighted average lead content $\leq 0.25\%$.

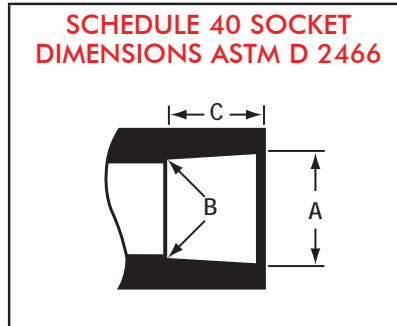


PVC WHITE SCHEDULE 40 FITTINGS UNIONS & SADDLES

ASTM STANDARD DIMENSIONS



Nominal Pipe Size In.	Mean Outside Diameter In.	O. D. Tolerance In.	Minimum Wall Thickness In.
1/8	.405	± .004	.068
1/4	.540	± .004	.088
3/8	.675	± .004	.091
1/2	.840	± .004	.109
3/4	1.050	± .004	.113
1	1.315	± .005	.133
1-1/4	1.660	± .005	.140
1-1/2	1.900	± .006	.145
2	2.375	± .006	.154
2-1/2	2.875	± .007	.203
3	3.500	± .008	.216
4	4.500	± .009	.237
5	5.563	± .010	.258
6	6.625	± .011	.280
8	8.625	± .015	.322
10	10.750	± .015	.365
12	12.750	± .015	.408



Nominal Size In.	Diameter			Socket Length Minimum C
	Entrance A	Bottom B	Tolerance A	
1/8	.417	.401	± .004	.500
1/4	.552	.536	± .004	.500
3/8	.687	.671	± .004	.594
1/2	.848	.836	± .004	.688
3/4	1.058	1.046	± .004	.719
1	1.325	1.310	± .005	.875
1-1/4	1.670	1.655	± .005	.938
1-1/2	1.912	1.894	± .006	1.094
2	2.387	2.369	± .006	1.156
2-1/2	2.889	2.868	± .007	1.750
3	3.516	3.492	± .008	1.875
4	4.518	4.491	± .009	2.000
5	5.583	5.553	± .010	3.000
6	6.647	6.614	± .011	3.000
8	8.655	8.610	± .015	4.000
10	10.780	10.735	± .015	5.000
12	12.780	12.735	± .015	6.000



Nominal Size In.	Threads Per Inch.	Effective Thread Length L	Pitch Of Thread P
1/8	27	.2639	.03704
1/4	18	.4018	.05556
3/8	18	.4078	.05556
1/2	14	.5337	.07143
3/4	14	.5457	.07143
1	11-1/2	.6828	.08696
1-1/4	11-1/2	.7068	.08696
1-1/2	11-1/2	.7235	.08696
2	11-1/2	.7565	.08696
2-1/2	8	1.1375	.12500
3	8	1.2000	.12500
4	8	1.3000	.12500
5	8	1.4063	.12500
6	8	1.5125	.12500
8	8	1.7125	.12500

Molded Schedule 40 products are manufactured to ASTM D 2466 for use with pipe manufactured to ASTM D 1785. Certain products carry reduced pressure handling capability and have maximum internal pressure ratings at 73°F noted.

Fabricated Schedule 40 pressure fittings (part numbers ending with "F") are manufactured to Spears® specifications for use with pipe manufactured to ASTM D 1785. See publication FAB-7, General Specifications for Standard Fabricated Fittings for additional information.

All specified Schedule 40 products are manufactured from materials certified by NSF® for use in potable water service.

PVC WHITE SCHEDULE 40 FITTINGS UNIONS & SADDLES



Injection Molded Dimension References:

- G** = (LAYING LENGTH) intersection of center lines to bottom of socket/thread; 90° elbows, tees, crosses; ± 1/32 inch.
- H** = Intersection of center lines to face of fitting; 90° elbows, tees, crosses; ± 1/32 inch.
- J** = Intersection of center lines to bottom of socket/thread; 45° elbows; ± 1/32 inch

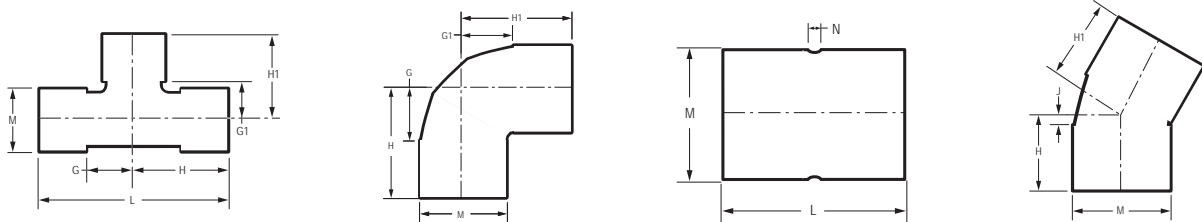
- L** = Overall length of fittings; ± 1/16 inch.
- M** = Outside diameter of socket/thread hub; ± 1/16 inch.
- N** = Socket bottom to socket bottom; couplings; ± 1/16 inch.
- W** = Height of cap; ± 1/16 inch.

Fabricated Dimension References:

- G** = (LAYING LENGTH) intersection of center lines to bottom of socket/thread; 90° elbows, tees, crosses; ± 1/4 inch; 14" & larger ± 1/2 inch.
- H** = Intersection of center lines to face of fitting; 90° elbows, tees, crosses; ± 1/4 inch.; wyes ± 1/2 inch; 14" & larger ± 1/2 inch.
- J** = Intersection of center lines to bottom of socket/thread; 45° elbows; ± 1/4 inch; 14" & larger ± 1/2 inch.

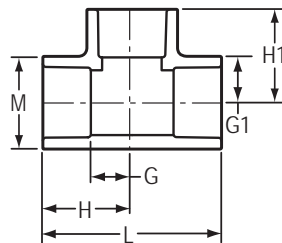
- L** = Overall length of fittings; ± 1/2 inch.; wyes ± 1 inch; 14" & larger ± 1 inch.
- M** = Outside diameter of socket/thread hub; ± 1/4 inch.
- N** = Socket bottom to socket bottom; couplings; ± 1/2 inch.
- W** = Height of cap; ± 1/4 inch.

Typical Fabricated Dimension References



TEE

Socket x Socket x Socket



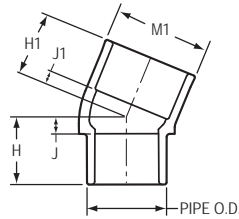
Part Number	Size	G	G1	H	H1	L	M	Approx. Wt. (Lbs.)
401-003	3/8	3/8	3/8	1-1/8	1-1/8	2-1/4	31/32	.04
401-005	1/2	1/2	1/2	1-1/4	1-1/4	2-1/2	1-3/32	.06
401-007	3/4	9/16	9/16	1-9/16	1-9/16	3-1/8	1-5/16	.10
401-010	1	11/16	11/16	1-3/4	1-3/4	3-1/2	1-5/8	.16
401-012	1-1/4	7/8	7/8	2-1/8	2-1/8	4-1/4	2	.25
401-015	1-1/2	1-3/32	1-3/32	2-11/32	2-11/32	4-11/16	2-1/4	.36
401-020	2	1-3/8	1-3/8	2-3/4	2-3/4	5-1/2	2-3/4	.51
401-025	2-1/2	1-21/32	1-21/32	3-13/32	3-13/32	6-13/16	3-11/32	1.03



PVC WHITE SCHEDULE 40 FITTINGS UNIONS & SADDLES

22-1/2° STREET ELBOW

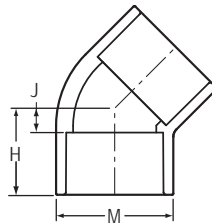
Spigot x Socket



Part Number	Size	H	H1	J	J1	M1	Approx. Wt. (Lbs.)
442-005	1/2	1-1/16	1	1/4	1/4	1-5/32	.05
442-010	1	1-15/32	1-3/8	11/32	9/32	1-11/16	.13
442-012	1-1/4	1-1/2	1-3/8	3/16	1-11/16	2-1/16	.20
442-015	1-1/2	1-21/32	1-7/8	9/32	1/2	2-3/8	.26
442-020	2	2	1-29/32	15/32	13/32	2-7/8	.40
442-025F	2-1/2	4-9/16	1-13/16	13/16	3/16	3-1/4	.81
442-030	3	2-1/2	2-5/16	21/32	7/16	4-5/32	.95
442-040	4	4-3/8	2-7/8	1-7/8	5/8	5-1/4	2.14
442-060	6	5-11/16	3-15/16	2-3/8	7/8	7-5/8	5.87
442-080	8	7-3/8	5-1/8	3-1/8	1-1/8	9-3/4	11.34

45° ELBOW

Socket x Socket



Part Number	Size	H	J	M	Approx. Wt. (Lbs.)
417-005	1/2	1-1/8	11/32	1-3/32	.04
417-007	3/4	1-3/8	7/16	1-5/16	.07
417-010	1	1-1/2	15/32	1-21/32	.11
417-012	1-1/4	1-19/32	3/8	1-31/32	.15
417-015	1-1/2	1-29/32	19/32	2-1/4	.22
417-020	2	2-1/16	11/16	2-3/4	.31
417-025	2-1/2	2-7/16	21/32	3-11/32	.56
417-030	3	2-27/32	27/32	4	.84
417-040	4	3-3/32	1-3/32	5-1/32	1.22
417-045F	4-1/2	4-3/16	1-11/16	5-7/16	1.59
417-050	5	4-3/8	1-3/8	6-1/16	2.41
417-060	6	4-3/4	1-11/16	7-9/32	3.47
417-080	8	6-7/16	2	9-9/32	6.56
417-100	10	8-1/8	3-1/8	11-1/2	20.72



SUBMITTAL FOR CHARLOTTE PIPE® PVC SCHEDULE 80 PRESSURE PIPE AND FITTING SYSTEM

Date: _____

Job Name: _____

Location: _____

Engineer: _____

Contractor: _____

► Scope:

This specification covers PVC Schedule 80 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140° F.

► Specification:

Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784.


PVC Schedule 80 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785. Injection molded PVC Schedule 80 fittings shall conform to ASTM D 2467. PVC Schedule 80 threaded fittings shall conform to ASTM D 2464. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. Pipe and fittings shall conform to NSF International Standard 61 or the health effects portion of NSF Standard 14.


► Installation:


Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with a primer meeting ASTM F 656 and a medium- or heavy-bodied solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation. **WARNING!** Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.


► Referenced Standards:

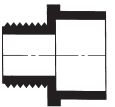
- | | | |
|---|--|---|
| ASTM D 1784: Rigid Vinyl Compounds | ASTM D 2774: Underground Installation of Thermoplastic Pressure Piping |  |
| ASTM D 1785: PVC Plastic Pipe, Schedule 80 | ASTM F 1668: Procedures for Buried Plastic Pipe | |
| ASTM D 2464 or D 2467: PVC Threaded Fittings, Schedule 80 | NSF Standard 14: Plastic Piping Components & Related Materials | |
| ASTM D 2467: PVC Socket Fittings, Schedule 80 | NSF Standard 61: Drinking Water System Components—Health Effects | |
| ASTM D 2564: Solvent Cements for PVC Pipe and Fittings | | |

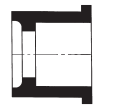

Quarter Bend

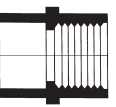

Eighth Bend



Cross



Street Quarter Bend

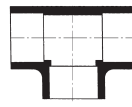

Male Adapter

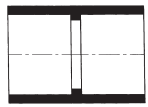

Bushing


Female Adapter


Cap


Plug


Tee


Coupling

Not all fitting patterns shown

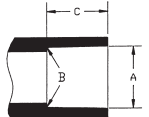
PIPE REFERENCE GUIDE

Product	Sizes Available																	
	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	
PVC Schedule 80	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Schedule 80 Tapered Socket Dimensions

PVC SCHEDULE 80 - ASTM D 2467

Nominal Size	Schedule 80 and Schedule 40 Socket Diameter			Schedule 80 Socket Length C (Minimum)	Schedule 40 Socket Length C (Minimum)
	Entrance A	Bottom B	Tolerance		
1/2	0.848	0.836	±0.004	0.875	0.688
3/4	1.058	1.046	±0.004	1.000	0.719
1	1.325	1.310	±0.005	1.125	0.875
1 1/4	1.670	1.655	±0.005	1.250	0.938
1 1/2	1.912	1.894	±0.006	1.375	1.094
2	2.387	2.369	±0.006	1.500	1.156
2 1/2	2.889	2.868	±0.007	1.750	1.750
3	3.516	3.492	±0.008	1.875	1.875
4	4.518	4.491	±0.009	2.250	2.000
6	6.647	6.614	±0.011	3.000	3.000
8	8.655	8.610	±0.015	4.000	4.000
10	10.780	10.735	±0.015	5.000	5.000
12	12.780	12.735	±0.015	6.000	6.000





**ASTM D3034/IB PVC Gravity Sewer Pipe
GASKETED INTEGRAL BELL**

North American Pipe Corporation's ASTM D3034 Gasketed Integral Bell PVC Pipe product line is manufactured to meet the needs of modern municipal waste water systems, storm water drainage systems, and other non-pressure applications. With top quality raw materials and modern processing technology, our ASTM D3034 pipe meets all industry standards in addition to our own rigorous quality control requirements.

Our D3034 pipe utilizes Rieber style gaskets throughout the entire product offering to create a leak-free joint.



Short Form Specification	
Pipe Standard:	ASTM D3034
Diameter Std.:	PSM
Nominal Sizes:	4", 6", 8", 10", 12", 15"
Dimension Ratios & Pipe Stiffness:	SDR 35 – 46 psi SDR 26 – 115 psi SDR 23.5 – 153 psi
Pressure Ratings:	Not rated for pressure applications
Lay Length:	14' or 20'
Color:	Green
Pipe Compound:	ASTM D1784 Cell Class 12454 or 12364
Pipe Options:	Solid Wall 2 Hole Perforated 3 Hole Perforated
Pipe Joint Std.:	ASTM D3212
Max. Angular Joint Deflection:‡	1°
Gasket Standard:	ASTM F477
Gasket Material Offerings:	Standard – SBR Optional – NBR or EPDM
Certifications:	IAPMO Uniform Plumbing Code*
Installation Std.:	ASTM D2321

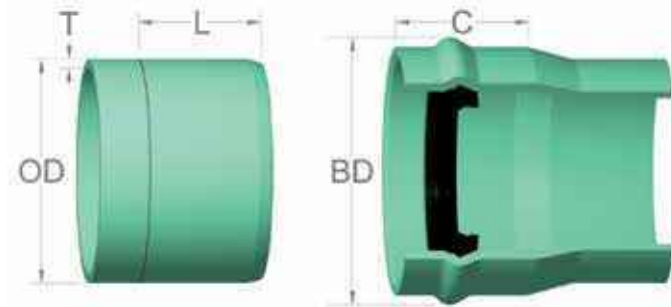
*IAPMO Uniform Plumbing Code listed products must be requested at time of order.

‡See Installation Guide for more information.





**ASTM D3034/IB PVC Gravity Sewer Pipe
GASKETED INTEGRAL BELL**



D3034/IB PIPE DIMENSIONS & PERFORMANCE

Nom. Size	Outside Diameter (OD)	SDR	Pipe Stiffness (psi)	Min. Wall Thickness (T)	Internal Diameter (ID)	Approx. Bell Diameter (BD)	Bell Depth (C)	Insertion Mark (L)
4"	4.215	35	46	0.120	3.975	5.000	3.750	3.125
		26	115	0.162	3.891			
		23.5	153	0.178	3.859			
6"	6.275	35	46	0.180	5.915	7.375	4.625	4.000
		26	115	0.241	5.793			
		23.5	153	0.265	5.745			
8"	8.400	35	46	0.240	7.920	9.625	5.250	4.125
		26	115	0.323	7.754			
10"	10.500	35	46	0.300	9.900	12.250	5.875	5.125
		26	115	0.404	9.692			
12"	12.500	35	46	0.360	11.780	14.375	6.500	5.375
		26	115	0.481	11.538			
15"	15.300	35	46	0.437	14.426	17.500	7.750	7.375
		26	115	0.588	14.124			

Notes:

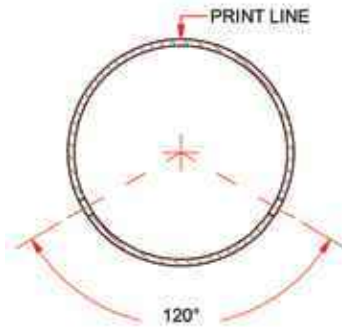
1. These dimensions are for estimating purposes only. All dimensions are in inches unless otherwise specified.
2. SDR = Standard Dimension Ratio
3. Pipe Stiffness determined using ASTM D2412 at 5% deflection. This is a property that defines the pipe's ability to resist external loading.
4. Internal diameter calculated using nominal outside diameter and minimum wall thickness.
5. Dimension given for Approx. Bell Diameter (BD) is for highest pipe stiffness.



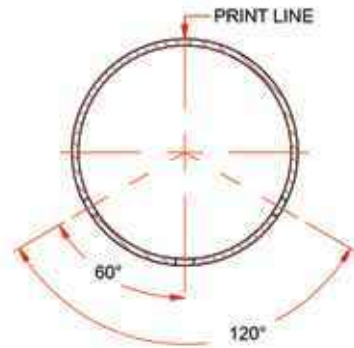
**ASTM D3034/IB PVC Gravity Sewer Pipe
GASKETED INTEGRAL BELL**

D3034/IB PIPE PERFORATION PATTERNS					
Nom. Size	Perforation Rows	Circumferential Hole Spacing	Longitudinal Hole Spacing (in)	Hole Diameter (in)	Inlet Area (in ² /ft pipe)
4"	2	120°	5.000	0.500	0.942
				0.625	1.473
	3	60°-60°	5.000	0.500	1.414
				0.625	2.209
6"	2	120°	5.000	0.500	0.942
				0.625	1.473
	3	60°-60°	5.000	0.500	1.414
				0.625	2.209
8"	2	120°	5.000	0.500	0.942
				0.625	1.473
	3	60°-60°	5.000	0.500	1.414
				0.625	2.209

2 Hole Pattern



3 Hole Pattern



MATERIAL PROPERTIES AND DIMENSIONS



EXCEL SR-1 RAPID GO™



Specifications

Western Excelsior manufactures a full line of Rolled Erosion Control Products (RECPs). Excel SR-1 Rapid Go temporary Erosion Control Blanket (ECB) is composed entirely of a straw matrix mechanically (stitch) bonded on two inch centers to a single photodegradable, synthetic net. The netting of Excel SR-1 Rapid Go ECB is treated to accelerate the degradation process. The straw matrix consists of certified weed free agricultural straw. Recommended for use in channels or slopes requiring erosion protection for a period forty-five to ninety days. Actual field longevity is dependent on soil and climatic conditions.

Each roll of EXCEL SR-1 Rapid Go is made in the USA and manufactured under Western Excelsior's Quality Assurance Program to ensure a continuous distribution of fibers and consistent thickness. Typical manufactured properties are provided in Table 1 and product characteristics are provided in Table 2.

Table 1- Specified Expected Values

Tested Property	Test Method	Value
Tensile Strength (MD) x (TD)	ASTM D6818	4.8 lb/in (0.8 kN/m) x 4.8 lb/in (0.8 kN/m)
Elongation (MD) x (TD)	ASTM D6818	15 % x 20 %
Mass Per Unit Area	ASTM D6475	8.0 oz/yd ² (271 g/m ²)
Thickness	ASTM D6525	0.28 in (7 mm)
Light Penetration	ASTM D6567	22 % open
Water Absorption	ASTM D1117	450 %

Table 2 - Netting

Top Net Type	Synthetic, Rapid Photodegradable
Bottom Net Type	N/A
Top Net Opening Dimensions	0.5 in (13 mm) x 0.5 in (13 mm)
Bottom Net Opening Dimensions	N/A

Excel SR-1 Rapid Go is available in multiple roll sizes ranging in width from 8.0 ft to 16.0 ft. and 112.5 ft to 600 ft in length. Standard roll sizes are 100 square yards, measuring 8.0 ft wide by 112.5 ft long. Custom roll sizes are available upon request.

Arcadis of Michigan, LLC

28550 Cabot Drive

Suite 500

Novi, Michigan 48377

Tel 248 994 2240

Fax 248 994 2241

www.arcadis.com

