

www.CRAworld.com



CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING

SPRING 018 INTERIM MEASURE

GM CETC BEDFORD FACILITY 105 GM DRIVE BEDFORD, INDIANA

Prepared for: General Motors LLC

Conestoga-Rovers & Associates

651 Colby Drive Waterloo, Ontario N2V 1C2



February 20, 2014 • 013968 • Report No. 368

Table of Contents

Section 1.0	Introduction1
	1.1 General1
	1.2 Report Organization
Section 2.0	Spring 018 Background and Monitoring Results2
	2.1 Spring 018 Investigations and Background Summary2
	2.2 Pre-Interim Measure Monitoring Summary5
	2.2.1 Spring 018 Discharge Volumes
	2.2.2 PCB Sampling Results
	2.2.3Spring 018 Temperature Monitoring6
	2.3 Conclusions
Section 3.0	Creek Sealing Objectives and Design Basis7
Section 5.0	creek Sealing Objectives and Design Dasis
Section 4.0	Concrete Sealing Interim Measure Activities9
	4.1 Site Preparation9
	4.2 Erosion/Sediment Transport Controls9
	4.3 Bedrock Cleaning10
	4.4 Spring 018 Containment Berm Improvements10
	4.5 Concrete Base Layer11
	4.6Permanent Spring 018 Conveyance Pipe Lines12
	4.7 Geosynthetic Clay Liner12
	4.8 Concrete Sealing Layer12
	4.9 Cable Concrete Low-Flow Crossing and Maintenance Road13
	4.10 Concrete Surface Inspection and Crack Repair14
	4.11 Resumption of Creek Flow and Monitoring14
	4.12 Interim Measure Summary14
	4.13 Post-Interim Measure Summary15
Section 5.0	References
Section 6.0	Construction Certification16



List of Figures (Following Text)

- Figure 1.1 Site Location
- Figure 1.2 Site Plan
- Figure 2.1 Geophysical Flow Pathway, Sinkhole, and Corehole Locations
- Figure 2.2 Spring 018 PCBs Analytical Results Monitoring
- Figure 2.3 Spring 018 Area Water Temperature Profile Monitoring

List of Tables (Following Text)

- Table 2.1 Spring 018 PCBs Analytical Results Summary
- Table 2.2Spring 018 Area Temperature Monitoring Summary

List of Appendices

- Appendix A Photographic Log
- Appendix B As-Recorded Drawings
- Appendix C Materials Information
 - Appendix C.1 Concrete Mix Specifications
 - Appendix C.2 Concrete Compression Test Results
 - Appendix C.3 Geosynthetic Clay Liner



List of Acronyms and Terms

AMSL	above mean sea level
AOC	Administrative Order on Consent
Bailey's Branch Creek	Bailey's Branch Creek located at the upstream end of Pleasant Run Watershed
CA	Corrective Action
Report	Construction Certification Report for Bailey's Branch and Tributary 3 Concrete Sealing – Spring 018 Interim Measure
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CETC	Castings Engines Transmissions and Components
CRA	Conestoga-Rovers & Associates Inc.
Facility	GM CETC Bedford Facility
ft	feet
GCL	geosynthetic clay liner
GM	General Motors LLC
HDPE	high-density polyethylene
IM	Interim Measure
IMI	Irving Materials, Inc.
lb	pound
MLC	Motors Liquidation Company
PCBs	polychlorinated biphenyls
PSI	Professional Service Industries, Inc.
psi	pounds per square inch
RA	Removal Action
RACER Trust	Revitalizing Auto Communities Environmental Response Trust
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SSC	Site Source Control
Site	Swallets and springs formerly within the Spring 018 area on Parcels 15 and 216
Spring 018 area	a sub-section of the Pleasant Run Creek Watershed that is a hydrologically linked system of springs, swallets, sinkholes, groundwater, and adjacent uplands areas



List of Acronyms and Terms (continued)

Spring 018A, B, and C	physical Spring 018 sampling locations representing different states of soil (Spring 018A) and bedrock removal (Spring 018B and C) but understood to represent the same water; Spring 018C is the current location
Tributary 3	unnamed tributary to Baileys Branch Creek originating in the area north of Area of Interest 4 within the Upstream Parcels at the upstream end of Pleasant Run Watershed
μg/L	micrograms per liter
U.S. EPA	United States Environmental Protection Agency
Willowstick	Willowstick Technologies, LLC



Section 1.0 Introduction

1.1 General

This document presents the Construction Certification Report (Report) for concrete sealing activities within the Pleasant Run Creek Watershed (Bailey's Branch Creek and Tributary 3) Lawrence County, Indiana, associated with the implementation of the United States Environmental Protection Agency (U.S. EPA) approved Spring 018 Interim Measure (IM) Proposal, originally dated June 26, 2012 (final approved revision dated June 19, 2013), and the design drawings submitted November 14, 2012 (and subsequent responses to comments emailed November 20, 2012). The IM activities described herein were conducted from August 16, 2012 to April 1, 2013.

Bailey's Branch Creek and areas downstream were affected by historical releases of polychlorinated biphenyls (PCBs) from the General Motors LLC (GM) Castings, Engines, Transmissions and Components (CETC) Bedford Facility (Facility), formerly owned and operated by General Motors Corporation Powertrain. The Spring 018 area discussed in this Report forms part of the Facility Removal Action (RA) Site as defined in the Administrative Order on Consent (AOC) (effective July 31, 2003).

Conestoga-Rovers & Associates, Inc. (CRA) has prepared this Report on behalf of GM in accordance with the Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) work conducted under the Performance Based Agreement (effective March 20, 2001, as amended October 1, 2002, March 29, 2007, May 9, 2008) with U.S. EPA for the Facility, and consistent with the AOC, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

The Spring 018 area (Site) refers to a sub-section of the Pleasant Run Creek Watershed that is a hydrologically linked system of springs, swallets, sinkholes, groundwater and adjacent uplands areas. The Site location is presented on Figure 1.1. The Site Plan, including existing spring locations of the Spring 018 area, is presented on Figure 1.2. Swallets and springs formerly within the Spring 018 area on Parcels 15 and 216 were located within and adjacent to the creek channel, which is typically coincident with the property boundaries in this immediate area.

The work described in this Report was preceded by work conducted under the Downstream Parcels RA Work Plan (CRA, May 25, 2004) and investigations completed under the Site Source Control (SSC) Work Plan (CRA, November 11, 2003). The Downstream RA Work Plan consisted of soil and sediment excavation and proper disposal, verification sampling to document attainment of the cleanup objectives, and restoration of the creek, including filling and covering select swallets with concrete upon such verification. The SSC Work Plan and addenda included: identification of swallets and springs through visual inspections; thermal imaging; sampling of spring water to identify potential PCB impacted areas; installation and sampling of boreholes and rock corings; geophysical surveys conducted with ground penetrating radar and electromagnetic groundwater mapping; and dye tracer studies. Additionally, temperature studies were performed in the Spring 018 area in 2012 and 2013 to assist in the



identification of potential flow pathways contributing to the Spring 018 discharge. Based on the information collected during the SSC Work Plan implementation, water from the Spring 018 area was identified as impacted with low level PCB concentrations and GM instituted collection and treatment of the impacted water emanating from Spring 018.

This Report documents the completion of the IM concrete sealing activities performed in accordance with the Spring 018 IM Work Plan, which was formally approved by U.S. EPA on June 19, 2013, although the implementation of the work preceded the formal approval and U.S. EPA was kept informed of progress throughout the implementation of the work and provided comments to the design. Creek sealing activities began in December 2012 and were completed in March 2013. A photographic log of historical Spring 018 Site conditions and construction activities related to the concrete sealing is presented in Appendix A.

1.2 Report Organization

The Report is organized in the following sections:

- i) Section 1.0 presents the Site location, a brief introduction to the history of the work performed in the Spring 018 area, and organization of the Report
- ii) Section 2.0 summarizes activities completed in the Spring 018 area during the initial Downstream RA and presents a summary of Spring 018 monitoring results to date
- iii) Section 3.0 provides the rationale for implementation of the concrete sealing activities to meet the IM objectives and the basis of the design
- iv) Section 4.0 presents a summary of the IM activities
- v) Section 5.0 presents references cited in this Report
- vi) Section 6.0 provides certification of the Spring 018 IM construction completion

Section 2.0 Spring 018 Background and Monitoring Results

2.1 Spring 018 Investigations and Background Summary

The water produced at the current Spring 018 location initially consisted of several springs, including Spring 018, Spring 021-002, Spring 021-003, Spring 021-004, and Spring 021-005. The locations of the seeps and springs within the Spring 018 area are presented on Figure 2.1¹. Historical sampling of these

¹ Removal of sediment, soil and rock from the mouth of Spring 018 was completed under the Downstream Parcels RA activities. As the RA excavation extended into the limestone bedrock and hillside, the physical location of where the Spring 018 water discharged to the creek changed, resulting in the consolidation of the down-gradient springs to a single source, renamed as interim sampling locations Spring 018A, Spring 018B, and the current location, Spring 018C. Although the current and interim locations represent different physical settings, they are understood to represent the water originally observed at Spring 018.



springs indicated the presence of PCBs at various levels exceeding the 0.3 micrograms per liter (μ g/L) action level, with the majority of spring flow observed emanating from Spring 018.

Two dye trace studies were completed in 2004 at the suspected sources for water which feed the springs, including several swallets located upstream of Spring 018 within Bailey's Branch Creek and sinkholes located within a farm field to the east on Parcel 14. Dye trace studies conducted on July 8 and July 21, 2004 on the upstream swallets and sinkholes to the east concluded that the water entering the swallets and sinkholes exited the underground conduit system and discharged to the creek at Spring 018. The dye exited the conduit system fairly rapidly and moved through the system without significant dispersion (i.e., as a slug), indicating a relatively direct flow path and limited underground storage. The results of these tests were provided in the RCRA Facility Investigation (RFI) Technical Memorandum for Swallet Testing (CRA, September 27, 2004).

The water discharging from Spring 018 was found to originate from:

- 1. Surface water seeping through the fractured rock of the creek bed (swallets) just upstream of the Spring 018 area
- 2. Groundwater flowing in overburden and the fractured bedrock along the western bank of the creek, west of Spring 018
- 3. Groundwater flowing from the east of Spring 018, including water introduced through a series of sinkholes located on Parcels 14 and 15

Soil, sediment and bedrock removal and concrete filling of select excavated swallets within Bailey's Branch Creek upstream of the Spring 018 area began in 2004. Removal Action work was completed in 2005. Bedrock removal in the creek channel upstream of Spring 018 extended to depths exceeding 10 feet (ft) below the original creek bed in select areas in order to remove PCB impacted media within bedrock fractures at the major swallet areas (Swallets 1A, 1B, 2, 3, 4, 5, 6, and 8). Rock removal at Spring 018 began on July 18, 2005, moving upstream/upgradient approximately 10 ft into the rock face, resulted in the consolidation of the springs in the study area with the exception of the main discharge at Spring 018 (the downgradient seeps and springs dried up). Excavation around Spring 018 was completed on August 17, 2005. The final and current discharge point, following soil, sediment and bedrock removal, is identified as Spring 018C for sampling identification purposes.

As part of the initial interim restoration work in the Spring 018 area, the bedrock excavations in the major swallet areas were backfilled with rock and Standard Type II Portland Cement with nylon fiber reinforcement (fiber-reinforced concrete) designed to yield 4,000 pounds per square inch (psi) compressive strength. Exposed bedrock walls were covered with shotcrete mixed with nylon fiber reinforcement designed to yield 4,000 psi compressive strength. Filling and shotcrete work was completed by August 2005. The filling of the former swallet areas with rock and concrete significantly



reduced the observed flow from Spring 018. Although the cleanup work lowered the concentrations in the spring water, it did not lower it sufficiently to allow the spring to discharge water directly to the creek and temporary treatment of the water before discharge was initiated.

At that time, the area surrounding and downstream of Spring 018 was bermed with a clay dam in order to collect the PCB-impacted water emanating from Spring 018. The collected water was pumped to a temporary water treatment plant constructed on top of the hill southeast of Spring 018 on Parcel 216. The spring water was treated using a combination of settling/flow equalization in two one-million gallon Modular Tanks, followed by sand and carbon filtering prior to discharge back to the creek, downstream of the Spring 018 containment berm. This water was periodically tested to ensure the treated water met the U.S.EPA requirements for discharge of the water.

Upon completion of the interim restoration work, three separate qualitative dye trace investigations were conducted in the Spring 018 area, starting July 2007, as part of the SSC Addendum No. 5 (CRA, November 9, 2006). The purposes of the dye trace investigations were to:

- Evaluate the effectiveness of the concrete filling of the swallets and surrounding creek bed and to see if additional areas of the creek were contributing to the flow at Spring 018
- Monitor and evaluate various potential groundwater flow paths between the area of former Swallet 1A and Spring 018
- Monitor and evaluate potential groundwater flow paths from the east (upgradient) sinkholes and associated bedrock on Parcel 14

In addition to the dye trace investigations, two geophysical studies were conducted by Willowstick Technologies, LLC (Willowstick) and CRA, to identify apparent groundwater flow pathways within the bedrock and to further delineate the area of the Spring 018 groundwater drainage basin. The flow pathways identified by the geophysical studies are shown on Figure 2.1.

Results of the geophysical studies and dye trace investigations supported results from previous dye trace studies showing flowpaths connecting Spring 018 to the upstream swallets. The studies were submitted to U.S. EPA on April 12, 2006. The results indicated that the pathways had not been completely sealed off during the RA excavation and concrete filling activities. A connection between the upgradient sinkholes to the east was also shown to exist with similar low storage capacity based on the fairly quick response time observed during the dye tracer studies.

A bedrock drilling/coring investigation was completed in March and April 2007, targeting the pathways identified by the geophysical investigations. The investigation did not definitively locate any conduits that had been previously identified by the geophysical studies, but did confirm water is likely transported through fractured bedrock zones in the general vicinity of those pathways. The results were



summarized in the SSC Investigation Summary and Proposed RA Approach – Spring 018C, dated November 14, 2008. Figure 2.1 shows the location of the coreholes.

A new work plan proposing additional visual dye trace observations was submitted to U.S. EPA on September 7, 2012. The Work Plan was designed to divide up Bailey's Branch Creek and Tributary 3 into discrete, isolated sections so as to provide direct and conclusive evidence of the location of any existing swallet areas losing surface water and contributing to the overall volume being discharged at Spring 018. The dye trace tests confirmed that a portion of the water emanating from Spring 018 continued to be a result of isolated recharge from the creek. Results were provided to U.S. EPA in CRA's memo dated November 26, 2012.

2.2 Pre-Interim Measure Monitoring Summary

Monitoring of Spring 018 discharge rates, PCB concentrations, water temperature, and conductivity has been conducted prior to, during, and post IM concrete sealing activities implementation. The following sections present a summary of monitoring conducted prior to the completion of the IM.

2.2.1 Spring 018 Discharge Volumes

Water discharge volumes from Spring 018 have been attenuated through the various phases of work, including the temporary by-pass of significant portions of the surface water flow during the RA activities and the initial filling of excavated swallets. Prior to installation of flow meters on the Spring 018 pumps in 2012, discharge volumes were estimated based on visual observations of Spring 018. Prior to any remediation work being conducted in the area, Spring 018 had an estimated base flow discharge of 500 to 800 gallons per minute (gpm) and peak discharge during storm events estimated to be 3,000 to 5,000 gpm. Following the initial swallet filling activities completed in 2005, Spring 018 discharge was reduced to approximately 200 to 400 gpm during base flow conditions and approximately 500 to 1,000 gpm during storm events. It is noted that following the interim swallet filling and creek bed restoration work, creek flow over the area immediately upstream of Spring 018 was predominantly carried through by-pass piping that was temporarily installed to facilitate cleanup of the creek and made it difficult to evaluate flow into the Spring 018 regime. Following removal of the temporary by-pass piping (after further IM sealing efforts), the creek was allowed to return to natural flow paths.

2.2.2 PCB Sampling Results

Sampling of Spring 018 was initially performed as part of the initial spring and seep sampling event conducted in May 2002 under the RFI Stream investigation. Additional sampling of Spring 018 has generally been completed on at least a quarterly basis since the second quarter of 2004, with more frequent sampling generally ranging from daily to monthly during the RA and creek sealing activities. Samples are currently collected on a monthly basis with additional opportunistic samples collected once per quarter if a precipitation event of at least 1-inch of rain occurs within a 24-hour time frame.



Figure 2.2 shows the Spring 018 (including interim and final spring locations) monitoring results of PCB concentrations over time, through January 2014. Table 2.1 presents a summary of the monitoring analytical results. In general, a reduction in PCB concentrations has been observed through the course of RA activities, with the exception of periods of invasive work disturbances (i.e., excavation, pressure washing, rock breaking) which occasionally resulted in a small spike of PCB concentrations followed by further PCB concentration decreases. In addition to the overall downward trend since completion of the RA activities, a cyclical trend was noted prior to the IM concrete sealing activities with concentrations generally peaking during the warmer months and decreasing through the winter when concentrations were in recent years at or below the levels allowed for discharge.

2.2.3 Spring 018 Temperature Monitoring

Temperature monitoring was conducted in the Spring 018 area, commencing in July 2012, in order to identify potential relationships between the surface water temperature, groundwater temperature, and Spring 018 discharge temperature. If the temperature of water emanating from Spring 018 were to be consistently similar to the surface water temperature and dissimilar to upgradient groundwater, for example, it would suggest that Spring 018 is recharged primarily from that surface water.

Figure 2.3 plots the temperature versus time for upgradient groundwater monitoring locations (green lines), groundwater monitoring locations near the creek channel (purple lines), surface water in Bailey Scales Branch and Tributary 3 (blue lines), and Spring 018 water (red line). The initial readings were taken prior to the commencement of the additional concrete creek sealing work in late 2012. Figure 2.3 illustrates that in the summer of 2012, prior to conducting the creek sealing work and re-establishing the creek flow, the temperature of spring water and groundwater in proximity to the creek channel correlated more closely with the temperature of surface water in the creek. This correlation is most particularly evident during the warmer summer months, when there is the maximum contrast in temperature between upgradient groundwater and surface water. This infers that the surface water flow within the creek channel (not otherwise conveyed in by-pass pipes) prior to creek sealing was still a source of recharge to spring water and is consistent with the findings of the 2012 dye-trace studies performed in the Spring 018 area.

Table 2.2 presents the summary of temperature field measurements.



2.3 Conclusions

The following summarizes the conclusions of the monitoring at Spring 018 performed prior to implementing the IM:

- Dye trace studies conducted in Bailey's Branch Creek and Tributary 3 in 2012 confirmed that pathways connecting surface water to the groundwater and Spring 018 in the areas surrounding the former swallets remained despite the swallet sealing efforts conducted in 2005.
- The discharge rate in Spring 018 remained weather dependent. Prior to the final concrete creek sealing work, the discharge rate was estimated to be generally 200 to 400 gpm in dry weather and 500 to 1,000 gpm or more in wet weather.
- Since completion of the RA sediment and rock removal and prior to the final concrete sealing, the PCB concentrations at Spring 018 had appeared to be cyclical, peaking during warmer summer months, with an overall trend of decreasing amplitude in the maximum (peak) concentration over time.
- Prior to implementing the IM, the peak PCB concentrations in Spring 018 water, generally above the action level of 0.3 µg/L, have typically occurred during the summer months and had a typical duration of about two to four months. These peak PCB concentrations were separated by periods of time when the PCB concentrations were at or below 0.3 µg/L, often during seasonally cooler weather.
- The spring water temperature at Spring 018 was influenced by the surface water temperature in the creek, suggesting the spring was being, at least in part, recharged by surface water via the swallets and fractures in the creek bed.

Section 3.0 Creek Sealing Objectives and Design Basis

Based on the completed investigations and monitoring results, a conceptual site model was developed for the Spring 018 area and presented in the aforementioned Proposed RA Approach (CRA, November 14, 2008). The final conceptual site model has been refined since this initial model by incorporating new data and information obtained over the past several years.

The source of the PCB impacts detected in water emanating from Spring 018 are believed to originate from the entrained PCB-contaminated sediment/clay material residing within the hydrogeologically active bedrock fractures between the various swallet locations and Spring 018. During the summer and early fall months, relatively warm surface water infiltrates through the swallets, recharging the groundwater system near Spring 018 through historical pathways, which had previously left PCB impacted sediments. This fast flowing warm surface water recharges groundwater and dislodges clay particles as it flows through the fractured bedrock hydrogeologic system towards Spring 018. It is



hypothesized that reducing surface water recharge to groundwater flow (by changing the flow pathway) through these original fractures minimizes the water in contact with the entrained sediment, thereby lowering the PCB levels in the discharging spring water.

GM evaluated several remedial alternatives to determine the most appropriate IM for Spring 018. In order to minimize the amount of surface water entering the groundwater system near Spring 018 from the fractures within the creek bed, GM determined the most efficient and effective IM would be to perform additional concrete sealing of the creek bed, both upstream of and directly adjacent to the Spring 018 area. If successful, this IM would limit the recharge of warmer surface water in the summer and early fall months, which resulted in the exceedance of the action level at Spring 018, as well as hopefully reduce the discharge from the spring.

In addition to the creek bed sealing, a permanent containment berm would be constructed to contain water discharging from Spring 018. By-pass piping would extend through the berm in order to allow Spring 018 to flow directly into the creek, if the water was not required by U.S. EPA to be collected for treatment. Valves on the piping would allow for cutoff of the flow and containment for collection and treatment, if needed. U.S. EPA and GM agreed to a contingency plan by which routine sampling results would be used to determine if Spring 018 water requires capture and treatment prior to being introduced in the creek system. This plan was provided to U.S. EPA in CRA's memo dated September 9, 2013.

The design basis for the concrete sealing of Bailey's Branch Creek and Tributary 3 was to provide a low permeability concrete seal over the creek bottom and form a base to support the restoration of the creek channel and banks in this area. The purpose of the sealing was to further minimize infiltration of surface water in the location of the former swallet areas. Creek base flow would be channeled near the center of the creek cross-section to reduce surface water from entering groundwater. The design assumes a v-channel such that the final concrete surface is shaped from the creek banks down towards the center of the creek, with slopes between 4 and 17 percent, as required, to convey flow for a 1 in 10-year storm event within the v-channel. The Spring 018 containment berm elevation was set to prevent the expected 1 in 100-year storm from flooding (or damaging) the Spring 018 berm.

The general cross-section of the concrete sealing cover consists of:

- Stone and concrete mix base fill layer over the bedrock, where necessary, of varying thicknesses, to bring the creek base to a generally uniform level with decreasing elevation from upstream to downstream. Base fill concrete near the walls was generally thicker to give the overall channel a 'V'' form.
- In areas where swallets have been identified as contributing to the discharge at Spring 018, the concrete seal consists of a geosynthetic clay liner (GCL) placed within 8 inches of concrete (2-inches below and a minimum 6-inches above).



• In areas with no identified swallets or where existing swallets have been shown to not have a direct connection to Spring 018, the concrete seal consisted of a 4-inch layer of concrete over top of the base fill concrete or bedrock.

As-built drawings from the IM are presented in Appendix B. Drawing C-01 presents the limits of GCL placement in addition to the overall concrete placement limits. Drawing C-07 presents general cross-sections of the construction.

Section 4.0 Concrete Sealing Interim Measure Activities

This section presents activities implemented as part of the Spring 018 and Bailey's Branch Creek/Tributary 3 concrete sealing IM.

4.1 Site Preparation

Site preparation activities were completed prior to initiating concrete sealing activities. Where possible, resources already in place for the East Plant IM and the CERCLA RA were used in conjunction with the creek sealing activities. The following is a list of activities previously completed in conjunction with other Site investigative and cleanup efforts:

- Mobilized construction facilities, material, equipment, and personnel necessary to perform the work
- Provided and maintained construction facilities
- Assembled construction support facilities (Site trailers, first aid facilities, break facilities, tool and material storage areas).

The following is a list of Site preparation activities for the Spring 018 IM not already completed in conjunction with other Site investigative and cleanup efforts:

- Performed surveys of private and public utilities
- Established erosion/sediment transport controls
- Removed sediment and vegetation accumulation from bedrock surfaces
- Removed select creek bypass controls (piping, earthen dams, temporary culverts) used during creek cleanup activities, but not needed for the concrete capping activities.

4.2 Erosion/Sediment Transport Controls

Erosion/sediment controls were put in place prior to initiating creek bed cleaning and concrete sealing activities to control the potential migration of sediment from the work areas. Select creek by-pass



controls used during the creek cleanup activities were left in place and relocated as needed throughout the bedrock cleanup and the various concrete pours. These erosion/sediment controls were removed as part of the final restoration of the work area.

4.3 Bedrock Cleaning

During the previous RA, the creek bed in the Spring 018 area had been excavated to bedrock and in most cases, had several feet of surficial bedrock removed. However, natural stream and erosion processes in this area over the past few years had resulted in sediment deposits and vegetative growth over the previously cleaned bedrock surface. In preparation for the concrete placement, the general contractor removed the vegetation and loose debris from the creek bed and re-cleaned the bedrock surface by pressure washing the creek floor. In a few areas, small rock outcrops were removed from the planned channel area to accommodate a continuous creek bottom slope as part of the final concrete sealing channel design.

4.4 Spring 018 Containment Berm Improvements

Prior to beginning the Spring 018 containment berm reinforcement activities, sediment that had accumulated within the containment berm area since its original construction in 2005 was removed, characterized, and properly disposed. The bedrock surface within the containment berm area was power washed and the bedrock surface was sealed with a layer of fiber-reinforced concrete to form a smooth base floor to the spring.

The existing clay containment berm around Spring 018 was refurbished with additional clay to bring the top of the berm to the design final grade and to adjust its overall base footprint in preparation for the resumption of normal flow through the creek channel alongside the berm, upon completion of the overall concrete sealing. A 4 to 6-inch layer of stone was placed on top of the clay to provide a surface for the concrete to adhere to.

An approximate 12-inch thick layer of fiber-reinforced concrete was placed over the entire berm (top and sides) once the top of the berm elevation and base footprint were achieved. To maintain the slopes of the berm's clay core, concrete was placed on the top of the berm with workers pushing the concrete down the side slopes to the extent practical, resulting in horizontal-to-vertical slopes ranging from 0.6:1.0 to 0.8:1.0 (i.e., concrete thickness at base of slopes likely thicker than at the top of slopes). The surface of the concrete was left rough to minimize slippage for samplers/workers in this area.

The second 12-inch fiber-reinforced concrete layer over the berm was placed as a single pour at the same time as the pour for the 4-inch layer of fiber-reinforced concrete placed on the creek floor within the containment area and the creek floor exterior to the berm. Steps were cast into the concrete surface at the upstream end of the berm to facilitate access to Spring 018 by sampling and maintenance personnel and to allow exit from the containment area. The final top elevation of the concrete covered



berm is approximately 562 ft above mean sea level (AMSL). Berm improvements were completed on December 13, 2012, in conjunction with the creek sealing activities.

Prior to refurbishing the clay berm, two 8-inch diameter high-density polyethylene (HDPE) pipes were placed through the downstream end of the Spring 018 containment berm. Each pipe was fitted with a gate valve, located on the exterior wall of the containment berm. The pipes were then sealed into the berm system as the concrete berm layers were placed. Hydra Stop 300, a hydrophobic urethane foam grout, was formed around the pipe where the pipes protruded through the berm (following concrete placement and curing) to prevent seepage. These pipes were installed to facilitate direct discharge of contained water to the creek if spring water collection and treatment is not required. The gate valves remained closed during the periods when Spring 018 water was collected for treatment.

4.5 Concrete Base Layer

A base layer consisting of a mixture of fiber-reinforced concrete and stone (where required) was placed along the length of the creek bed to adjust the channel floor elevations to a generally more consistent slope, and across the width of the creek bed to create and maintain a stable flow regime (upstream to downstream) with base flow events contained to the center line of the creek through an obtuse 'V' shaped channel.

The concrete mixture, comprised of standard Type II Portland Cement with fibrillated microsynthetic fibers (also known as fiber-reinforced concrete), which was designed to yield 4,000- (psi) compressive strength, consisted of 564 pounds (lbs) of cement, 1,280 lbs of sand, 1,750 lbs of #8 limestone, 1 lb of fiber, 33 ounces of water reducer, 12 lbs of a water proofer, 236 lbs of water, and frost guard depending on the day's temperature (specification provided in Appendix C.1). Fiber-reinforced concrete was selected as opposed to regular Type II Portland Cement for the design to provide additional strength and help to reduce the permeability of the overall concrete mixture. Additives to reduce shrinkage and cracking and chemical treatment additives for waterproofing were also included in the mixture to achieve the lowest permeability and optimum flexibility. The concrete was supplied by Irving Materials, Inc. (IMI). Each batch of concrete delivered to the Site was accompanied by a load ticket verifying the mixture.

The base layer concrete mix was generally placed in depressions in the creek bed to create the consistent slope and along the squared edges of the creek bed to form the basic 'V' design of the channel. Stone was placed in deeper areas of the creek to act as filler and reduce the amount of concrete required, as well as provide workability for thicker concrete placement (i.e., allow workers to walk over a surface of stone and not sink too far into wet concrete during placement). The contractor surveyed the final elevation of the base layer to confirm design elevations were met and to ensure there were no bedrock outcroppings that might protrude through the final (surface) concrete layer. The base



layer concrete surface was given a textured finish for the subsequent application of the GCL (where applicable) and the final concrete sealing layer.

Concrete cylinder samples were collected daily by Professional Service Industries, Inc. (PSI) for compressive strength testing according to ASTM C-39 [standard test method for compressive strength of cylindrical concrete specimens]. Each sample exceeded the target compressive strength of 4,000 psi (Appendix C.2).

Base-layer concrete generally began with the stretch of concrete upstream of the Bailey's Branch and Tributary 3 confluence, followed by the stretch of creek downstream of the confluence. This work was performed between November 9, 2012 and January 9, 2013. The base-layer concrete at the confluence was poured once the creek sealing activities upstream and downstream of the creek were complete. This was done to prevent damage by construction equipment traversing the area while completing the restoration in the adjacent areas. The base layer concrete was poured between February 12 and 14, 2013.

4.6 Permanent Spring 018 Conveyance Pipe Lines

As a contingency measure, two 10-inch diameter HDPE pipes were embedded in the bottom portion of the concrete base layer across the bottom of the creek, such that they were placed beneath the final concrete sealing layer. The pipes extend from within the reinforced Spring 018 berm to a point approximately 137 ft to the southwest (Drawing C-02, and cross section B on Drawing C-08 in Appendix B shows the detail for these pipes). These two pipes would facilitate future pumping of water from within the Spring 018 containment berm (if required) to a future water treatment facility located west of the creek, without restricting creek flow with overland piping. Currently, the pipe ends have been capped.

4.7 Geosynthetic Clay Liner

GCL was placed, according to the manufacturer's specifications, with a minimum overlap of six inches between panels (Appendix C.3), over select areas of the concrete base layer. GCL was placed over areas identified in the 2012 dye trace study as having a water-loss downward, through the creek bed, to Spring 018, primarily the Swallet 2/3 area, Swallet 9, and the fractured area just upstream of Spring 018C (Drawing C-02 in Appendix B). Water was applied to the GCL along the seams to ensure adequate hydration/sealing of the bentonite powder at the overlaps.

4.8 Concrete Sealing Layer

The final upper concrete sealing layer was placed over the concrete base and GCL layers. The same 4,000 psi compressive strength fiber-reinforced concrete mix used for the base layer was specified for the concrete sealing layer (Appendix C.1). The final concrete pour in the creek was generally completed



as a continuous pour (on a daily basis) to the extent possible, from downstream to upstream, with any overlapping pours resulting in a downstream facing seam. The continuous pours were completed as 4-inch or 8-inch thick lifts (per the design specifications) using a boom-arm concrete pumper truck, keeping heavy equipment off of the base concrete and GCL layers (it should be noted that where 8-inch thick concrete lifts were required, the bottom 2 inches were installed as part of the base concrete layer prior to placement of the GCL such that the final placed concrete surface layer was 6 inches thick). Where the concrete sealing layer was placed over the GCL covered areas, a small amount of water was applied to the GCL to pre-saturate the liner and prevent the bentonite clay in the GCL from drawing water out of the concrete mixture prior to the concrete hardening.

As part of the restoration of this portion of the creek, nodules, or bumps of concrete, generally 6 inches to 36 inches across and approximately 3 to 6 inches high were hand-formed in the concrete surface outside of the creek centerline. These nodules were formed into the sealing surface to provide a more natural looking creek surface and to collect sediment during base flow in order to encourage potential future vegetative growth within the channel.

A large depression in the bedrock near the Swallet 7, just upstream of Spring 018, was left as a pool formation (pond) within the creek profile. The 2012 dye trace test showed this area to be relatively sealed off from Spring 018 (i.e., not hydraulically connected), so it was left as a small waterfall and pool habitat feature within the creek. The 4-inch concrete sealing layer was applied to the base and sides of the pool with a target pool base flow elevation of 564.75 ft AMSL.

Concrete for the final layers were poured between January 15 and February 15, 2013. Concrete cylinder samples were collected daily by PSI to test the compressive strength of the concrete. Tests were performed in accordance with ASTM C-39 [standard test method for compressive strength of cylindrical concrete specimens]. Each sample exceeded the target compressive strength of 4,000 psi (Appendix C.2).

4.9 Cable Concrete Low-Flow Crossing and Maintenance Road

A low-flow crossing and access road was constructed across the creek at the confluence of Tributary 3 and Bailey's Branch Creek, as well as an access road along the east bank of Bailey's Branch Creek, downstream of the confluence, to maintain service access to the Spring 018 berm area. Concrete under the crossing and access road was reinforced with #6 steel reinforcing rods on 12-inch centers in a crossing pattern. Cable concrete type CC45 mats (4-foot by 8-foot mats comprised of interlocking concrete blocks, each roughly 12 inches square and 6 inches high, held together by steel cables) were placed over the reinforced sealing layer of concrete. The cable concrete mats define the driving surface of the access road in areas where the road was constructed over concrete and allow for stream flow through/across the road (i.e., between cable concrete blocks).



4.10 Concrete Surface Inspection and Crack Repair

Due to the large surficial area of the concrete pours completed, some minor shrinkage cracking of the concrete was expected and did occur. The final concrete surface was inspected and identified cracks were sealed. Repairs were completed using liquid concrete crack sealant (Quikrete Brand Gray Concrete Crack Sealant) for smaller hairline cracks and a combination of the liquid concrete crack sealant covered with polyurethane enhanced concrete crack sealant (Quikrete Brand Polyurethane Concrete Crack Sealant) for larger cracks, as recommended by the concrete supplier (IMI). A flexible scraper was used to push sealant into the cracks and smooth the surface over the repair.

4.11 Resumption of Creek Flow and Monitoring

Following receipt of the concrete test results and completion of the concrete patching (crack repairs), the temporary creek by-pass piping and check dams were removed and the creek water was allowed to return to its natural flow path within the concrete-lined creek bed on April 1, 2013.

Figure 2.2 and Table 2.1 present the PCBs analytical results for Spring 018, including monitoring conducted subsequent to the resumption of flow to the main creek channel on April 1, 2013. Figure 2.2 depicts relatively steady concentrations (less than $0.3 \mu g/L$) following the resumption of flow through Bailey's Branch Creek and Tributary 3. PCB concentrations from Spring 018 samples collected in the summer of 2013 showed no change when compared to samples collected during seasonally cooler portions of the year, as had been typically observed in the past.

Figure 2.3 presents the results of temperature monitoring conducted from July 2012 through October2013 (May 2013 creek readings were taken shortly after a cold snap which explains the sharp drop in surface water temperature). Prior to sealing the creek, spring water temperature at Spring 018 more closely followed the temperature of surface water in the creek. Following completion of the restoration work and re-establishing the entire creek flow, the temperature of the spring water and that of the surface water diverges. Additionally, groundwater temperature near the creek channel after completion of the sealing correlates more closely with upgradient groundwater temperature. These metrics indicate that the surface water recharge to Spring 018 via swallets in the creek bed has been largely eliminated as a result of the concrete sealing activities.

4.12 Interim Measure Summary

The completed as-recorded topographic plan views for the final concrete sealing, cross-sections along the length of the creek centerline, sections across the width of the channel, and construction details are presented in Appendix B on Drawings C-01 through C-09.



4.13 Post-Interim Measure Summary

The following summarizes significant observations of the monitoring performed at Spring 018 after construction of the IM:

- Discharge from Spring 018 continues to be weather dependent, estimated since April 2013 to be 200 to 400 gpm during base flow conditions, and 400 to 800 gpm following storm events. This represents an estimated decrease of approximately 50 to 60-percent during base flow and approximately 85-percent during wet weather peak discharge when compared to pre-RA implementation (original flow conditions).
- PCB concentrations from Spring 018 samples in prior years exhibited a cyclic increase during the summer and decrease during the cooler months. Sample results from the summer of 2013, after completion of the concrete sealing activities, showed no significant increase in PCB concentrations when compared to results for samples collected during the balance of the year, despite air temperatures ranging from 90° to low 100°s Fahrenheit. Since the initiation of the additional creek concrete sealing activities in December 2012, PCB concentrations (samples are collected monthly) have remained below the action level (0.3 µg/L). At the time of writing, the twelve month rolling PCB average (March 2013 through February 2014) is 0.14 µg/L (February 2014 sample results not yet validated).
- Water temperature at Spring 018 generally more closely reflects upgradient groundwater temperatures than upstream surface water temperatures, indicating Spring 018 is currently being recharged primarily by upgradient groundwater rather than surface water.

The monitoring results collected to date support the assertion that the concrete sealing activities have further isolated Spring 018 from swallets and creek bed fractures located within Bailey's Branch Creek. The concrete sealing activities have decreased the discharge at Spring 018, and sampling has indicated a continued and sustained overall decrease in PCB concentrations due to decreased flow through the fractured hydrogeologic system, formerly supplied by surface water in-flows at the swallets.

Section 5.0 References

- CRA, Site Source Control Work Plan, November 11, 2003.
- CRA, Downstream Parcels RA Work Plan, May 25, 2004.
- CRA, RCRA Facility Investigation Technical Memorandum for Swallet Testing Bailey's Branch to Pleasant Run Creek, September 27, 2004.
- CRA, Ground Penetrating Radar (GPR) Results for Bailey's Branch (Spring 018 Area), April 12, 2006.
- CRA, Site Source Control Work Plan: Addendum No. 5, November 9, 2006.



- CRA, Site Source Control Investigation Summary and Proposed Removal Action Approach Spring 018C, November 14, 2008.
- CRA, Spring 018 Interim Measures Work Plan, June 26, 2012.
- CRA, Spring 018 Creek Sealing Design, emailed November 14, 2012.
- CRA, Spring 018 Dye Tracer Testing Results, November 26, 2012.
- CRA, Memo from Jim McGuigan to Peter Ramanauskas, et.al., Re: Spring 18 Interim Measure, September 9, 2013

Willowstick, Delineation of Groundwater Flow Pathways Near Spring 018C, March 17, 2006.

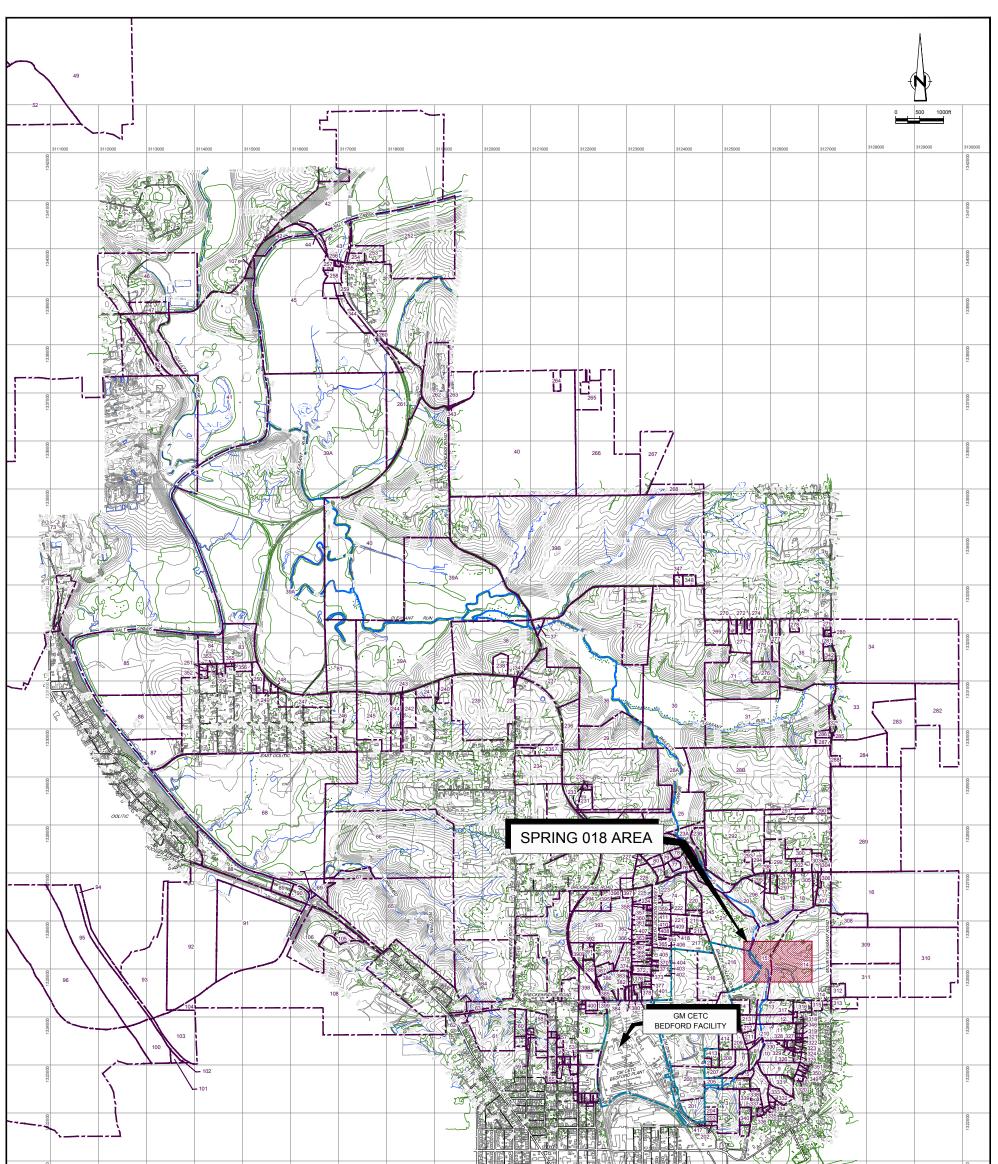
Section 6.0 Construction Certification

Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

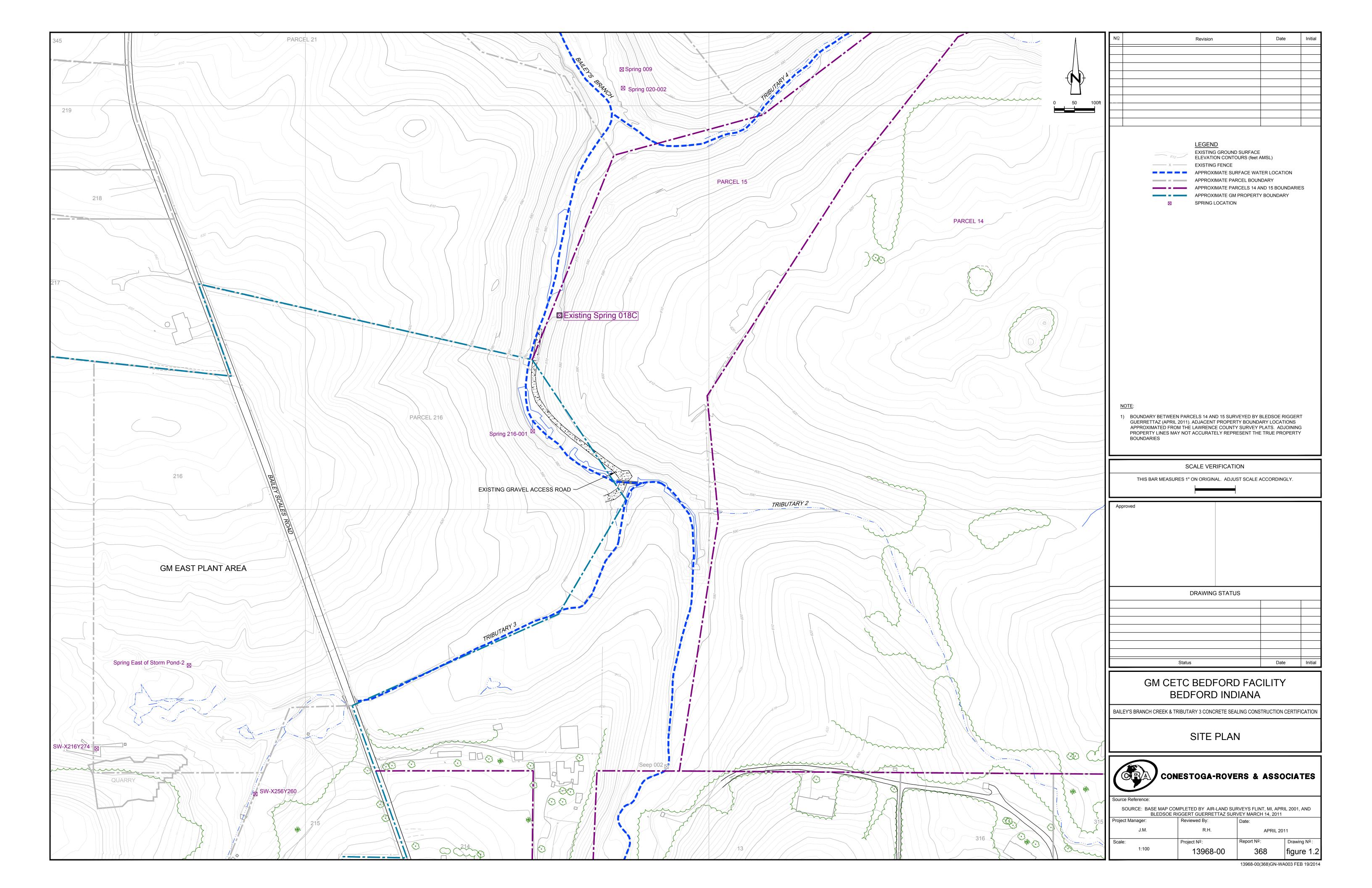
Respectfully Submitted,

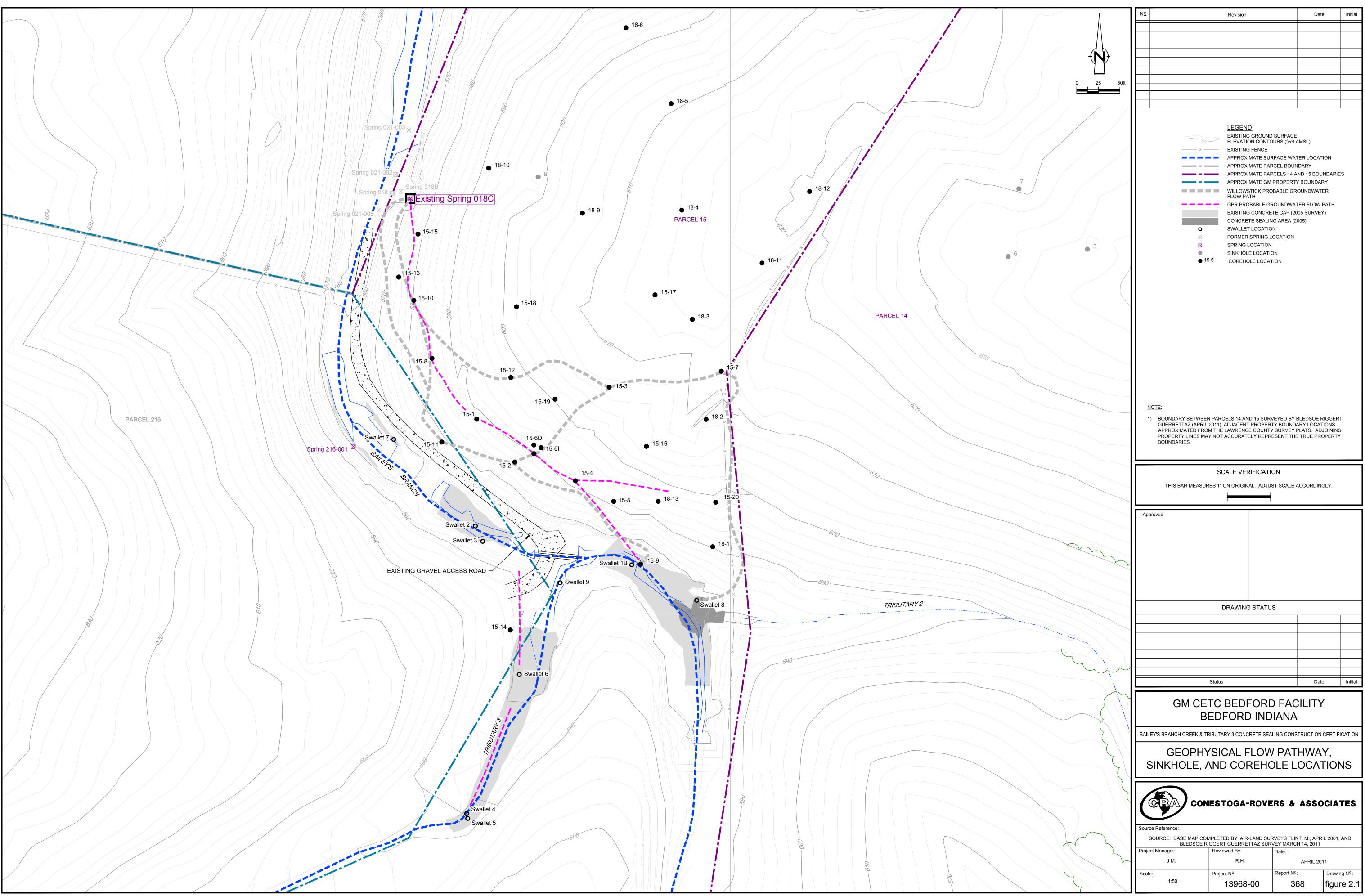
James J. McGuigan, P.E. Project Coordinator



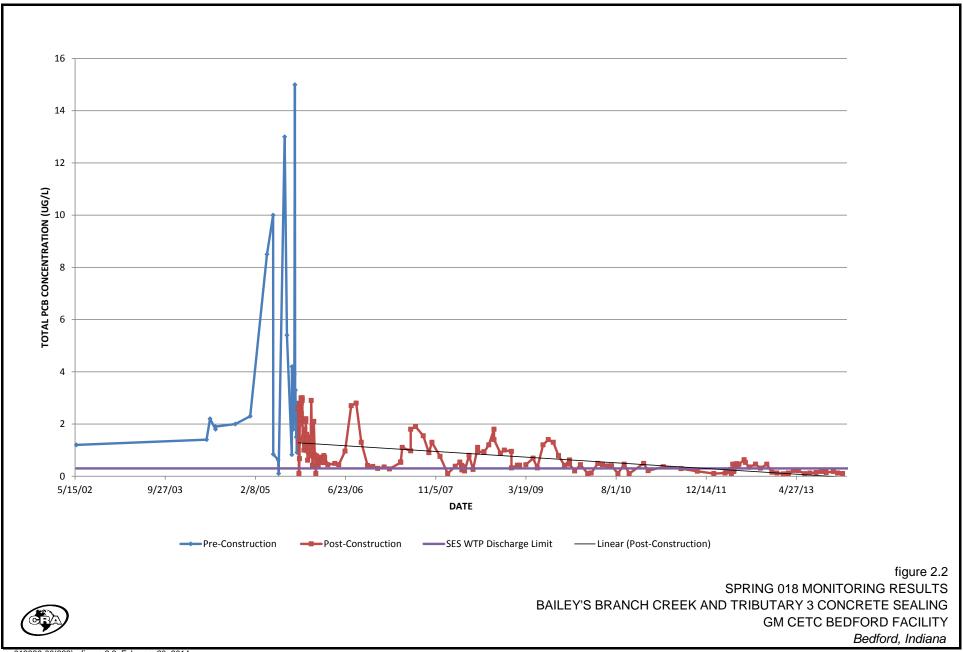


EXISTING GROUND SURF	ACE	3114000	3115000	NOTE: GM PROPERTY BC RECEIVED OCTOB APPROXIMATED F	DUNDARY SURVEY BY BER 2007. ADJACENT FROM THE LAWRENCE	PROPERTY BOUNDARY LC E COUNTY SURVEY PLATS	RRETTAZ DCATIONS 5. ADJOINING	3120000	3121000	3122000	3123000	3124000	3125000	3126000	3127000 312	8000 3129	000 31300
ENCE LINE RAILROAD TRACKS DIRT ROADS ROADS / PAVED AREAS APPROXIMATE SURFACE APPROXIMATE PARCEL B APPROXIMATE GM PROPI	OUNDARY ERTY BOUNDARY			Joneral													
 Revision		Date Initi		S BAR MEASURES 1"	ON ORIGINAL.		ORDINGLY.	_	GM CET	C BEDFO DFORD, I			C		NESTOGA-R	OVERS & /	ASSOCIAT
			Approve	ed									0	<u> </u>			
			Approve	ed				BAILEY'S BRAN		TARY 3 CONCRET	E SEALING CONS	TRUCTION CERTIFIC		eference: BASE MAP COMP	PLETED BY AIR-LAND S AND CRA SURVEYS Reviewed By:	URVEYS, FLINT, MI. 2002 TO 2005	APRIL 2001
	LEGEND EXISTING GROUND SURF, ELEVATION CONTOURS (I EXISTING VEGETATION EXISTING SUILDINGS FENCE LINE RAILROAD TRACKS DIRT ROADS ROADS / PAVED AREAS APPROXIMATE SURFACE APPROXIMATE SURFACE APPROXIMATE GAR PARCH	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (teel AMSL) EXISTING VEGETATION EXISTING VEGETATION EXISTING BUILDINGS FENCE LINE RALROAD TRACKS DIRT ROADS ROADS / PAVED AREAS	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) EXISTING VEGETATION EXISTING SUBLIDINGS FENCE LINE RALROAD TRACKS DIRT ROADS ROADS / PAVED AREAS APPROXIMATE SURFACE WATER LOCATION APPROXIMATE SURFACE WATER LOCATION APPROXIMATE GM PROPERTY BOUNDARY	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (teet AMSL) EXISTING VEGETATION EXISTING BUILDINGS FENCE LINE RALROAD TRACKS EXISTING VEGETATION ROADS / PAVED AREAS APPROXIMATE SURFACE WATER LOCATION APPROXIMATE FARCEL BOUNDARY	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) PROPERTY UNES EXISTING VEGETATION PROPERTY UNES EXISTING BUILDINGS FENCE LINE RALROAD TRACKS DIRT ROADS APPROXIMATE SURFACE WATER LOCATION APPROXIMATE SURFACE WATER LOCATION APPROXIMATE SURFACE WATER LOCATION APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) PRECEIVED OCTOBER 2007 ADJACENT PROPERTY UNES MAY NOT ACCURAT PROPERTY UNES MAY NOT ACCURAT BOUNDARIES PENCE LINE RALROAD TRACKS DIRT ROADS APPROXIMATE SURFACE WATER LOCATION APPROXIMATE SURFACE WATER LOCATION APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) Process EXISTING VEGETATION PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUBOLING EXISTING VEGETATION PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUBOLING EXISTING BUILDINGS BOUNDARES PENCE LINE RALROAD TRACKS DIRT ROADS APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEGEND ELEVATION CONTOURS (teet MASL) NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDSCE RIGGERT GUERRETTA2 RECEIVED OCTOBER 2007 ADJACENT PROPERTY BOUNDARY LOCATIONS EXISTING VEGETATION EXISTING SULLDINGS FENCE LINE RALROAD TRACKS DIRT ROADS APPROXIMATE SURFACE WATER LOCATION APPROXIMATE SURFACE WATER LOCATION APPROXIMATE SURFACE WATER LOCATION APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEGEND ELEVATION CONTOURS (feet AMSL) PROCEEDED OCTOBER 2007, ADJACENT PROPERTY BOUNDARY LOCATIONS PROCEDUAL SOLUTIONS PROCEEDED OCTOBER 2007, ADJACENT PROPERTY BOUNDARY LOCATIONS PROCEED NOT ACCURATELY REPRESENT THE TIBLE PROPERTY BOUNDARY BOUNDARIES PROCEED LINE RALROAD TRACKS DIRT ROADS APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (leef AMSL) NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDSOE REGGET GUERRETTAZ RECEIVED OCTOORS (leef AMSL) RECEIVED OCTOORS (leef AMSL) PROPERTY INTE SUM NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY SURVEY BY BLEDSOE REGGET GUERRETTAZ RECEIVED OCTOORS (leef AMSL) PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY SURVEY BY BLEDSOE REGGET GUERRETTAZ RELEVANCE VIEW RELEVANCE VIEW RELEVANCE VIEW RELEVANCE VIEW RELEVANCE VIEW RAILROAD TRACKS DIRT ROADS ROADS / PAVED AREAS APPROXIMATE SURFACE WATER LOCATION APPROXIMATE GM PROPERTY BOUNDARY APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEGEND ELEVATION CONTOURS (feet AMSL) PROCENCE OFTOBER 207, AUACENT PROPERTY BOUNDARY SURVEY BY BLEDGE RIGGERT GUERRETTAZ RELEVATION CONTOURS (feet AMSL) PROCENCE OFTOBER 207, AUACENT PROPERTY BOUNDARY LOCATIONS PROCENT UNES BW NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDAMES PROCENT UNES BW NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDAMES PROCENT UNES BW NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDAMES PROCENT SUBJECT RALROAD TRACKS BOUNDARY PROXIMATE SUFFACE WATER LOCATION APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) Processor EXISTING VEGETATION Property Boundary survey by BLEDSCE RIGGERT GLERRETTAZ RECEIVED OCTOBER 2007 AUXCANT PROPERTY BOUNDARY SURVEY by BLEDSCE RIGGERT GLERRETTAZ RECEIVED OCTOBER 2007 AUXCANT PROPERTY BOUNDARY SURVEY BOUNDARY BOUNDARY SURVEY BOUNDARY SURV	LEGEND EXISTING GROUND SURFACE ELEGEND ELEVATION COUND SURFACE ELEVATION COUND SURFACE ELEVATION COUND SURFACE ELEVATION COUND SURFACE EXISTING REGENTION POPERTY UNIS BUT NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY LOATIONS PROPERTY UNIS BUT NOT ACCURATELY REPRESENT THE TRUE PROPERTY BILROAD TRACKS DIRT ROADS APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE SUFFACE WATER LOCATION APPROXIMATE STUDY AREA	LEGEND EXISTING COUND SURFACE ELEVATION CONTOURS (feet AMSL) PROPERTY BOUNDARY SURVEY BY BLOSOG RIGGERT GLERRETTAZ RECEIVED OCTOBER 2007 ADJACENT PROPERTY BOUNDARY SURVEY BY BLOSOG RIGGERT GLERRETTAZ RECEIVED OCTOBER 2007 ADJACENT PROPERTY BOUNDARY SURVEY BY BLOSOG RIGGERT GLERRETTAZ RECEIVED OCTOBER 2007 ADJACENT PROPERTY BOUNDARY SURVEY BY BLOSOG RIGGERT GLERRETTAZ RESTING VEGETATION PROPERTY UNES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES PROPERTY SUNDARY BOUNDARY APPROXIMATE SUPACE WATER LOCATION APPROXIMATE GM PROPERTY BOUNDARY APPROXIMATE GM PROPERTY BOUNDARY APPROXIMATE STUDY AREA	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (leef AMSL) Received octroder 2007 AdJuctor theoremy soundary uncaring in the premy soundary unc	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDGE RIGGERT GUERRETTAZ RECEIVES OUTGER 2007, ADJACENT PROPERTY BOUNDARY CONTONS PROPERTY LINES BUT NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARES EXISTING VEGETATION PROPERTY BOUNDARY SURVEY BY BLEDGE RIGGERT GUERRETTAZ RECEIVES OUTGER 2007, ADJACENT PROPERTY BOUNDARY CONTONS PROPERTY LINES BUT NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARES FERCE LINE RALROAD TRACKS DIRT ROADS SURVEY AND TACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARES APPROXIMATE SURFACE WATER LOCATION SURVEY AND TACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY APPROXIMATE SURFACE WATER LOCATION SURVEY AND TACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY APPROXIMATE STUDY AREA SURVEY AND TACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY APPROXIMATE STUDY AREA SURVEY AND TACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY	LEGEND EXISTING GROUND SURFACE ELEVATION CONTOURS (ket AMSL) BERSTING SEGERATION Control Surface EXISTING SEGERATION PORCENT UNABLE TO MAIN SURVEY BY BLESSER FOODERT ALLERETTY SURVEY BY ALLERET PROPERTY BOUNDARY LOCATIONS PORCENT UNES MULTICATION PORCENT UNES ANY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARY PORCENT UNES MULTICATE PROPERTY BOUNDARY PORCENT UNES MULTICATELY REPRESENT THE TRUE PROPERTY BOUNDARY PORCENT SUFFACE PORCENT BULK PORCENT BULK

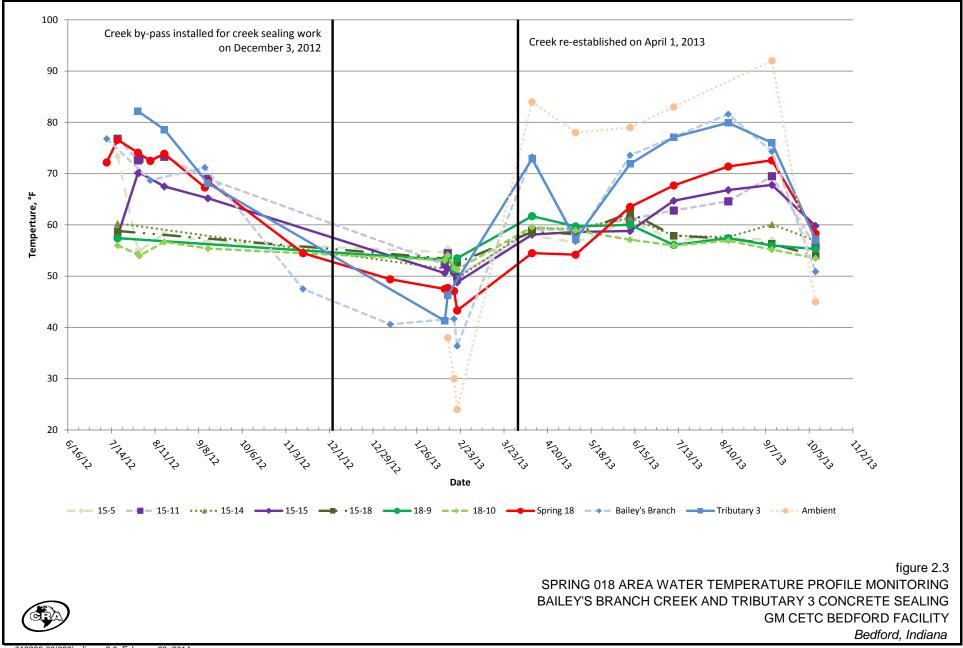




13968-00(368)GN-WA008 FEB 19/2014



013986-00(368) - figure 2.2, February 20, 2014



013986-00(368) - figure 2.3, February 20, 2014

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 015-007 SW-015-010111-GS-39539 1/1/2011	Spring 018 SW-052202-JW-5047 5/22/2002	Spring 018 SW-051304-JN-5204 5/13/2004	Spring 018 SW-060104-KMV-5220 6/1/2004	Spring 018 SW-070204-KMV-5228 7/2/2004	Spring 018 SW-070204-KMV-5229 7/2/2004 Duplicate	Spring 018 SW-102004-JN-5280 10/20/2004	Spring 018 SW-011005-JN-5312 1/10/2005
PCBs	Units								
FCDS									
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.2 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.2 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.4 U	0.40 UJ	0.40 UJ	0.40 UJ	0.40 UJ	0.40 U	0.40 U
Aroclor-1242 (PCB-1242)	ug/L	0.49	1.2	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	2.0	2.3
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.2 U	1.4 J	2.2 J	1.8 J	1.9 J	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.2 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.2 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Total PCBs	ug/L	0.49	1.2	1.4 J	2.2 J	1.8 J	1.9 J	2	2.3
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.2 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.2 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.4 U	0.40 U	0.40 UJ	0.40 UJ	0.40 UJ	0.40 U	0.40 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.2 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.2 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.2 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.2 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
General Chemistry									
Total suspended solids (TSS)	ug/L								
Field Parameters									
Conductivity, field	mS/cm		0.510	0.650	0.642	0.629	0.629	0.687	0.509
Dissolved oxygen (DO), field	ug/L		910	4610	6270	1400	1400	8090	9600
Flow rate	gpm/ft			1	2.5	5	5	11	15
Oxidation reduction potential (ORP), field	millivolts		168.2	81.6	164.9	72.4	72.4	201.2	198.8
pH, field	s.u.		7.70	6.89	7.25	7.17	7.17	7.54	7.65
Temperature, sample	Deg C		15.10	18.09	17.68	23.16	23.16	14.97	10.27
Turbidity, field	NTU		1.48	3.19	14.40	2.51	2.51	12.50	8

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018 SW-216-041305-CL-7542 4/13/2005	Spring 018 SW-015-051705-CL-7754 5/17/2005	Spring 018 SW-051805-JN-5398 5/18/2005	Spring 018 SW-015-061305-CL-7849 6/13/2005	Spring 018 SW-061705-JN-5431 6/17/2005	Spring 021-002A SW-021-072005-CL-7912 7/20/2005	Spring 018B SW-080205-CH-7945 8/2/2005	Spring 018C SW-015-082905-DM-7985 8/29/2005
PCBs	Units								
1025									
Aroclor-1016 (PCB-1016)	ug/L	1.0 U	1.0 U	0.20 U	0.20 U	0.20 UJ	1.0 U	1.0 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	1.0 U	1.0 U	0.20 U	0.20 U	0.20 UJ	1.0 U	1.0 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	2.0 U	1.0 U	0.20 U	0.20 U	0.20 UJ	1.0 U	1.0 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	8.5	10	0.20 U	0.63	0.20 UJ	13	5.4	0.83
Aroclor-1248 (PCB-1248)	ug/L	1.0 U	1.0 U	0.84	0.20 U	0.20 UJ	1.0 U	1.0 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	1.0 U	1.0 U	0.20 U	0.20 U	0.20 UJ	1.0 U	1.0 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	1.0 U	1.0 U	0.20 U	0.20 U	0.20 UJ	1.0 U	1.0 U	0.20 U
Total PCBs	ug/L	8.5	10	0.84	0.63	ND	13	5.4	0.83
Aroclor-1016 (PCB-1016) (dissolved)	ug/L			0.20 UJ		0.20 UJ	0.20 U		0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L			0.20 UJ		0.20 UJ	0.20 U		0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L			0.20 UJ		0.20 UJ	0.20 U		0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L			0.20 UJ		0.20 UJ	0.79		0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L			0.20 UJ		0.20 UJ	0.20 U		0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L			0.20 UJ		0.20 UJ	0.20 U		0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L			0.20 UJ		0.20 UJ	0.20 U		0.20 U
Total PCBs (dissolved)	ug/L			ND		ND	0.79		ND
General Chemistry									
Total suspended solids (TSS)	ug/L								
Field Parameters									
Conductivity, field	mS/cm			0.598		0.703			
Dissolved oxygen (DO), field	ug/L			5980		7540			
Flow rate	gpm/ft			10		20			
Oxidation reduction potential (ORP), field	millivolts			478.2		465.2			
pH, field	s.u.			7.43		6.99			
Temperature, sample	Deg C			16.72		19.56			
Turbidity, field	NTU			24.9		5.37			

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

Page 3 of 29

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-083005-DM-7992 8/30/2005	Spring 018C SW-015-083005-DM-7993 8/30/2005	Spring 018C SW-021-090105-DM-7994 9/1/2005	Spring 018C SW-021-090605-DM-7997 9/6/2005	Spring 018C SW-021-090605-DM-7998 9/6/2005 Duplicate	Spring 018C SW-015-090805-DM-11004 9/8/2005	Spring 018C SW-015-091005-KH-11024 9/10/2005
PCBs	Units							
Aroclor-1016 (PCB-1016)	ug/L	0.40 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ
Aroclor-1221 (PCB-1221)	ug/L	0.40 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ
Aroclor-1232 (PCB-1232)	ug/L	0.40 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ
Aroclor-1242 (PCB-1242)	ug/L	4.2	2.4	2.8	3.0	0.20 UJ	3.3 J	2.6 J
Aroclor-1248 (PCB-1248)	ug/L	0.40 U	0.20 U	0.20 U	0.20 U	1.8 J	0.20 UJ	0.20 UJ
Aroclor-1254 (PCB-1254)	ug/L	0.40 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ
Aroclor-1260 (PCB-1260)	ug/L	0.40 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ
Total PCBs	ug/L	4.2	2.4	2.8	3	1.8 J	3.3 J	2.6 J
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.75	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	0.75	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU				-			

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

Page 4 of 29

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-091205-DM-11035 9/12/2005	Spring 018C SW-015-091405-DM-11035 9/14/2005	Spring 018C SW-015-091605-DM-11045 9/16/2005	Spring 018C SW-015-091705-DM-11046 9/17/2005	Spring 018C SW-015-091905-JS-11062 9/19/2005	Spring 018C SW-015-092005-DM-11074 9/20/2005	Spring 018C SW-015-092205-DM-11104 9/22/2005
PCBs	Units							
PCBS								
Aroclor-1016 (PCB-1016)	ug/L	0.20 UJ	1.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 UJ	1.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 UJ	1.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	3.9 J	15	2.8	0.20 U	2.4	2.0	1.5
Aroclor-1248 (PCB-1248)	ug/L	0.20 UJ	1.0 U	0.20 U	3.3	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	1.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	1.0 U	0.20 U	0.20 U	0.20 U	0.065 J	0.20 U
Total PCBs	ug/L	3.9 J	15	2.8	3.3	2.4	2.065 J	1.5
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U						
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U						
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U						
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.82	0.20 U	0.20 U	0.20 U	0.12 J	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U						
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U						
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.061 J	0.20 U				
Total PCBs (dissolved)	ug/L	ND	0.82	ND	ND	ND	0.181 J	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							-

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-092405-CH-11110 9/24/2005	Spring 018C SW-015-092605-JS-11111 9/26/2005	Spring 018C SW-015-092805-DM-11130 9/28/2005	Spring 018C SW-015-093005-DM-11154 9/30/2005	Spring 018C SW-015-100305-DM-11163 10/3/2005	Spring 018C SW-015-100505-DM-11173 10/5/2005	Spring 018C SW-015-100705-DM-11191 10/7/2005
PCBs	Units							
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.91	0.20 UJ	0.20 U	0.20 U	1.3	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1222 (PCB-1222)	ug/L	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	2.0	0.20 U	0.20 UJ	2.5	2.6	0.20 U	0.20 U
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	2.8 J	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	2	0.91	2.8 J	2.5	2.6	1.3	ND
101111055	06/E	2	0.51	2.03	2.5	2.0	1.5	ND
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U						
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U						
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U						
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.38	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U						
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U						
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U						
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	0.38	ND	ND
,	8, -							
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-101005-DG-11192 10/10/2005	Spring 018C SW-015-101205-DM-11211 10/12/2005	Spring 018C SW-015-101405-DM-11237 10/14/2005	Spring 018C SW-015-101705-DM-11265 10/17/2005	Spring 018C SW-015-101905-DM-11278 10/19/2005	Spring 018C SW-015-102105-DM-11294 10/21/2005	Spring 018C SW-015-102105-DM-11295 10/21/2005 Duplicate
PCBs	Units							
Aroclor-1016 (PCB-1016) Aroclor-1221 (PCB-1221) Aroclor-1232 (PCB-1232) Aroclor-1242 (PCB-1242) Aroclor-1248 (PCB-1248) Aroclor-1248 (PCB-1248) Aroclor-1248 (PCB-1254) Aroclor-1260 (PCB-1260) Total PCBs Aroclor-1016 (PCB-1016) (dissolved) Aroclor-1221 (PCB-1221) (dissolved) Aroclor-1232 (PCB-1242) (dissolved) Aroclor-12424 (PCB-1242) (dissolved)	ug/L ug/L ug/L ug/L ug/L ug/L ug/L ug/L	1.0 U 1.0 U 1.0 U 1.0 U 0.67 J 1.0 U 1.0 U 0.67 J 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 2.20 U 2.8 0.20 U 0.20 U 0.20 U 2.8 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 2.2 U 0.20 U 0.20 U 0.20 U 0.20 U 2.2 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 2.0 U 2.0 U 0.20 U 0.20 U 0.20 U 2 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 3.0 0.20 U 0.20 U 0.20 U 0.20 U 3 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 2.0 U 2.4 0.20 U 0.20 U 0.20 U 2.4 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 2.20 U 2.8 0.20 U 0.20 U 0.20 U 2.8 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U
Aroclor-1248 (PCB-1248) (dissolved) Aroclor-1254 (PCB-1254) (dissolved) Aroclor-1250 (PCB-1260) (dissolved) Total PCBs (dissolved) General Chemistry Total suspended solids (TSS)	ug/L ug/L ug/L ug/L ug/L	0.31 0.20 U 0.20 U 0.31	0.20 U 0.20 U 0.20 U ND	0.20 U 0.20 U 0.20 U ND	0.20 U 0.20 U 0.20 U ND	0.20 U 0.20 U 0.20 U ND	0.20 U 0.20 U 0.20 U ND	0.20 U 0.20 U 0.20 U ND
Field Parameters	.0,							
Conductivity, field Dissolved oxygen (DO), field Flow rate Oxidation reduction potential (ORP), field pH, field Temperature, sample Turbidity, field	mS/cm ug/L gpm/ft millivolts s.u. Deg C NTU				 	 		

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-102405-KH-11303 10/24/2005	Spring 018C SW-015-102605-DM-11315 10/26/2005	Spring 018C SW-015-102605-DM-11316 10/26/2005 Duplicate	Spring 018C SW-015-102805-DM-11342 10/28/2005	Spring 018C SW-015-103105-DM-11347 10/31/2005	Spring 018C SW-015-103105-DM-11348 10/31/2005 Duplicate	Spring 018C SW-015-110205-DM-11362 11/2/2005
PCBs	Units							
FCD3								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	3.0	2.9	3.0	1.4	1.4	1.4	1.5
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	3	2.9	3	1.4	1.4	1.4	1.5
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.34 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							-
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:	Spring 018C SW-015-110405-AH-11375 11/4/2005	Spring 018C SW-015-110705-AH-11386 11/7/2005	Spring 018C SW-015-110905-AH-11402 11/9/2005	Spring 018C SW-015-111105-KH-11405 11/11/2005	Spring 018C SW-015-111405-AH-11406 11/14/2005	Spring 018C SW-015-111505-AH-11412 11/15/2005	Spring 018C SW-015-111705-AH-11416 11/17/2005
Un PCBs	ts						
Aroclor-1016 (PCB-1016) ug Aroclor-1221 (PCB-1221) ug Aroclor-1232 (PCB-1232) ug Aroclor-1242 (PCB-1242) ug Aroclor-1248 (PCB-1242) ug Aroclor-1248 (PCB-1248) ug Aroclor-1254 (PCB-1254) ug Aroclor-1260 (PCB-1260) ug Aroclor-1016 (PCB-1016) (dissolved) ug Aroclor-1232 (PCB-1221) (dissolved) ug Aroclor-1232 (PCB-1232) (dissolved) ug Aroclor-1232 (PCB-1232) (dissolved) ug Aroclor-1248 (PCB-1242) (dissolved) ug Aroclor-1248 (PCB-1242) (dissolved) ug Aroclor-1248 (PCB-1242) (dissolved) ug Aroclor-1248 (PCB-1242) (dissolved) ug Aroclor-1254 (PCB-1240) (dissolved) ug Aroclor-1254 (PCB-1240) (dissolved) ug Aroclor-1254 (PCB-1254) (dissolved) ug Aroclor-1254 (PCB-1250) (dissolved) ug	/L R /L R /L 1.0 J /L R /L R /L R /L 1 J /L 0.20 U /L 0.20 U	0.20 UJ 0.20 UJ 1.2 J 0.20 UJ 0.20 UJ 0.20 UJ 1.2 J 0.20 UJ 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	R R R 1.8J R R 1.8J R R R 2.0J R R R	0.20 UJ 0.20 UJ 0.20 UJ 1.1 J 0.20 UJ 0.20 UJ 0.20 UJ 1.1 J 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ	0.20 U 0.20 U 2.20 U 2.1 0.20 U 0.20 U 0.20 U 2.1 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 2.2 0.20 U 0.20 U 0.20 U 2.2 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.64 0.20 U 0.078 J 0.20 U	0.20 U 0.20 U 0.99 0.20 U 0.20 U 0.20 U 0.20 U 0.99 0.20 U 0.20 U
Total PCBs (dissolved) ug General Chemistry	/L ND	ND	2 J	ND	ND	0.718 J	ND
Total suspended solids (TSS)	/L						
Field Parameters							
Conductivity, field mS, Dissolved oxygen (DO), field ug Flow rate gpr Oxidation reduction potential (ORP), field milli pH, field s. Temperature, sample De Turbidity, field N	/L //ft olts J ç C						

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:	Spring 018C SW-015-111905-AH-11419 11/19/2005	Spring 018C SW-015-111905-AH-11420 11/19/2005 Duplicate	Spring 018C SW-015-112105-AH-11427 11/21/2005	Spring 018C SW-015-112305-AH-11428 11/23/2005	Spring 018C SW-015-112505-CH-11429 11/25/2005	Spring 018C SW-015-112805-AH-11433 11/28/2005	Spring 018C SW-015-113005-AH-11434 11/30/2005
Units PCBs							
Aroclor-1016 (PCB-1016) ug/L Aroclor-1221 (PCB-1221) ug/L Aroclor-1232 (PCB-1232) ug/L Aroclor-1242 (PCB-1242) ug/L Aroclor-1248 (PCB-1248) ug/L Aroclor-1248 (PCB-1248) ug/L Aroclor-1248 (PCB-1260) ug/L Aroclor-1260 (PCB-1260) ug/L Aroclor-1260 (PCB-1260) ug/L Aroclor-1216 (PCB-121) (dissolved) ug/L Aroclor-1221 (PCB-1221) (dissolved) ug/L Aroclor-1222 (PCB-1222) (dissolved) ug/L Aroclor-1242 (PCB-1248) (dissolved) ug/L Aroclor-1242 (PCB-1248) (dissolved) ug/L Aroclor-1242 (PCB-1248) (dissolved) ug/L Aroclor-1248 (PCB-1248) (dissolved) ug/L Aroclor-1256 (PCB-1248) (dissolved) ug/L Aroclor-1256 (PCB-1260) (dissolved) ug/L Aroclor-1256 (PCB-1260) (dissolved) ug/L Aroclor-1256 (PCB-1260) (dissolved) ug/L Aroclor-1256 (PCB-1260) (dissolved) ug/L	0.20 U 0.20 U 1.5 0.20 U 0.20 U 0.20 U 0.20 U 1.5 0.20 U 0.20 U 0.21 J	0.20 U 0.20 U 1.6 0.20 U 0.20 U 0.20 U 0.20 U 1.6 0.20 U 0.20 U	0.20 U 0.20 U 1.3 0.20 U 0.20 U 0.20 U 0.20 U 1.3 0.20 U 0.20 U	0.20 U 0.20 U 1.4 0.20 U 0.20 U 0.20 U 0.20 U 1.4 0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 0.20 U 0.61 0.20 U 0.20 U 0.61 0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 0.93 0.20 U 0.20 U 0.21 J	0.20 U 0.20 U 1.2 0.20 U 0.20 U 0.20 U 0.20 U 1.2 0.20 U 0.20 U
General Chemistry	0.115		0.003	0.153	0.1115	0.113	
Total suspended solids (TSS) ug/L	-						
Field Parameters							
Conductivity, field mS/cm Dissolved oxygen (DO), field ug/L Flow rate gpm/ft Oxidation reduction potential (ORP), field millivolt: pH, field s.u. Temperature, sample Deg C Turbidity, field NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-120205-AH-11441 12/2/2005	Spring 018C SW-015-120505-AH-11442 12/5/2005	Spring 018C SW-015-120805-JF-11459 12/8/2005	Spring 018C SW-015-121205-KH-11464 12/12/2005	Spring 018C SW-015-121205-KH-11465 12/12/2005 Duplicate	Spring 018C SW-015-121505-AH-11477 12/15/2005	Spring 018C SW-015-121905-AH-11478 12/19/2005
PCBs	Units							
r CD3								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.78	1.1	1.3	1.4	1.5	2.9	0.98
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	0.78	1.1	1.3	1.4	1.5	2.9	0.98
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.33	0.26	0.16 J	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.13 J	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	0.13 J	ND	0.33	0.26	0.16 J	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-122205-AH-11482 12/22/2005	Spring 018C SW-015-122905-AH-11496 12/29/2005	Spring 018C SW-015-010306-KH-11503 1/3/2006	Spring 018C SW-015-010506-AH-11510 1/5/2006	Spring 018C SW-015-010906-AH-11515 1/9/2006	Spring 018C SW-015-011206-AH-11524 1/12/2006	Spring 018C SW-015-011906-KH-11531 1/19/2006
PCBs	Units							
1025								
Aroclor-1016 (PCB-1016)	ug/L	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.42 J	2.1	0.20 U	0.77	0.20 U	0.78	0.20 U
Aroclor-1248 (PCB-1248)	ug/L	0.20 UJ	0.20 U	0.82	0.20 U	0.20 U	0.20 U	0.56
Aroclor-1254 (PCB-1254)	ug/L	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	0.42 J	2.1	0.82	0.77	ND	0.78	0.56
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-012306-AH-11545 1/23/2006	Spring 018C SW-015-012606-AH-11549 1/26/2006	Spring 018C SW-015-013006-CL-11550 1/30/2006	Spring 018C SW-015-020206-KH-11568 2/2/2006	Spring 018C SW-015-020606-KH-11569 2/6/2006	Spring 018C SW-015-020906-AH-11589 2/9/2006	Spring 018C SW-015-021306-KH-11597 2/13/2006
PCBs	Units							
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.37	0.54	0.73	0.60	0.20 UJ	0.20 U	0.20 U
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.58 J	0.69	0.60
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U
Total PCBs	ug/L	0.37	0.54	0.73	0.6	0.58 J	0.69	0.6
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.093 J
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	0.093 J
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-021606-AH-11599 2/16/2006	Spring 018C SW-015-022006-AH-11604 2/20/2006	Spring 018C SW-015-022306-AH-11612 2/23/2006	Spring 018C SW-015-022706-AH-11618 2/27/2006	Spring 018C SW-015-031706-KH-11632 3/17/2006	Spring 018C SW-015-042406-AH-11673 4/24/2006	Spring 018C SW-015-051606-DL-11773 5/16/2006
PCBs	Units							
FCBS								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U						
Aroclor-1221 (PCB-1221)	ug/L	0.20 U						
Aroclor-1232 (PCB-1232)	ug/L	0.20 U						
Aroclor-1242 (PCB-1242)	ug/L	0.20 U	0.52	0.79	0.72	0.44	0.49	0.44
Aroclor-1248 (PCB-1248)	ug/L	0.66	0.20 U					
Aroclor-1254 (PCB-1254)	ug/L	0.20 U						
Aroclor-1260 (PCB-1260)	ug/L	0.20 U						
Total PCBs	ug/L	0.66	0.52	0.79	0.72	0.44	0.49	0.44
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U						
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U						
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U						
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U						
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U						
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U						
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U						
Total PCBs (dissolved)	ug/L	ND						
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-062006-AH-11846 6/20/2006	Spring 018C SW-015-072406-KH-11919 7/24/2006	Spring 018C SW-015-082106-AH-11939 8/21/2006	Spring 018C SW-091806-JN-5833 9/18/2006	Spring 018C SW-102306-JN-5884 10/23/2006	Spring 018C SW-015-112106-AH-27146 11/21/2006	Spring 018C SW-015-121806-AH-27168 12/18/2006
PCBs	Units							
FCDS								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.20 U	2.7	2.8	0.20 U	0.41	0.20 U	0.20 U
Aroclor-1248 (PCB-1248)	ug/L	0.96	0.20 U	0.20 U	1.3	0.20 U	0.37	0.30
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	0.96	2.7	2.8	1.3	0.41	0.37	0.3
	0.							
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Tiela Faranieters								
Conductivity, field	mS/cm				0.645	0.672		
Dissolved oxygen (DO), field	ug/L				5430	3530		
Flow rate	gpm/ft				20	50		
Oxidation reduction potential (ORP), field	millivolts				277.2	201.7		
pH, field	s.u.				7.18	7.53		
Temperature, sample	Deg C				17.25	13.82		
Turbidity, field	NTU				25	43		
••								

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-012307-AH-27194 1/23/2007	Spring 018C SW-015-022107-AH-27218 2/21/2007	Spring 018C SW-042507-JN-5985 4/25/2007	Spring 018C SW-042507-JN-5986 4/25/2007 Duplicate	Spring 018C SW-015-053007-AH-27296 5/30/2007	Spring 018C SW-015-061907-AH-27322 6/19/2007	Spring 018C SW-015-061907-AH-27323 6/19/2007 Duplicate
PCBs	Units							
FCDS								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.20 U	0.28	0.53	0.55	1.1	0.20 U	0.20 U
Aroclor-1248 (PCB-1248)	ug/L	0.35	0.20 U	0.20 U	0.20 U	0.20 U	0.97 J	1.8 J
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ
Total PCBs	ug/L	0.35	0.28	0.53	0.55	1.1	0.97 J	1.8 J
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.077 J
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	0.077 J
General Chemistry								
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm			0.505	0.501			
Dissolved oxygen (DO), field	ug/L			10210	9970			
Flow rate	gpm/ft			55	55			
Oxidation reduction potential (ORP), field	millivolts			100.1	103.8			
pH, field	s.u.			7.71	7.69			
Temperature, sample	Deg C			13.62	13.11			
Turbidity, field	NTU			267	49.1			

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-071607-AH-27344 7/16/2007	Spring 018C SW-082707-JN-6006 8/27/2007	Spring 018C SW-015-091807-AH-27388 9/18/2007	Spring 018C SW-015-101507-AH-27405 10/15/2007	Spring 018C SW-015-112907-AH-27470 11/29/2007	Spring 018C SW-011008-JN-6047 1/10/2008	Spring 018C SW-015-022008-AH-27530 2/20/2008
	Units							
PCBs								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	1.9	1.5	0.90	0.20 U	0.76	0.20 U	0.38
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	0.20 U	1.3	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.050 J	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	1.9	1.55 J	0.9	1.3	0.76	ND	0.38
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved) Aroclor-1232 (PCB-1232) (dissolved)	ug/L ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved) Aroclor-1242 (PCB-1242) (dissolved)		0.20 U 0.20 U	0.20 U 0.20 U	0.20 U 0.20 U	0.20 U	0.20 U 0.20 U	0.20 U	1.2
	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L ug/L	0.20 U 0.20 U	0.20 U 0.20 U	0.20 U 0.20 U	0.20 UJ	0.20 U 0.20 U	0.20 U	0.20 U 0.20 U
Aroclor-1254 (PCB-1254) (dissolved)								
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U ND	0.20 U ND	0.20 U ND	0.20 UJ ND	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	1.2
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm		0.713				0.488	
Dissolved oxygen (DO), field	ug/L		5960				8540	
Flow rate	gpm/ft		7.5				55	
Oxidation reduction potential (ORP), field	millivolts		177.9				94.5	
pH, field	s.u.		7.94				8.44	
Temperature, sample	Deg C		22.51				10.09	
Turbidity, field	NTU		10.53				23.8	

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

Page 17 of 29

TABLE 2.1

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-031808-MB-27551 3/18/2008	Spring 018C SW-015-032708-CH-27557 3/27/2008	Spring 018C SW-015-032708-CH-27558 3/27/2008	Spring 018C SW-015-032808-CH-27559 3/28/2008	Spring 018C SW-015-032908-MB-27560 3/29/2008	Spring 018C SW-015-033108-CH-27561 3/31/2008	Spring 018C SW-015-040108-CH-27562 4/1/2008
PCBs	Units							
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U					
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U					
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U					
Aroclor-1242 (PCB-1242)	ug/L	0.20 U	0.36	0.41	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248)	ug/L	0.54	0.20 U	0.20 U	0.41	0.24	0.26	0.31
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U					
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U					
Total PCBs	ug/L	0.54	0.36	0.41	0.41	0.24	0.26	0.31
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U					
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U					
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U					
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U					
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U					
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U					
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U					
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:	SW-015	5pring 018C -040308-CH-27571 4/3/2008	Spring 018C SW-015-040408-CH-27572 4/4/2008	Spring 018C SW-015-041308-YM-27577 4/13/2008	Spring 018C SW-015-050808-MB-27631 5/8/2008	Spring 018C SW-015-053008-MB-27696 5/30/2008	Spring 018C SW-015-062408-MB-27731 6/24/2008	Spring 018C SW-015-062408-MB-27732 6/24/2008 Duplicate
PCBs	Jnits							
Aroclor-1221 (PCB-1221) Aroclor-1232 (PCB-1232) Aroclor-1242 (PCB-1242) Aroclor-1248 (PCB-1248) Aroclor-1254 (PCB-1248) Aroclor-1254 (PCB-1254) Aroclor-1260 (PCB-1260) Total PCBs Aroclor-1016 (PCB-1016) (dissolved) Aroclor-1221 (PCB-1221) (dissolved) Aroclor-1242 (PCB-1242) (dissolved) Aroclor-1242 (PCB-1248) (dissolved) Aroclor-1248 (PCB-1248) (dissolved)	ug/L ug/L ug/L ug/L ug/L ug/L ug/L ug/L	0.20 U 0.20 U 0.20 U 0.31 0.20 U 0.20 U 0.31 0.20 U 0.31 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 0.36 0.20 U 0.36 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U	0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 0.20 U 0.26 0.20 U 0.26 0.20 U 0.26 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 1.1 0.20 U 0.20 U 0.20 U 0.20 U 1.1 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ	0.20 U 0.20 U 0.20 U 0.93 0.20 U 0.20 U 0.20 U 0.20 U 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ 0.20 UJ
Aroclor-1260 (PCB-1260) (dissolved)	ug/L ug/L ug/L	0.20 U 0.20 U ND	0.20 U 0.20 U ND	0.20 U 0.20 U ND	0.20 U 0.20 U ND	0.20 U 0.20 U ND	0.20 UJ 0.20 UJ ND	0.20 UJ 0.20 UJ ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Dissolved oxygen (DO), field Flow rate g Oxidation reduction potential (ORP), field mi pH, field Temperature, sample E	IS/cm ug/L pm/ft Ilivolts s.u. Deg C NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-072908-MB-27765 7/29/2008	Spring 018C SW-015-072908-MB-27766 7/29/2008 Duplicate	Spring 018C SW-015-082508-MB-27807 8/25/2008	Spring 018C SW-092308-JN-6084 9/23/2008	Spring 018C SW-092308-JN-6085 9/23/2008 Duplicate	Spring 018C SW-015-102908-MB-27858 10/29/2008	Spring 018C SW-015-112008-MB-27893 11/20/2008
PCBs	Units							
PCBS								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.94	0.91	1.2	1.8 J	1.4 J	0.88	1.0
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	0.94	0.91	1.2	1.8 J	1.4 J	0.88	1
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.82 J	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	0.82 J	ND	ND	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm				0.729	0.727	-	
Dissolved oxygen (DO), field	ug/L				3410	3950		
Flow rate	gpm/ft					7.5		
Oxidation reduction potential (ORP), field	millivolts				52.7	55.5		
pH, field	s.u.				7.37	7.18		
Temperature, sample	Deg C				20.81	20.47		
Turbidity, field	NTU				6.75	6.74		

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-122908-JN-6097 12/29/2008	Spring 018C SW-122908-JN-6098 12/29/2008 Duplicate	Spring 018C SW-012109-JN-6108 1/21/2009	Spring 018C SW-015-021209-JN-27980 2/12/2009	Spring 018C SW-015-021209-JN-27980 2/12/2009 Split Duplicate	Spring 018C SW-015-031909-JN-39008 3/19/2009	Spring 018C SW-015-042809-JN-39051 4/28/2009	Spring 018C SW-015-052109-JN-39075 5/21/2009
PCBs	Units								
Aroclor-1016 (PCB-1016)		0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
. ,	ug/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U 0.20 U	0.20 U	0.20 U 0.20 U	0.20 U 0.20 U	0.20 U	0.20 U
. ,	ug/L	0.20 U		0.42		0.42	0.44	0.69	0.32
Aroclor-1242 (PCB-1242) Aroclor-1248 (PCB-1248)	ug/L	0.20 U 0.95 J	0.20 U 0.32 J	0.42 0.20 U	13 0.20 U	0.42 0.20 U	0.44 0.20 U	0.69 0.20 U	0.32 0.20 U
. ,	ug/L	0.95 J 0.20 U	0.32 J 0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U 0.20 U	0.20 0	0.20 U 0.20 U	0.20 U 0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	0.20 U 0.95 J	0.32 J		13.33 *	0.42	0.44	0.69	0.32
Total PCBs	ug/L	0.95 J	0.32 J	0.42	13.33 +	0.42	0.44	0.69	0.32
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U	0.20 U		0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND		ND	ND	ND
General Chemistry									
····· ·									
Total suspended solids (TSS)	ug/L								
Field Parameters									
Conductivity, field	mS/cm	0.498	0.496	0.548					
Dissolved oxygen (DO), field	ug/L	11390	10810	18380					
Flow rate	gpm/ft	0 NM	0 NM	12.5					
Oxidation reduction potential (ORP), field	millivolts	77.6	79.1	140.9					
pH, field	s.u.	7.69	7.67	8.48					
Temperature, sample	Deg C	8.99	9.01	7.71					
Turbidity, field	NTU	139	131	6.48					
•									

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-062209-JN-39096 6/22/2009	Spring 018C SW-015-072109-JN-39117 7/21/2009	Spring 018C SW-015-081809-JN-39149 8/18/2009	Spring 018C SW-015-091609-JN-39170 9/16/2009	Spring 018C SW-015-091609-JN-39171 9/16/2009 Duplicate	Spring 018C SW-015-101909-JN-39196 10/19/2009	Spring 018C SW-015-111609-JN-39220 11/16/2009
PCBs	Units							
PCDS								
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1242 (PCB-1242)	ug/L	1.2	1.4	1.3	0.78	0.79	0.41	0.62
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U				
Total PCBs	ug/L	1.2	1.4	1.3	0.78	0.79	0.41	0.62
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.20 U	0.21	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.20 U	0.20 U				
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.20 U	1.5 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	0.21	ND	ND	ND	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-111609-JN-39221 11/16/2009 Duplicate	Spring 018C SW-015-121409-JN-39252 12/14/2009	Spring 018C SW-015-011510-GS-39277 1/15/2010	Spring 018C SW-015-022510-GS-39278 2/25/2010	Spring 018C SW-015-031610-GS-39335 3/16/2010	Spring 018C SW-015-042210-GS-39366 4/22/2010	Spring 018C SW-015-051810-GS-39385 5/18/2010
PCBs	Units							
Aroclor-1016 (PCB-1016) Aroclor-1221 (PCB-1221) Aroclor-1232 (PCB-1232) Aroclor-1242 (PCB-1242) Aroclor-1248 (PCB-1248) Aroclor-1248 (PCB-1248) Aroclor-1248 (PCB-1254) Aroclor-1260 (PCB-1260) Total PCBs Aroclor-1016 (PCB-1016) (dissolved) Aroclor-1242 (PCB-1221) (dissolved) Aroclor-1242 (PCB-1242) (dissolved) Aroclor-1242 (PCB-1242) (dissolved) Aroclor-1248 (PCB-1248) (dissolved) Aroclor-1248 (PCB-1248) (dissolved) Aroclor-1254 (PCB-1248) (dissolved) Aroclor-1256 (PCB-1249) (dissolved) Aroclor-1260 (PCB-1260) (dissolved) Aroclor-1260 (PCB-1260) (dissolved) Aroclor-1260 (PCB-1260) (dissolved)	ug/L ug/L ug/L ug/L ug/L ug/L ug/L ug/L	0.20 U 0.20 U 0.20 U 0.46 0.20 U 0.20 U 0.20 U 0.20 U 0.46 0.20 UJ 0.20 UJ	0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 0.44 0.20 U 0.20 U	0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 0.12 J 0.20 U 0.20 U	0.20 UJ 0.20 UJ	0.20 UJ 0.20 UJ
General Chemistry	0 <u>6</u> / 2							
Total suspended solids (TSS) Field Parameters	ug/L		-	-			-	-
Conductivity, field Dissolved oxygen (DO), field Flow rate Oxidation reduction potential (ORP), field pH, field Temperature, sample Turbidity, field	mS/cm ug/L gpm/ft millivolts s.u. Deg C NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

TABLE 2.1

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-061610-GS-39402 6/16/2010	Spring 018C SW-015-070710-SM-39429 7/7/2010	Spring 018C SW-015-081110-AS-39445 8/11/2010	Spring 018C SW-015-091510-GS-39474 9/15/2010	Spring 018C SW-015-101310-SM-39494 10/13/2010	Spring 018C SW-015-012611-GS-39557 1/26/2011	Spring 018C SW-015-042011-GS-39607 4/20/2011
PCBs	Units							
Aroclor-1221 (PCB-1221) Aroclor-1232 (PCB-1232) Aroclor-1232 (PCB-1242) Aroclor-1248 (PCB-1242) Aroclor-1254 (PCB-1248) Aroclor-1256 (PCB-1260) Total PCBs Aroclor-1016 (PCB-1016) (dissolved) Aroclor-1221 (PCB-1221) (dissolved) Aroclor-1232 (PCB-1242) (dissolved) Aroclor-1242 (PCB-1242) (dissolved) Aroclor-1254 (PCB-1242) (dissolved) Aroclor-1254 (PCB-1254) (dissolved)	ug/L ug/L ug/L ug/L ug/L ug/L ug/L ug/L	0.20 U 0.20 U 0.20 U 0.39 0.20 U 0.20 U	0.20 UJ 0.20 UJ 0.40 J 0.40 J 0.20 UJ 0.20 UJ	0.20 UJ 0.20 UJ	0.20 UJ 0.20 UJ 0.20 UJ 0.46 J 0.20 UJ 0.20 UJ	0.20 UJ 0.20 UJ	0.20 U 0.20 U 0.20 U 0.21 0.20 U 0.20 U 0.20 U 0.20 U 0.21 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U	0.20 U 0.20 U 0.20 U 0.36 0.20 U 0.36 0.20 U 0.20 U 0.36 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U 0.20 U
	ug/L	ND	ND	ND	ND	ND	ND	ND
General Chemistry								
Total suspended solids (TSS)	ug/L							
Field Parameters								
Dissolved oxygen (DO), field Flow rate g Oxidation reduction potential (ORP), field m pH, field Temperature, sample I	mS/cm ug/L gpm/ft nillivolts s.u. Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-072711-SM-39675 7/27/2011	Spring 018C SW-015-102511-GS-39735 10/25/2011	Spring 018C SW-015-012512-GS-39798 1/25/2012	Spring 018C SW-015-032712-GS-39834 3/27/2012	Spring 018C SW-015-040212-GS-39837 4/2/2012	Spring 018C SW-015-041712-GS-39838 4/17/2012	Spring 018C SW-015-042712-GS-39847 4/27/2012
202	Units							
PCBs								
Aroclor-1016 (PCB-1016)	ug/L	0.19 U	0.19 U	0.20 U	0.19 U	0.19 U	0.21 U	0.19 U
Aroclor-1221 (PCB-1221)	ug/L	0.19 U	0.19 U	0.20 U	0.19 U	0.19 U	0.21 U	0.19 U
Aroclor-1232 (PCB-1232)	ug/L	0.19 U	0.19 U	0.20 U	0.19 U	0.19 U	0.21 U	0.19 U
Aroclor-1242 (PCB-1242)	ug/L	0.19 U	0.19	0.20 U	0.19 U	0.21	0.17 J	0.19 U
Aroclor-1248 (PCB-1248)	ug/L	0.29	0.19 U	0.20 U	0.12 J	0.19 U	0.21 U	0.26
Aroclor-1254 (PCB-1254)	ug/L	0.19 U	0.19 U	0.20 U	0.19 U	0.19 U	0.21 U	0.19 U
Aroclor-1260 (PCB-1260)	ug/L	0.19 U	0.19 U	0.20 U	0.19 U	0.19 U	0.21 U	0.19 U
Total PCBs	ug/L	0.29	0.19	ND	0.12 J	0.21	0.17 J	0.26
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U			
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U			
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U			
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U			
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U			
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U			
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U			
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND			
General Chemistry								
Total suspended solids (TSS)	ug/L				4000 U	3000 J	4000 U	4000 U
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-050212-GS-39848 5/2/2012	Spring 018C SW-015-050812-GS-39849 5/8/2012	Spring 018C SW-015-050912-GS-39850 5/9/2012	Spring 018C SW-015-051512-GS-39851 5/15/2012	Spring 018C SW-015-051512-GS-39852 5/15/2012 Duplicate	Spring 018C SW-015-052312-GS-39855 5/23/2012	Spring 018C SW-015-053012-GS-39856 5/30/2012
PCBs	Units							
Aroclor-1016 (PCB-1016)	ug/L	0.19 U	0.20 U	0.20 U	0.19 U	0.19 U	0.19 U	0.19 U
Aroclor-1221 (PCB-1221)		0.19 U	0.20 U	0.20 U	0.19 U	0.19 U	0.19 U	0.19 U
Aroclor-1221 (PCB-1221) Aroclor-1232 (PCB-1232)	ug/L ug/L	0.19 U	0.20 U	0.20 U	0.19 U 0.19 U	0.19 U 0.19 U	0.19 U 0.19 U	0.19 U 0.19 U
Aroclor-1232 (PCB-1232) Aroclor-1242 (PCB-1242)		0.19 U 0.10 J	0.20 U	0.46	0.19 U 0.18 J	0.19 0	0.36	0.19 U
Aroclor-1242 (PCB-1242) Aroclor-1248 (PCB-1248)	ug/L ug/L	0.10 J 0.19 U	0.20 0	0.46 0.20 U	0.18 J 0.19 U	0.25 0.19 U	0.19 U	0.19 0
Aroclor-1248 (PCB-1248) Aroclor-1254 (PCB-1254)	ug/L ug/L	0.19 U	0.21 0.20 U	0.20 U	0.19 U 0.19 U	0.19 U 0.19 U	0.19 U 0.19 U	0.48 0.19 U
Aroclor-1254 (PCB-1254) Aroclor-1260 (PCB-1260)	ug/L ug/L	0.19 U	0.20 U	0.20 U	0.19 U 0.19 U	0.19 U 0.19 U	0.19 U 0.19 U	0.19 U 0.19 U
Total PCBs	ug/L ug/L	0.13 0	0.20 0	0.46	0.19 U	0.25	0.36	0.48
TOLATPEBS	ug/L	0.13	0.21	0.46	0.18 J	0.25	0.36	0.48
Aroclor-1016 (PCB-1016) (dissolved)	ug/L			-				
Aroclor-1221 (PCB-1221) (dissolved)	ug/L							
Aroclor-1232 (PCB-1232) (dissolved)	ug/L							
Aroclor-1242 (PCB-1242) (dissolved)	ug/L							
Aroclor-1248 (PCB-1248) (dissolved)	ug/L							
Aroclor-1254 (PCB-1254) (dissolved)	ug/L							
Aroclor-1260 (PCB-1260) (dissolved)	ug/L							
Total PCBs (dissolved)	ug/L							
General Chemistry								
Total suspended solids (TSS)	ug/L	2000 J	25000	11000	4000 U	4000 U	2000 J	4000 U
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							
•								

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-060612-GS-39857 6/6/2012	Spring 018C SW-015-061312-GS-39862 6/13/2012	Spring 018C SW-015-071112-GS-39868 7/11/2012	Spring 018C SW-015-071812-KMV-39869 7/18/2012	Spring 018C SW-015-080812-GS-39870 8/8/2012	Spring 018C SW-015-080812-GS-39871 8/8/2012 Duplicate	Spring 018C SW-015-091212-GS-39881 9/12/2012
PCBs	Units							
1 625								
Aroclor-1016 (PCB-1016)	ug/L	0.19 U	0.19 U	0.19 U	0.20 U	0.19 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.19 U	0.19 U	0.19 U	0.20 U	0.19 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.19 U	0.19 U	0.19 U	0.20 U	0.19 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.19 U	0.46	0.63	0.20 U	0.34 J	0.35 J	0.46
Aroclor-1248 (PCB-1248)	ug/L	0.37	0.19 U	0.19 U	0.53	0.19 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.19 U	0.19 U	0.19 U	0.20 U	0.19 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.19 U	0.19 U	0.19 U	0.20 U	0.19 U	0.20 U	0.20 U
Total PCBs	ug/L	0.37	0.46	0.63	0.53	0.34 J	0.35 J	0.46
Aroclor-1016 (PCB-1016) (dissolved)	ug/L							
Aroclor-1221 (PCB-1221) (dissolved)	ug/L							
Aroclor-1232 (PCB-1232) (dissolved)	ug/L							
Aroclor-1242 (PCB-1242) (dissolved)	ug/L							
Aroclor-1248 (PCB-1248) (dissolved)	ug/L							
Aroclor-1254 (PCB-1254) (dissolved)	ug/L							
Aroclor-1260 (PCB-1260) (dissolved)	ug/L							
Total PCBs (dissolved)	ug/L							-
General Chemistry								
Total suspended solids (TSS)	ug/L	4000 U	3000 J	3000 J	4000	4000 U	4000 U	16000
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-101012-GS-39907 10/10/2012	Spring 018C SW-015-111412-GS-39912 11/14/2012	Spring 018C SW-015-121212-GS-39924 12/12/2012	Spring 018C SW-015-010913-GS-39925 1/9/2013	Spring 018C SW-015-021313-GS-39928 2/13/2013	Spring 018C SW-015-031313-GS-39940 3/13/2013	Spring 018C SW-015-031313-GS-39941 3/13/2013 Duplicate
PCBs	Units							
		0.40.11	0.40.11	0.00.11	0.04.11	0.0011	0.40.11	0.40111
Aroclor-1016 (PCB-1016)	ug/L	0.19 U	0.19 U	0.20 U	0.21 U	0.20 U	0.19 U	0.19 UJ
Aroclor-1221 (PCB-1221)	ug/L	0.19 U 0.19 U	0.19 U 0.19 U	0.20 U 0.20 U	0.21 U 0.21 U	0.20 U 0.20 U	0.19 U 0.19 U	0.19 UJ
Aroclor-1232 (PCB-1232)	ug/L		0.19 0			0.20 0 0.088 J		0.19 UJ
Aroclor-1242 (PCB-1242) Aroclor-1248 (PCB-1248)	ug/L	0.19 U 0.31	0.46 0.19 U	0.15 J 0.20 U	0.21 U 0.12 J	0.088 J 0.20 U	0.19 U 0.12 J	0.19 UJ 0.19 UJ
Aroclor-1248 (PCB-1248) Aroclor-1254 (PCB-1254)	ug/L ug/L	0.19 U	0.19 U 0.19 U	0.20 U	0.12 J 0.21 U	0.20 U	0.12 J 0.19 U	0.19 U
Aroclor-1254 (PCB-1254) Aroclor-1260 (PCB-1260)	ug/L ug/L	0.19 U	0.19 U	0.20 U	0.21 U	0.20 U	0.19 U 0.19 U	0.19 U
Total PCBs	ug/L ug/L	0.31	0.46	0.15 J	0.12 J	0.20 0 0.088 J	0.19 0	ND
Total PCBS	ug/L	0.31	0.40	0.13 1	0.12 J	0.088 J	0.12	ND
Aroclor-1016 (PCB-1016) (dissolved)	ug/L							
Aroclor-1221 (PCB-1221) (dissolved)	ug/L							
Aroclor-1232 (PCB-1232) (dissolved)	ug/L							
Aroclor-1242 (PCB-1242) (dissolved)	ug/L							
Aroclor-1248 (PCB-1248) (dissolved)	ug/L							
Aroclor-1254 (PCB-1254) (dissolved)	ug/L							
Aroclor-1260 (PCB-1260) (dissolved)	ug/L							
Total PCBs (dissolved)	ug/L							
General Chemistry								
Total suspended solids (TSS)	ug/L	4000	43000	4000 U	5000	4000 U	5000	3000 J
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-041013-G5-39942 4/10/2013	Spring 018C SW-015-050813-GS-39953 5/8/2013	Spring 018C SW-015-061213-SA-39956 6/12/2013	Spring 018C SW-015-071013-GS-39966 7/10/2013	Spring 018C SW-015-081413-GS-39969 8/14/2013	Spring 018C SW-015-091113-SM-39973 9/11/2013	Spring 018C SW-015-100713-GS-39976 10/7/2013
DCD-	Units							
PCBs								
Aroclor-1016 (PCB-1016)	ug/L	0.19 U	0.21 U	0.19 U	0.19 U	0.19 U	0.19 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.19 U	0.21 U	0.19 U	0.19 U	0.19 U	0.19 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.19 U	0.21 U	0.19 U	0.19 U	0.19 U	0.19 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.19 U	0.21 U	0.19 U	0.12 J	0.14 J	0.18 J	0.20 J
Aroclor-1248 (PCB-1248)	ug/L	0.22	0.21	0.19 U	0.19 U	0.19 U	0.19 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.19 U	0.21 U	0.19 U	0.19 U	0.19 U	0.19 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.19 U	0.21 U	0.19 U	0.19 U	0.19 U	0.19 U	0.20 U
Total PCBs	ug/L	0.22	0.21	ND	0.12 J	0.14 J	0.18 J	0.2 J
Aroclor-1016 (PCB-1016) (dissolved)	ug/L							
Aroclor-1221 (PCB-1221) (dissolved)	ug/L							
Aroclor-1232 (PCB-1232) (dissolved)	ug/L							
Aroclor-1242 (PCB-1242) (dissolved)	ug/L							
Aroclor-1248 (PCB-1248) (dissolved)	ug/L							
Aroclor-1254 (PCB-1254) (dissolved)	ug/L							
Aroclor-1260 (PCB-1260) (dissolved)	ug/L							
Total PCBs (dissolved)	ug/L							
General Chemistry								
Total suspended solids (TSS)	ug/L	4000 U	5000	2000 J	4000 U	3000 J	4000	2000 J
Field Parameters								
Conductivity, field	mS/cm							
Dissolved oxygen (DO), field	ug/L							
Flow rate	gpm/ft							
Oxidation reduction potential (ORP), field	millivolts							
pH, field	s.u.							
Temperature, sample	Deg C							
Turbidity, field	NTU							

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration. UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

Page 29 of 29

TABLE 2.1

SPRING 018 PCBs ANALYTICAL RESULTS SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCITON CERTIFICATION GM CETC BEDFORD FACILITY BEDFORD, INDIANA

Sample Location: Sample Identification: Sample Date: Sample Type:		Spring 018C SW-015-100913-GS-39977 10/9/2013	Spring 018C SW-015-111813-GS-39982 11/18/2013	Spring 018C SW-015-121113-GS-39985 12/11/2013	Spring 018C SW-015-010814-GS-39988 1/8/2014	Spring 018C SW-015-021114-GS-39994 ¹ 2/11/2014
	Units					
PCBs						
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.22 U	0.19 U	0.20 U	0.19 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.22 U	0.19 U	0.20 U	0.19 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.22 U	0.19 U	0.20 U	0.19 U
Aroclor-1242 (PCB-1242)	ug/L	0.14 J	0.18 J	0.12 J	0.20 U	0.059 J
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.22 U	0.19 U	0.20 U	0.19 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.22 U	0.19 U	0.20 U	0.19 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.22 U	0.19 U	0.20 U	0.19 U
Total PCBs	ug/L	0.14 J	0.18 J	0.12 J	ND	0.059 J
Aroclor-1016 (PCB-1016) (dissolved)	ug/L					
Aroclor-1221 (PCB-1221) (dissolved)	ug/L					
Aroclor-1232 (PCB-1232) (dissolved)	ug/L					
Aroclor-1242 (PCB-1242) (dissolved)	ug/L					
Aroclor-1248 (PCB-1248) (dissolved)	ug/L					
Aroclor-1254 (PCB-1254) (dissolved)	ug/L					
Aroclor-1260 (PCB-1260) (dissolved)	ug/L					
Total PCBs (dissolved)	ug/L					
General Chemistry						
Total suspended solids (TSS)	ug/L	3000 J	5000	4000 U	8000	19000
Field Parameters						
Conductivity, field	mS/cm					
Dissolved oxygen (DO), field	ug/L					
Flow rate	gpm/ft					
Oxidation reduction potential (ORP), field	millivolts					
pH, field	s.u.					
Temperature, sample	Deg C					
Turbidity, field	NTU					

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

UJ - Not detected; associated reporting limit is estimated.

R - Rejected.

* - Laboratory split/duplicate reanalyzed by laboratory

SPRING 018 AREA TEMPERATURE AND CONDUCTIVITY MONITORING SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCTION CERTIFICATION GM BEDFORD REMEDIATION PROJECT BEDFORD, INDIANA

1	7/18/2012	7/	31/2012	7/31-12	- 8/1/12		8/17	/2012			9/14	4/2012			2/13/2013	2	/15/2013	2	2/19/2013
Corehole				Upper	Lower		Upper		Lower		Upper		Lower						
	°F		Conductivity	°F	°F	°F	Conductivity	°F	Conductivity	°F	Conductivity	°F	Conductivity	۴F	Conductivity	°F	Conductivity	°F	Conductivity
15-1		61.6	514	60.85	61.63	64.7	467	66.2	548	64.5	326	65.3	354						S
15-2		66.7	811	68.13	66.79	66.7	495	67.3	662	62.5	448	62.9	454						
15-3 15-4	58.3	54.7	523	54.43	54.74	56.9	347	58.3	368	55.5	343	55.3	351						
15-4	Dry 73.4	55.1	505	54.97	55.13	58.3	378	 59.5	422	56.7	350	57.7	364	54.7	808		756	52.3	621
15-6	58.8																		
15-6 D	57.7																		
15-6	58.1																		
15-7	58.8	55.1	531	54.83	58.28	57.3	354	58.7	367	55.9	357	57.6	370						
15-8		55.6	463	55.44	55.72	58.5	330	61.2	344	56.7	394	57.7	411						
15-9	68.2	67.7	729	68.57	68.32	59.3	432	66.4	463	57.5	387	61.3	398	Grouted	Grouted	Grouted	Grouted	Grouted	Grouted
15-9 (creek)	78.8	76.6	920		76.72		784	72.9			426	70.8							
15-10	76.1	72.9	880	73.04	73.1	70.5	412	71.7	426	67.5	447	60.1	442						
15-11	76.8	72.6	764	72.86	72.69	73.3	347	73.1	350	69	356	68.2	321	52.3	535	54.5	521	51.1	597
15-12	58.6	55.4	470	55.22	55.42	58.4	326	60.8	344	56	328	55.8	339						
15-13 15-14	Dry 60.3	Dry	Dry			Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry					51.2	523
15-14	57.8	70.1	828	70.19	70.26	67.5	392	68.5	470	65.2	417	65.2	417	50.6	583	51.5	614	51.2	655
15-16	57.5										417								
15-17	57.9																		
15-18	58.8															53.4	753	51.7	631
15-19	58.4																		
15-20	58.1																		
18-1	56.9																		
18-2	58.5																		
18-3	57.2																		
18-4	57.3																		
18-5	57.9	54.3	476	53.78	54.34	58.8	320	59.7	338	54.8	327	55.8	337						
18-6 18-7	56.4 55.8																		
18-7	60.8	57.3	500	56.65	57.17	61.6	320	62.8	326	60	326	59.9	348						
18-8	57.4													53.2	511	53.8	702	51.3	715
18-10	56	54.3	504	53.96	54.34	56.7	329	58.7	326	55.4	343	55.4	361	53.1	710	54.1	689	51.6	683
18-11	57.3																		
18-12	56.6																		
18-13	58.1																		
Spring 18	76.6	74.1	801		74.12	73.9	428			68.5	443			47.5	665	47.7	698	47.1	640
Tributary 2		Dry	Dry			76.3	328			71.6	439							Dry	Dry
Tributary 3		82.2	575		82.23	78.6	262			68.1	315			41.3	997	46.3	1117	Constant	Cr
Swallet 7		74.4	631		74.27	77.5	263			66.2	296			Concrete	Concrete	Concrete	Concrete	Concrete	Concrete
Pond Area Air Temp.	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	44.5 NA	667 NA	47.9 38	683 NA	42.7 30	602 NA
Air remp.	NA	INA	NA	INA	NA	INA	NA	INA	NA	NA	NA	INA	NA	NA	NA	38	INA	30	NA
Trib 3 - Ponded at																			
Dam near Confluence																		41.8	754
SES By-Pass Pump																			
Discharge																			
(downstream of																			
Spring 018)																		42.5	739
Baileys Branch																			
(upstream of																			
concrete sealing																			
areas)																┨───┼		41.7	744
Trib 3 - at Bailey																			
Scales Road Culvert																		37.3	341
scales Road curvert								I										57.5	JHI

SPRING 018 AREA TEMPERATURE AND CONDUCTIVITY MONITORING SUMMARY BAILEY'S BRANCH CREEK AND TRIBUTARY 3 CONCRETE SEALING CONSTRUCTION CERTIFICATION GM BEDFORD REMEDIATION PROJECT BEDFORD, INDIANA

	2	2/21/2013	4	4/10/2013		5/8/2013	6	/12/2013		7/10/2013	8	3/14/2013		9/11/2013		10/9/2013
Corehole	°F	Conductivity	°F	Conductivity	°F	Conductivity	°F	Conductivity	۴F	Conductivity	°F	Conductivity	°F	Conductivity	۴F	Conductivity
15-1																
15-2																
15-3																
15-4																
15-5	50.3	523	57.9	637	56.6	663	60.8	759	57.1	350	57.4	350	57.1	358	54.9	716
15-6																
15-6 D																
15-61																
15-7 15-8																
15-8	Grouted	 Grouted	Grouted	Grouted	Grouted	Grouted	Grouted	 Grouted	Grouted	Grouted	Grouted	Grouted	Grouted	Grouted	 Grouted	Grouted
15-9 (creek)																
15-10																
15-11	49.9	501	58.9	558	59.3	602	61.1	565	62.8	576	64.6	328	69.5	288	55.8	682
15-12																
15-13																
15-14	49.6	536	59.3	793	59.3	783	61.4	660	57.9	368	57.6	421	60.1	379	56.9	938
15-15	48.8	642	58.1	801	58.6	799	58.8	715	64.7	434	66.8	662	67.8	653	59.8	1317
15-16																
15-17																
15-18	52.6	628	58.6	766	58.2	801	62.4	246	57.9	333	57.3	319	56.3	333	54	601
15-19																
15-20																
18-1																
18-2																
18-3																
18-4																
18-5																
18-6																
18-7																
18-8										338						
18-9 18-10	53.5 51.3	640 663	61.7 59.6	711 737	59.7 58.9	736 821	60 57.1	695 680	56.1 56	354	57.4 56.9	369 365	56 55.2	365 356	55.3 53.5	870 738
18-10																
18-11																
18-12																
10 15																
Spring 18	43.3	756	54.5	337	54.2	629	63.5	801	67.7	1043	71.4	777	72.6	762	58.3	1016
Tributary 2	Dry	Dry	Dry	Dry	56.8	722	75.8	549	dry	dry	dry	dry	dry	dry	dry	dry
Tributary 3	í í	1	72.9	1211	57.2	773	71.9	999	77.1	315	79.9	784	76	251	57.2	708
Swallet 7	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete
Pond Area	38.6	421	71.1	1213	56.9	728	74.2	608	77.9	580	79.1	768	76.5	251	59.2	716
Air Temp.	24	NA	84	NA	78	NA	79	NA	83	NA	NA	NA	92	NA	45	NA
Trib 3 - Ponded at																
Dam near Confluence	37.7	1135					I				Ⅰ↓					
SES By-Pass Pump																
Discharge																
(downstream of																
Spring 018)	39.1	1005					┫─────┤		 		Ⅰ				- I	
Baileys Branch																
(upstream of																
concrete sealing	26.1	4200	72.2	4254	56.0	044	72.6	501		C 22	04.6	700	74.0	000	50.0	4222
areas)	36.4	1308	73.3	1251	56.8	811	73.6	584	77.1	630	81.6	783	74.3	808	50.9	1323
Trib 3 - at Bailey																
Scales Road Culvert	34.7	153	72.2	1161	57.2	821	72.3	709	74.1	366	82.4	102	69.4	540	50.1	757
	54.7	453	72.3	1101	57.3	021	/2.3	708	74.1	000	02.4	193	09.4	549	50.1	757

Appendix A

Photographic Log







PHOTO No. 2: BAILEY'S BRANCH FACING DOWNSTREAM. SWALLET 3 MARKED BY ORANGE FLAG. SEP. 2004 CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 3: SPRING 018 PRE-EXCAVATION. OCT. 2004



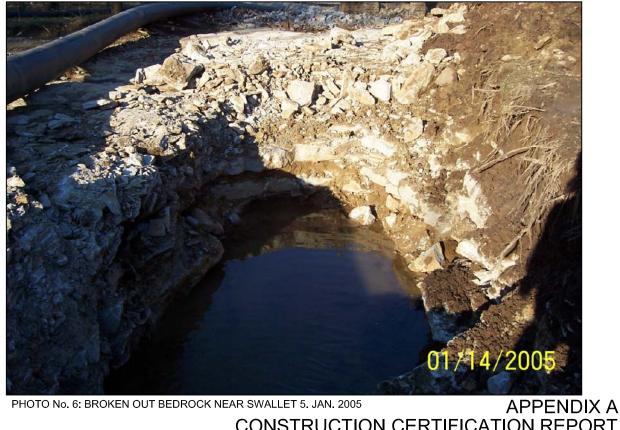


PHOTO No. 4: SPRING 018 EXPOSED, AFTER INITIAL REMOVAL ACTION EXCAVATION. NOV. 2004





PHOTO No. 5: SPRING 018 FOLLOWING HIGH-FLOW EVENT. DEC. 2004







CONSTRUCTION CERTIFICATION REPORT **GM CETC BEDFORD FACILITY** Bedford, Indiana



PHOTO No. 9: BROKEN OUT ROCK NEAR SWALLETS 2 AND 3 TO BE HAULED OUT. APR. 2005



PHOTO No. 10: CONCRETE FILLING OF SWALLETS 1A AND 1B BEDROCK TRENCH. MAY. 2005 APPENDIX A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana







PHOTO No. 12: SIMULTANEOUS WATER PUMPING AND CONCRETE FILLING AT SWALLETS 2 AND 3. MAY. 2005



Bedford, Indiana





PHOTO No. 14: COMPLETED CONCRETE NEAR SWALLETS 2 AND 3. AUG. 2005



PHOTO No. 15: COLLECTION OF GRAB SOIL AND SURFACE WATER SAMPLES IN SPRING 018B FOLLOWING FIRST SIGNIFICANT ROCK REMOVAL. AUG. 2005 APPENDIX A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 16: CRA SURVEYOR LOCATING THE CONCRETE POURED NEAR SWALLET 7, ADJACENT TO THE CREEK BY-PASS PIPING. AUG. 2005



PHOTO No. 17: SPRING 018C FOLLOWING THE SECOND SIGNIFICANT ROUND OF ROCK REMOVAL. AUG. 2005 APPENDIX A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 18: PUMP TRUCK POURING BASEFILL CONCRETE OF SEALING LAYER UPSTREAM OF TRIBUTARY 3. DEC. 2012





PHOTO No. 19: BEGINNING OF CONCRETE POUR WHERE TRIBUTARY 2 DISCHARGES INTO BAILEY'S BRANCH. DEC. 2012





PHOTO No. 20: TRIBUTARY 3 CONCRETE SEALING WORK LOOKING DOWNSTREAM. DEC. 2012





PHOTO No. 21: MAN-MADE "ROCKS" IN TRIBUTARY 3. DEC. 2012



PHOTO No. 22: CONCRETE WORK LOOKING FROM SWALLET 7 AREA UPSTREAM TOWARD TRIBUTARY 3 CONFLUENCE. DEC. 2012 APPENDIX A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 23: CONCRETE WORK LOOKING FROM CONFLUENCE TOWARD SWALLET 7 ALONG CENTERLINE DEC. 2012



PHOTO No. 24: PLACING CONCRETE ON THE SPRING 018 CONTAINMENT BERM. DEC. 2012 APPENDIX A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 25: FINAL CONCRETE ON THE SPRING 018 CONTAINMENT BERM. DEC. 2012



PHOTO No. 26: POURING CONCRETE FOR THE POND CONSTRUCTION NEAR FORMER APPENDIX A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 27: POURING CONCRETE ALONG THE CREEK SIDEWALL OVER PREVIOUSLY SHOTCRETE WITHIN POND NEAR FORMER SWALLET 7. DEC. 2012



PHOTO No. 28: COMPLETED BASEFILL CONCRETE FOR THE POND CONSTRUCTION NEAR FORMER SWALLET 7, LOOKING UPSTREAM. DEC. 2012 A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 29: PLACING GEOSYNTHETIC CLAY LINER (GCL). FEB. 2012

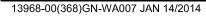


PHOTO No. 30: PLACING GEOSYNTHETIC CLAY LINER (GCL). FEB. 2012 CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY Bedford, Indiana



PHOTO No. 31: REBAR MATTING COVERING GLC LAYER FOR CONCRETE POUR FEB. 2012

APPENDIX A CONSTRUCTION CERTIFICATION REPORT BAILEY'S BRANCH AND TRIBUTARY 3 CONCRETE SEALING GM CETC BEDFORD FACILITY *Bedford, Indiana*



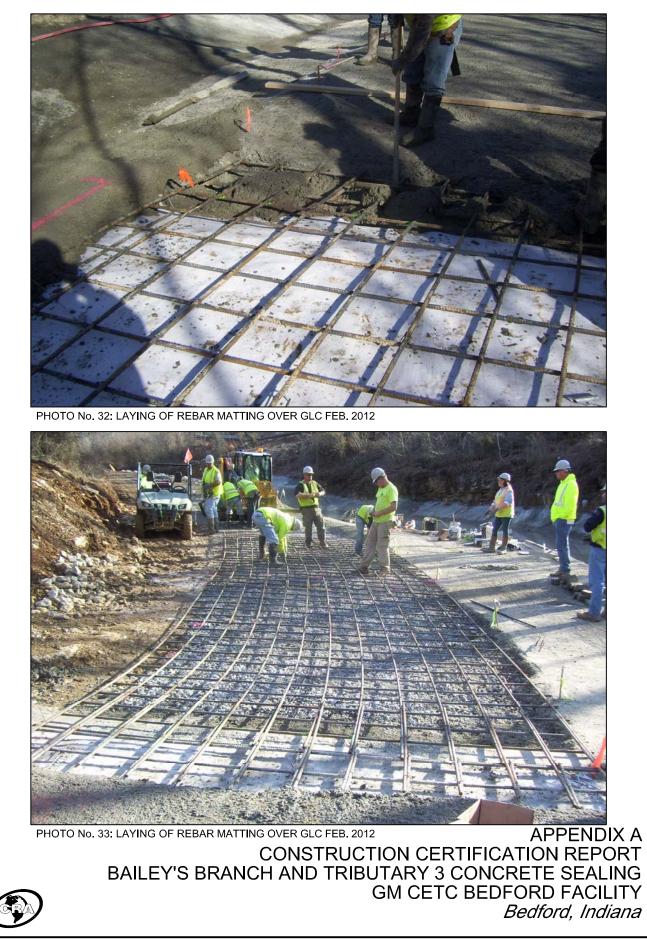




PHOTO No. 34: REBAR MATTING FOR CONCRETE ACCESS ROAD. FEB. 2012

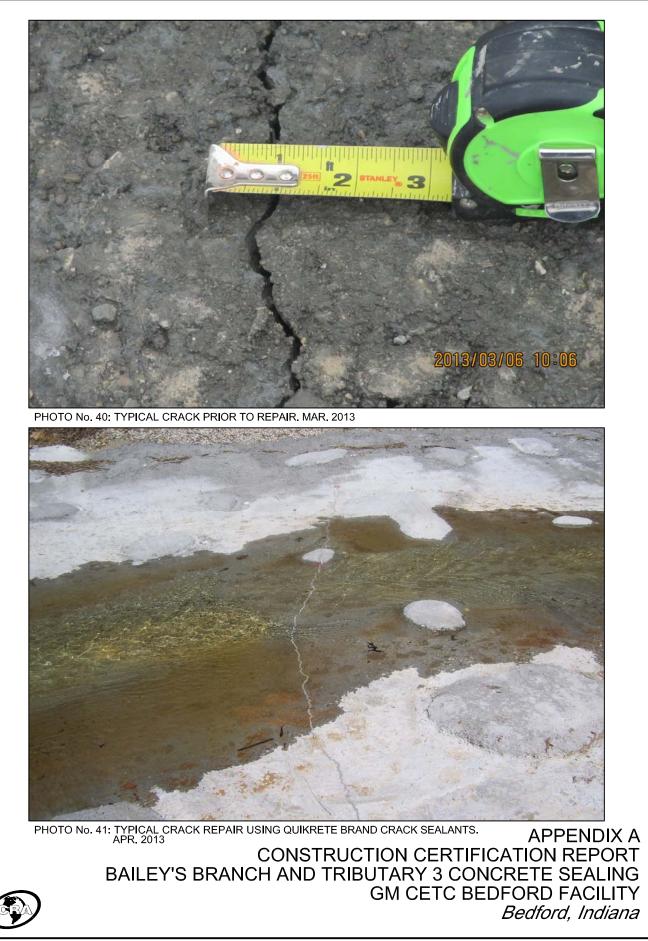






13968-00(368)GN-WA007 JAN 14/2014



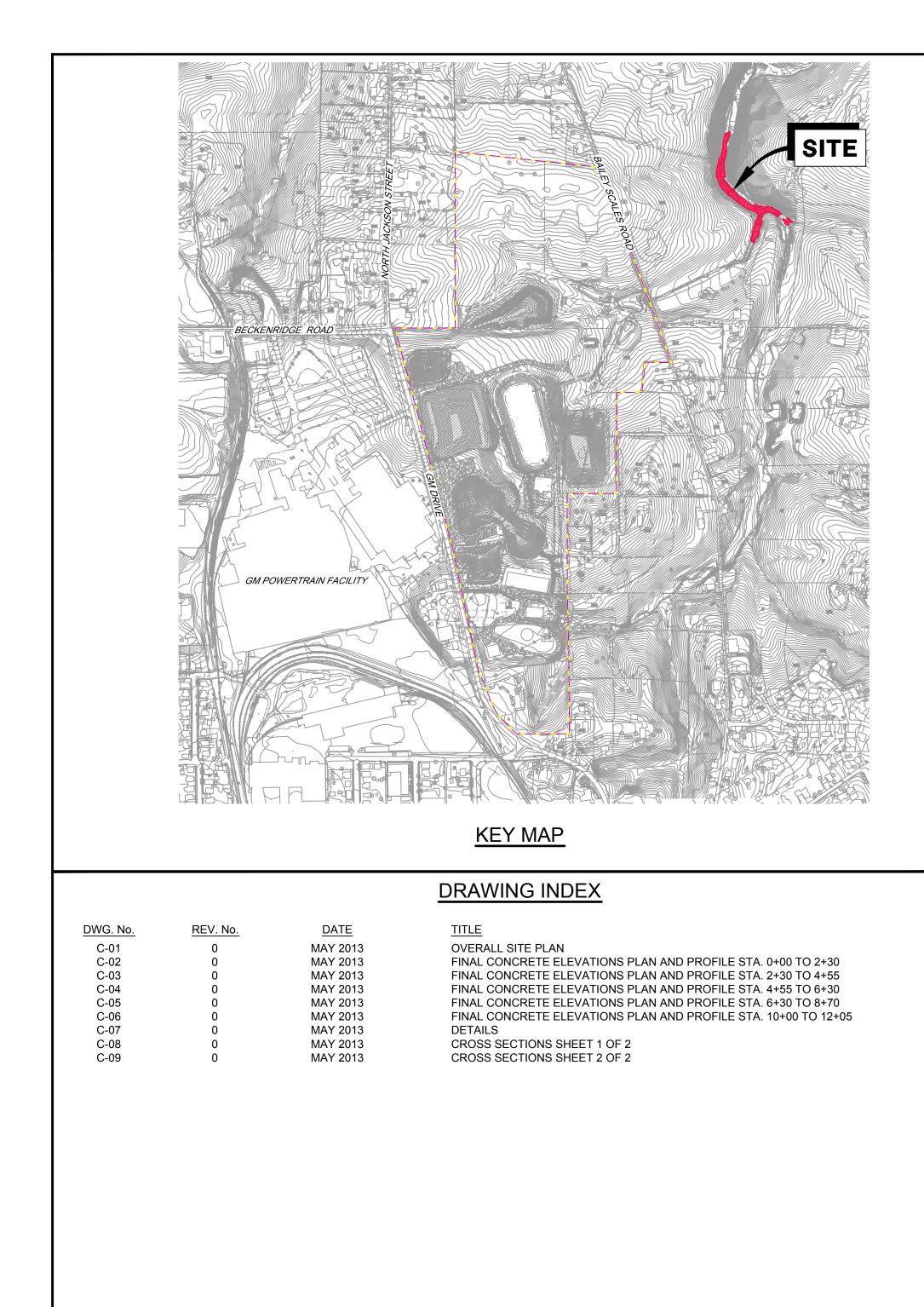


13968-00(368)GN-WA009 JAN 14/2014

Appendix B

As-Recorded Drawings





BAILEY'S BRANCH CREEK AND TRIBUTARY 3 **CONCRETE SEALING CONSTRUCTION CERTIFICATION AS-BUILTS GM CETC BEDFORD FACILITY**

BEDFORD, INDIANA

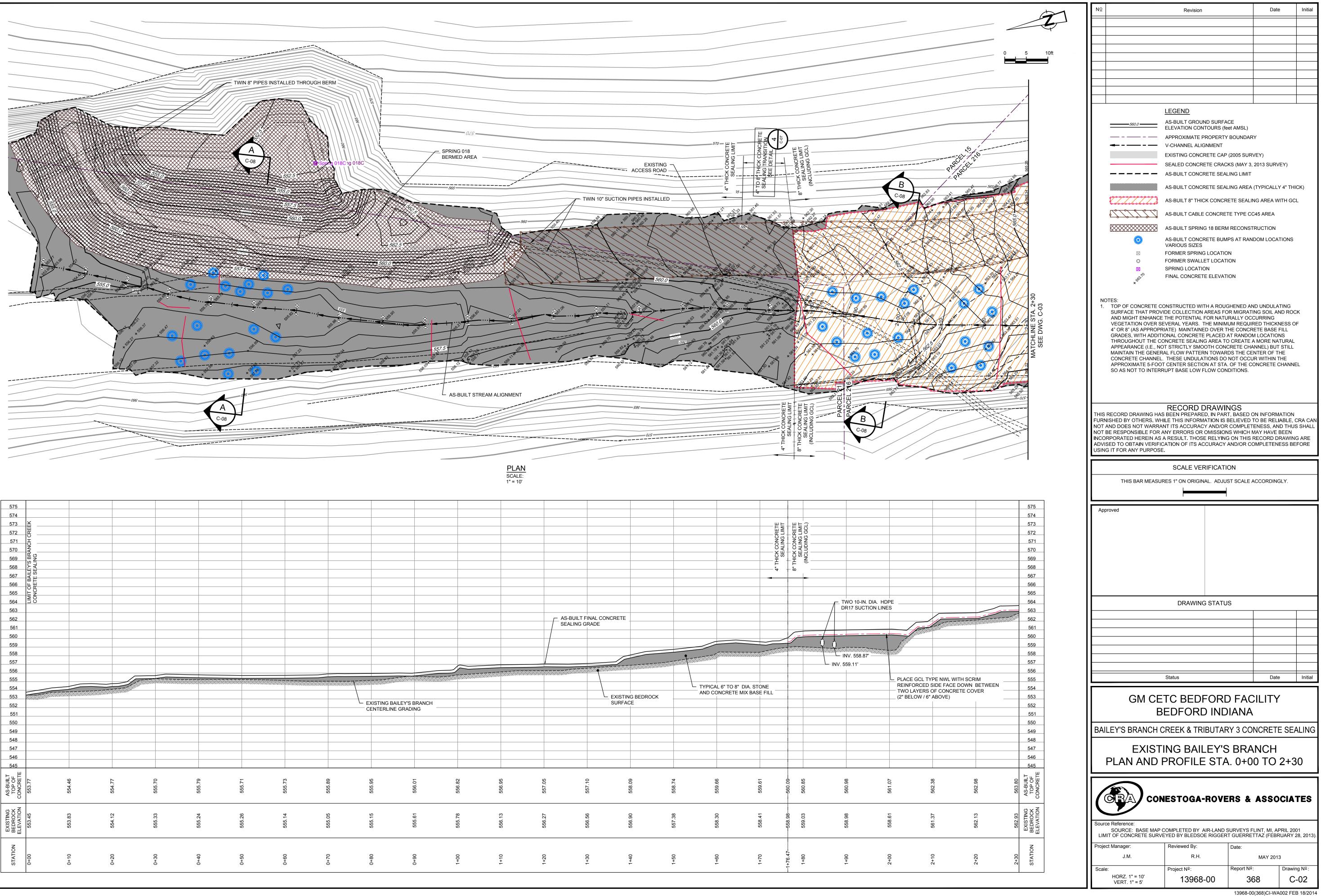


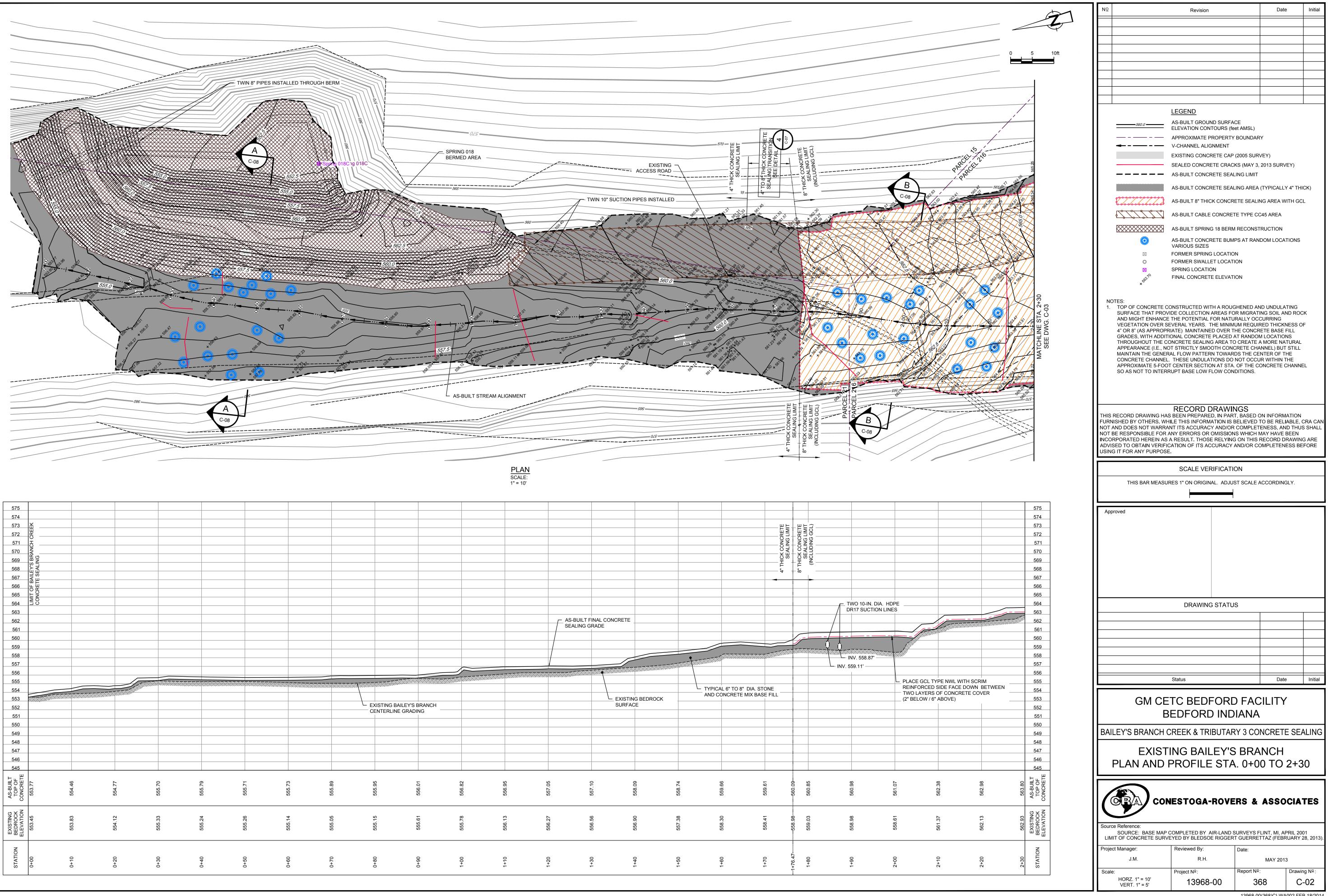
CONESTOGA-ROVERS & ASSOCIATES

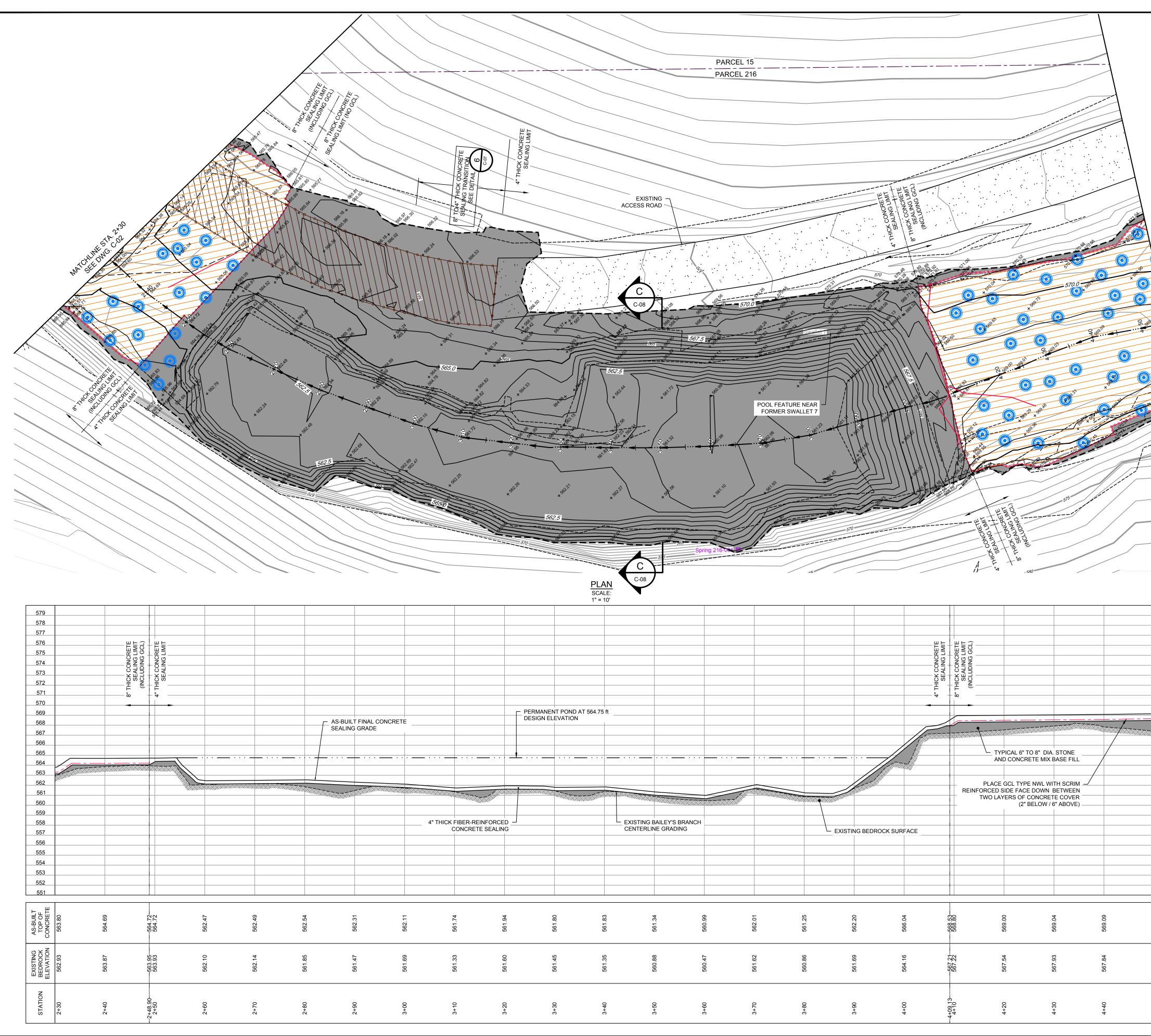
RECORD DRAWINGS THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, CRA CAN NOT AND DOES NOT WARRANT ITS ACCURACY AND/OR COMPLETENESS, AND THUS SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED HEREIN AS A RESULT. THOSE RELYING ON THIS RECORD DRAWING ARE ADVISED TO OBTAIN VERIFICATION OF ITS ACCURACY AND/OR COMPLETENESS BEFORE USING IT FOR ANY PURPOSE.



Δ	Nº	Revision		Date	Initial
0 20 40ft					
		LEGEND			
	610		ITOURS (feet AMSL)		
		APPROXIMATE I	PROPERTY BOUNDA GNMENT	ARY	
			RETE CAP (2005 SU		
			RETE SEALING LIMI		THICK)
		AS-BUILT 8" THI	CK CONCRETE SEAI	LING AREA WITH	GCL
		AS-BUILT CABLE	E CONCRETE TYPE	CC45 AREA	
			IG 18 BERM RECONS		
	\bigcirc	(VARIOUS SIZES	,	NDOM LOCATION	NS
	⊠ ○ ⊠	FORMER SPRIN FORMER SWALL SPRING LOCATI	ET LOCATION		
	NOTES:				
	1. TOP OF CONCRETE C SURFACE THAT PROV AND MIGHT ENHANCE	IDE COLLECTION	AREAS FOR MIGRA	TING SOIL AND R	
	VEGETATION OVER SI 4" OR 8" (AS APPROPE GRADES, WITH ADDIT	EVERAL YEARS. ⁻ RIATE) MAINTAINE	THE MINIMUM REQU ED OVER THE CONC	JIRED THICKNESS RETE BASE FILL	6 OF
	THROUGHOUT THE CO APPEARANCE (I.E., NO	ONCRETE SEALIN DT STRICTLY SMC	G AREA TO CREATE	E A MORE NATUR HANNEL) BUT STIL	
	MAINTAIN THE GENER CONCRETE CHANNEL APPROXIMATE 5-FOO	. THESE UNDULA T CENTER SECTIO	TIONS DO NOT OCO ON AT STA. OF THE (OR WITHIN THE	INEL
	SO AS NOT TO INTER 2. BOUNDARY BETWEEN GUERRETTAZ (APRIL 2	I PARCELS 14 ANI 2011). ADJACENT	D 15 SURVEYED BY PROPERTY BOUND	BLEDSOE RIGGE ARY LOCATIONS	
	APPROXIMATED FROM PROPERTY LINES MAY BOUNDARIES				
		RECORD D			
	THIS RECORD DRAWING HAS FURNISHED BY OTHERS. WHI NOT AND DOES NOT WARRAN	LE THIS INFORMA	TION IS BELIEVED AND/OR COMPLET	TO BE RELIABLE ENESS, AND TH	, CRA CAN JS SHALL
	NOT BE RESPONSIBLE FOR A INCORPORATED HEREIN AS A ADVISED TO OBTAIN VERIFIC	RESULT. THOSE	RELYING ON THIS	RECORD DRAWI	NG ARE
	USING IT FOR ANY PURPOSE.				
		SCALE VER			
	THIS BAR MEASUR		AL. ADJUST SCALE	ACCORDINGLY.	
	Approved				
		DRAWING	STATUS	1	
	-				
		Status			
		Status		Date	Initial
	GM CE	TC BEDF		CILITY	Initial
	GM CE ⁻ BE	TC BEDF EDFORD	, INDIANA		
	GM CE	TC BEDF EDFORD	, INDIANA		
	GM CE BE BAILEY'S BRANCH C OV	TC BEDF EDFORD REEK & TRI	, INDIANA BUTARY 3 CO SITE PLAN	CILITY NORETE SE	
	GM CE BE BAILEY'S BRANCH C OV	TC BEDF EDFORD REEK & TRI	, INDIANA BUTARY 3 CO	CILITY NORETE SE	
	GM CE BE BAILEY'S BRANCH C OV	TC BEDF EDFORD REEK & TRI	, INDIANA BUTARY 3 CO SITE PLAN	CILITY NORETE SE	
	GM CE BE BAILEY'S BRANCH C OV DELINEA	TC BEDF EDFORD REEK & TRI (ERALL \$ TION OF	, INDIANA BUTARY 3 CO SITE PLAN	CILITY NCRETE SE	EALING
	GM CE BE BAILEY'S BRANCH C OV DELINEA	TC BEDF EDFORD REEK & TRI (ERALL \$ TION OF	, INDIANA BUTARY 3 CO SITE PLAN COVER	CILITY NCRETE SE	EALING
	GM CE BE BAILEY'S BRANCH C OV DELINEA	TC BEDF EDFORD REEK & TRI (ERALL \$ TION OF ESTOGA-	, INDIANA BUTARY 3 CO SITE PLAN COVER	CILITY NCRETE SE N AREAS ASSOCIA	ALING TES
	GM CE BE BAILEY'S BRANCH C OV DELINEA OV DELINEA Source Reference: BASE MAP COMPLETED BY LIMIT OF CONCRETE SURVE Project Manager:	TC BEDF EDFORD REEK & TRI (ERALL & TION OF ESTOGA-	, INDIANA BUTARY 3 CO SITE PLAN COVER	CILITY NCRETE SE N AREAS ASSOCIA	ALING TES
	GM CE BE BAILEY'S BRANCH C OV DELINEA OV DELINEA	TC BEDF EDFORD REEK & TRI (ERALL S TION OF ESTOGA-	, INDIANA BUTARY 3 CO SITE PLAN COVER ROVERS &	CILITY NCRETE SE N AREAS ASSOCIA .2001, AND AREA TTAZ (FEBRUARY MAY 2013	ALING TES

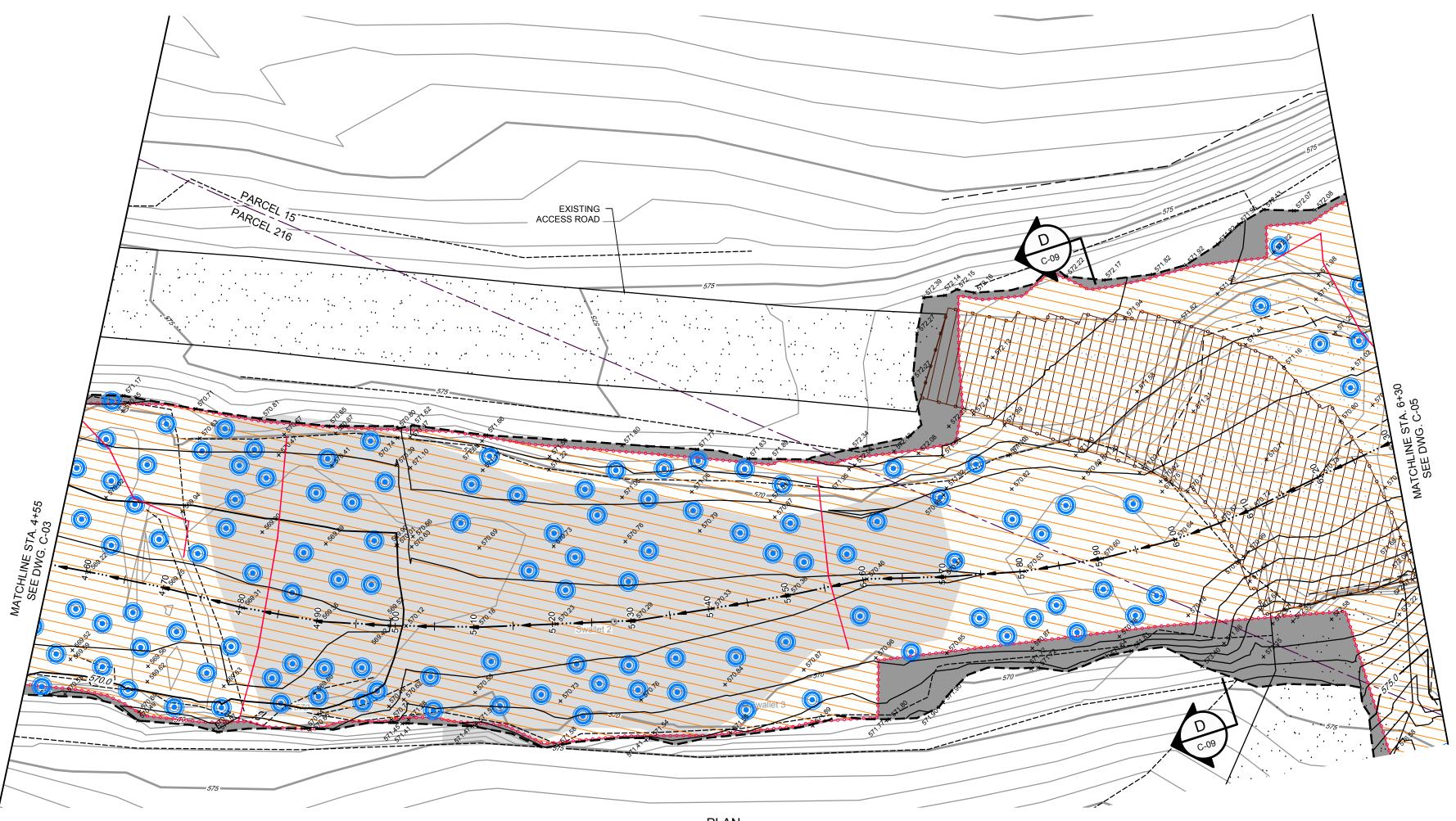


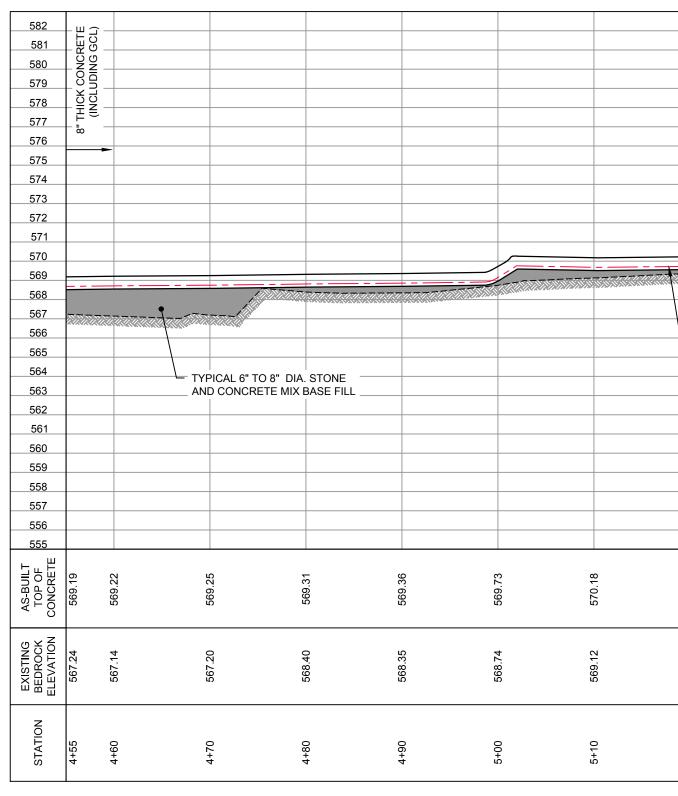




579										
578										
577										
576		<u> </u>	↓ ↓ µ ⊨							
575		GC RE GC RE								
574		NG NC								
573										
572		THICK CONCRETE SEALING LIMIT (INCLUDING GCL)	THICK CONCRETE SEALING LIMIT							
571			- 1 - −							
570		~~~~								
569										
568						_	AS-BUILT FINAL C			D
567							SEALING GRADE	1		
566										
565										
564				· · ·	· · · · <u></u> · · ·	· · +	••••	· · · ·	· · ·	· · ·
563										
562	Stiller and									
561					IN NINININININININININININININININININI		and the second states of the			
560										
559										
558								4	1" THICK FIBER-RE	
557										TE SEALING
556										
555										
554										
553										
			i l							
552										
552 551										
552 551	263.80	00 00 00	564.72	562.47	562.49	562.54	562.31	562.11	561.74	561.94
252 251 AS-BUILT TOP OF CONCRETE			563.93 564.72 564.72	562.10 562.47	562.14 562.49	561.85 562.54	561.47 562.31	561.69 562.11	561.33 561.74	561.60 561.94
EXISTING AS-BUILT POP OF ELEVATION CONCRETE	262.93	563.87								

			NՉ		Revision		Date	e	Initial
		\sim			Revision				
		\sim							
		5 10ft							
]
				500.0	LEGEND AS-BUILT GROUND S	SURFACE			
				560.0	ELEVATION CONTOU APPROXIMATE PRO	JRS (feet AMSL)	27		
					V-CHANNEL ALIGNM		()		
					EXISTING CONCRET			/EY)	
					AS-BUILT CONCRET			,	
					AS-BUILT CONCRET	E SEALING AREA	(TYPICALL	Y 4" THI	CK)
					AS-BUILT 8" THICK C	ONCRETE SEAL	ING AREA W	/ITH GC	L
					AS-BUILT CABLE CO	NCRETE TYPE C	C45 AREA		
7					AS-BUILT CONCRET	E BUMPS AT RAN	NDOM LOCA	TIONS	
4+55	ţ			⊠ 0	FORMER SPRING LC FORMER SWALLET L				
	о _.			× 10	SPRING LOCATION FINAL CONCRETE EI				
	DMG			× ^{565.}					
H	MATCHEDWG								
	MA)TES:				T 10 / 2	
+569.A5	1		1.	SURFACE THAT PROV		AS FOR MIGRA	TING SOIL A		к
569.5				VEGETATION OVER S 4" OR 8" (AS APPROPI	EVERAL YEARS. THE RIATE) MAINTAINED C	MINIMUM REQU	IRED THICK	FILL	F
Contraction of the second				GRADES, WITH ADDIT THROUGHOUT THE C	ONCRETE SEALING A	REA TO CREATE	A MORE NA	TURAL	
and the second				APPEARANCE (I.E., NO MAINTAIN THE GENER CONCRETE CHANNEL	RAL FLOW PATTERN T	OWARDS THE C	ENTER OF T	ΉE	
				APPROXIMATE 5-FOO SO AS NOT TO INTER	T CENTER SECTION A	T STA. OF THE C			:L
			THIS	RECORD DRAWING HA	RECORD DR				
			FURN NOT /	ISHED BY OTHERS. WH AND DOES NOT WARRA	HILE THIS INFORMATION	ON IS BELIEVED	TO BE REL TENESS, AN	iable, c Id thus	
580		$\left\{ \right\}$	INCO	BE RESPONSIBLE FOR RPORATED HEREIN AS SED TO OBTAIN VERIFI	A RESULT. THOSE RE	ELYING ON THIS	RECORD D	RAWING	
				G IT FOR ANY PURPOSI		RACT AND/OR C	OMPLETEN	E33 DE	FURE
					SCALE VERIFI	CATION			
				THIS BAR MEASU	RES 1" ON ORIGINAL.	ADJUST SCALE	ACCORDING	GLY.	
			Арр	proved					
	579								
	578 577								
	576 575								
	574								
	573 572								
	571								
	570 569				DRAWING S	TATUS	1		
	568 567		⊢						
	566								
	565 564								
	563		\vdash						
	562 561				Status		Date	9	Initial
	560 559		\square					/	
	558							*	
	557 556			B	BEDFORD I	NDIANA	۱		
	555		BAI	LEY'S BRANCH (CREEK & TRIBL	JTARY 3 CC	NCRET	E SEA	\LING
	554 553			FYICT	ING BAILE	Y'S RP/			
	552 551			PLAN AND	_	_	-	4+5	5
						`	-		
569.16 569.19	AS-BUILT TOP OF CONCRETE								
56, 56	AS-I TO CON			GRA CO	NESTOGA-R	OVERS &	ASSO		ΓES
~ ,	O X N								
567.41 567.24	EXISTING BEDROCK ELEVATION								
				IIT OF CONCRETE SURV	/EYED BY BLEDSOE R	GGERT GUERRE	LITAZ (FEBF	KUARY 2	:8, 2013).
a g	STATION			J.M.	Reviewed By. R.H.		MAY 201	3	
4+50 4+55	STA		Scale		Project Nº:	Report N ⁴	2:	Drawin	•
	I			HORZ. 1" = 10' VERT. 1" = 5'	13968-00) 3	68	C	-03
						13968-0			





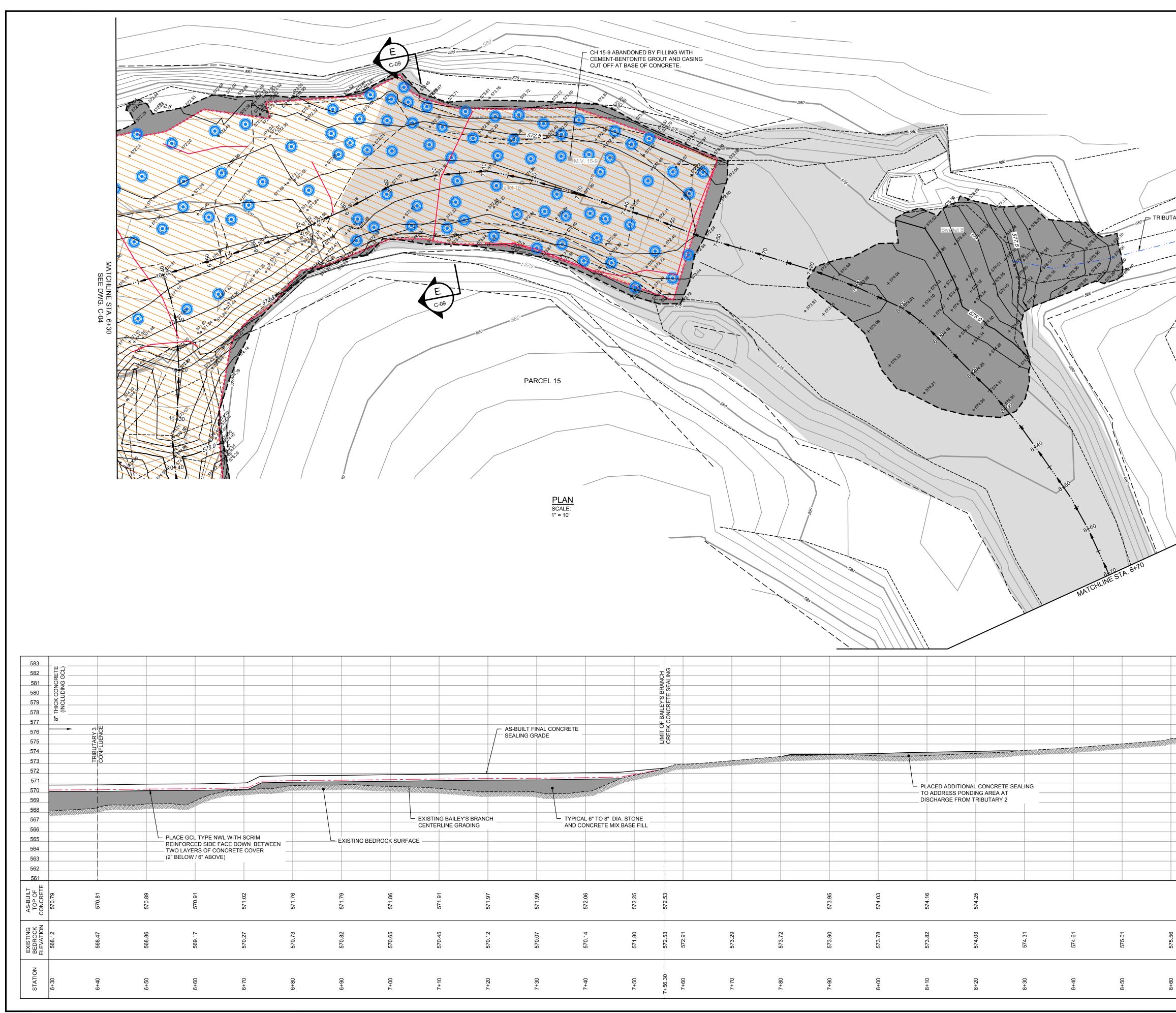


										i			i	
													THICK CONCRETE	582
													900 100 100	581
										ļ				580
													ΩΠ-	579
													HON -	578
													⊢) 8 –	577
														576
										-	ACCESS RO		İ	575
			LT FINAL CONCRET	Е						-	- CABLE CONCE TYPE CC4	KEIE —► 5		574
												-		573
														572
										(-3)(T)(-	NOR THE AND			571
		+												570
17.7											CREEK CRO	OSSING		569
\square							<u>PORTRUKUKUK</u>			777-	· · · · · · · · · · · · · · · · · · ·		~~~~	568
														567
					BAILEY'S BRANCH									566
				CENTERLI	INE GRADING	1								565
ſ		E NWL WITH SCRI							TYPICAL 6" TO	:) 8" DI/				564
	REINFORCED SI	DE FACE DOWN E	BETWEEN		EX	STING BEDROCK S			D CONCRET					563
	(2" BELOW / 6" A	F CONCRETE COV BOVE)	ER											562
	_ `	, 												561
														560
														559
														558
														557
														556
														555
ç		,	ი ი	-	6 0	-	ņ	Q	4		N	ω Ι	[AS-BUILT TOP OF CONCRETE
0 1	00.073	67.07C	570.33	0.010	70.4	0,0,0,0	\$G.U/G	570.60	570.64	-80.076	570.72	570.73	-770.79 570.79	
i	ດ i	n	io i	n i	Ω.	Ω i	Ω	Q	io i	ဂ	Q	io i	ρio İ	Son → AS
ć	N	n	. 	0	ω	D	o		0	0	τΩ.	~ (N 0	EXISTING BEDROCK ELEVATION
č	2009.3Z	00.000 0	569.11 560.11	00000000000000000000000000000000000000	569.68	009.40	Ω. 2000 2000	568.91	568.90	-65.806-	568.03	567.91	-208.02 568.12	ISTI RO
ì			20	ň ì	20		5	26	20	ñ	26	20		EXI
													1	
														z
c	2 0	2	o o	2 4	0	D	2	0	o !	<u>ل</u>	0	0	-04. 0	
	07.+6	05+0	5+40 5-40		2+60	0/+9	08+0	5+90	6+00	-/ 1. 90+9	6+10	6+20	-0+20.40- 6+30	STATION
												(

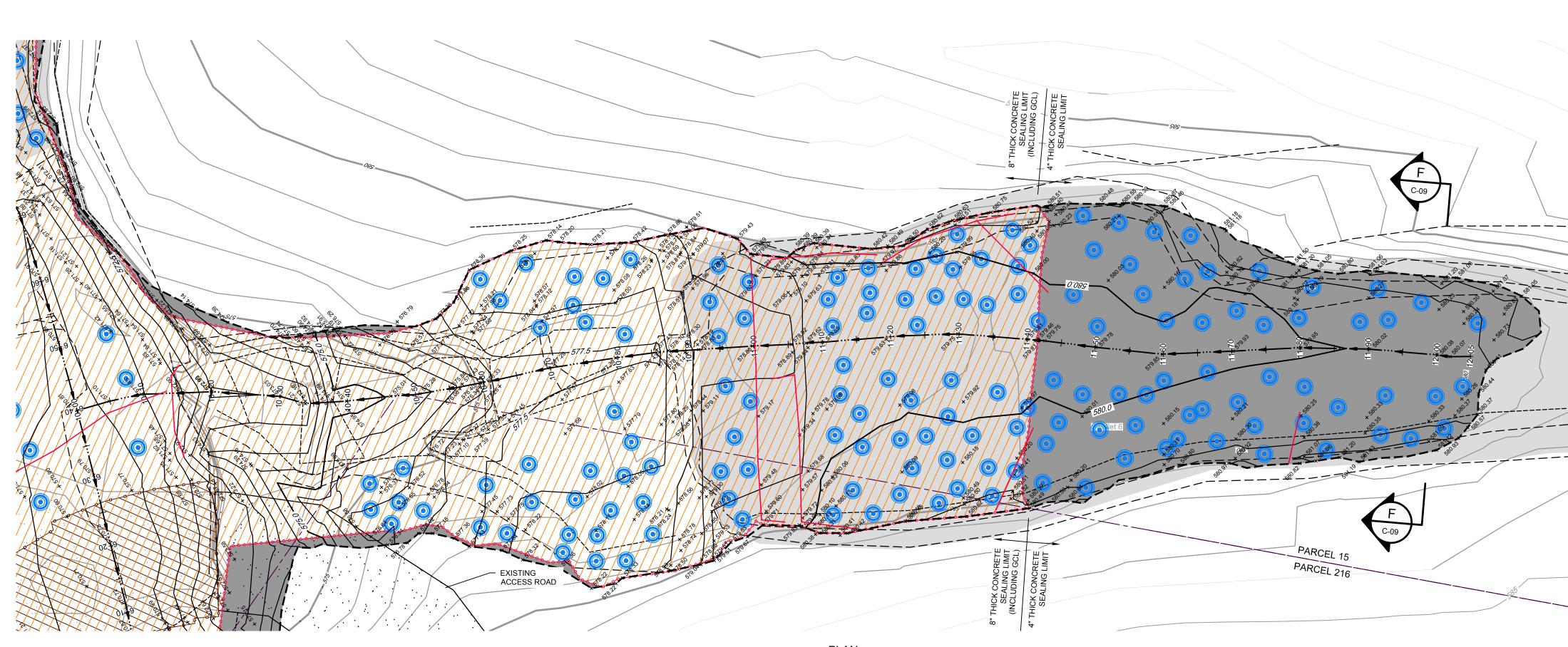
	Þ	
0	5	10ft

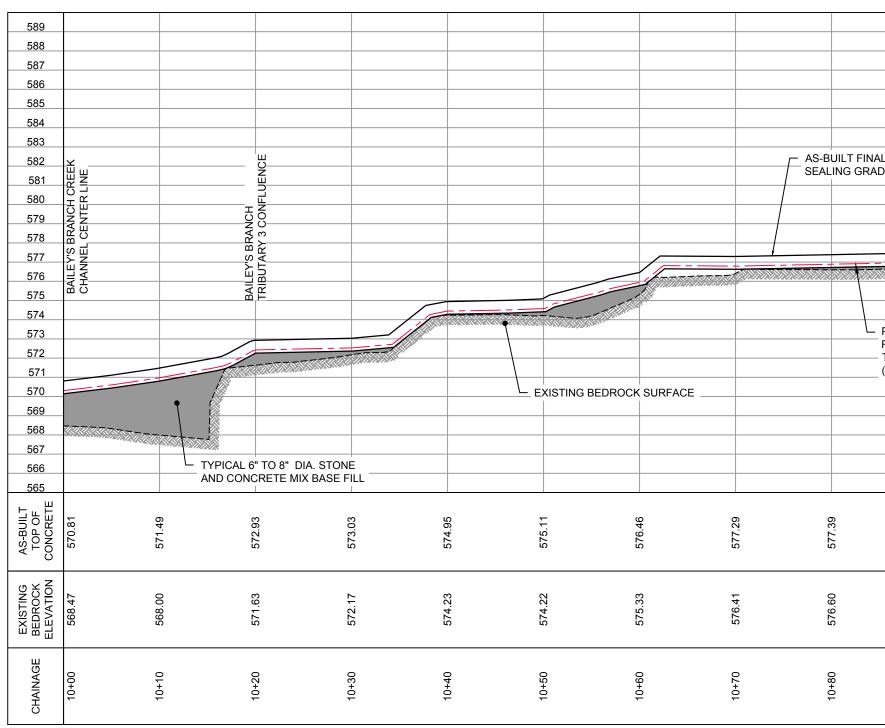
NΩ		Revision		Date	Initial
		LEGEND			
	560.0	AS-BUILT GROUND SURFACELEVATION CONTOURS (fee			
		APPROXIMATE PROPERTY V-CHANNEL ALIGNMENT	BOUNDAR	Y	
		EXISTING CONCRETE CAP			
		SEALED CONCRETE CRACI AS-BUILT CONCRETE SEAL		2013 SURVEY)	
		AS-BUILT CONCRETE SEAL	ING AREA	(TYPICALLY 4" T	HICK)
	<u> </u>	AS-BUILT 8" THICK CONCRI	ETE SEALIN	NG AREA WITH G	ICL
		AS-BUILT CABLE CONCRET			
		VARIOUS SIZES		DOM LOCATIONS	5
	0	FORMER SWALLET LOCATI SPRING LOCATION	ON		
	×60,10	FINAL CONCRETE ELEVATI	ON		
	DTES:				
1.	SURFACE THAT PROVI	DNSTRUCTED WITH A ROUG DE COLLECTION AREAS FO THE POTENTIAL FOR NATU	R MIGRATI	NG SOIL AND RO	OCK
	VEGETATION OVER SE 4" OR 8" (AS APPROPR	VERAL YEARS. THE MINIM IATE) MAINTAINED OVER T	JM REQUIF	RED THICKNESS ETE BASE FILL	OF
	THROUGHOUT THE CO	ONAL CONCRETE PLACED A INCRETE SEALING AREA TO T STRICTLY SMOOTH CONC	CREATE A	MORE NATURA	
	MAINTAIN THE GENERA	AL FLOW PATTERN TOWARI THESE UNDULATIONS DO	OS THE CE NOT OCCU	NTER OF THE R WITHIN THE	
		CENTER SECTION AT STA.		JNUKETE CHAN	NEL
		RECORD DRAWIN	IGS		
	NISHED BY OTHERS. WHI	RECORD DRAWIN BEEN PREPARED, IN PAR- LE THIS INFORMATION IS E	Γ, BASED C BELIEVED ⁻	TO BE REL <mark>I</mark> ABLE	, CRA CAN
NOT . NOT	NISHED BY OTHERS. WHI AND DOES NOT WARRAM BE RESPONSIBLE FOR A	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION	F, BASED C BELIEVED COMPLET S WHICH N	TO BE RELIABLE ENESS, AND TH /IAY HAVE BEEN	, CRA CAN US SHALL
NOT NOT INCO ADVI	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION RESULT. THOSE RELYING ATION OF ITS ACCURACY /	F, BASED C BELIEVED COMPLET S WHICH N ON THIS I	TO BE RELIABLE ENESS, AND TH /AY HAVE BEEN RECORD DRAWI	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION RESULT. THOSE RELYING ATION OF ITS ACCURACY /	F, BASED C BELIEVED ⁻ COMPLET S WHICH N S ON THIS I AND/OR CC	TO BE RELIABLE ENESS, AND TH /AY HAVE BEEN RECORD DRAWI	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY /	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS N AND/OR CC	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E IT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS P AND/OR CC DN DN ST SCALE A	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS P AND/OR CC DN DN ST SCALE A	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS P AND/OR CC DN DN ST SCALE A	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS P AND/OR CC DN DN ST SCALE A	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS DRAWING STATUS	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS P AND/OR CC DN DN ST SCALE A	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI OMPLETENESS E	, CRA CAN US SHALL NG ARE BEFORE
NOT NOT INCO ADVI USIN	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS	F, BASED C BELIEVED T COMPLET S WHICH N S ON THIS P AND/OR CC DN DN ST SCALE A	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE
NOT NOT INCO ADVI USIN	VISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS / SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS DRAWING STATUS	S	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E	, CRA CAN US SHALL NG ARE BEFORE
NOT NOT INCO ADVI USIN	ISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS DRAWING STATUS	S S F S S S S S S S S S S S S S S S S S	TO BE RELIABLE ENESS, AND TH AAY HAVE BEEN RECORD DRAWI DMPLETENESS E ACCORDINGLY.	, CRA CAN US SHALL NG ARE BEFORE
	NISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS DRAWING STATUS DRAWING STATUS Status TC BEDFORE	r, based c Believed - Complet s which n c on this p and/or cc DN ST SCALE A S S S D FAC IANA	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWI DMPLETENESS E ACCORDINGLY.	, CRA CAN US SHALL NG ARE BEFORE
	ISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS / SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR	BEEN PREPARED, IN PARTILE THIS INFORMATION IS ENTITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATION RES 1" ON ORIGINAL. ADJUS DRAWING STATUS DRAWING STATUS Status TC BEDFORD EDFORD IND REEK & TRIBUTAR	r, based c Believed - Complet S which M S ON THIS P AND/OR CC DN ST SCALE A S S S S S S S S S S S S S S S S S S S	TO BE RELIABLE ENESS, AND TH AAY HAVE BEEN RECORD DRAWID MPLETENESS E ACCORDINGLY.	, CRA CAN US SHALL NG ARE BEFORE
	VISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS / SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR proved	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY A SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS DRAWING STATUS DRAWING STATUS Status TC BEDFORD IND	r, BASED C BELIEVED COMPLET S WHICH N G ON THIS P AND/OR CC DN ST SCALE A S S S S S S S S S S S S S S S S S S S	TO BE RELIABLE ENESS, AND TH AAY HAVE BEEN RECORD DRAWID MPLETENESS E ACCORDINGLY.	, CRA CAN US SHALL NG ARE BEFORE
	VISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS / SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR proved	BEEN PREPARED, IN PARTILE THIS INFORMATION IS ENTITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS DRAWING STATUS Status TC BEDFORD EDFORD IND REEK & TRIBUTAR ING BAILEY'S	r, BASED C BELIEVED COMPLET S WHICH N G ON THIS P AND/OR CC DN ST SCALE A S S S S S S S S S S S S S S S S S S S	TO BE RELIABLE ENESS, AND TH AAY HAVE BEEN RECORD DRAWID MPLETENESS E ACCORDINGLY.	, CRA CAN US SHALL NG ARE BEFORE
	ISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR proved	BEEN PREPARED, IN PARTILE THIS INFORMATION IS ENTITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY / SCALE VERIFICATIO RES 1" ON ORIGINAL. ADJUS DRAWING STATUS Status TC BEDFORD EDFORD IND REEK & TRIBUTAR ING BAILEY'S	S S S S S S S S S S S S S S S S S S S	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWID MPLETENESS E ACCORDINGLY.	, CRA CAN US SHALL NG ARE BEFORE
	ISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR proved GM CE BI ILEY'S BRANCH C EXISTI PLAN AND F CON	BEEN PREPARED, IN PAR- ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY A SCALE VERIFICATION RES 1" ON ORIGINAL. ADJUS DRAWING STATUS DRAWING STATUS Status TC BEDFORD EDFORD IND REEK & TRIBUTAR NG BAILEY'S PROFILE STA	S S S S S S S S S S S S S S S S S S S	TO BE RELIABLE ENESS, AND TH MAY HAVE BEEN RECORD DRAWID MPLETENESS E ACCORDINGLY.	, CRA CAN US SHALL NG ARE BEFORE
	ISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE. THIS BAR MEASUR proved CON CON CON CON CON CON CON CON CON CO	BEEN PREPARED, IN PAR- ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY A SCALE VERIFICATION RES 1" ON ORIGINAL. ADJUS DRAWING STATUS DRAWING STATUS Status TC BEDFORD EDFORD IND REEK & TRIBUTAR NG BAILEY'S PROFILE STA	S S S S S S S S S S S S S S S S S S S	Date Date ACCORDINGLY. CCORDINGLY. CCORDIN	
	ISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR proved	BEEN PREPARED, IN PAR ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR ARESULT. THOSE RELYING ATION OF ITS ACCURACY A SCALE VERIFICATION SCALE VERIFICATION BESTORIAL. ADJUSE COMPLETED BY AIR-LANDES PROFILE STA STATUS COMPLETED BY AIR-LANDES PROFILE STA COMPLETED BY AIR-LANDES PROFILE STA PROFILE	S S S S S S S S S S S S S S S S S S S	Date Date ACCORDINGLY. CCORDINGLY. CCORDIN	
	ISHED BY OTHERS. WHI AND DOES NOT WARRAN BE RESPONSIBLE FOR A PRPORATED HEREIN AS A SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE THIS BAR MEASUR proved	BEEN PREPARED, IN PAR- ILE THIS INFORMATION IS E NT ITS ACCURACY AND/OR NY ERRORS OR OMISSION A RESULT. THOSE RELYING ATION OF ITS ACCURACY A SCALE VERIFICATION RES 1" ON ORIGINAL. ADJUST DRAWING STATUS DRAWING STATUS Status TC BEDFORD IND REEK & TRIBUTAR ING BAILEY'S PROFILE STA DRAVILE STA	S S S S S S S S S S S S S S	Date Date NCRETE SE NCRETE SE NCH 5 TO 6+ ASSOCIA MAY 2013	

13968-00(368)CI-WA002 FEB 18/2014



		NՉ		Revision		Date	Initial
\mathbf{r}							
Ţ							
0 5	10ft						
JTARY 2		1. THIS	DIES: TOP OF CONCRETE C SURFACE THAT PROV AND MIGHT ENHANCE VEGETATION OVER S 4" OR 8" (AS APPROPF GRADES, WITH ADDIT THROUGHOUT THE CI APPEARANCE (I.E., NO MAINTAIN THE GENEF CONCRETE CHANNEL APPROXIMATE 5-FOO SO AS NOT TO INTERI	V-CHANNEL ALIGN EXISTING CONCRE SEALED CONCRE AS-BUILT CONCRE AS-BUILT CONCRE AS-BUILT CONCRE AS-BUILT 8" THICH AS-BUILT 8" THICH AS-BUILT CONCRE FORMER SPRING FORMER SPRING FORMER SWALLE SPRING LOCATION FINAL CONCRETE SPRING LOCATION FINAL CONCRETE ONSTRUCTED WITH IDE COLLECTION A THE POTENTIAL FE EVERAL YEARS. TH RIATE) MAINTAINEE IONAL CONCRETE I ONCRETE SEALING ONSTRUCTELY SMOC RAL FLOW PATTERN THESE UNDULAT T CENTER SECTION RUPT BASE LOW FL	OURS (feet AMSL) ROPERTY BOUNDAP NMENT ETE CAP (2005 SUR TE CRACKS (MAY 3 ETE SEALING LIMIT ETE SEALING AREA CONCRETE SEALI ETE BUMPS AT RAN LOCATION T LOCATION T LOCATION N E ELEVATION N E ELEVATION N E ELEVATION A ROUGHENED AI REAS FOR MIGRAT OR NATURALLY OC HE MINIMUM REQUI D OVER THE CONCP PLACED AT RANDO A AREA TO CREATE DTH CONCRETE CH/ N TOWARDS THE CE IONS DO NOT OCCU N AT STA. OF THE C OW CONDITIONS.	VEY) , 2013 SURVEY , (TYPICALLY 4 NG AREA WITH IDOM LOCATIC IDOM LOCAT	' THICK) I GCL INS IG ROCK SS OF RAL TILL INNEL
		NOT /	ISHED BY OTHERS. WH AND DOES NOT WARRA BE RESPONSIBLE FOR A	NT ITS ACCURACY	AND/OR COMPLET	ENESS, AND	THUS SHALL
282		INCO ADVI	RPORATED HEREIN AS SED TO OBTAIN VERIFIC G IT FOR ANY PURPOSE	A RESULT. THOSE CATION OF ITS ACC	RELYING ON THIS	RECORD DRA	WING ARE
	/	USING	G IT FOR ANY PURPOSE				
			THIS BAR MEASU	SCALE VER	L. ADJUST SCALE	ACCORDINGLY	·
		Арр	proved				
	583 582 581 580			DRAWING	STATUS		
	579 578						
	577 576						
	575						
	574 573						
	572 571			Status		Date	Initial
	570 569 568 567				ORD FAC		
	566 565	BAI	LEY'S BRANCH (BUTARY 3 CC	NCRETE	SEALING
	564 563 562 561		EXIST PLAN AND	-	EY'S BRA STA. 6+3	_	+70
	AS-BUILT TOP OF CONCRETE		COR COR	IESTOGA-I	ROVERS &	ASSOC	IATES
575.56 575.75	EXISTING BEDROCK ELEVATION	LIM	ce Reference: SOURCE: BASE MAP IIT OF CONCRETE SURV	EYED BY BLEDSOE	RIGGERT GUERRE	FLINT, MI, APRI TTAZ (FEBRUA	L 2001 NRY 28, 2013).
09 02	STATION	Proje	ct Manager: J.M.	Reviewed By: R.H.	Date:	MAY 2013	
8+60	ST	Scale	e: HORZ. 1" = 10' VERT. 1" = 5'	Project №: 13968-0		68	rawing №: C-05
					13968-0	0(368)CI-WA00	2 FFB 18/2014

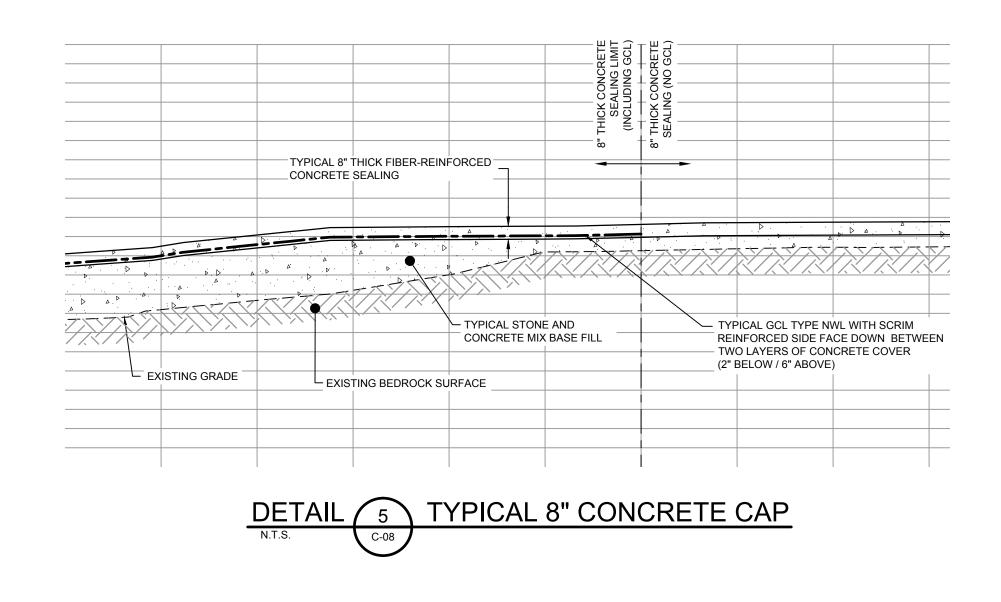




PLAN SCALE: 1" = 10'

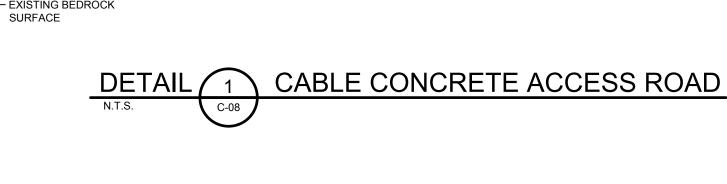
FINAL CONCRETE					8" THICK CONCRETE SEALING LIMIT (INCLUDING GCL)	4" THICK CONCRETE SEALING LIMIT					LIMIT OF TRIBUTARY 3 CONCRETE SEALING	589 588 587 586 585 584 583 582 581
PLACE GCL TY REINFORCED S	PE NWL WITH SCRIM SIDE FACE DOWN BETWEEN			TING TRIBUTARY	3				- TYPICAL 6" TO 8" AND CONCRETE	DIA. STONE		580 579 578 577 576 575 575 574 573
TWO LAYERS ((2" BELOW / 6" .	ABOVE)											572 571 570 569 568 567 566
578.17	578.86	579.65	579.65	579.75	579.81	579.78	579.85	579.93	579.96	580.03	580.08	AS-BUILT TOP OF CONCRETE
577.36	578.12	578.34	578.68	578.93	578.88 578.70	578.59	578.51	578.27	578.28	578.55	579.46	EXISTING BEDROCK ELEVATION
10+90	11+00	11+10	11+20	11+30	11+40	11+50	11+60	11+70	11+80	11+90	12+00	CHAINAGE

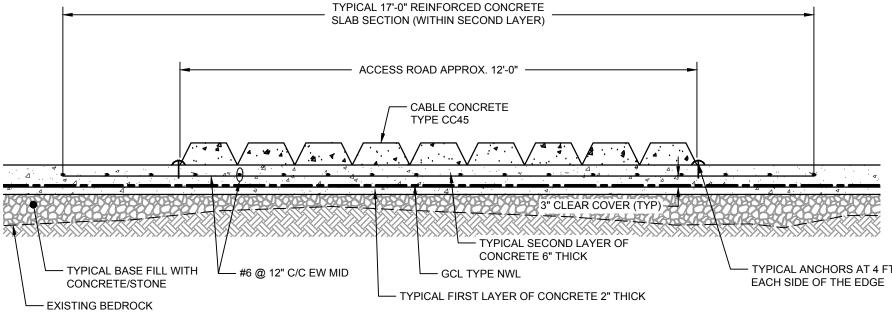
	NՉ		Revision		Date	Initial
T						
0 5 10ft						
		560.0	LEGEND AS-BUILT GROUND SUI ELEVATION CONTOURS APPROXIMATE PROPE V-CHANNEL ALIGNMEN EXISTING CONCRETE O	S (feet AMSL) RTY BOUNDAF IT CAP (2005 SUR	VEY)	
			SEALED CONCRETE C AS-BUILT CONCRETE S AS-BUILT CONCRETE S AS-BUILT 8" THICK COM	SEALING LIMIT SEALING AREA NCRETE SEALI	(TYPICALLY 4" TI NG AREA WITH G	
		© © ¤ × ^{\$6^{3, P}}	AS-BUILT CABLE CONC AS-BUILT CONCRETE E VARIOUS SIZES FORMER SPRING LOCA FORMER SWALLET LOO SPRING LOCATION FINAL CONCRETE ELE	BUMPS AT RAN ATION CATION		3
		TOP OF CONCRETE C SURFACE THAT PROV AND MIGHT ENHANCE VEGETATION OVER S 4" OR 8" (AS APPROPI GRADES, WITH ADDIT THROUGHOUT THE C APPEARANCE (I.E., NO MAINTAIN THE GENEF CONCRETE CHANNEL APPROXIMATE 5-FOC	CONSTRUCTED WITH A R /IDE COLLECTION AREAS E THE POTENTIAL FOR N EVERAL YEARS. THE MI RIATE) MAINTAINED OVE TONAL CONCRETE PLAC ONCRETE SEALING ARE OT STRICTLY SMOOTH C RAL FLOW PATTERN TOV THESE UNDULATIONS TO CENTER SECTION AT RUPT BASE LOW FLOW (S FOR MIGRAT ATURALLY OC NIMUM REQUI ER THE CONCR ED AT RANDOI A TO CREATE CONCRETE CHA VARDS THE CE DO NOT OCCL STA. OF THE C	ING SOIL AND RC CURRING RED THICKNESS RETE BASE FILL M LOCATIONS A MORE NATURA ANNEL) BUT STILI ENTER OF THE JR WITHIN THE	OF L
	FURNIS NOT AN NOT BE INCORI ADVISE	SHED BY OTHERS. WH ND DOES NOT WARRA E RESPONSIBLE FOR PORATED HEREIN AS	RECORD DRAY S BEEN PREPARED, IN F HILE THIS INFORMATION ANT ITS ACCURACY AND ANY ERRORS OR OMISS A RESULT. THOSE RELY CATION OF ITS ACCURA E.	PART, BASED (I IS BELIEVED VOR COMPLET BIONS WHICH I YING ON THIS	TO BE RELIABLE ENESS, AND THI MAY HAVE BEEN RECORD DRAWI	, CRA CAN JS SHALL NG ARE
			SCALE VERIFIC	ATION		
		THIS BAR MEASU	IRES 1" ON ORIGINAL. AI	DJUST SCALE /	ACCORDINGLY.	
9 3 7 5 5 4 3 2	Appro	oved				
1						
			DRAWING STA	TUS		
			Status		Date	Initial
3 7 3			TC BEDFOR BEDFORD IN			
	BAIL	EY'S BRANCH	CREEK & TRIBUT	ARY 3 CO	NCRETE SE	EALING
ION CONCRETE	PL		STING TRIE			+05
ELEVATION		col	NESTOGA-RO	VERS &	ASSOCIA	TES
	LIMIT	OF CONCRETE SURV	COMPLETED BY AIR-LAI EYED BY BLEDSOE RIGO			
	Project	Manager: J.M.	Reviewed By: R.H.	Date:	MAY 2013	
	Scale:	AS SHOWN	Project Nº:	Report Nº		ving Nº:
			13968-00		68 (0(368)CI-WA002 F	C-06

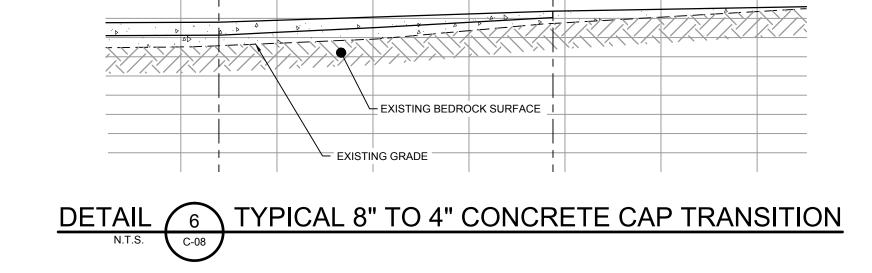




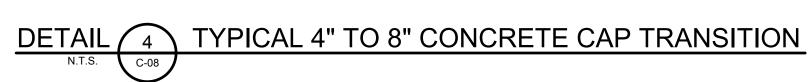
	ICAL 4" THICK FIBE ICRETE SEALING				
Þ. Þ.		Δ	Р 		 >>
		ν. Δ ν. Δ			
		I	 EXISTING GRADE	CONCRETE MI	
	EXIS	STING BEDROCK S			

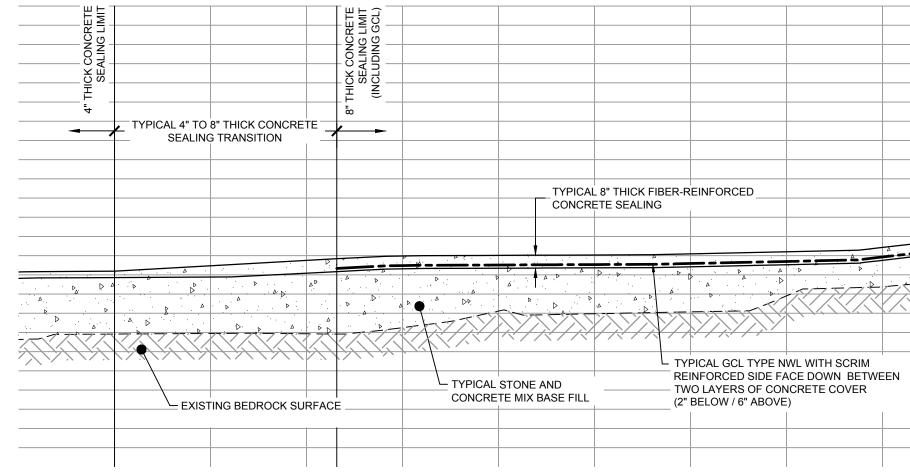




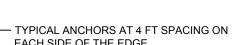


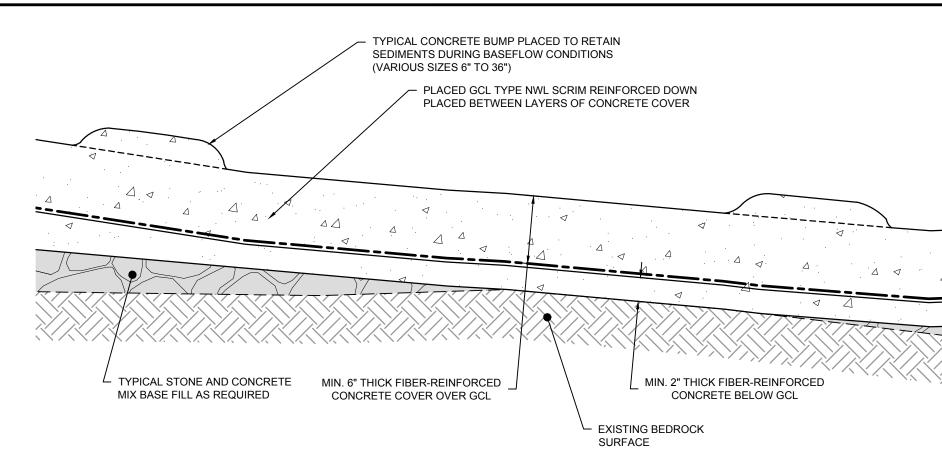
TYPICAL 8" TO 4" THICK CONCRETE SEALING TRANSITION



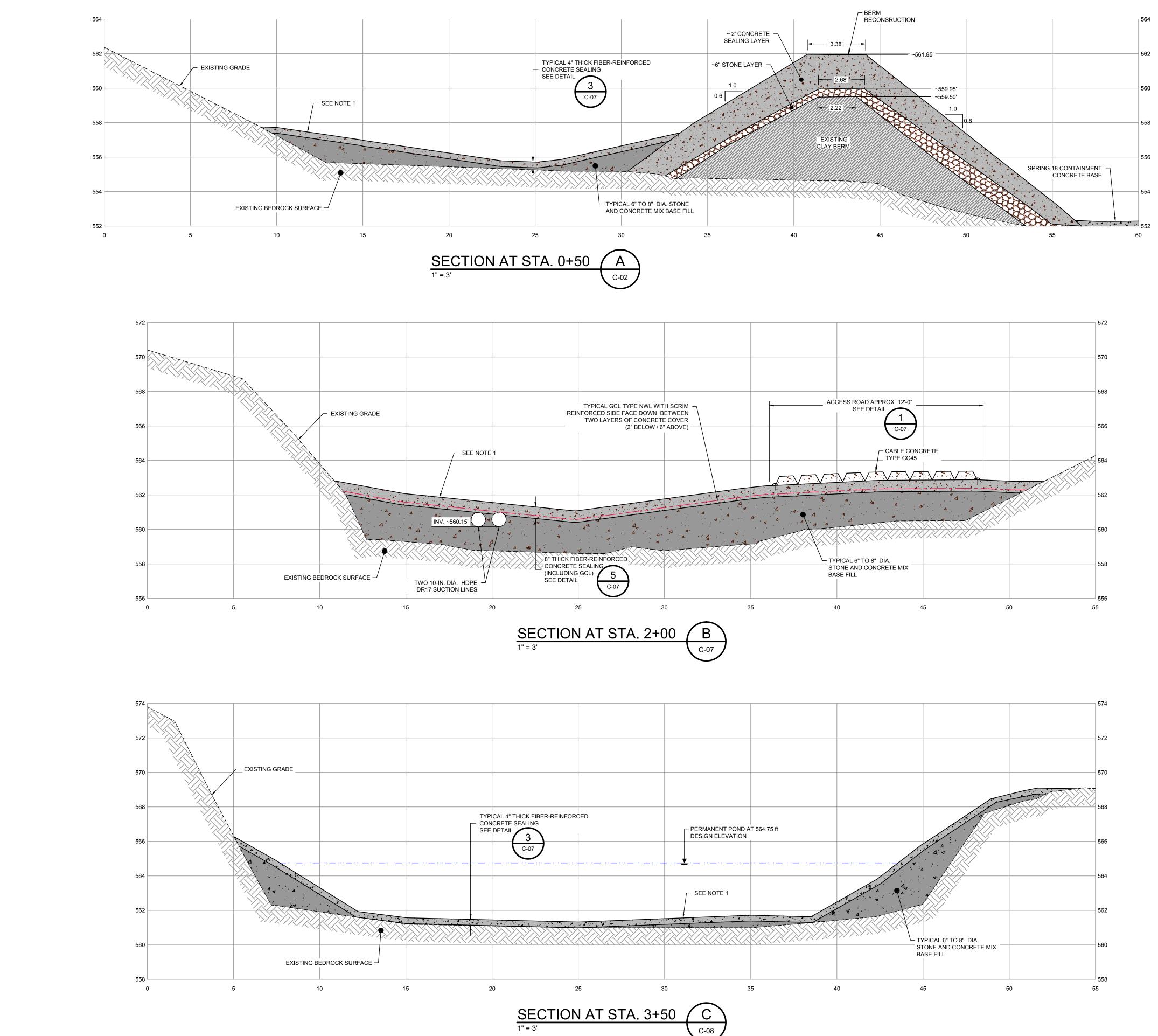




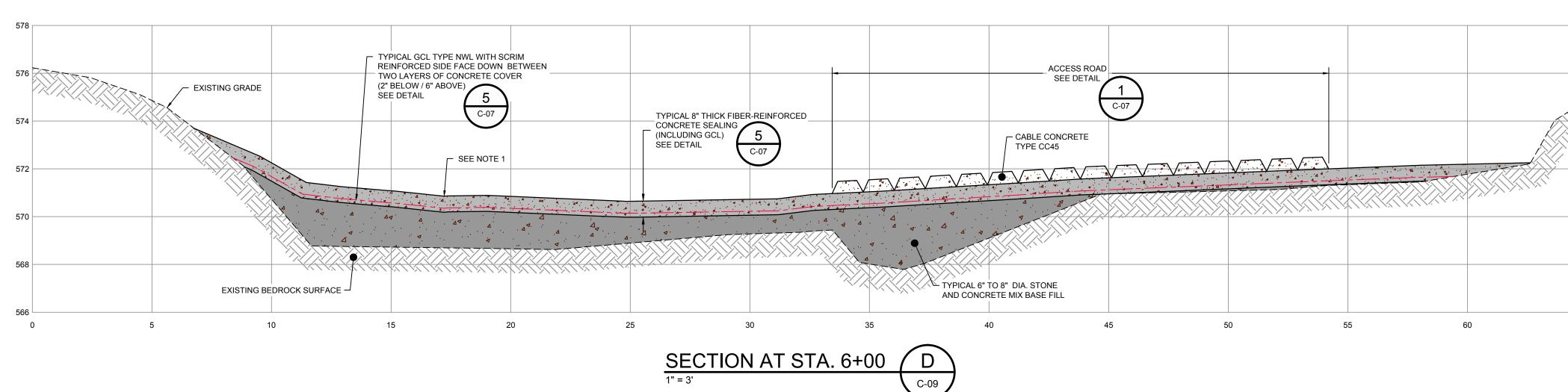


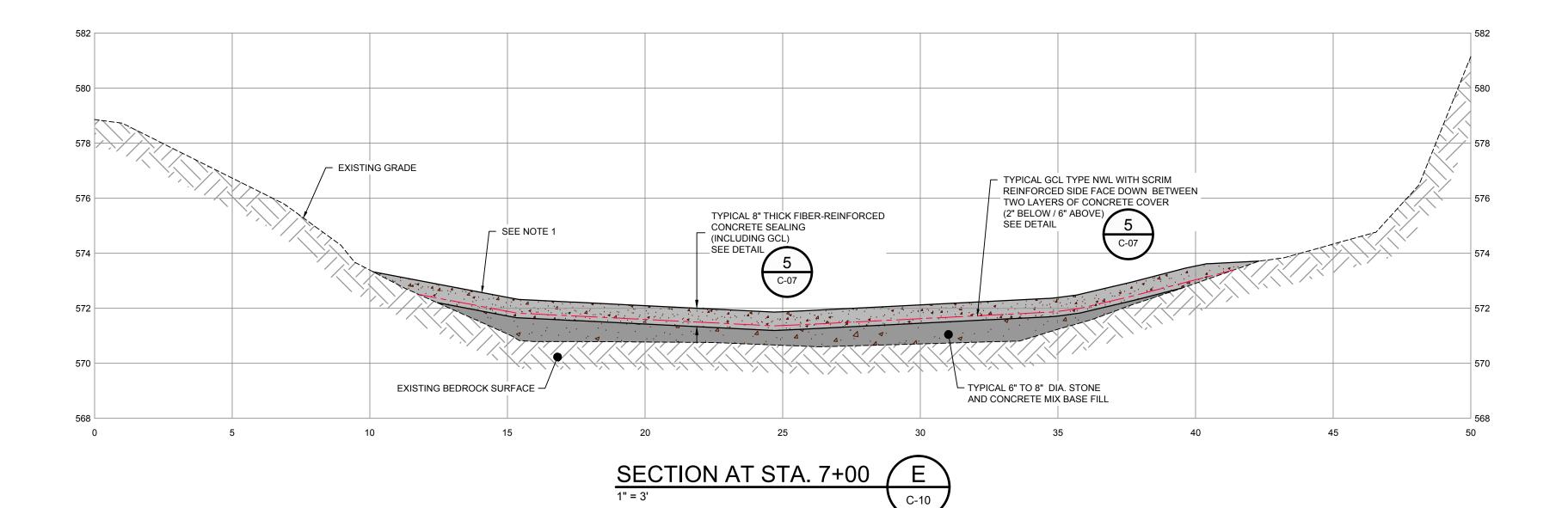


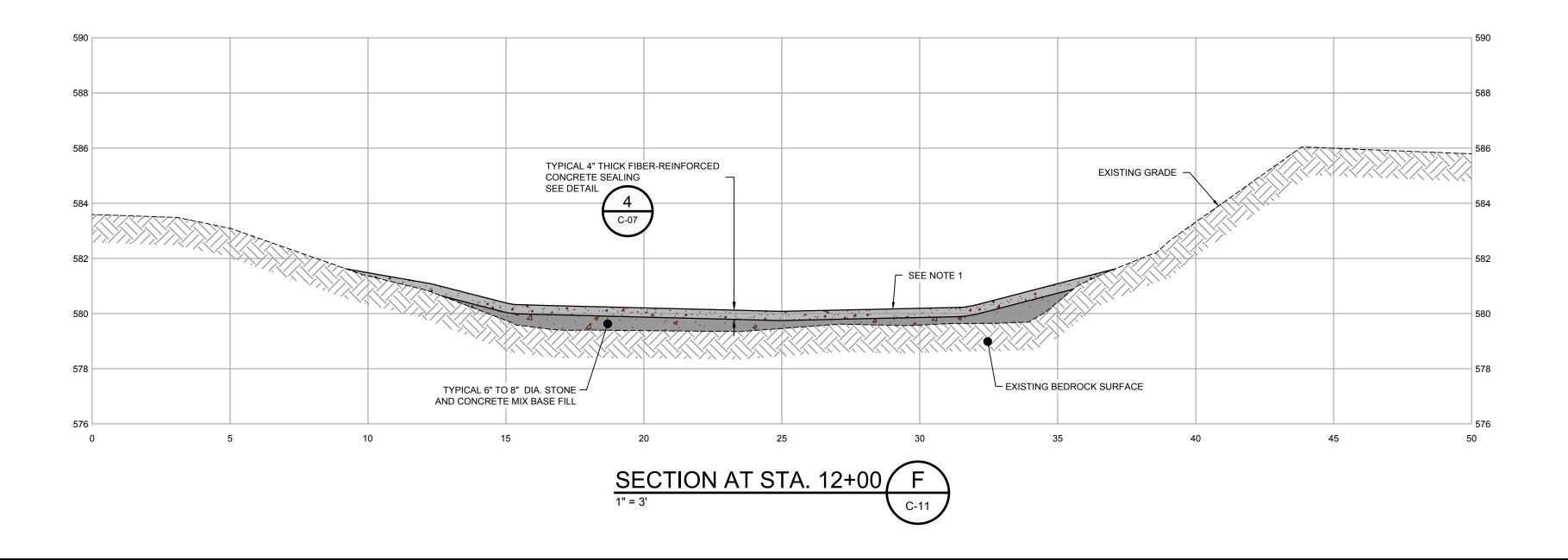
Revision Date Initial NOTES: 1. TOP OF CONCRETE CONSTRUCTED WITH A ROUGHENED AND UNDULATING SURFACE THAT PROVIDE COLLECTION AREAS FOR MIGRATING SOIL AND ROCK AND MIGHT ENHANCE THE POTENTIAL FOR NATURALLY OCCURRING VEGETATION OVER SEVERAL YEARS. THE MINIMUM REQUIRED THICKNESS OF 4" OR 8" (AS APPROPRIATE) MAINTAINED OVER THE CONCRETE BASE FILL GRADES, WITH ADDITIONAL CONCRETE PLACED AT RANDOM LOCATIONS THROUGHOUT THE CONCRETE SEALING AREA TO CREATE A MORE NATURAL APPEARANCE (I.E., NOT STRICTLY SMOOTH CONCRETE CHANNEL) BUT STILL MAINTAIN THE GENERAL FLOW PATTERN TOWARDS THE CENTER OF THE CONCRETE CHANNEL. THESE UNDULATIONS DO NOT OCCUR WITHIN THE APPROXIMATE 5-FOOT CENTER SECTION AT STA. OF THE CONCRETE CHANNEL SO AS NOT TO INTERRUPT BASE LOW FLOW CONDITIONS. RECORD DRAWINGS THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, CRA CAN NOT AND DOES NOT WARRANT ITS ACCURACY AND/OR COMPLETENESS, AND THUS SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED HEREIN AS A RESULT. THOSE RELYING ON THIS RECORD DRAWING ARE ADVISED TO OBTAIN VERIFICATION OF ITS ACCURACY AND/OR COMPLETENESS BEFORE USING IT FOR ANY PURPOSE. SCALE VERIFICATION THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY. Approved DRAWING STATUS Status Date Initial GM CETC BEDFORD FACILITY **BEDFORD INDIANA** BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING DETAILS GRA CONESTOGA-ROVERS & ASSOCIATES Source Reference: SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS FLINT, MI, APRIL 2001 Project Manager: eviewed By: Date: R.H. J.M. NOVEMBER 2012 eport Nº Scale: Drawing N^o: Project Nº: AS SHOWN 13968-00 C-07 368 13968-00(368)CI-WA003 OCT 29/2013



	N♀						
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND			Revision		Date		Initial
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND							
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND							
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND							
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND							
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND							
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND							
In the CONSIGNET CONSTRUCTION METAL AND UNDULATING SUPPLICE THE PROVINCE OLICITIAL FORM ATTIGATURE SOLUTION AND AND AND AND AND AND AND							
THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION SUPPRISED ON OTHERS, WHI THIS ACCURACY AND/OR COMPLETENESS, AND THUS SHAL NOT AND DOES NOT WARRANT ITS ACCURACY AND/OR COMPLETENESS, AND THUS SHAL NOT DE RESPORTED HERRIN AS A RESULT. THOSE RELIVING ON THIS RECORD DRAWING ARE ADVISED TO DRAWING ARE SCALE VERIFICATION THIS BAR MEASURES 1° ON ORIGINAL. ADJUST SCALE ACCORDINGLY. Approved DRAWING STATUS D	VEG 4" O GRA THF APF MAII CON APF	SETATION OVER SE R 8" (AS APPROPR ADES, WITH ADDITI OUGHOUT THE CC PEARANCE (I.E., NO NTAIN THE GENER/ ICRETE CHANNEL. PROXIMATE 5-FOOT	VERAL YEARS. THE MINIM IATE) MAINTAINED OVER T ONAL CONCRETE PLACED INCRETE SEALING AREA TO T STRICTLY SMOOTH CON AL FLOW PATTERN TOWAR THESE UNDULATIONS DO CENTER SECTION AT STA	UM REQUI HE CONCR AT RANDOM O CREATE / CRETE CHA DS THE CE NOT OCCU . OF THE CO	RED THICKN ETE BASE F M LOCATION A MORE NAT NNEL) BUT NTER OF TH R WITHIN T	FILL NS FURAL STILL HE HE	
THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION SUPPRISED ON OTHERS, WHI THIS ACCURACY AND/OR COMPLETENESS, AND THUS SHAL NOT AND DOES NOT WARRANT ITS ACCURACY AND/OR COMPLETENESS, AND THUS SHAL NOT DE RESPORTED HERRIN AS A RESULT. THOSE RELIVING ON THIS RECORD DRAWING ARE ADVISED TO DRAWING ARE SCALE VERIFICATION THIS BAR MEASURES 1° ON ORIGINAL. ADJUST SCALE ACCORDINGLY. Approved DRAWING STATUS D							
THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION SUPPRISED ON OTHERS, WHI THIS ACCURACY AND/OR COMPLETENESS, AND THUS SHAL NOT AND DOES NOT WARRANT ITS ACCURACY AND/OR COMPLETENESS, AND THUS SHAL NOT DE RESPORTED HERRIN AS A RESULT. THOSE RELIVING ON THIS RECORD DRAWING ARE ADVISED TO DRAWING ARE SCALE VERIFICATION THIS BAR MEASURES 1° ON ORIGINAL. ADJUST SCALE ACCORDINGLY. Approved DRAWING STATUS D							
DRAWING STATUS		THIS BAR MEASUR			ACCORDING	ilY.	
DRAWING STATUS							
Status Date Initial GM CETC BEDFORD FACILITY BEDFORD INDIANA Initial BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: Reviewed By: J.M. R.H. NOVEMBER 2012 Scale: Project N ² :	Approved						
GM CETC BEDFORD FACILITY BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: R.H. J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº: Drawing Nº:	Approved						
GM CETC BEDFORD FACILITY BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: R.H. J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº: Drawing Nº:	Approved		DRAWING STATU	S			
GM CETC BEDFORD FACILITY BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: R.H. J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº: Drawing Nº:	Approved		DRAWING STATU	S			
GM CETC BEDFORD FACILITY BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: R.H. J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº: Drawing Nº:	Approved		DRAWING STATU	S			
GM CETC BEDFORD FACILITY BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: R.H. J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº: Drawing Nº:	Approved		DRAWING STATU	S			
GM CETC BEDFORD FACILITY BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: R.H. J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº: Drawing Nº:	Approved		DRAWING STATU	S			
BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' Topect Manager: J.M. Reviewed By: J.M. Reviewed By: M. RH. Date: NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº:	Approved		DRAWING STATU	S			
BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS A - A', B - B', C - C' Topect Manager: J.M. Reviewed By: J.M. Reviewed By: M. RH. Date: NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº:	Approved			S	Date		Initial
CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: Reviewed By: J.M. Reviewed By: R.H. NOVEMBER 2012 Scale: Project N ^Q :	Approved		Status				Initial
CROSS SECTIONS A - A', B - B', C - C' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: Reviewed By: J.M. Reviewed By: R.H. NOVEMBER 2012 Scale: Project N ^Q :	Approved		Status TC BEDFORE) FAC	CILITY		Initial
A - A', B - B', C - C' Image: CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: J.M. Reviewed By: R.H. Date: NOVEMBER 2012 Scale: Project N ^o : Project N ^o : Drawing N ^o :		В	Status TC BEDFORI EDFORD IND) FAC	ILITY		
CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: Reviewed By: Date: J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº:		B S BRANCH C	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF	D FAC DIANA	ILITY		
Source Reference: Project Manager: Reviewed By: J.M. R.H. Date: Scale: Project Nº: Report Nº: Drawing Nº:		B S BRANCH C C	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF	D FAC IANA RY 3 CO	ILITY		
Source Reference: Project Manager: Reviewed By: J.M. R.H. Date: Scale: Project Nº: Report Nº: Drawing Nº:		B S BRANCH C C	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF	D FAC IANA RY 3 CO	ILITY		
Source Reference: Project Manager: Reviewed By: J.M. R.H. Date: Scale: Project Nº: Report Nº: Drawing Nº:		B S BRANCH C C	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF	D FAC IANA RY 3 CO	ILITY		
Project Manager: Reviewed By: Date: J.M. R.H. NOVEMBER 2012 Scale: Project N ^o : Report N ^o : Drawing N ^o :		B S BRANCH C C A	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF ROSS SECT A - A', B - B', C	D FAC HANA RY 3 CO ONS C - C'	NCRETE	E SEA	LING
Project Manager: Reviewed By: Date: J.M. R.H. NOVEMBER 2012 Scale: Project N ^o : Report N ^o : Drawing N ^o :		B S BRANCH C C A	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF ROSS SECT A - A', B - B', C	D FAC HANA RY 3 CO ONS C - C'	NCRETE	E SEA	LING
J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº:		B S BRANCH C C A	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF ROSS SECT A - A', B - B', C	D FAC HANA RY 3 CO ONS C - C'	NCRETE	E SEA	LING
J.M. R.H. NOVEMBER 2012 Scale: Project Nº: Report Nº: Drawing Nº:	BAILEY	B S BRANCH C C A	Status TC BEDFORI EDFORD IND REEK & TRIBUTAF ROSS SECT A - A', B - B', C	D FAC HANA RY 3 CO ONS C - C'	NCRETE	E SEA	LING
Scale: Project Nº: Report Nº: Drawing Nº:	BAILEY	B S BRANCH C C A CON	Status TC BEDFORE EDFORD IND REEK & TRIBUTAF ROSS SECT A - A', B - B', C	D FAC IANA RY 3 CO IONS C - C'	NCRETE	E SEA	LING
	BAILEY	B S BRANCH C C A CON Brence:	Status TC BEDFORE EDFORD IND REEK & TRIBUTAF ROSS SECT A - A', B - B', C ESTOGA-ROVE	D FAC JANA Y 3 CO ONS C - C' RS &		E SEA	LING
	BAILEY Source Refe	B S BRANCH C C A CON Brence:	Status TC BEDFORD EDFORD IND REEK & TRIBUTAF ROSS SECT A - A', B - B', C ESTOGA-ROVE	D FAC D FAC	NCRETE ASSO	E SEA CIA ⁻	TES







Revision Date Initial NOTES: 1. TOP OF CONCRETE CONSTRUCTED WITH A ROUGHENED AND UNDULATING SURFACE THAT PROVIDE COLLECTION AREAS FOR MIGRATING SOIL AND ROCK AND MIGHT ENHANCE THE POTENTIAL FOR NATURALLY OCCURRING VEGETATION OVER SEVERAL YEARS. THE MINIMUM REQUIRED THICKNESS OF 4" OR 8" (AS APPROPRIATE) MAINTAINED OVER THE CONCRETE BASE FILL GRADES, WITH ADDITIONAL CONCRETE PLACED AT RANDOM LOCATIONS THROUGHOUT THE CONCRETE SEALING AREA TO CREATE A MORE NATURAL APPEARANCE (I.E., NOT STRICTLY SMOOTH CONCRETE CHANNEL) BUT STILL MAINTAIN THE GENERAL FLOW PATTERN TOWARDS THE CENTER OF THE CONCRETE CHANNEL. THESE UNDULATIONS DO NOT OCCUR WITHIN THE APPROXIMATE 5-FOOT CENTER SECTION AT STA. OF THE CONCRETE CHANNEL SO AS NOT TO INTERRUPT BASE LOW FLOW CONDITIONS. RECORD DRAWINGS THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED ON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, CRA CAN NOT AND DOES NOT WARRANT ITS ACCURACY AND/OR COMPLETENESS, AND THUS SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED HEREIN AS A RESULT. THOSE RELYING ON THIS RECORD DRAWING ARE ADVISED TO OBTAIN VERIFICATION OF ITS ACCURACY AND/OR COMPLETENESS BEFORE USING IT FOR ANY PURPOSE. SCALE VERIFICATION THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY. Approved DRAWING STATUS Date Initial Status GM CETC BEDFORD FACILITY BEDFORD INDIANA BAILEY'S BRANCH CREEK & TRIBUTARY 3 CONCRETE SEALING CROSS SECTIONS D - D', E - E', F - F' CONESTOGA-ROVERS & ASSOCIATES Source Reference: Project Manager: Reviewed By: Date: R.H. J.M. NOVEMBER 2012 Drawing Nº: Scale: leport N^o Project Nº: AS SHOWN 13968-00 C-09 368 13968-00(368)CI-WA004 OCT 29/2013

Appendix C

Materials Information



Appendix C.1

Concrete Mix Specifications



Sevenson Environmental Services, Inc.

LETTER OF TRANSMITTAL

2749 Lockport Road Niagara Falls, New York 14305 (716) 284-0431

TO: CRA	DATE: November 30, 2012
ADDRESS:	JOB NO.: E801
CITY: Waterloo, Canada	RE: Sevenson Submittal#29
ATTENTION: Rick Hoekstra	

PLEASE BE ADVISED:

WE ARE SENDING YOU:		🛛 Attached	Under Separate Cover Via The Following:		
PRINTS	PLANS	SHOP DRAWINGS	SAMPLES	SPECIFICATIONS	
ARTWORK	PROOFS	PHOTOGRAPHS	COPY OF LETTER	CHANGE ORDER	

	No. of Copies	Drawing No.	Date	Description
1	3	SES Submittal #29	11/30/12	Concrete Mix Manufacturer Literature and Data for the Bailey's Branch and Tributary #3 Capping Project at Spring 18
2				
3				
4				
5				
6				
7				

THESE ARE BEING TRANSMITTED AS INDICATED BELOW:

AS REQUESTED	APPROVED AS IS	SUBMIT COPIES FOR DISTRIBUTION
FOR APPROVAL	APPROVED WITH CORRECTIONS	RETURN CORRECTED
FOR YOUR USE	RETURNED WITH CORRECTIONS	RETURNED AFTER LOAN TO US
FOR YOUR COMMENTS	RESUBMIT COPIES FOR APPROVAL	
L		

COMMENTS:

Please reiew and return one appoved copy of the submittal for our records

Please return all documents if corrections are required

COPIES TO:	SEVENSON ENVIRONMENTAL SERVICES, INC.
	Signed VIV // Daniel Sekanovich

M:\Submittals\Submittal #27 Gate 31 Turnstile Access Stairs\Submittal 27 Transmittal 20120625.doc

SUBMITTAL FORM

Project: Bailey's Branch and Tributary #3 Capping Project at Spring 18

Contractor: Sevenson Environmental Services 2749 Lockport Road Niagara Falls, N.Y. 14305

Engineer: Conestoga-Rovers & Associates 320 GM Drive Bedford, Indiana 47421

SUBMITTAL NUMBER:	#29		
SECTION:	Cast in place concrete notes		
PAGE NUMBER	CRA Drawing C-07	CRA Drawing C-07	
ITEM:	4000 psi concrete mix		
SUBMITTAL TYPE:	 A - Test Results and/or Certificates B - Manufacturer's Literature or Data C - Shop Drawings D - Operation and Maintenance Instructions E - Samples F - Alternative Product Supporting Data G - Administrative such as schedules, etc. 		
DEFICIENCIES:		SHOP DRAWING R Submission No. #2 Contract No. 139	9
SUBMITTAL DATE:	11/30/12	Contract No. <u>139</u> ENGINEER's approval is purpose of ascertaining with general design concert in the Contract Documents	for the sol conformanc ts expresse
RESPONSE REQUIRED:	A.S.A.P	way constitutes approval a	5 the detail TORECOR TORACION CRACION L does up

Certification Statement:: By this submittal, I hereby represent that I have determined and verified all field measurements, site partic field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.

Date

Signature

11/30/12

File: 13968 5/12 121



December 5, 2012

Mr. Shane Reynolds Sevenson 2749 Lockport Road Niagara Falls, NY 14305

Re: G.M. Project - Bedford, Indiana

We are pleased to resubmit the following mix designs for the above referenced project. Per ACI 318 and ASTM C-94, imi kindly requests that we receive copies of all concrete test reports for this project. They can be sent to technicalservices@irvmat.com

Description	6 Bag
	Air
	Limestone
imi Mix Number	060
Cement	564 lbs.
Sand	1280
#8 Limestone	1750
Fiber	1 lb.
Water Reducer	33 oz.
Waterproof	12 lbs.
W/C	0.42
Water	236 lbs.
Air	5-8 %
Slump	8" max.

HIGH RANGE WATER REDUCER (Superplasticizer): This admixture will be ordered in any of the above mix design by specifying <u>SUP</u> after the imi mix design number. The dosage rate of this admixture is 5-7 oz/cwt of cement. This will increase the maximum allowable slump to 8".

FIBER SECONDARY REINFORCING: This product will be added to the above mix design by specifying *CF* after the imi mix design number. A 1 lb. dosage of NYTECH will be added when requested per yard.

MATERIAL SUPPLIERS & SPECIFICATIONS:

Cement:	ASTM C-150: Type I-II or Type III, Lehigh (Mitchell, IN)
Admixtures:	ASTM C-494: Superplasticizer, Type F, Glenium 7500. BASF
	Optional: Non-chloride Accelerator, Polarset, Grace Construction Products
	ASTM C-260: Air entrainment, Micro Air, BASF
	Water-proofing admixture, Xypex C-1000, Xypex Corporation.
Aggregates:	ASTM C-33 & INDOT Specifications: #23 Sand, from Rogers Group (Morgan County);
00 0	#8,¾" Limestone from Rogers Group (Springville, IN).
Fiber:	ASTM C-1116, Nytech CG, NMW, Inc.

Respectfully Submitted,

Rodney Haag Irving Materials, Inc.

"We're Proud Of Our Work"

8032 N. State Road 9 • Greenfield, IN 46140 317.326.3101 • Fax: 317.326.3105 www.irvmat.com



Technical Services

November 30, 2012

Mr. Shane Reynolds Sevenson 2749 Lockport Road Niagara Falls, NY 14305

Re: G.M. Project - Bedford, Indiana

We are pleased to submit the following mix designs for the above referenced project. Per ACI/318 and ASTM C-94, imi kindly requests that we receive copies of all concrete test reports for this project. They can be sent to technicalservices@irvmat.com

Description	6 Bag	
	Air	
	Limestone	
imi Mix Number	060	
Cement	564 lbs.	6/1
Sand	1280	X//_
#8 Limestone	1750	
Fiber	1 lb.	Cit
Water Reducer	33 oz.	
Waterproof	2-3% of cement	
W/C	0.42	$\sqrt{0}$
Water	236 lbs.	. 7/
Air	5-8 %	5
Slump	8" max.	EV /
		\vee /

HIGH RANGE WATER REDUCER (Superplasticizer): This optional admixture can be ordered in any of the above mix designs by specifying <u>SUP</u> after the imi mix design number. The dosage rate of this admixture is 5-7 oz/cwt of cement. This will increase the maximum allowable slump to 8".

MID RANGE WATER REDUCER: This optional product may be ordered by specifying <u>MID</u> after the imi mix design number. The dosage rate of this admixture is 4 oz/owt of cement. This will increase the maximum allowable slump to 6".

FIBER SECONDARY REINFORCING: This optional product may be added to any of the above mix designs by specifying *CF* after the imi mix design number. A 1 lb. dosage of NYTECH will be added when requested per yard.

MATERIAL SUPPLIERS & SPECIFICATIONS: Cement: ASTM C-150: Type I-II or Type III, Lehigh (Mitchell, IN) ASTM C-494: Water Reducer, Type A, Glenium 7500, BASF Admixtures: Optional: Mid-Range Water Reducer, Glenium 7500, BASF ASTM C-494: Superplasticizer, Type F, Glenium 7500. BASF Optional: Non-chloride Accelerator, Polarset, Grace Construction Products ASTM C-260: Air entrainment, Micro Air, BASF Water-proofing admixture, Xypex C-1000, Xypex Corporation. ASTM C-33 & INDOT Specifications: #23 Sand, from Rogers Group (Morgan County); Aggregates: #8,¾" Limestone from Rogers Group (Springville, IN). Fiber: ASTM C-1116, Nytech CG, NMW, Inc. Respectfully Submitted.

Rodney Haag Irving Materials, Inc.

> 8032 N. State Road 9 • Greenfield, IN 46140 317.326.3101 • Fax: 317.326.3105 www.irvmat.com



Material Safety Data Sheet

Revised: Replaces: October 27, 2011 August 6, 2004

Corporate Office: 8032 N State Road 9, Greenfield, IN 46140

Freshly Mixed Unhardened Concrete

also called <u>Ready-Mixed Concrete</u>, Portland Cement Concrete, &/or Flowable Fill

2 -- PRODUCT AND COMPONENT DATA

Concrete is a mixture of Portland and other cements, gravel and/or crushed limestone, sand, and water. It may also contain fly ash, silica fume, fibers and/or chemical admixtures.

Ingredients	%	OSHA-PEL	NIOSH-REL	CAS No.
Portland Cement*	10 - 25	5.0 mg/m ³ respirable dust 15.0 mg/m ³ total dust	5.0 mg/m ³ respirable dust 10.0 mg/m ³ total dust	65997-15-1
Aggregates*	35 - 90	5.0 mg/m ³ respirable dust 15.0 mg/m ³ total dust	5.0 mg/ M ³ respirable dust 10.0 mg/m ³ total dust	Limestone 1317-65-3 Sand & Gravel None
Fly Ash*	0 - 15	5.0 mg/m ³ respirable dust 15.0 mg/m ³ total dust	5.0 mg/m ³ respirable dust 10.0 mg/m ³ total dust	68131-74-8
Slag Cement*	0 - 15	5.0 mg/m ³ respirable dust 15.0 mg/m ³ total dust	5.0 mg/m ³ respirable dust 10.0 mg/m ³ total dust	**
Water	5 - 25	None	None	77321-85
Crystalline Silica SiO ₂	> 1	See note below*	See note below*	14808-60-7

*Each of these ingredients may have quartz [silica (SiO₂)] as a component. The percent of silica varies greatly from product to product and also within the same product. Silica exposure may occur when respirable dust is present. Dust is not present in Freshly Mixed Unhardened Concrete. The OSHA-PEL for respirable crystalline silica = $10 \text{ mg/m}^3 \div (\% \text{SiO}_2 + 2)$ and the ACGIH TLV for respirable silica = 0.05 mg/m^3 .

**Slag Cement may contain any or all of the following: Calcium Oxide, Fused Silca Oxide, Mangesium Oxide, Aluminum Oxide, Sulfur, Manganese Oxide, Postassium Oxide, Sodium Oxide, Titanium Oxide, and Ferric Oxide, CAS Nos.; 1305-78-8, 60676-86-0, 1309-48-4, 1344-28-1, 7704-34-9, 7439-96-5, 12136-45-7, 12401-86-4, 13463-67-7, 1309-37-1. Since Blast Furnace Slag Cement is manufactured from materials mined from the earth, and process heat is provided by burning fuels derived form the earth, trace but detectable amounts of naturally occurring metals, and possibly harmful elements may be found during chemical analysis. Ingredients are expressed as oxides for quantitative purposes. Actual oxides do not generally occur in "free form" but rather as complex silica-based glasses or crystals. May contain more than 0.1% of free crystalline silica.

The chemical admixtures are present in quantities comprising less than 1%. These chemical admixtures can be both dry and/or liquid. Admixtures contained in Freshly Mixed Unhardened Concrete at the time of delivery would have no effect on the hazards associated with the use of Fresh Mixed Unhardened Concrete.

The hazardous ingredients associated with dust from concrete cannot become airborne in plastic (wet) concrete. When water is added to the dry ingredients a reaction occurs with the calcium oxide that is present to form calcium hydroxide, a high alkalinity chemical which can irritate the eyes and skin upon contact. The product is delivered as a ready mixed unhardened concrete. There is no dust hazard present from the wet product. An OSHA-PEL or a NIOSH-REL would not apply at the time of delivery.

Component product Material Safety Data Sheets are available upon request.

3-- PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	NA	Specific Gravity (H ₂ O = 1)	1.5 - 3.0
Vapor Pressure	NA	Melting Point	NA
Vapor Density (Air = 1)	NA	Evaporation Rate (Butyl Acetate = 1)	NA
Solubility in Water	Slight (0.01 to 1%)	pH (in water) (ASTM D 1293-95)	12 to 13
Appearance and Color	Odorless gray, plastic, flowable, granular mud		

4 -- FIRE AND EXPLOSION HAZARD

NA NA NA

Flash point	NA	Flammable Limits
LEL	NA	UEL
Extinguishing Media	NA	Special Fire Fighting Procedures
Unusual fire and Explosion Hazards	None	

5 -- REACTIVITY DATA

Stability **Conditions to Avoid** Incompatibility (Materials to avoid) **Hazardous Decomposition Products Hazardous Polymerization**

Stable None known Strong Acids None known Will not occur

6 -- HEALTH HAZARDS

Emergency Overview: Short term exposure to wet concrete is not likely to cause an immediate hazard. However, freshly mixed unhardened (plastic) concrete has a high alkalinity level which can cause skin and eye irritation. Exposure of sufficient duration to wet concrete can cause serious, potentially irreversible tissue (skin or eye) damage in the form of chemical (caustic) burns. Take appropriate precautions to minimize direct contact with the product. See Personal Protective Equipment precautions in Section 7 below.

Routes of Entry: Skin Contact, Eye Contact, Ingestion

Effects of Acute Exposure: Plastic concrete can dry the skin and cause alkali burns (cement dermatitis). Prolonged exposure may irritate the skin and cause a burning sensation, particularly in areas of prior abrasion or irritation. Contact with plastic concrete can cause irritation of the eye. Ingestion may cause throat irritation.

Effects of Chronic Exposure: Hypersensitive individuals may develop an allergic dermatitis. This product may contain crystalline silica. Since freshly mixed unhardened concrete is a wet product, the risk of silica inhalation is negligible and should not present a significant health hazard.

Emergency and First Aid Procedures: Irrigate eyes with copious amounts of water. Wash exposed areas of the body with soap and water. Saturated or contaminated clothing should be removed and washed before re-use. If irritation persists, obtain medical attention,

Carcinogenic Potential: Freshly Mixed Unhardened Concrete is not listed as a carcinogen by NTP, OSHA, or IARC. Concrete frequently contains crystalline silica in concentrations greater than 0.1%,. Respirable crystalline silica is classified by IARC (International Agency for Research on Cancer) as a known human carcinogen and by NTP (National Toxicology Program) as "reasonably anticipated to be a carcinogen." Crystalline silica in wet concrete is not respirable and does not pose a health hazard. See Additional Precautions in Section 7 below.

7 -- PRECAUTIONS FOR SAFE HANDLING AND USE

Personal Protective Equipment: Use barrier creams, gloves, boots, and clothing to protect skin from prolonged contact with plastic concrete. Particularly protect abrasions of the skin from contact with plastic concrete. Wear safety glasses or goggles when placing methods cause splashing of the plastic concrete.

Waste Disposal Methods: Spills of plastic concrete should be allowed to harden, when it can be disposed of as common waste. All disposals should be accordance with local regulations.

Additional Precautions: Any cutting, grinding, or scarifying of dry hardened concrete can cause dusting of the concrete. Dust created in this fashion may contain crystalline silica. Repeated and prolonged inhalation of respirable crystalline silica in excess of appropriate exposure limits can cause scarring of the lungs or a progressive lung disease called silicosis. Silicosis may aggravate other chronic lung related conditions. Smoking is strongly suspected of aggravating the effects of silica exposure and may increase the risk of lung cancer. When cutting, grinding, or scarifying dry hardened concrete, appropriate precautions must be taken to prevent inhalation of the dust. Engineering controls such as dust suppression or capture should be employed. When this is not possible a NIOSH - MSHA approved respirator should be used when the TLV is exceeded.

Ready-Mixed Concrete is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA). In October 1996, an IARC Working Group re-assessing crystalline silica, a component of this product, designated respirable crystalline silica as carcinogenic (Group 1). The NTP's <u>Report on Carcinogens</u>, 9th Edition, lists respirable crystalline silica as a "known human carcinogen". In year 2000, the American Conference of Governmental Industrial Hygienists (ACGIH) listed respirable crystalline silica (quartz) as a suspected human carcinogen (A-2). These classifications are base on sufficient evidence of carcinogenicity in certain experimental animals and on selected epidemiological studies of workers exposed to crystalline silica.

8 -- PREPARATION OF THIS DOCUMENT

Prepared by:

Irving Materials, Inc. 8032 North SR 9 Greenfield, Indiana 46140 (317) 326-3101 Effective Date: Replaces: October 27, 2011 August 6, 2004

Notice: Irving Materials, Inc. believes that the information contained on this Material Safety Data Sheet is based on hazard information from sources considered technically reliable and has been prepared in good faith in accordance with available information. The conditions or methods of handling, storage, use, and disposal of this product are beyond our control and may be beyond our knowledge. Therefore, NO WARRANTY IS MADE, EXPRESSED, OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE.

PRODUCT DATA SHEET



DESCRIPTION

Xypex is a unique chemical treatment for the waterproofing, protection and improvement of concrete. XYPEX ADMIX C-1000 is added to the concrete mix at the time of batching. Xypex Admix C-1000 consists of portland cement, very fine treated silica sand and various active, proprietary chemicals. These active chemicals react with the moisture in fresh concrete and with the by-products of cement hydration to cause a catalytic reaction which generates a non-soluble crystalline formation throughout the pores and capillary tracts of the concrete. Thus the concrete becomes permanently sealed against the penetration of water or liquids from any direction. The concrete is also protected from deterioration due to harsh environmental conditions.

XYPEX ADMIX C-SERIES

The Admix C-Series has been specially formulated to meet varying project and temperature conditions. Xypex Admix C-500 is specifically formulated to meet modern concrete practices that incorporate additives such as fly ash and slag. For most concrete mix designs adding the Admix C-500 will have minimal or no effect on setting time. Xypex Admix C-1000 is designed for typical Portland cement-rich concrete, where normal to a mild retarded set is desired. Xypex Admix C-2000 is designed for projects where extended retardation is required due to high ambient temperatures or long ready-mix delivery times. See Setting Time and Strength for more details. Consult with a Xypex Technical Representative for the most appropriate Xypex Admix for your project.

RECOMIVENDED FOR:

- Reservoirs
- Sewage and Water Treatment Plants
- Secondary Containment Structures
- Tunnels and Subway Systems
- Underground Vaults
- Foundations
- Parking Structures
- Swimming Pools
- Pre-Cast Components

ADMIX C-1000

ADVANTAGES

- Resists extreme hydrostatic pressure from either positive or negative surface of the concrete
- Becomes an integral part of the substrate
- Highly resistant to aggressive chemicals
- · Can seal static hairline cracks up to 0.4 mm
- Allows concrete to breathe
- Non-toxic
- . Less costly to apply than most other methods
- Permanent
- Added to the concrete at time of batching and therefore is not subject to climatic restraints
- Increases flexibility in construction scheduling

PACKAGING

Xypex Admix C-1000 is packaged in 20 lb. (9.1 kg) pails, 60 lb. (27.2 kg) pails and 50 lb. (22.7 kg) bags. Admix C-1000 is also available in cartons containing 10 lb. (4.5 kg), 12 lb. (5.5 kg), and 15 lb. (6.8 kg) soluble bags. For specific projects, contact the manufacturer for availability of custom sized packaging.

STORAGE

Xypex products must be stored dry at a minimum temperature of 45°F (7°C). Shelf life is one year when stored under proper conditions.

DOSAGE RATES

Xypex Admix C-1000: 2% - 3% by weight of cement Xypex Admix C-1000 NF (No Fines Grade): 1% - 1.5% by weight of cement

Note: Under certain conditions, the dosage rate for No Fines Grade may be as low as 0.8% depending on the quantity and type of total cementitious materials.

Consult with Xypex's Technical Department for assistance in determining the appropriate dosage rate and for further information regarding enhanced chemical resistance, optimum concrete performance, or meeting the specific requirements and conditions of your project.

TEST DATA PERMEABILITY

U.S. Army Corps of Engineers CRD C48-73 "Permeability of Concrete" Aviles Engineering Corp., Houston, USA

Two concrete samples containing Xypex Admix at 3% and 5% respectively, and an untreated control sample were tested for water permeability. Both the treated and untreated samples were subjected to a pressure of 150 psi (350 ft. waterhead). Results showed moisture and permeated water throughout the untreated sample after 24 hours. However, the Xypex Admix samples showed no leakage, and water penetration of only 1.5 mm after 120 hours (5 days).

U.S. Army Corps of Engineers CRD C48-73 "Permeability of Concrete" Setsco Services, Pte Ltd, Singapore

Six Xypex Admix-treated and six untreated concrete samples were tested for water permeability. Pressure was gradually increased over five days and then maintained at 7 bars (224 ft. waterhead) for 10 days. While the six reference samples showed water leakage beginning on the fifth day and increasing throughout the test period, the Xypex Admix samples showed no water leakage at any time during the test.

DIN 1048 "Water Impermeability of Concrete" DICTU S.A.

Dept. Of Engineering and Construction Mgt., Santiago, Chile Concrete samples 120 mm thick containing Xypex Admix were tested with the same size reference samples for water impermeability. Samples were subjected to hydrostatic pressure for 28 days. Water totally permeated the untreated samples but no water penetration was detected in any of the Xypex Admix-treated samples.

COMPRESSIVE STRENGTH

ASTM C 39 "Compressive Strength of Cylindrical Concrete Specimens" HBT Agra, Vancouver, Canada

Concrete samples containing Xypex Admix at various dosage rates (1%, 2% and 5%) were tested against an untreated concrete control sample. Compressive strength test results after 28 days indicated a significant strength increase in the samples incorporating Xypex Admix. The compressive strength increase varied between 5% and 20% (depending on the Xypex Admix dosage rate) over that of the reference sample.

ASTM C 39 "Compressive Strength of Cylindrical Concrete Specimens" Kleinfelder Laboratories, San Francisco, USA

At 28 days, the compressive strength test of the concrete containing Xypex Admix measured 7160 psi as compared to the reference sample at 6460 psi (a 10% increase).

CHEMICAL RESISTANCE

JIS "Chemical Durability Test" Japanese Utility Company, In-house Test Report, Tokyo, Japan

Concrete samples containing Xypex Admix were tested against five samples containing other admixtures and against a control sample, to determine resistance to corrosion and deterioration caused by contact with aggressive chemicals. All samples were soaked in a 5% sulfuric acid solution at 20°C for six months. Various evaluations and measurements were assessed every month during the test period, including: photographic comparisons, relative dynamic modulus of elasticity, percentage change in length, weight and flexural rigidity. Although the Xypex Admix sample was subjected to acid conditions well outside its published range, the results confirmed Xypex with the best performance among the seven samples tested.

"Sulfuric Acid Resistance Test" Aviles Engineering Corporation, Houston, USA

Concrete samples containing Xypex Admix at different dosage rates (3%, 5% and 7%) were tested against untreated control samples for Sulfuric acid resistance. After immersion in the Sulfuric acid, each sample was tested for weight loss on a daily basis until a weight loss of 50% or a definite response trend was obtained. The percentage weight loss of the samples containing Xypex Admix tested significantly lower than the control samples.

"Sulphate Resistance Test" Taywood Engineering Ltd., Perth. Australia

Xypex Admix-treated concrete samples were immersed in an ammonium-sulphate solution and tested for "resistance in a harsh environment". The performance of the Xypex-Crystalline-Technology was compared with five other concretes, including one containing a sulphateresistant cement. Each of the test samples was cured for seven days and then placed in an ammonium-sulphate solution (132 g/l) for 180 days. The rate of corrosion was determined by measuring weight loss, and length change was noted on a weekly basis. The Xypex-Crystalline-Technology substantially improved concrete performance as compared to the reference concrete and tested very similar to the sulphate-resistant concrete. The Xypex Admix-treated samples also provided the highest level of protection as measured by change in length.

FREEZE/THAW DURABILITY

ASTM C 666 "Freeze/Thaw Durability" Independent Laboratory, Cleveland, USA

After 300 freeze/thaw cycles, the Xypex Admix-treated samples indicated 94% relative durability.

POTABLE WATER EXPOSURE

NSF 61 "Drinking Water System Component-Health Effects" NSF International, Ann Arbor, USA

Exposure testing of potable water in contact with Xypextreated samples indicated no harmful effects.

DIRECTIONS FOR USE

Xypex Admix C-1000 must be added to the concrete at the time of batching. The sequence of procedures for addition will vary according to the type of batch plant operation and equipment:

1. READY MIX PLANT - DRY BATCH OPERATION Add Xypex Admix in powder form to the drum of the ready-mix truck. Drive the ready-mix truck under the batch plant and add the balance of the materials in accordance with standard concrete batching practices. Mix materials for a minimum of 5 minutes to ensure that the Xypex Admix has been thoroughly dispersed throughout the concrete.

2. READY MIX PLANT - CENTRAL MIX OPERATION Mix Xypex Admix with water to form a very thin slurry (e.g. 15 - 20 lb/6.75 - 9 kg of powder mixed with 3 gallons/13.6 litres of water). Pour the required amount of material into the drum of the ready-mix truck. The aggregate, cement and water should be batched and mixed in the plant in accordance with standard practices (taking into account the quantity of water that has already been placed in the ready-mix truck). Pour the concrete into the truck and mix for at least 5 minutes to ensure even distribution of the Xypex Admix throughout the concrete.

3. PRECAST BATCH PLANT Add Xypex Admix to the rock and sand, then mix thoroughly for 2 - 3 minutes before adding the cement and water. The total concrete mass should be blended using standard practices.

Notes:

1. It is important to obtain a homogeneous mixture of Xypex Admix with the concrete. Therefore, do not add dry Admix powder directly to wet concrete as this may cause clumping and thorough dispersion will not occur.

2. Concrete containing the Xypex Admix does not preclude the requirement for design of crack control, construction joint detailing and measures for repairing defects in concrete (i.e. honeycombing, tie holes, cracks beyond specified limits).

For further information regarding the proper use of Xypex Admix for a specific project, consult with a Xypex Technical Representative.

SETTING TIME AND STRENGTH

The setting time of concrete is affected by the chemical and physical composition of ingredients, temperature of the concrete and climatic conditions. Xypex Admix C-1000 is designed for typical Portland cement-rich concrete, where normal to a mild retarded set is desired. Concrete containing the Xypex Admix C-1000 may develop higher ultimate strengths than plain concrete. Trial mixes should be carried out under project conditions to determine the setting time and strength of the concrete dosed with Xypex Admix C-1000. Consult with a Xypex Technical Representative for the most appropriate Xypex Admix for your project.

LIMITATIONS

When incorporating Xypex Admix, the temperature of the concrete mix should be above 40°F (4°C).

TECHNICAL SERVICES

For more instructions, alternative installation methods, or information concerning the compatibility of the Xypex treatment with other products or technologies, contact the Technical Services Department of Xypex Chemical Corporation or your local Xypex Representative.

SAFE HANDLING INFORMATION

Xypex is alkaline. As a cementitious powder or mixture, Xypex may cause significant skin and eye irritation. Directions for treating these problems are clearly detailed on all Xypex pails and packaging. The Manufacturer also maintains comprehensive and up-to-date Material Safety Data Sheets on all its products. Each sheet contains health and safety information for the protection of workers and customers. The Manufacturer recommends you contact Xypex Chemical Corporation or your local Xypex representative to obtain copies of Material Safety Data Sheets prior to product storage or use.

WARRANTY

The Manufacturer warrants that the products manufactured by it shall be free from material defects and will be consistent with its normal high quality. Should any of the products be proven defective, the liability to the Manufacturer shall be limited to replacement of the product ex factory. The Manufacturer makes no warranty as to merchantability or fitness for a particular purpose and this warranty is in lieu of all other warranties expressed or implied. The user shall determine the suitability of the product for his intended use and assume all risks and liability in connection therewith.

Commercial Grade Division 3



Performance Concrete Fibers

Nytech[®] CG (Commercial Grade) Nylon monofilament fibers reduce early plastic shrinkage cracking and provides multi-dimensional secondary reinforcement that cannot be achieved with WWF.

Nytech[®] CG fibers improve long term durability as well as quantifiable engineering properties. Nytech[®] CG fibers will always be positioned correctly with millions of fibers dispersed evenly throughout the concrete.

Nytech® CG fibers conform to ASTM C 1116, ICC-ES AC32, and numerous Federal, State and Local Codes.

Benefits:

- · CG Fibers provide 3-Dimensional reinforcement
- · Provides plastic shrinkage crack reduction
- Provides secondary/temperature shrinkage crack reduction
- · Easily finished with non-hairy concrete
- · Significant time and labor cost savings over WWF
- · Improves overall durability of the concrete
- · Easier to pump without equipment clogs
- · Greater fatigue strength and Impact resistance than WWF
- · Reduces Permeability

Applications:

- Commercial, Industrial, Warehouse and Residential Slabs-on-ground
- Decorative Concrete
- Shotcrete
- Precast Concrete
- Composite Elevated Decks

General Specification:

Nytech[®] CG is a monofilament nylon that meets the requirements of ASTM C - 1116, Section 4.1.3 and Note 3. Additionally Nytech[®] CG meets ICC ES AC32 Section 3.1.1 (Plastic Shrinkage Reinforcement) and Section 3.1.2 (Secondary/Temperature – Shrinkage Reinforcement). The standard dosage rate to meet this specification is 1.0 lbs / yd³ (0.6 kg / m³). Nytech[®] CG is marketed by NMW, Inc., 6553 West 400 North, Greenfield, IN 46140. Phone: (800)253-4237, Fax: (317)891-1019.

Nytech[®] CG

Installation:

Nytech® CG fibers are packaged in pre-weighed paper/degradable bags that are added to the mix at the batch plant. To ensure even fiber disbursement, do not add concurrently with cement. If added after all the standard ingredients, then continue to mix for an additional 3 – 5 minutes.

Normal Dosage rate for Nytech[®] CG fibers is 1 pound / yd³ of concrete.

Packaging:

Standard Packaging for Nytech® CG fibers is:

	1lb bags	30 bags / box, 36 boxes/skid
	5lb bags	6 bags / box, 36 boxes/skid
Optional Packa	iging:	
	9lb bags*	3 bags / box, 36 boxes/skid
	10lb bags*	3 bags / box, 36 boxes/skid
*Additional Charges	Apply	

Physical Properties:

Specific Gravity1.16
Denier Range 2 – 7
Melting Point 490° - 510° F
Alkali & Chemical Resistance Excellent
Water Absorption 4 – 5%
Color Natural

Shipping Policy:

NMW, Inc. utilizes multiple shipping points around the country and can have products virtually anywhere in the US in 1 - 2 days.

All LTL shipments/deliveries are fob plant.*

*Some exceptions apply

Limitations:

Nytech® CG fibers are intended to reduce plastic shrinkage cracking and provide secondary/temperature-shrinkage reinforcement. Nytech® CG should not be used as structural reinforcement. NMW, Inc: warrants that the product sold hereunder is of merchantable quality and conforms to seller's standards and specifications. Seller's sole liability for claim shall be limited to replacement of defective or non-conforming product. In no event shall seller be liable for any special, incidental, consequential, or exemplary damages. NMW, Inc. recommends that each user determine the suitability of the product(s) for their own particular application.



6553 West 400 North • Greenfield IN • 46140 Ph: (317)891-1010 • Fax: (317)891-1019 • Toli Free: (800)253-4237 On the web: <u>www.nmwinc.com</u>

Nytech® is a registered trademark of NMW, Inc.



The Chemical Company

September 30, 2010

Project: Airport renovation Project location: Bedford Indiana

Certificate of Conformance GLENIUM® 7500 BASF Construction Chemicals, LLC* Admixture for Concrete

(*Previously doing business as BASF Admixtures, Inc. and prior to that as Degussa Admixtures, Inc. and Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Construction Chemicals, LLC , Cleveland, Ohio,certify:

That GLENIUM 7500 is a high-range water-reducing admixture manufactured by BASF Construction Chemicals, LLC; and

That no calcium chloride or chloride based ingredient is used in the manufacture of GLENIUM 7500; and

That GLENIUM 7500, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00017 percent (1.7 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That GLENIUM 7500 meets the requirements for a Type A, Water-Reducing and Type F, Water-Reducing, High Range Admixture specified in ASTM C 494, Corps of Engineers' CRD-C 87 and AASHTO M194, the Standard Specifications for Chemical Admixtures for Concrete.

Richard Hubbard II

Richard Hubbard Sr. Technical Marketing Specialist BASF Construction Chemicals, LLC

BASF Construction Chemicals, LLC 23700 Chagrin Boulvard Cleveland, OH 44122 216 839-7500 ph www.masterbuilders.com





The Chemical Company

May 28, 2009

Irving Materials, Inc. 5024 S. State Road 67 Anderson, Indiana 46013

Attention: Svetlana Latashiline Project: Annual Certification Project location: various locations

Certificate of Conformance Micro-Air® BASF Construction Chemicals, LLC* Air-Entraining Admixture for Concrete

(*Previously doing business as BASF Admixtures, Inc. and prior to that as Degussa Admixtures, Inc. and Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Construction Chemicals, LLC, Cleveland, Ohio,certify:

That Micro-Air is a BASF Construction Chemicals, LLC Air-Entraining Admixture for concrete; and

That no calcium chloride or chloride based ingredient is used in the manufacture of Micro-Air; and

That Micro-Air, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.0001 percent (1.0 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That Micro-Air meets the requirements of ASTM C 260, Corps of Engineers CRD-C 13 and AASHTO M154, the Standard Specifications for Air-Entraining Admixtures for Concrete.

Richard Hudbord II

Richard Hubbard Sr. Technical Marketing Specialist BASF Construction Chemicals, LLC

BASF Construction Chemicals, LLC 23700 Chagrin Boulvard Cleveland, OH 44122 216 839-7500 ph www.masterbuilders.com



Grace Construction Products

W.R. Grace & Co. - Cons. 6000 W. 51st Street Chicago, R. 60638 T 800-232-6411 www.oraceconstruction.com

5/22/2009

Svetlana Latashiline Irving Materials, Inc. 5024 S. State Road 67 Anderson, Indiana 46013

Project Name: Annual Certification Product Selected: Polarset®



This is to certify that the Polarset, a Accelerator, as manufactured and supplied by Grace Construction Products, W.R. Grace & Co. – Conn., is formulated to comply with the Specifications for Chemical Admixtures for Concrete, ASTM: C494, Type C, AASHTO: M194, Type C.

Polarset does not contain calcium chloride or chloride containing compounds as a functional ingredient. Chloride ions may be present in trace amounts contributed from the process water used in manufacturing.

The foregoing is in addition to and not in substitution for our standard Conditions of Sale attached.

L A 1/2000

James A. Kolakowski Central Region Technical Services Manager

Lehigh Cement Company **Mill Test Certificate Report** Test Period: August 2012 Type: I-II ASTM, I-II AASHTO Certification This certifies that the described cement, at the time of shipment, meets chemical and physical requirements of the current applicable specification for ASTM C-150, for type I and type II as well as AASHTO M-85 for type I and type II. We are not responsible for improper use or workmanship. **General Information** Source Location: Lehigh Cement Company Supplier: Lehigh Cement Company Address: 180 N. Meridian Road Mitchell, Indiana Mitchell, IN 47446 Contact: Joe Cieslik Telephone: (812)-849-2191 Quality Control Manager Tests Data on ASTM "Standard" Requirements Chemical Physical Item ASTM Limit Result Item ASTM Limit Result SiO₂ (%) C 114 20 min C 204 20.1 Fineness: Al₂O₃ (%) C 114 6.0 max % Passing 45 µm (No. 325) Sieve (%) C430 95.7 4.8 Fe₂O₃ (%) C 114 C204 280-430 400 6.0 max 3.0 Blaine Fineness (m²/kg) * C151 0.8 max 0.007 CaO (%) C 114 62.7 Autoclave Expansion (%) C191 MgO (%) C 114 6.0 max Vicat Setting Time: 2.1 C191 45 min 122 SO3(%) C 114 Intial Vicat (minutes) 3.4 375 max 216 Loss on Ignition (%) C 114 Final Vicat (minutes) C191 3.0 max 2.5 12 max 8.3 Na₂O (%) C185 C114 0.16 Air Content (%) K20 (%) C114 0.76 Heat of Hydration (KJ/kg) Insoluble Residue (%) C 114 0.75 max 0.34 7 Days ** C186 346 C1038 Mortar Bar Expansion (%) *** C1038 0.01 CO2 (%) C 114 1.4 * C 114 Limestone (%) 5 max 3.3 C 109/C 109M CaCO₃ in Limestone (%) C114 70 min Compressive Strength MPa: 96.5 C 109/C 109M 12.9 Inorganic Processing Addition (%) C114 5 max 1 Day 12.0 min C 109/C 109M 245 3 Day (Type I-II) C 109/C 109M 19.0 min 30.8 C114 7 Day Potential Compounds: C 109/C 109M 28 Day C3S (%) C114 52 ~ C2S (%) C114 18 C 109/C 109M Compressive Strength PSI: C₃A (%) C114 8 max 7.4 C 109/C 109M 1865 C4AF (%) C114 9 1 Day $C_4AF + 2(C_3A)$ C114 3 Day C 109/C 109M 1740 min 3550 24 C3S+4.75*C3A 7 Day C 109/C 109M 2760 min 4472 C114 100 Max 87 C 109/C 109M Na Eqv (%) C114 0.67 28 Day ~ Notes Maximum fineness limits do not apply if the sum of C3S + 4.75C3A is less than or equal to 90. *Test result represents most recent value and is provided for information only. **Test result for this production period not available. Most recent test result provided. 7. Ciesti

09/18/12

Date

Joe Cieslik Quality Control Manager

Lehigh Cement Company **Mill Test Certificate Report**

Type: I-II ASTM, I-II AASHTO

Test Period: August 2012

Certification

This certifies that the described cement, at the time of shipment, meets chemical and physical requirements of the current applicable specification for ASTM C-150, for type I and type II as well as AASHTO M-85 for type I and type II. We are not responsible for improper use or workmanship.

General Information

Supplier: Lehigh Cement Company Address: 180 N. Meridian Road Mitchell, IN 47446 Telephone: (812)-849-2191

Source Location: Lehigh Cement Company Mitchell, Indiana

> Contact: Joe Cieslik Quality Control Manager

Additi	onal Data	
Inorganic Proce	ssing Addition Data	
Туре		
Amount (%)	-	
SiO ₂ (%)	• [*]	
Al ₂ O ₃ (%)	-	
Fe ₂ O ₃ (%)	-	
CaO (%)	-	
SO ₃ (%)	-	
Base Cement	Phase Composition	
C ₃ S (%)	53	
C ₂ S (%)	19	
C ₃ A (%)	7,7	
C ₄ AF (%)	10	

Notes

We certify that the above described data represents the materials used in the cement manufacturing during the production period indicated

September 18, 2012

Date

Joe Cieslik

Ciest

Quality Control Manager

	Leł				
	Mill	Test	t Certificate Report		
ype: III ASTM			Test Period: Janu	Jary 2012	
			Certification		
his certifies that the day	cribad comont of th				
pecification for ASTM C-18	50, for type lit as well	e time of as AASHT	shipment, meets chemical and physical requirer O M-85 for type III. We are not responsible for imp	nents of the current roper use or workman	applicabl ship.
		G	ieneral Information		
Address: 180	gh Cement Compa North Meridian roa hell, IN 47445 - 11)-849-2191	d	Source Location: Lehigh Cemen Mitchell, Indiar Contact: Joe Cieslik		
			Quality Contro	I Supervisor	
• • •		ata on .	Quality Contro ASTM "Standard" Requirements	I Supervisor	
c	Tests D	ata on			
C Item	Tests D	Result	ASTM "Standard" Requirements Physical Item	Límit	Result
C Item iO ₂	Tests D	Result 20.1	ASTM "Standard" Requirements Physical Item Fineness:		
C Item iO2 iQ3	Tests D	Result 20.1 4.8	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sileve (%)	Límit	99.6
C Item iO ₂ kO ₃ e ₂ O ₃	Tests D	Result 20.1 4.8 3.1	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sileve (%) Blaine Fineness (m ² /kg)	Límit	99.6 614
C Item iO ₂ kO ₃ e ₂ O ₃ iaO	Tests D	Result 20.1 4.8 3.1 62.6	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m ² /kg) Autoclave Expansion (%)	Límit	99.6
C item iO ₂ kO ₃ e ₂ O ₃ iaO igO	Tests D	Result 20.1 4.8 3.1	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sileve (%) Blaine Fineness (m ² /kg)	Límit	99.6 614 -0.01
C: Item iO2 l ₂ O3 c2O3 iaO igO O3	Tests D hemical Limit 6.0 max	Result 20.1 4.8 3.1 62.6 1.8	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m ² /kg) Autoclave Expansion (%) Vicat Setting Time:	Limit	99.6 614 -0.01
C Item iO2 I2O3 62O3 iaO iaO iaO iaEqv	Tests D hemical Limit 6.0 max	Result 20.1 4.8 3.1 62.6 1.8 3.3	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m ² /kg) Autoclave Expansion (%) Vicat Setting Time: Intual Vicat (minutes)	Limit - - - 45 min	99.6 614 -0.01 107
C Item IQ2 I2O3 62O3 62O3 <td>Tests D herrical Limit - - 6,0 max 3.5 max</td> <td>Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64</td> <td>ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m²/kg) Autoctave Expansion (%) Vicat Setting Time: Intual Vicat (minutes) Final Vicat (minutes)</td> <td>Limit - - 45 min 375 max</td> <td>99.6 614 -0.01 107 211</td>	Tests D herrical Limit - - 6,0 max 3.5 max	Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m ² /kg) Autoctave Expansion (%) Vicat Setting Time: Intual Vicat (minutes) Final Vicat (minutes)	Limit - - 45 min 375 max	99.6 614 -0.01 107 211
C Item IQ ₂ IQ ₃ e ₂ O ₃ e ₂ O ₃ aO IgO O ₃ Ia Eqv oss on Ignition Isofuble Residue	Tests D hemical Limit - - - 6.0 max 3.5 max - 3.0 max	Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64 2.1	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m ² /kg) Autoctave Expansion (%) Vicat Setting Time: Intual Vicat (minutes) Final Vicat (minutes)	Limit - - 45 min 375 max	99.6 614 -0.01 107 211
C Item IQ ₂ I ₂ O ₃ e ₂ O ₃ aO IgO O ₃ Ia Eqv oss on Ignition Isofuble Residue Iotential Compounds: I ₃ S	Tests D hemical Limit - - - 6.0 max 3.5 max - 3.0 max	Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64 2.1	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sleve (%) Blaine Fineness (m ² /kg) Autoclave Expansion (%) Vicat Setting Time: Intual Vicat (minutes) Final Vicat (minutes) Air Content (%)	Limit - - 45 min 375 max	99.6 614 -0.01 107 211
C Item iD ₂ I ₂ O ₃ e ₂ O ₃ iaO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IGO IGO IGO IGO IGO IGO IG	Tests D hemical Limit - - - 6.0 max 3.5 max - 3.0 max	Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64 2.1 0.44	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m ² /kg) Autoclave Expansion (%) Vicat Setting Time: Initial Vicat (minutes) Final Vicat (minutes) Air Content (%) Compressive Strength MPa:	Limit	99.6 614 -0.01 107 211 9
C Item iD ₂ I ₂ O ₃ e ₂ O ₃ iaO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IgO IGO IGO IGO IGO IGO IGO IGO IG	Tests D	Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64 2.1 0.44 56	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m²/kg) Autoctave Expansion (%) Vicat Setting Time: Initial Vicat (minutes) Final Vicat (minutes) Air Content (%) Compressive Strength MPa 1 Day	Limit - - - - - - - - - - - - - - - - - - -	99.6 614 -0.01 107 211 9 28.7
C item iiO ₂ v _k O ₃ e ₂ O ₃ iaO AgO iO ₃ ia Eqv coss on Ignition nsoluble Residue Potential Compounds: O ₃ S O ₂ S O ₃ S O ₃ S O ₂ S O ₃ S O	Tests D	Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64 2.1 0.44 56 16	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m²/kg) Autoctave Expansion (%) Vicat Setting Time: Initial Vicat (minutes) Final Vicat (minutes) Air Content (%) Compressive Strength MPa: 1 Day 3 Day	Limit - - - - - - - - - - - - - - - - - - -	99.6 614 -0.01 107 211 9 28.7 33.9
c	Tests D	Result 20.1 4.8 3.1 62.6 1.8 3.3 0.64 2.1 0.44 56 16 7	ASTM "Standard" Requirements Physical Item Fineness: % Passing 45 µm (No. 325) Sieve (%) Blaine Fineness (m ² /kg) Autoctave Expansion (%) Vicat Setting Time: Initial Vicat (minutes) Final Vicat (minutes) Air Content (%) Compressive Strength MPa: 1 Day 3 Day 7 Day	Limit - - - - - - - - - - - - - - - - - - -	99.6 614 -0.01 107 211 9 28.7 33.9

Date

Joe Cieslik Quality Control Supervisor imi Technical Services

ACI 214/318 Strength Test Evaluation

Project Name:Mackey Arena #D6, NW Athletics Complex - Phase I, PID #08-9658Contractor:JR Kelly, Shiel SextonMix Design #:060: 6 Bag, Air, Stone, WRSpec'd Str. (fc):4000 psi

West Lafayette Concrete Plant

								28-D	av Compres	sive Strength	n, psi	
Test					Air	Concrete	7-Day Str.,				Avg	Moving
No.	Date	Slump, in	Air, %	Additive	Temp., °F	Temp., °F	psi	Cvl#1 nsi	Cyl.#2, psi	Cvl #3 nsi	Strength,	Avg
,					1011101., 1	romp., i	p0.	Chin I, boi	0)	•J	psi	of Three
1	03/30/12	6.00	5.6		48	66	3520	4460	4070		4265	
2	04/02/12	4.25	5.4		65	72	4350	4970	5050		5010	
3	04/06/12	6.00	5.8		50	71	3300	4590	4510		4550	4608
4	04/10/12	5.00	6.4		36	67	4240	4800	4580		4690	4750
5	04/11/12	5.25	6.4		28	66	4100	5040	4820		4930	4723
6	04/12/12	5.00	6.0	RF IMIXC FTE		58	3760	4380	4120		4250	4623
7	04/13/12	4.75	5.7		41	68	3950	4600	4400		4500	4560
8	05/10/12	4.50	5.1	RF	47	63	3570	4260	4400		4330	4360
9	05/10/12	5.00	5.9	CF	55	64	3430	4210	4030		4120	4317
10	05/11/12	3.50	4.0		44	64	4460	5020	4980		5000	4483
11	05/14/12	5.00	5.4	CF	57	68	3520	3990	4260		4125	4415
12	05/14/12	3.25	4.6		70	76	4780	5390	5310		5350	4825
12	05/15/12	7.00	5.2	CF	55	69	3790	4330	4590		4460	4645
13	05/16/12	4.50	4.9		66	73	4595	5270	5370		5320	5043
15	05/10/12	4.50	<u>4.9</u> 5.6	CF	60	68	3960	5110	5060		5085	4955
16	06/05/12	5.00	5.5	CF	55	69	3500	4090	3970		4030	4812
17	06/06/12	5.00	5.3	CF	54	67	4175	4800	4830	4640	4757	4624
18	06/07/12	5.00	5.0	CF	54	68	4175	4930	5540	4930	5133	4640
10				CF	60 60	71	4405	5530	5480	5250	5420	5103
20	06/08/12	5.00	4.8		A			4290	4500	4370	4387	4980
	06/09/12	5.25	5.3	CF	63	70	3795		4500	5290	4953	4980
21	06/11/12	4.75	5.0	CF FT8	71	73	4335	4810 4330	4430	5290	4955	4920
22	06/12/12 06/13/12	5.00 4.25	6.0 5.3	CF CF	66 58	70 68	3660 4240	5030	4430		4905	4746
23							3855	4360	4780		4340	4542
	06/14/12	5.25	6.5	CF OF	56 63	70 70		4360	4320	5000	4850	4698
25 26	06/15/12	4.75	4.4	CF CF	87	70	4145 3570	4740	4810	3880	4117	4436
	06/18/12	5.50	6.0					4240	5110	5250	5103	4690
27 28	06/19/12 06/20/12	3.25 4.50	4.7 4.2	CF CF	70 86	78 85	4620 4235	4950	4980	4740	4860	4693
			2	UF	77	83		5020	5060	4/40	5040	5001
29 30	06/20/12	3.75	4.2 4.6	CF	73	88	4435 3560	4140	4060	-	4100	4667
	05/21/12	5.00 4.75	2	CF	62	80	4215	5120	5070	5050	5080	4740
31	06/22/12		4.3	GF					4720	4820	4800	4660
32	06/25/12	3.50	4.5	CF	72 70	77	4130	4860	5050	5400	5373	5084
33 34	06/25/12 07/11/12	4.25	4.4 5.7	CF	69	73	4600	4580	4340	4520	4480	4884
		5.50		RF	<u>69</u> 85		3500	4580	3930	4520	4480	4628
35 36	07/16/12	4.50	6.3 6.4	RF RF	80	76 75	3500	4000	4690	4100	4030	4020
30	07/20/12	4.50	6.4 5.5	RF RF	78	82	3530	4090	4090	4310	4427	4312
37	07/25/12	2.75	3.0		83	83	4700	5510	5270	4010	5390	4698
						80		4960	4940		4950	4872
39	07/28/12	7.00	2.0		87	80	4430	5440	5340		5390	5243
40	07/31/12	4.00	4.0		82	78	3490		4000	3920	4023	4788
41	08/02/12	4.50	1.9					4150	4100	3920	4023	4700
42	08/02/12	5.00	4.5		86	75	3700	4070	1		4085	4499
43	08/03/12	5.00	4.5		73	80	4030	4700	4520	4770	4610	4239
44	08/07/12	3.50	5.5	RF	87	85	4090	5210	4680	4770	4887	4527
45	08/10/12	4.50	5.0		70	80	4480	4960	4830	5030	4940	4012
A		470	E 0		65	73	4047			+	4691	
Avera	ge	4.73	5.0	I	60	13	4047		1		1 4031	

	imi Technica ACI 214 3	Il Services Strength Analysis		
Average Strength, X No. of Tests, n	4691 psi 45		Min Strength, psi Avg Strength, psi Max Strength, psi	4023 4691 5420
Standard Deviation, s Coefficient of Variation, V	438 psi 9.3 %		Min Slump, in. Avg Slump, in. Max Slump, in.	2.75 4.73 7.00
			Min Air Content, % Avg Air Content, % Max Air Content, %	1.9 5.0 6.5
			Min Conc. Temp., °F Avg Conc. Temp., °F Max Conc. Temp., °F Min Air Temp., °F Avg Air Temp., °F Max Air Temp., °F	58 73 88 28 65 87
	imi Tech	nnical Services		
	ACI 318 Pe	rformance Approval	VALID, >15 Ti	ESTS
Modification factor for sample standard deviation: Sample standard deviation, Ss: Required average compressieve strength, f'cr: Required average compressieve strength, f'cr:	1.000 438 psi 4587 psi 4520 psi	f'cr = f 'c + 1.34Ss f'cr = f 'c + 2.33Ss - Notation:	d deviation x modification fa- 500 ressive strength of concrete	

CONCLUSION: MIX APPROVED



Quality Test Report

Plant072-Sieboldt QuarryProduct5019-#8 AP INDOTSpecification#8 IMI Spec



Sample Information

Sample No	1876076249		Split Sample	Sequence
Date Sampled	08/24/2012 09:20		Resample	Code
Sampled By	Laresa Ingram		Lot / Sublot	
Туре	Production		Quad / Quantity	
Method	Bin			
Location		Test Note		
Process				
Ledge	4-9 (short /full face)			
Other				
Weather	Sunny			
Temp	92			
화장 등 것같다.	ne Mittige za ebietati	Gradation Results		

Date Completed 08/24/2012 10:22

Tested By Laresa Ingram

Unit g	Moist Mass 7903.80	Dry Mass 7860.70	Wash Mass	Moistu 0.5		ash Loss %	Procedure	
Sieve	Mass Retained	Cum Mass Retained	Ind % Retained	% Retained	% Passing	Target	Specification	Comment
1" (25mm) 0.0	0.0	0.0	0.0	100.0		100-100	

, , ,							
3/4" (19mm)	744.2	744.2	9.5	9.5	90.5	75-95	
1/2" (12.5mm)	2926.3	3670.5	37.2	46.7	53.3 39.9-58.5\49.9	40-70	
3/8" (9.5mm)	1459.3	5129.8	18.6	65.3	34.7	20-50	
#4 (4.75mm)	2081.0	7210.8	26.5	91.7	8.3	0-15	
#8 (2.36mm)	549.6	7760.4	7.0	98.7	1.3	0-10	
#16 (1.18mm)							
#30 (0.6mm)							
#50 (0.3mm)							
#100 (0.15mm)							
#200 (75um)	59.6	7820.0	0.8	99.5	0.5	0-2.5	
Pan	40.1	7860.1	0.5	100.0	0.0		

Other Test Results

Test Name	Date	Result	Unit Target	Specification Comment
	Procedure	Lab		Tested By
Grad Loss	08/24/2012 10:22	0.008	%	-0.3-0.3
		Sieboldt Qua	arry	Laresa Ingram
Total Moisture	08/24/2012 10:22	0.55	%	
		Sieboldt Qua	arry	Laresa Ingram

aggQC

Rogers Group



Quality Test Report

Plant 0424-Morgan County Sand & Gravel Product 2001-#23 Natural Sand/#4 Structural Backfill/De-Ice Specification #23 Natural Sand/#4 Structural Backfill/De-Ice



Sample Information

Sample No	1517843815		Split Sample	Sequence
Date Sampled	11/19/2012 09:40		Resample	Code
Sampled By	Laresa Ingram		Lot / Sublot	
Туре	Production		Quad / Quantity	
Method	Stockpile			
Location	Paddle #5	Test Note		
Process				
Ledge	2:30			
Other				
Weather				
Temp				

. Gradation Results Date Completed 11/19/2012 09:40 Tested By Laresa Ingram

Unit	Moist Mass	Dry Mass	Wash Mass	Moisture %	Wash Loss %	Procedure
g	574.70	546.30		5.2		

Sieve	Mass Retained	Cum Mass Retained	Ind % Retained	% Retained	% Passing	Target	Specification	Comment
1/2" (12.5mm)	0.0	0.0	0.0	0.0	100.0		>100	
3/8" (9.5mm)	0.0	0.0	0.0	0.0	100.0		>100	
#4 (4.75mm)	5.2	5.2	1.0	1.0	99.0		95-100	
#8 (2.36mm)	90.5	95.7	16.6	17.5	82.5		80-100	
#16 (1.18mm)	105.9	201.6	19.4	36.9	63.1		50-85	
#30 (0.6mm)	124.6	326.2	22.8	59.7	40.3		25-60	
#50 (0.3mm)	162.0	488.2	29.7	89.4	10.6		5-30	
#100 (0.15mm)	48.0	536.2	8.8	98.2	1.8		0-10	
#200 (75um)	4.5	540.7	0.8	99.0	1.0	0-2.9\1.5	0-3	
Pan	4.1	544.8	0.8	100.0	0.0			

Other Test Results

Test Name	Date	Result Unit Ta	arget	Specification	Comment
	Procedure	Lab		Tested By	
FM	11/19/2012 09:40	3.03			
Grad Loss	11/19/2012 09:40	Morgan County Sand & 0 0.275 %	Gravel	Laresa Ingram	
Total Moisture	11/19/2012 09:40	Morgan County Sand & 0 5.20 %	Gravel	Laresa Ingram	
		Morgan County Sand & C	Gravel	Laresa Ingram	

aggQC

Appendix C.2

Concrete Compression Test Results



	S ering • (Inform To Buil Consulting	mation ild On • Testing	7			53 In Pl	362 W dianap none:	ional Service I est 78th Stree polis, IN 4626 (317) 876-772 I7) 876-8155	t 8 3		
Con	cret	e Field	Ren	ort						Report	No: FC:0	
Client:	SEVEN 320 GM TRAILE BEDFC	ISON ENVIF 1 DRIVE, CO ER DRD, IN 474 DFORD SPI	RONMENTA DNSTRUCT	L CC:	DAN SEKA SHANE RE		m re In th P:	ay not produc dustrie e repor SI scop	represent any other except in full s, Inc. If a non-corrected non-compliance of engagement	istopher Carson (Pro	locations and ma evations. This rep ermission by Prof s on this report, to oject, the resoluti	ort may not be essional Service the extent that
Genera Technicia Test Date Weather:	n: John	Staples 2012										
Test R _{Set}		Specimens	Ticket	Time	Time	Cubic	Slump	(in)		Air Content	Air Temp.	Concrete
		Made		Batched	Unloaded	Yards Placed			Plasticizer (in)	(%)	(°F)	Temp. (°F)
001492	1-4-C1	2	3118749	09:55	10:55	36.0	2.2	5	2.25	5.80	44	65
	ocation:	Remarks Spring 18 be Location	rm				Remar	ks				
001492		North side o	f spring 18 be	erm, elevation	n = 560.50							
Mix Da		Cumulian								D'	an Chan arth	(mai)
001492	-	Supplier Irving Materi	als Inc		Mi					4000	gn Strength	(psi)

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)		
Form No: 18971, Report No: FC:0014921-4	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

	s ing • C	Inform To Bui	nation ld On Testing)			Professional Ser 5362 West 78th Indianapolis, IN Phone: (317) 876-8 Fax: (317) 876-8	46268 6-7723 155		
Conc	rete	Field	Repo	ort				Repo	ort No: FC:	0014921-6 Issue No: 1
Client: S 3 T	SEVENS 20 GM RAILEF	SON ENVIR DRIVE, CO	ONMENTAL NSTRUCTIO	CC: D	AN SEKANC HANE REYN	-	may not represent reproduced, except Industries, Inc. If a	apply only to the spe any other locations of t in full, without writte non-compliance app ompliance impacts th gement.	or elevations. This re on permission by Pr bears on this report,	naterials noted and eport may not be ofessional Service to the extent that
	GM BED BEDFOF	FORD SPR RD, IN	NNG 18				Approved Signato Date of Issue:	ry: Christopher Carsor 11/28/2012	(Project Manager)	
General	Field	Data								
Technician:										
Test Date:		•								
Weather:	Sunny	,								
Test Res	sults									
Set No).	Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slump (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)
0014921-6	6-C1	2	3118774	08:35	09:30	9.0	4.00	5.90	31	65
Location General Loc			ce spring 18							
Set No		Location				Rem	arks			
0014921-6	6-C1	North side of	4" wear surfa	ice						
Mix Data	a									
Set No).	Supplier			Mix			D	esign Strengt	h (psi)
0014921-6	6-C1	Irving Materia	als, Inc.		908			4	000	

Notes	Remarks
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C231 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019; Slump-Flow: C1611; Mortar: C109; Flow: C1437.
Form No: 19071 Bonort No: EC:0014021 6	© 2000 2011 OESTLob by SportroOEST com

	Infor To Bu	mation ild On • Testing)			Professional Ser 5362 West 78th 3 Indianapolis, IN Phone: (317) 876 Fax: (317) 876-8	46268 6-7723 155		
Concr	ete Field	d Repo	ort				Repo	ort No: FC:	0014921-9 Issue No: 1
Client: SE 32 TR BE	EVENSON ENVI 0 GM DRIVE, Co AILER EDFORD, IN 47	RONMENTAL DNSTRUCTIO	CC: D/	AN SEKANC HANE REYN		may not represent a reproduced, except Industries, Inc. If a	apply only to the spearany other locations of in full, without writte non-compliance app mpliance impacts the gement.	or elevations. This re on permission by Pro ears on this report,	naterials noted and eport may not be ofessional Service to the extent that
	M BEDFORD SP EDFORD, IN	RING 18				Approved Signator Date of Issue:	y: Christopher Carson 12/11/2012	(Project Manager)	
General F	Field Data								
Technician:	/lelissa Vander	iberg							
	2/6/2012	U U							
Weather: C	Cloudy								
Test Res	ults								
Set No.	Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slump (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)
0014921-9-	C1 2	3118958	08:45	09:45	27.0	4.75	7.90	76	31
Location General Locat	& Remarks								
Set No.	Location				Rema	arks			
0014921-9-	C1 Station 6+5	0-7+65							
Mix Data									
Set No.	Supplier			Mix			D	esign Strengt	h (psi)
0014921-9-	C1 Irving Mater	ials, Inc.		060			40	000	

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Ma Samples: C31 (except sec. 10.1.2); Slump: C143; Air Cont (except sec. 6); Temperature: C1064; Sampling: C17; Gro Slump-Flow: C1611; Mortar: C109; Flow: C1437.	ent: C231
Form No: 18971, Report No: FC:0014921-9	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

Engineering •	.To Bui	nation Id On Testing			: 	Professional Sen 5362 West 78th \$ Indianapolis, IN Phone: (317) 876 Fax: (317) 876-8	46268 6-7723 155		
Concret	e Field	Repo	ort				Repor	rt No: FC:0	014921-11 Issue No: 1
320 GI TRAIL	NSON ENVIR M DRIVE, CO ER ORD, IN 474	NSTRUCTIC		AN SEKANO HANE REYN	NOLDS	may not represent a reproduced, except Industries, Inc. If a	apply only to the spea any other locations o in full, without writte non-compliance app ompliance impacts th gement.	or elevations. This re on permission by Pro ears on this report,	eport may not be ofessional Service to the extent that
Project: GM BE BEDF	edford Spr Ord, In	ING 18				Approved Signator Date of Issue:	y: Christopher Carson 12/12/2012	(Project Manager)	
General Fiel	d Data								
Technician: Davi									
Test Date: 12/1	00								
Weather: Clou									
Test Results	3								
Set No.	Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slump (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)
0014921-11-C1	2	3118982	08:29	09:40	9.0	3.00	5.00	35	76
Location & I									
Set No.	Location				Rema	rks			
0014921-11-C1		station 11+40-	11+98						
Mix Data									
Set No.	Supplier			Mix			D	esign Strengt	h (psi)
0014921-11-C1	Irving Materia	als, Inc.		060			40	000	

Notes	Remarks
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C231 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019; Slump-Flow: C1611; Mortar: C109; Flow: C1437.
Form No: 18071 Report No: EC:0014021-11	© 2000-2011 OEST ab by SportraOEST com

Engineering •	ToBui	nation ld On Testing				Professional Ser 5362 West 78th : Indianapolis, IN Phone: (317) 876 Fax: (317) 876-8	46268 6-7723 155		
Concret	e Field	Repc	ort				Repoi	rt No: FC:0	014921-12 Issue No: 1
320 G TRAIL	NSON ENVIR M DRIVE, CO .ER ORD, IN 474	NSTRUCTIO		AN SEKANC HANE REYN	IOLDS	may not represent a reproduced, except Industries, Inc. If a	apply only to the spea any other locations o the full, without writte non-compliance app ompliance impacts the gement.	or elevations. This re on permission by Pr ears on this report,	eport may not be ofessional Service to the extent that
Project: GM B BEDF	edford Spr Ord, in	ING 18				Approved Signator Date of Issue:	y: Christopher Carson 12/20/2012	(Project Manager)	
General Fie	ld Data								
Technician: Dav									
Test Date: 12/1									
Weather: Clou									
Test Result	S								
Set No.	Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slump (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)
0014921-12-C1	2	3119004	09:08	10:00	9.0	4.25	5.10	28	65
Location & General Location		:h							
Set No.	Location				Rema	arks			
0014921-12-C1	Tributary 2								
Mix Data									
Set No.	Supplier			Mix			D	esign Strengt	h (psi)
0014921-12-C1	Irving Materia	als, Inc.		908			40	000	

Notes	Remarks
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C231 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019; Slump-Flow: C1611; Mortar: C109; Flow: C1437.
Form No: 18071 Roport No: EC:0014021-12	

Engineer	S/ ing • (nation Id On Testing)			Professional Ser 5362 West 78th Indianapolis, IN Phone: (317) 876 Fax: (317) 876-8	46268 6-7723 155		
Conc	rete	e Fielc	Repo	ort				Repo	rt No: FC:0	014921-13 Issue No: 1
Client: S	SEVEN 320 GN FRAILE	SON ENVIR I DRIVE, CO	ONMENTAI	CC: D	AN SEKANC HANE REYN	-	may not represent a reproduced, except Industries, Inc. If a	apply only to the spe any other locations of in full, without writte non-compliance app mpliance impacts th gement.	or elevations. This re on permission by Pro ears on this report,	naterials noted and eport may not be ofessional Service to the extent that
1 1		dford Spf Rd, In	RING 18				Approved Signator Date of Issue:	y: Christopher Carsor 12/20/2012	(Project Manager)	
General	Field	Data								
Technician:										
Test Date:		/2012								
Weather:	Clear									
Test Re	sults									
Set No	Э.	Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	s Slump (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)
0014921-1	I3-C1	2	3119019	08:16	09:40	18.0	4.25	5.20	27	67
Location General Loc		emarks Bailey Branch	station 4+20	to 5+70						
Set No		Location				Rem	arks			
0014921-1	I3-C1	4+50								
Mix Data	a									
Set No		Supplier			Mix			D	esign Strengt	h (psi)
0014921-1	I3-C1	Irving Materia	als, Inc.		908			4	000	

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicate Samples: C31 (except sec. 10.1.2); Slump: C143; Ai (except sec. 6); Temperature: C1064; Sampling: C1 Slump-Flow: C1611; Mortar: C109; Flow: C1437.	ir Content: C231
Form No: 18971, Report No: FC:0014921-13	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

Engineering •	.To Bui	nation Id On Testing			:	Professional Ser 5362 West 78th 3 Indianapolis, IN Phone: (317) 876 Fax: (317) 876-8	46268 6-7723 155	-				
Concret	e Field	Repo	rt			Report No: FC:0014921-14 Issue No: 1						
Client: SEVEN 320 GI TRAIL	NSON ENVIR	ONMENTAL	CC: D	AN SEKANC HANE REYN	IOLDS	may not represent a reproduced, except Industries, Inc. If a	apply only to the spea any other locations o t in full, without writte non-compliance app ompliance impacts th gement.	r elevations. This re n permission by Pro ears on this report,	eport may not be ofessional Service to the extent that			
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 12/20/2012												
General Fiel	d Data											
Technician: Davi												
Test Date: 12/1												
Weather: Clea												
Test Results	5											
Set No.	Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slump (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)			
0014921-14-C1	2	3119044	08:25	09:20	9.0	4.50	5.10	23	64			
Location & I												
General Location:		m final layer			D							
Set No. 0014921-14-C1	Location 10' south of th	he north end o	f the berm		Rema	IIKS						
Mix Data												
Set No.	Supplier			Mix				esign Strengtl	h (nsi)			
0014921-14-C1	Irving Materia	als, Inc.		908				000				

Notes	Remarks
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C231 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019; Slump-Flow: C1611; Mortar: C109; Flow: C1437.
Form No: 18071 Roport No: FC:0014021-14	

		ormation Build On Ing • Testing	7			53 In Pl	362 W dianaj none:	ional Service I 'est 78th Stree' polis, IN 4626 (317) 876-772 17) 876-8155	t 8 3			
Cond	crete Fie	eld Repo	ort				Report No: FC:0014921-16 Issue No: 1					
	SEVENSON EN 320 GM DRIVE TRAILER BEDFORD, IN	, CONSTRUCT		DAN SEKA SHANE RE		m re In th	ay not produc dustrie e repoi	represent any oth ced, except in full es, Inc. If a non-co	her loo , witho omplia nce in	cations or ele out written pe	locations and ma evations. This rep ermission by Profe s on this report, to roject, the resolution	ort may not be essional Service the extent that
	GM BEDFORD BEDFORD, IN	SPRING 18						ved Signatory: Chri of Issue: 1/4/			Dject Manager)	
Techniciar	I Field Data Dohn Staples 12/18/2012 Overcast											
Test Re	esults											
Set N			Time Batched	Time Unloaded	Cubic Yards Placed	Slump	(in)	Slump w/ Plasticizer (in)		Content (%)	Air Temp. (°F)	Concrete Temp. (°F)
0014921	-16-C1 2	3119101	08:55	09:38	36.0			6.00		5.70	38	67
		Branch				Remar	ks					
Mix Dat	ta											
Set N				Mi						1	gn Strength	(psi)
0014921	-16-C1 Irvina M	aterials, Inc.		90	NG S					4000)	

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C23 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019; Slump-Flow: C1611; Mortar: C109; Flow: C1437.	
Form No: 18971, Report No: FC:0014921-16	© 2000-2011 QESTLab by SpectraQEST.com Page	e 1 of 1

Engineering •	Information To Build On Engineering • Consulting • Testing								Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155					
Concret	e Field Rep	ort				Report No: FC:0014921-19 Issue No: 1								
SERVI 2749 L	ISON ENVIRONMENTA CE OCKPORT ROAD RA FALLS, NY 14305	L CC:	DAN SEKAI SHANE RE			may not r reproduce Industries the repor	epresent any oth ed, except in full, s, Inc. If a non-co	ner locations or el without written p impliance appear ince impacts the p	c locations and ma evations. This rep ermission by Prof s on this report, to roject, the resoluti	ort may not be essional Service the extent that				
	DFORD SPRING 18 DRD, IN					Approve Date o	ed Signatory: Chris of Issue: 1/9/2	stopher Carson (Pr 2013	oject Manager)					
General Fiel	d Data													
Technician: David														
Test Date: 1/8/2	013													
Weather: Clear	r													
Test Results														
Set No.	Specimens Ticket Made	Time Batched	Time Unloaded	Cubic Yards Placed	Slum	זף (in)	Slump w/ Plasticizer (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)				
0014921-19-C1	2 3119134	09:15	11:30	5.0			7.00	3.90	40	71				
Location & F General Location: Set No.					Rema	arks								
0014921-19-C1	Trib #3 station 11+40 to 1	0+25												
Mix Data														
Set No.	Supplier		Mix					Des	ign Strength	(psi)				
0014921-19-C1	Irving Materials, Inc.		908	}				400	0					

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Samples: C31 (except sec. 10.1.2); Slump: C143; Air C (except sec. 6); Temperature: C1064; Sampling: C17; C Slump-Flow: C1611; Mortar: C109; Flow: C1437.	ontent: C231
Form No: 18971, Report No: FC:0014921-19	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 2

	Information To Build On • Consulting • Testing	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155		
Concre	ete Field Repo	ort		Report No: FC:0014921-20 Issue No: 1
SE 274	VENSON ENVIRONMENTA RVICE 19 LOCKPORT ROAD IGARA FALLS, NY 14305		EKANOVICH REYNOLDS	These test results apply only to the specific locations and materials noted an may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.
1 1	I BEDFORD SPRING 18 DFORD, IN			Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/11/2013
General F	ield Data			
Technician: D				
Test Date: 1,	/9/2013			
Weather: C	loudy			
Test Resu	ılts			
Set No.	Specimens Ticket Made	Time Time Batched Unloade	Cubic ed Yards Placed	Slump (in) Slump w/ Air Content Air Temp. Concrete Plasticizer (%) (°F) Temp. (°F (in)
0014921-20-	C1 2 3119145	08:53 09:40	5.0	7.00 7.00 4.00 40 65
	& Remarks on: Baileys Branch Location C1 Station 4+50 to 3+88			Remarks
Mix Data				
Set No.	Supplier		Mix	Design Strength (psi)
0014921-20-	C1 Irving Materials, Inc.		908	4000

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated Samples: C31 (except sec. 10.1.2); Slump: C143; Air ((except sec. 6); Temperature: C1064; Sampling: C17; Slump-Flow: C1611; Mortar: C109; Flow: C1437.	Content: C231
Form No: 18971, Report No: FC:0014921-20	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 2

	S ering • C	Inform To Buil	nation Id On Testing]				5362 W Indianar Phone:	ional Service Ii est 78th Street polis, IN 4626 (317) 876-772 7) 876-8155	t B	, Inc.		
Cond	crete	e Fielc	Repo	ort				Report No: FC:0014921-23					
	SERVIO 2749 LO	SON ENVIR CE DCKPORT R RA FALLS, 1	ROAD	L CC:	DAN SEKA SHANE RE			may not reproduc Industries the repor	represent any oth ed, except in full s, Inc. If a non-co	ner location , without without without and ompliance ance impact	is or ele ritten pe appears	locations and ma evations. This rep ermission by Profe s on this report, to roject, the resoluti	ort may not be essional Service the extent that
1 1	GM BEI BEDFO	DFORD SPF RD, IN	RING 18						ed Signatory: Chri of Issue: 1/24		Son (Pro	2000 Diject Manager)	
Genera	al Field	Data											
Techniciar													
Test Date:	1/15/2	2013											
Weather:	Partly	Cloudy											
Test Re	esults												
Set N		Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slun	חף (in)	Slump w/ Plasticizer (in)	Air Coı (%		Air Temp. (°F)	Concrete Temp. (°F)
0014921	-23-C1	2	3119177	09:23	10:27	9.0			2.00	2.5	0	31	61
	ocation: No.	emarks Trib 3, station Location upstream qua	•	ayer			Rema	arks					
Mix Dat	ta												
Set N	-	Supplier			Mi							gn Strength	(psi)
0014921	-23-C1	Irving Materia	als, Inc.		90)7					4000)	

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C Slump-Flow: C1611; Mortar: C109; Flow: C1437.	C231
Form No: 18971, Report No: FC:0014921-23	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

	Informa To Build	On	5362 \ Indian Phone	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155							
Conc	rete Field R	leport				Report No: FC:0014921-24					
	SEVENSON ENVIRONN SERVICE 2749 LOCKPORT ROAL NIAGARA FALLS, NY)	DAN SEKA SHANE RE		may no reprodu Industr the rep	t represent any ot uced, except in full es, Inc. If a non-c	only to the specific her locations or ele , without written pe ompliance appears nce impacts the pr t.	evations. This rep ermission by Prof s on this report, to	oort may not be essional Service the extent that		
	GM BEDFORD SPRING BEDFORD, IN	18				oved Signatory: Chr e of Issue: 1/24	istopher Carson (Pro 4/2013	Dject Manager)			
Technician	I Field Data :: John Staples 1/16/2013 Sunny										
Test Re	eulte										
Set N		cket Time Batched	Time Unloaded	Cubic Yards Placed	Slump (in	Slump w/ Plasticizer (in)	Air Content (%)	Air Temp. (°F)	Concrete Temp. (°F)		
0014921-	-24-C1 2 311	9183 10:30	11:10	27.0		3.00	5.80	34	65		
					Remarks						
Mix Dat	ta										
Set N	· · · · · · · · · · · · · · · · · · ·		Mi					gn Strength	(psi)		
0014921-	-24-C1 Irving Materials. Ir	IC.	90	8			4000)			

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Maki Samples: C31 (except sec. 10.1.2); Slump: C143; Air Conter (except sec. 6); Temperature: C1064; Sampling: C17; Grout Slump-Flow: C1611; Mortar: C109; Flow: C1437.	nt: C231
Form No: 18971, Report No: FC:0014921-24	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 2

	Si ering • C		nation Id On Testing]		Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155								
Cond	crete	e Fielc	Repo	ort				Report No: FC:0014921-25 Issue No: 1						
Client:	SERVIC 2749 LC	SON ENVIR CE DCKPORT R RA FALLS, 1	ROAD	L CC:	DAN SEKA SHANE RE			These test results apply only to the specific locations and materials not may not represent any other locations or elevations. This report may no reproduced, except in full, without written permission by Professional S Industries, Inc. If a non-compliance appears on this report, to the exter the reported non-compliance impacts the project, the resolution is outs PSI scope of engagement.						
Project:	GM BEI BEDFO	DFORD SPF RD, IN	NG 18						ed Signatory: Chri of Issue: 1/24			y		
Genera Technicia Test Date: Weather:	n: John	Staples 2013												
Test Re	esults													
Set I		Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slun	np (in)	Slump w/ Plasticizer (in)	Air	Content (%)	Air Temp. (°F)	Concrete Temp. (°F)	
0014921	-25-C1	2	3119196	10:30	11:00	36.0			3.00		5.80	34	70	
	ocation: No.	emarks Bailey's Brand Location Station 7+48					Rem	arks						
Mix Da	ta													
Set I	-	Supplier			Mi							gn Strength	(psi)	
0014921	-25-C1	Irving Materia	als, Inc.		90	8					4000			

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: M Samples: C31 (except sec. 10.1.2); Slump: C143; Air Cor (except sec. 6); Temperature: C1064; Sampling: C17; Gro Slump-Flow: C1611; Mortar: C109; Flow: C1437.	ntent: C231
Form No: 18971, Report No: FC:0014921-25	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 7

Engineer	Information To Build On ing • Consulting • Testing		Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155	
Conc	rete Field Rep	ort		Report No: FC:0014921-26 Issue No: 1
2	SEVENSON ENVIRONMENT SERVICE 1749 LOCKPORT ROAD NAGARA FALLS, NY 14305	SHAN	SEKANOVICH E REYNOLDS	may not represent any other locations of elevations. This report may not be
	GM BEDFORD SPRING 18 BEDFORD, IN			Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/29/2013
Technician:	Field Data John Staples 1/18/2013 Sunny			
Test Res Set No		Time Tim Batched Unloa		Slump (in) Slump w/ Air Content Air Temp. Concrete Plasticizer (%) (°F) Temp. (°F (in)
0014921-2	26-C1 2 3119209	09:37 10:1	9 36.0	4.00 5.50 27 67
		4+65		Remarks
Mix Data Set No 0014921-2	o. Supplier		Mix 908	Design Strength (psi)

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C2 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C10 Slump-Flow: C1611; Mortar: C109; Flow: C1437.	
Form No: 18971, Report No: FC:0014921-26	© 2000-2011 QESTLab by SpectraQEST.com Page	ge 1 of

	S ering • C	·	nation Id On Testing]		Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155								
Cond	crete	e Fielc	Repo	ort				Report No: FC:0014921-27 Issue No: 1						
Client:	SERVIC 2749 LC	SON ENVIR CE DCKPORT R RA FALLS,	ROAD	L CC:	DAN SEKA SHANE RE			These test results apply only to the specific locations and materials normay not represent any other locations or elevations. This report may reproduced, except in full, without written permission by Professional Industries, Inc. If a non-compliance appears on this report, to the exter the reported non-compliance impacts the project, the resolution is outs PSI scope of engagement.						
Project:	GM BEI BEDFO	DFORD SPF RD, IN	RING 18						ed Signatory: Chri of Issue: 1/29			ject Manager)		
Genera	al Field	Data												
Technicia	n: John	Staples												
Test Date: Weather:	: 1/19/2 Sunn													
Test Re	esults	-												
Set 1		Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slun	np (in)	Slump w/ Plasticizer (in)		Content (%)	Air Temp. (°F)	Concrete Temp. (°F)	
0014921	-27-C1	2	3119217	09:00	09:52	18.0			3.00		5.70	41	70	
	ocation: No.	emarks Bailey's Bran Location Station 4+83	ch Area thru Station !	5+55			Rem	arks						
Mix Da	ta													
Set I	-	Supplier			Mi							gn Strength	(psi)	
0014921	-27-C1	Irving Materia	als, Inc.		PS	SI					4000			

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C2 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C10 Slump-Flow: C1611; Mortar: C109; Flow: C1437.	
Form No: 18971, Report No: FC:0014921-27	© 2000-2011 QESTLab by SpectraQEST.com Page	ige 1 of '

	si ering • (nation Id On Testing	7		Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155								
Con	crete	e Fielc	Repo	ort				Report No: FC:0014921-29 Issue No: 1						
Client:	SERVI0 2749 L0	ISON ENVIR CE OCKPORT R RA FALLS, 1	OAD	L CC:	DAN SEKA SHANE RE			These test results apply only to the specific locations and materials may not represent any other locations or elevations. This report mareproduced, except in full, without written permission by Profession Industries, Inc. If a non-compliance appears on this report, to the e the reported non-compliance impacts the project, the resolution is PSI scope of engagement.						
Project:	GM BE BEDFC	DFORD SPF DRD, IN	RING 18						ed Signatory: Chri of Issue: 1/29			vject Manager)		
Genera Technicia Test Date: Weather:	in: John	Staples 2013												
Test R	esults													
Set		Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slun	np (in)	Slump w/ Plasticizer (in)		Content (%)	Air Temp. (°F)	Concrete Temp. (°F)	
0014921	1-29-C1	2	3119226	10:45	11:35	27.0			4.00		5.80	19	67	
	ocation: No.	Cemarks Baileys Brand Location Station 0+00)+60			Rema	arks						
Mix Da	ata													
Set	-	Supplier			Mi						1	gn Strength	(psi)	
0014921	1-29-C1	Irving Materia	als. Inc.		PS	SI					4000			

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: M Samples: C31 (except sec. 10.1.2); Slump: C143; Air Con (except sec. 6); Temperature: C1064; Sampling: C17; Gro Slump-Flow: C1611; Mortar: C109; Flow: C1437.	tent: C231
Form No: 18971, Report No: FC:0014921-29	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 2

		rmation uild On g•Testing	7	530 Ind Ph	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155								
Conc	rete Fie	ld Rep	ort				Report No: FC:0014921-30						
	SEVENSON EN SERVICE 2749 LOCKPOR NIAGARA FALLS	r ROAD	L CC:	DAN SEKA SHANE RE		ma rep Ind the	These test results apply only to the specific locations and materials no may not represent any other locations or elevations. This report may n reproduced, except in full, without written permission by Professional S Industries, Inc. If a non-compliance appears on this report, to the exter the reported non-compliance impacts the project, the resolution is outs PSI scope of engagement.						
	GM BEDFORD S BEDFORD, IN	PRING 18					Approved Signatory: 0 Date of Issue: 1			oject Manager)			
Technician	I Field Data Subhn Staples 1/24/2013 Sunny												
Test Re	esults												
Set N		is Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slump	(in) Slump v Plasticiz (in)		r Content (%)	Air Temp. (°F)	Concrete Temp. (°F)		
0014921-	-30-C1 2	3119234	10:35	11:30	27.0		4.00		5.20	20	68		
		anch				Remark	S						
Mix Dat	a												
Set N				Mi						gn Strength	(psi)		
0014921-	-30-C1 Irving Mat	erials, Inc.		91	7				4000)			

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C2 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C10 Slump-Flow: C1611; Mortar: C109; Flow: C1437.	
Form No: 18971, Report No: FC:0014921-30	© 2000-2011 QESTLab by SpectraQEST.com Page	ige 1 of

	Si ering • C		nation ld On Testing]	53 Ind Př	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155								
Cond	crete	e Field	Repo	ort				Report No: FC:0014921-32 Issue No: 1						
Client:	SERVIO 2749 LO	SON ENVIR CE DCKPORT R RA FALLS, 1	OAD	L CC:	DAN SEK/ SHANE RI		ma re Ine the	These test results apply only to the specific locations and materials may not represent any other locations or elevations. This report ma reproduced, except in full, without written permission by Profession. Industries, Inc. If a non-compliance appears on this report, to the ext the reported non-compliance impacts the project, the resolution is or PSI scope of engagement.						
Project:	GM BEI BEDFO	DFORD SPR RD, IN	RING 18						red Signatory: Chri of Issue: 1/30			Dject Manager)		
Genera Technician Test Date: Weather:	n: John	Staples 2013												
Test Re	esults													
Set I		Specimens Made	Ticket	Time Batched	Time Unloaded	Cubic Yards Placed	Slump	(in)	Slump w/ Plasticizer (in)		Content (%)	Air Temp. (°F)	Concrete Temp. (°F)	
0014921	-32-C1	2	3119245	09:40	10:30	36.0			3.00		5.00	61	74	
	ocation: No.	Cemarks Bailey's Brand Location Station 0+98					Remark	٢S						
Mix Da	ita													
Set I	No.	Supplier			М	ix					Desi	gn Strength	(psi)	
0014921	-32-C1	Irving Materia	als, Inc.		06	60 4000 PSI					4000)		

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C237 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019 Slump-Flow: C1611; Mortar: C109; Flow: C1437.	
Form No: 18971, Report No: FC:0014921-32	© 2000-2011 QESTLab by SpectraQEST.com Page	e 1 of 1

Engineering •	Information To Build On Consulting • Testing			Professional Service Indu 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155			
Concrete	e Field Repo	ort			Report No		14921-37 ssue No: 1
Client: SEVEN SERVIO 2749 LO NIAGA	ISON ENVIRONMENTAL CE OCKPORT ROAD RA FALLS, NY 14305 DFORD SPRING 18			Approved Signatory: Alex Sta	locations or elevat thout written permin pliance appears on impacts the project upper location of the project perminent N	tions. This rep ission by Profe this report, to ct, the resoluti	ort may not be essional Service the extent that
				Date of Issue: 2/13/20	013		
General Field Technician: John Test Date: 2/5/2 Weather: Over	Staples 013						
Test Results							
Set No.	Specimens Ticket Made	Batched Unloaded	Cubic Slun Yards Placed	np (in) Slump w/ A Plasticizer (in)	ir Content A (%)	vir Temp. (°F)	Concrete Temp. (°F)
0014921-37-C1	2 3119261	09:20 10:10	10.0	5.00	5.80	32	65
Location & F General Location: Set No. 0014921-37-C1	Cemarks Spring 18, access road Location Station 20+00 thru station 2	20+65	Rem	arks			
Mix Data							
Set No.	Supplier	Mix			Design	Strength	(psi)

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indica Samples: C31 (except sec. 10.1.2); Slump: C143; (except sec. 6); Temperature: C1064; Sampling: C Slump-Flow: C1611; Mortar: C109; Flow: C1437.	Air Content: C231 C17; Grout: C1019;
Form No: 18971, Report No: FC:0014921-37	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of

Report No: FC:0014921-38 Issue No: 1 Concrete Field Report Cient: SEVENSON ENVIRONMENTAL SERVICE 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305 C: DAN SEKANOVICH SHANE REYNOLDS These test results and yonly to the specific locations or elevations. This report may not be reported, accept in full, whole writer points provide the elevations or elevations. This report may not be reported, accept in full, whole writer points the project, the results and yonly to the specific hore appears on this report. The extent that the report appears on this report. The extent th		Information To Build On Consulting • Testing	7				5362 We Indianap Phone: (onal Service In est 78th Street polis, IN 4626 (317) 876-772 7) 876-8155	t 8 3			
Chiefini Serverson Environmentation of elevations or elevatity or elevatern that elevations or elevations or elevations or el	Concret	e Field Repo	ort						Repor	t No:		
BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager) Date of Issue: 2/20/2013 General Field Data Technician: John Staples Test Date: 2/6/2013 Weather: Overcast Test Results Specimens Ticket Time Batched Unloaded Unloaded Vards Plasticizer (%) (°F) 0014921-38-C1 2 3119278 09:45 Outer of Issue: 2/20/2013 Unloaded Cubic Slump (in) Slump w/ Air Content Air Temp. Concrete Plasticizer (%) (°F) Temp. (°F) 0014921-38-C1 2 Station 2+45 Remarks General Location: Baileys Branch Set No. Location Remarks General Location: Baileys Branch Set No. Location 2+45 thru station 2+95 Mix Design Strength (psi)	SERVI 2749 L NIAGA	CE OCKPORT ROAD RA FALLS, NY 14305	L CC:				may not r reproduce Industries the report	represent any oth ed, except in full s, Inc. If a non-co ted non-complian e of engagemen	ner locations of , without writter ompliance appender ince impacts the t.	elevation permiss ars on the project,	ns. This rep sion by Profe is report, to the resoluti	ort may not be essional Service the extent that
Technician: John Staples Test Date: 2/6/2013 Weather: Overcast Test Results Set No. Specimens Made Time Batched Time Unloaded Slump (in) Slump w/ Air Content Air Temp. (°F) Concrete Temp. (°F) 0014921-38-C1 2 3119278 09:45 10:24 36.0 3.50 6.00 35 65 Location & Remarks General Location: Baileys Branch Remarks Set No. Location 2+45 thru station 2+95 Mix Design Strength (psi)								ed Signatory: Alex	Stanley (Depar)
Test Date: 2/6/2013 Weather: Overcast Test Results Time Batched Time Batched Cubic Yards Placed Slump (in) Slump w/ Air Content Air Temp. (°F) Concrete Temp. (°F) 0014921-38-C1 2 3119278 09:45 10:24 36.0 3.50 6.00 35 65 Location & Remarks General Location: Baileys Branch Remarks Temp (°F) 0014921-38-C1 Station 2+45 thru station 2+95 10:24 36.0 0 3.50 6.00 35 65 Made Remarks General Location: Baileys Branch Set No. Location 2+45 thru station 2+95 10:24 36.0 0 3.50 6.00 35 65 Mix Design Strength (psi)	General Fiel	d Data										
Weather: Overcast Test Results Set No. Specimens Made Ticket Time Batched Clubic Yards Placed Slump (in) Plasticizer (in) Air Content Air Temp. Concrete Temp. (°F) Concrete Temp. (°F) 0014921-38-C1 2 3119278 09:45 10:24 36.0 3.50 6.00 35 65 Location & Remarks General Location: Baileys Branch 6.00 35 65 Mix Remarks 0014921-38-C1 Station 2+45 thru station 2+95 <td>Technician: John</td> <td>Staples</td> <td></td>	Technician: John	Staples										
Test Results Set No. Specimens Made Ticket Batched Time Batched Time Unloaded Cubic Yards Placed Slump (in) Plasticizer (in) Slump w/ Plasticizer (in) Air Content (%) Air Temp. (°F) Concrete Temp. (°F) 0014921-38-C1 2 3119278 09:45 10:24 36.0 3.50 6.00 35 65 Location & Remarks General Location: Baileys Branch Set No. Location 2+45 thru station 2+95 Mix Data Set No. Supplier Mix Design Strength (psi)	Test Date: 2/6/2	013										
Set No.Specimens MadeTicket BatchedTime BatchedTime UnloadedCubic Yards PlacedSlump (in)Slump w/ Air Content Air Content Air Content (%)Air Temp. (°F)Concrete Temp. (°F)0014921-38-C12311927809:4510:2436.03.506.003565Location & RemarksGeneral Location:Baileys BranchVerticationRemarksVerticationVerticationVerticationSet No.LocationLocation 2+45 thru station 2+95VerticationNemarksVerticationVerticationMixDesign Strength (psi)	Weather: Over	cast										
Set No.Specimens MadeTicket BatchedTime BatchedTime UnloadedCubic Yards PlacedSlump (in)Slump w/ Air Content Air Content Air Content (%)Air Temp. (°F)Concrete Temp. (°F)0014921-38-C12311927809:4510:2436.03.506.003565Location & RemarksGeneral Location:Baileys BranchVerticationRemarksVerticationVerticationVerticationSet No.LocationLocation 2+45 thru station 2+95VerticationNemarksVerticationVerticationMixDesign Strength (psi)	Test Results											
Location & Remarks General Location: Baileys Branch Set No. Location No. Remarks		Specimens Ticket			Yards	Slur	np (in)	Plasticizer		nt Air		
General Location: Baileys Branch Set No. Location Remarks 0014921-38-C1 Station 2+45 thru station 2+95 Image: Comparison of the station 2+95 Mix Data Supplier Mix Design Strength (psi)	0014921-38-C1	2 3119278	09:45	10:24	36.0			3.50	6.00		35	65
Mix Data Set No. Supplier Mix Design Strength (psi)	General Location: Set No.	Baileys Branch Location	2+05			Rem	arks					
Set No. Supplier Mix Design Strength (psi)												
		Supplier		N.4:-					D	aian C	trop oth	(noi)
	0014921-38-C1	Irving Materials, Inc.		917	-					- U	sirength	(psi)

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicar Samples: C31 (except sec. 10.1.2); Slump: C143; <i>J</i> (except sec. 6); Temperature: C1064; Sampling: C Slump-Flow: C1611; Mortar: C109; Flow: C1437.	Air Content: C231
Form No: 18971, Report No: FC:0014921-38	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

	Information To Build On	ı		Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155	
Conc	rete Field Rep	ort		Report No: FC:0014921-	
Client: S 2 N Project: C	SEVENSON ENVIRONMENT SERVICE 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305 GM BEDFORD SPRING 18 BEDFORD, IN	AL CC: DAN S SHANE	EKANOVICH REYNOLDS	These test results apply only to the specific locations and materials noted may not represent any other locations or elevations. This report may not reproduced, except in full, without written permission by Professional Ser Industries, Inc. If a non-compliance appears on this report, to the extent t the reported non-compliance impacts the project, the resolution is outside PSI scope of engagement. Approved Signatory: Alex Stanley (Department Manager)	d and be rvice that
				Date of Issue: 2/20/2013	
General	Field Data				
Technician:	John Staples				
Test Date:	2/7/2013				
Weather:	Sunny				
Test Res	sults				
Set No		Time Time Batched Unload		Slump (in) Slump w/ Air Content Air Temp. Concre Plasticizer (%) (°F) Temp. (in)	
0014921-3	39-C1 2 3119294	09:45 10:40	36.0	3.00 6.00 41 65	
		2+55		Remarks	
Mix Data	a				
Set No			Mix	Design Strength (psi)	
0014921-3	39-C1 Irving Materials, Inc.		918	4000	

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicar Samples: C31 (except sec. 10.1.2); Slump: C143; <i>J</i> (except sec. 6); Temperature: C1064; Sampling: C Slump-Flow: C1611; Mortar: C109; Flow: C1437.	Air Content: C231
Form No: 18971, Report No: FC:0014921-39	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

Engineering • 0	Information To Build On Consulting • Testing					5362 We Indianap Phone: (onal Service I est 78th Stree olis, IN 4626 317) 876-772 7) 876-8155	t 8 3				
Concrete	e Field Repo	ort						Re	eport	No:		14921-40 ssue No: 1
Client: SEVEN SERVIO 2749 LO NIAGA	ISON ENVIRONMENTAL CE OCKPORT ROAD RA FALLS, NY 14305 DFORD SPRING 18		DAN SEKAI SHANE RE			may not r reproduce Industries the report	epresent any ot ed, except in full s, Inc. If a non-co	her loca , withou ompliane nce imp t.	tions or e t written p ce appear acts the p	levation permissi rs on thi project,	ns. This rep ion by Prof is report, to the resolut	terials noted and tort may not be essional Service the extent that ion is outside the
							ed Signatory: Alex of Issue: 2/20		(Departm	ent Man	ager)	
General Field Technician: John Test Date: 2/8/2 Weather: Over	Staples 013											
Test Results												
Set No.	Specimens Ticket Made	Time Batched	Time Unloaded	Cubic Yards Placed	Slur	np (in)	Slump w/ Plasticizer (in)		Conten (%)		Temp. (°F)	Concrete Temp. (°F)
0014921-40-C1	2 3119314	09:00	09:48	18.0			3.00	4	4.70		35	65
Location & F General Location: Set No. 0014921-40-C1	Cemarks Spring 18 Acess Road Location Station 21+40 thru station 2	21+98			Rem	arks						
Mix Data												
Set No. 0014921-40-C1	Supplier Irving Materials, Inc.		Mix 917						Des 400	0	trength	(psi)

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C231 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019; Slump-Flow: C1611; Mortar: C109; Flow: C1437.	
Form No: 18971, Report No: FC:0014921-40	© 2000-2011 QESTLab by SpectraQEST.com Page 1	1 of '

	Information To Build On • Consulting • Testing	7				5362 We Indianap Phone: (onal Service Ir est 78th Street oolis, IN 46268 (317) 876-7723 7) 876-8155	t 8 3			
Concre	ete Field Rep	ort						Rep	ort N	o: FC:00 ا	14921-41 ssue No: 1
Client: SEV SEF 274: NIA	ZENSON ENVIRONMENTA AVICE DEOCKPORT ROAD GARA FALLS, NY 14305 BEDFORD SPRING 18 DFORD, IN		DAN SEKA SHANE RE			may not r reproduce Industries the report PSI scope	epresent any oth ed, except in full, s, Inc. If a non-co	without write mpliance a nee impacts t. Stanley (De	s or ele tten pe opears the pro	locations and ma vations. This rep rmission by Prof on this report, to oject, the resoluti	aterials noted and port may not be essional Service
General Fi Technician: Jo Test Date: 2/ Weather: O	hn Staples										
Test Resu Set No.	ts Specimens Ticket Made	Time Batched	Time Unloaded	Cubic Yards Placed	Slur	mp (in)	Slump w/ Plasticizer (in)	Air Con (%)	tent	Air Temp. (°F)	Concrete Temp. (°F)
0014921-41-0	1 2 3119348	09:50	10:27	45.0			3.50	5.30)	32	67
Location & General Location Set No. 0014921-41-0	on: Baileys Branch Location	6+70			Rem	arks					
Mix Data Set No. 0014921-41-0	Supplier 1 Irving Materials, Inc.		Mi× 918	-				1	Desią 4000	gn Strength	(psi)

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated Samples: C31 (except sec. 10.1.2); Slump: C143; Air (except sec. 6); Temperature: C1064; Sampling: C17 Slump-Flow: C1611; Mortar: C109; Flow: C1437.	Content: C231
Form No: 18971, Report No: FC:0014921-41	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

Engineering	Information To Build On Consulting • Testing	7				5362 We Indianap Phone: (onal Service In est 78th Street polis, IN 4626 (317) 876-772 7) 876-8155	3			
Concre	te Field Repo	ort						Rep	ort N	00: FC:00 ا	14921-42 ssue No: 1
Client: SEVI SER 2749 NIAG Project: GM E	ENSON ENVIRONMENTA		DAN SEKA SHANE RE			may not r reproduce Industries the repor PSI scop	represent any oth ed, except in full s, Inc. If a non-complian e of engagemen	ter location without wr ompliance a nce impacts t.	s or ele itten pe ppears the pro	vations. This rep rmission by Prof on this report, to oject, the resolut	essional Service
						Approve Date of	ed Signatory: Alex of Issue: 2/20	Stanley (De)/2013	partmer	nt Manager)	
General Fie Technician: Joh Test Date: 2/1 Weather: Pa	in Staples										
Test Result Set No.	S Specimens Ticket Made	Time Batched	Time Unloaded	Cubic Yards Placed	Slur	np (in)	Slump w/ Plasticizer (in)	Air Cor (%)		Air Temp. (°F)	Concrete Temp. (°F)
0014921-42-C	2 3119368	10:05	10:52	54.0			3.50	5.80)	36	70
Location & General Location Set No. 0014921-42-C ²	n: Baileys Branch Location	6+70			Rem	arks					
Mix Data Set No. 0014921-42-C ²	Supplier Irving Materials, Inc.		Mi> 918	-					Desig 4000	gn Strength	(psi)

Notes	Remarks	
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indic Samples: C31 (except sec. 10.1.2); Slump: C143 (except sec. 6); Temperature: C1064; Sampling: C Slump-Flow: C1611; Mortar: C109; Flow: C1437.	; Air Content: C231 C17; Grout: C1019;
Form No: 18971, Report No: FC:0014921-42	© 2000-2011 QESTLab by SpectraQEST.com	Page 1 of 1

	Information To Build On g • Consulting • Testing		Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155				
Concr	ete Field Repo	Report No: FC:0014921-43 Issue No: 1					
Client: SE SE 274 NIA Project: GM	VENSON ENVIRONMENTA RVICE 49 LOCKPORT ROAD AGARA FALLS, NY 14305 M BEDFORD SPRING 18 DFORD, IN		These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement. Approved Signatory: Alex Stanley (Department Manager) Date of Issue: 2/20/2013				
Test Resu Set No.	JIts Specimens Ticket Made	Time Time Cubic Batched Unloaded Yards Placed	Slump (in) Slump w/ Air Content Air Temp. Concrete Plasticizer (%) (°F) Temp. (°F) (in)				
0014921-43-	C1 2 3119396	11:00 11:34 45.0	3.50 5.70 40 70				
	& Remarks ion: Baileys Branch Location C1 Station 5+40 thru station 6		Remarks				
Mix Data Set No. 0014921-43-	Supplier C1 Irving Materials, Inc.	Mix 918	Design Strength (psi) 4000				

Notes	Remarks
Sampled from Revolving Drum Truck Mixer (ASTM C 172, 5.2.3)	Applicable ASTM standards unless otherwise indicated: Making Samples: C31 (except sec. 10.1.2); Slump: C143; Air Content: C231 (except sec. 6); Temperature: C1064; Sampling: C17; Grout: C1019; Slump-Flow: C1611; Mortar: C109; Flow: C1437.
Form No: 18071 Report No: EC:0014021-43	© 2000, 2011 OESTLab by SportraOEST.com

Engineering •	.To Bu	mati ild C • Testi	m				5362 Wes Indianapol				
Concrete	e Test	Re	port					Rep	ort No: CO	ON:001	14921-4-C1 Issue No: 3
Client: SEVENSON ENVIRONMENTAL 320 GM DRIVE, CONSTRUCTION TRAILER BEDFORD, IN 47421						These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.					
Project: GM BE BEDFC	DFORD SP)RD, IN	RING 1	8					Signatory: Christop Issue: 12/11/2		ct Manager)	
Mix Data											
Mix Data Submitted Supplier Plant	d By		Materials, I Materials, I		С	Material ement (lb) ly Ash (lb)		Source	A	mount 564	Moisture (%) N/A N/A
Mix Identification Specified Design S Design Unit Weigh Cement Factor (Sa	t (pcf)	060 4000	at age	28 days	Fir Adı	arse Agg (lb ne Agg (lb) mix Agg (lb) Vater (gal)				1800 1340 12.0 226.0	N/A N/A
Details of Sa	mple										
Date Sampled General Location Sample Location Curing Method	11/9/2012 Spring 18 I North side	perm of spring	e Received 18 berm, el aboratory Ci	11/12/2013 evation = 560	Slur	mp w/ plasti	ſemp (°F)	ASTM C 143 ASTM C 1064	Measured 2.25 2.25 44 65	Specif	ied
Field Sample No	Three day		d Cure Tem			Air Co	ntent (%) ight (pcf)	ASTM C 1084 ASTM C 231 ASTM C 138	5.80		
Contractor Truck No. Sampled By	Sevenson 476 John Stap	Ticl	mental ket No.	3118749			Size (yd³) Ided (gal)	Before After	9		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa V Sunny		erg Placed	36.0		Time	Batched Sampled ne Placed ck (mins)		09:55 10:57 10:55 60		
Compressive	e Streng	th of (Concret	e Cylind	ers					A	STM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf				Required Strength (psi)
0014921-4-C1\1	12/07/12	28	4.00	8.00	12.57		96030	2	7640		4000

Average 28 Day Compressive Strength (psi) 7640

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-4-C1 © 2000-2011 QESTLa	b by SpectraQEST.com Page 1 of 1

Engineering • 0	Info To Bu	ild (Dn /				5362 West Indianapol			0014921-6-C1
Concrete	e Tes ⁻	t Re	port					Кер	SIT NO. CON	Issue No: 2
Client: SEVEN 320 GM TRAILE	ISON ENVI 1 DRIVE, C	RONME	• ENTAL	CC: DAN SHAN	SEKANO\ IE REYNO		may not rep reproduced, Industries, In the reported	resent any other lo except in full, with nc. If a non-compli	ocations or elevations nout written permission ance appears on this	s and materials noted and This report may not be n by Professional Service report, to the extent that e resolution is outside the
Project: GM BE BEDFC		PRING 1	18				Approved S	Signatory: Christoph ssue: 12/13/2	- Ceur ner Carson (Project Mar 012	ager)
Mix Data										
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irving 908	g Materials, g Materials, at age	nc.	C Fl Coa	Material ement (lb) ly Ash (lb) Irse Agg (lb) ne Agg (lb))	Source	Amou	unt Moisture (%) N/A N/A
Design Unit Weight Cement Factor (Sa	t (pcf)	,			Adr	nix Agg (lb) /ater (gal)				N/A N/A
Details of Sa	mple									
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By Weather Est. Wind (mph) Est. Rh (%)	11/14/201 4" wear su North side One day I Sevensor 1702 John Stap Melissa V Sunny	nface sp of 4" we Field/Lal Fie Enviror Tic bles andenbe	ear surface poratory Cur Id Cure Tem nmental ket No.		Slur	np w/ plasti Air T Concrete T Air Co Unit We Batch S Water Ad Time Time	Temp (°F) Temp (°F) Intent (%) ight (pcf) Size (yd ³) ded (gal) Batched Sampled ie Placed	ASTM C 1064 ASTM C 231 ASTM C 138	Measured Sp 4.00 N/A 31 65 5.90 9 08:35 09:35 09:30 55	pecified
Compressive	•		Concret	e Cylind	ers					ASTM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf			
0014921-6-C1\1 0014921-6-C1\2	12/12/12	28 Hold	4.00	8.00	12.57		76600	1	6100	4000 4000

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 1 = C39: Cones on both ends; C1314: Conical Break,
Form No: 18970, Report No: CON:0014921-6-C1 © 2000-2011 QESTLa	b by SpectraQEST.com Page 1 of 1

Engineering • C	Inform To Builting	ild C	n 🛛				5362 Wes Indianapo Phone: (3	nal Service Indu t 78th Street lis, IN 46268 17) 876-7723 876-8155			14021 0 01
Concrete	e Test	Re	port					кер	ort No: C	ON:00	14921-9-C1 Issue No: 3
Client: SEVEN		These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.									
Project: GM BEI BEDFO		RING 1	8				Approved Date of	Signatory: Christop Issue: 1/3/201		ect Manager)	
Mix Data											
Mix Data Submitted Supplier Plant Mix Identification Specified Design St	rength (psi)	Irving 060	Materials, I Materials, I at age	nc.	Cem Fly A Coarse Fine	iterial ient (Ib) Ash (Ib) e Agg (Ib) Agg (Ib))	Source	ļ	Amount 564 1800 1340	Moisture (%) N/A N/A
Design Unit Weight Cement Factor (Sac	u ,					: Agg (lb) er (gal)				12.0 226.0	N/A N/A
Details of Sar						o. (gu.)					
Date Sampled Sample Location	12/6/2012 Station 6+5		e Received	12/10/201	_	w/ plasti	lump (in) cizer (in) emp (°F)	ASTM C 143	Measured 4.75 N/A 76	Speci	fied
Curing Method Field Sample No		ield/Lat	ooratory Cu d Cure Tem	re p (°F) High Low	Co	oncrete T Air Cor	emp (°F) remp (°F) ntent (%) ght (pcf)	ASTM C 1064 ASTM C 231 ASTM C 138	76 31 7.90		
Contractor Truck No. Sampled By	Sevenson 1746 Melissa Va	Tick	ket No.	3118958	١	Batch S	Size (yd³) ded (gal)		9		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa Va Cloudy	ndenbe	0	27.0	Tim	Time	Batched Sampled e Placed ck (mins)		08:45 09:30 09:45 60		
Compressive	Strenat	h of (Concret	e Cylind	ers					F	ASTM C 39
	Date Tested			ions (in) Height		Type of Cap	Ultimate Load (Ib				Required Strength (psi)

67740

65720

2

3

5420

5260

5340

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear, 3 = C39: Vert cracking/no cones; C1314: Cone & Split,
Form No: 18970, Report No: CON:0014921-9-C1 © 2000-2011 QESTLat	b by SpectraQEST.com Page 1 of 1

0014921-9-C1\1

0014921-9-C1\2

01/03/13

01/03/13

28

28

3.99

3.99

8.00

8.00

12.50

12.50

4000

Engineering • C	all Du	ild (Dn /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concrete	e Tes	t Re	port		Repo	rt No: CON:0	014921-11-C1 Issue No: 3			
Client: SEVEN SERVIC 2749 LC	SON ENVI	resent any other le except in full, with nc. If a non-compl	ocations or elevations. Nout written permission ance appears on this r	and materials noted and This report may not be by Professional Service eport, to the extent that resolution is outside the						
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/8/2013										ager)
Mix Data										
Mix Data Submitted Supplier Plant Mix Identification Specified Design St	,	Irving 060	g Materials, g Materials, at age	Inc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Amou 564 1800 1340	N/A N/A
Design Unit Weight Cement Factor (Sac	(pcf) ks/yd³)	,			Adr	nix Agg (lb) /ater (gal)			12.0 226.	
Details of Sar	•				_					
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By Weather Est. Wind (mph) Est. Rh (%)	-	43 statior Field/Lal Fie h Enviror Tic ggle andenb	nmental ket No.		Slur	np w/ plasti Air 1 Concrete 1 Air Co Unit We Batch 3 Water Ad Time Time	Femp (°F) Femp (°F) ntent (%) ight (pcf) Size (yd ³) ded (gal) Batched Sampled te Placed	ASTM C 1064 ASTM C 231 ASTM C 138	Measured Sp 3.00 N/A 35 76 5.00 9 08:29 09:10 09:40 71	ecified
Compressive	Streng	th of	Concret	e Cylind			(ASTM C 39
	Date Tested			ions (in) Height	Area (in ²)	Type of Cap	Ultimate Load (lbf		· · · · · · ·	Required
0014921-11-C1\1 0014921-11-C1\2	01/07/13 01/07/13	28 28 28	4.01 4.00	8.00 8.00	12.60 12.57	U	93400 92660	1 2	7410 7370	4000 4000

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Comb	ined	Vert
Form No: 18970, Report No: CON:0014921-11-C1	© 2000-2011 QESTLab by SpectraQEST.com Page	<u>= 1 of 1</u>

Engineering • 0	.To Bu	mat vild (Dn /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concrete	e Tes [.]	t Re	port		Repo	rt No: CON:0	014921-12-C1 Issue No: 2			
Client: SEVEN SERVIO 2749 LO	ISON ENVI	RONMI ROAD	ENTAL	/ICH)LDS	These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.					
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/8/2013										iger)
Mix Data										
Mix Data Submitted Supplier Plant Mix Identification Specified Design S	·	Irving 908	g Materials, I g Materials, I) at age	nc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Amou	nt Moisture (%) N/A N/A
Design Unit Weight Cement Factor (Sa	cks/yd³)		-	·		nix Agg (lb) /ater (gal)				N/A N/A
Details of Sa										
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By	Sevensor 531	anch ? Field/Lal Fie i Enviroi Tic	te Received boratory Cur Id Cure Tem nmental ket No.			np w/ plasti Air 1 Concrete 1 Air Co Unit We Batch 5	Femp (°F) Femp (°F) ntent (%) ight (pcf) Size (yd ³)	ASTM C 1064	Measured Sp 4.25 N/A 28 65 5.10 9	ecified
Submitted By Weather Est. Wind (mph) Est. Rh (%)	David Nog Melissa V Cloudy	andenb	erg ³ Placed	9.0	ſ	Time	Batched Sampled ne Placed ck (mins)		09:08 09:45 10:00 52	
Compressive	e Streng	th of	Concret	e Cylind	ers					ASTM C 39
Specimen ID	Date Tested	Age (Days)		ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (Ibf			
0014921-12-C1\1 0014921-12-C1\2	01/08/13 01/08/13	28 28	4.01 4.01	8.00 8.00	12.60 12.60	U U	84130 84090	2 2	6680 6670	4000 4000

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-12-C1 © 2000-2011 QESTLa	b by SpectraQEST.com Page 1 of 1

Engineering •	ToBu	rmati uild (Dn /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concret		t Re	nort		Repo	rt No: CON:0	014921-13-C1			
			•							Issue No: 2
Client: SEVENSON ENVIRONMENTAL SERVICE 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305 CC: DAN SEKANOVICH SHANE REYNOLDS CC: DAN SEKANOVICH SHANE REYNOLDS SHANE REYNOLDS										This report may not be by Professional Service eport, to the extent that
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/9/2013										
Mix Data										
Mix Data Submitter Supplier Plant Mix Identification Specified Design S		Irving 908	g Materials, g Materials, at age	Inc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Amou	nt Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	t (pcf) cks/yd³)	,			Adr	nix Agg (lb) /ater (gal))			N/A N/A
Details of Sa	mple									
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By Weather Est. Wind (mph) Est. Rh (%)	12/12/20 Bailey Bra 4+50 Field Curr Sevensor 1692 David No Melissa V Clear	nch stati e Fie n Enviror Tic ggle ′andenb	ket No.		Slur	np w/ plasti Air 1 Concrete 1 Air Co Unit We Batch 3 Water Ad Time Time	icizer (in) remp (°F) remp (°F) ntent (%) ight (pcf) Size (yd ³) Ided (gal) e Batched Sampled he Placed		Measured Sp 4.25 N/A 27 67 5.20 9 08:16 09:30 09:40 84	ecified
Compressive	e Streng	th of	Concret	e Cylind	ers					ASTM C 39
	Date Tested			ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf		- · · · · · ·	
0014921-13-C1\1 0014921-13-C1\2	01/09/13 01/09/13	28 28	4.01 4.00	8.00 8.00	12.60 12.57	U U	81050 81020	3	6430 6450	4000 4000

Notes 1.Sampling to ASTM C 172	Remarks Fracture Type / Remarks: 3 = C39: Vert cracking/no cones; C1314: Cone & Split,
2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	
Form No: 18970, Report No: CON:0014921-13-C1 © 2000-2011 QESTL	ab by SpectraQEST.com Page 1 of 1

Engineering •	ToBu	rmati uild (Dn /				5362 West Indianapoli				
Concrete	e Tes	port		Repo	rt No: CON	:0014	921-14-C1 Issue No: 2				
Client: SEVENSON ENVIRONMENTAL SERVICE CC: DAN SEKANOVICH SHANE REYNOLDS These test results apply only to the specific locations and materials may not represent any other locations or elevations. This report musical reportuged, except in full, without written permission by Professior Industries, Inc. If a non-compliance appears on this report, to the et the reported non-compliance impacts the project, the resolution is PSI scope of engagement.										materials noted and eport may not be rofessional Service to the extent that	
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/11/2013											
Mix Data											
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irving 908	g Materials, g Materials, at age	nc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Am	ount	Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	t (pcf) cks/yd³)	,			Adr	nix Agg (lb) /ater (gal))				N/A N/A
Details of Sa					_						
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By Weather		berm fina of the no Field/Lal Fie Fie n Enviror Tic ggle	rth end of the poratory Cur Id Cure Tem nmental ket No.	е	_	np w/ plasti Air 1 Concrete 1 Air Co Unit We Batch 3 Water Ad Time	icizer (in) Femp (°F) Femp (°F) ntent (%) ight (pcf) Size (yd ³)	ASTM C 143 ASTM C 1064 ASTM C 231 ASTM C 138 Before After	Measured 3 4.50 N/A 23 64 5.10 9 08:25 09:20	Specifi	ea
Est. Wind (mph) Est. Rh (%)		Yd	³ Placed	9.0	r	Tim Fime In Tru	ne Placed ck (mins)		09:20 55		
Compressive	e Streng	th of	Concret	e Cylind	ers					A	STM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf				Required Strength (psi)
0014921-14-C1\1 0014921-14-C1\2	01/10/13 01/10/13	28 28	4.00 4.01	8.00 8.00	12.57 12.60	U U	90670 81560	5 4	7220 6470		4000 4000

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 4 = C39: Diagonal fracture; C1314: Tension Break, 5 = C39: Side fracture-opposite ends; C1314: Semi-Conical Break,
Form No: 18970, Report No: CON:0014921-14-C1 © 2000-2011 QESTLat	b by SpectraQEST.com Page 1 of 1

Engineering • 0	ToBi	rmati uild (Dn				5362 West Indianapol				
Concrete	port		Repo	rt No: COI	N:0014	4921-16-C1 Issue No: 2					
Client: SEVEN SERVIO 2749 LO NIAGA	ENTAL	may not rep reproduced Industries, I the reported	resent any other lo except in full, with nc. If a non-compl	ocations or elevat hout written permi iance appears on	tions. This ission by F this repor	I materials noted and report may not be Professional Service t, to the extent that olution is outside the					
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/21/2013											
Mix Data											
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irving 908	g Materials, g Materials, at age	Inc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Ar	mount	Moisture (%) N/A N/A
Design Unit Weight Cement Factor (Sa	t (pcf) cks/yd³)	, 1000	arugo	20 00,0	Adr	nix Agg (lb) /ater (gal)					N/A N/A
Details of Sa	•										
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By Weather Est. Wind (mph)	12/18/20 Baileys Bi Station 2- One day Sevensor 1604 John Sta Melissa \ Overcast	ranch 54 to 4+4 Field/Lal Fie n Enviror Tic bles /andenbe	boratory Cur Id Cure Tem nmental ket No.			np w/ plast Air T Concrete T Air Co Unit We Batch Water Ad Time Time	ſemp (°F)	ASTM C 143 ASTM C 1064 ASTM C 231 ASTM C 138 Before After	Measured 6.00 38 67 5.70 9 08:55 09:45 09:38	Specil	fied
Est. Rh (%)						Fime In Tru	ck (mins)		43		
Compressive	-										STM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf		· · · · ·		Required Strength (psi)
0014921-16-C1\1 0014921-16-C1\2	01/15/13 01/15/13	28 28	4.00 4.01	8.00 8.00	12.53 12.60	U U	85570 91950	5 5	6830 7300		4000 4000

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 5 = C39: Side fracture-opposite ends; C1314: Semi-Conical Break,
Form No: 18970, Report No: CON:0014921-16-C1 © 2000-2011 QESTL	ab by SpectraQEST.com Page 1 of 1

Engineering •	ToBu	rmati uild (Dn				5362 West Indianapol			
Concret	e Tes	t Re	port		Repo	rt No: CON:0	014921-17-C1 Issue No: 2			
Client: SEVEN SERVI 2749 L	ISON ENV	RONM	ENTAL	/ICH)LDS	may not rep reproduced, Industries, li the reported	resent any other lo except in full, with nc. If a non-compli	ocations or elevations. nout written permission ance appears on this	s and materials noted and This report may not be by Professional Service report, to the extent that a resolution is outside the		
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Christopher Carson (Project Manager) Date of Issue: 1/21/2013										ager)
Mix Data										
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irving 908	g Materials, g Materials, at age	NC.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Αmoι	int Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	t (pcf) cks/yd³)	, 1000	arago	20 00,0	Adr	nix Agg (lb) /ater (gal)	1			N/A N/A
Details of Sa										
Date Sampled General Location Sample Location	12/19/20 ² Baileys Br Station 3+	anch	e Received	12/20/201	_	np w/ plasti		ASTM C 143	Measured Sp 3.00 40	ecified
Curing Method Field Sample No		Field/Lal	poratory Cur Id Cure Tem	p (°F) High		Concrete T Air Co	Temp (°F) ntent (%)	ASTM C 1064 ASTM C 231	40 70 5.80	
Contractor Truck No. Sampled By	Sevensor 1617 John Stap	Tic	nmental ket No.	Low 3119115		Batch	Size (yd ³)	ASTM C 138 Before After	9	
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa V Partly Clo	oudy	erg Placed	27.0	1	Time	Batched Sampled ne Placed ck (mins)		09:10 10:10 09:59 49	
Compressive	Streng	th of	Concret	e Cylind			(-	ASTM C 39
	Date Tested			ions (in) Height	Area (in ²)	Type of Cap	Ultimate Load (Ibf		Compressive Strength (psi	Required
0014921-17-C1\1 0014921-17-C1\2	01/16/13 01/16/13	28 28	4.00 4.00	8.00 8.00	12.53 12.57	U U	104750 94680	5 2	8360 7530	4000 4000

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear, 5 = C39: Side fracture-opposite ends; C1314: Semi-Conical Break,
Form No: 18970, Report No: CON:0014921-17-C1 © 2000-2011 QESTLai	b by SpectraQEST.com Page 1 of 1

	rmation uild On	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concrete Tes	t Report		Repor	rt No: CON:	0014921-19-C1			
			SEKANOV		Those test r	sulte apply only t	a the specific location	Issue No: 2
Client: SEVENSON ENV SERVICE 2749 LOCKPORT NIAGARA FALLS	ROAD	may not repr reproduced, Industries, In the reported	esent any other lo except in full, with c. If a non-compli	ocations or elevations out written permission ance appears on this	s. This report may not be in by Professional Service report, to the extent that he resolution is outside the			
Project: GM BEDFORD SF BEDFORD, IN	PRING 18				Approved S	R. U.	ley (Department Mana	ger)
Mix Data					Date of Is	ssue: 2/14/20	13	
Mix Data Submitted By	Irving Materials	. Inc.	1	Material		Source	Amo	unt Moisture (%)
Supplier Plant Mix Identification	Irving Materials		Fl	ement (lb) y Ash (lb) rse Agg (lb)			N/A N/A
Specified Design Strength (ps Design Unit Weight (pcf) Cement Factor (Sacks/yd ³)		28 days	Fin Adn	ne Agg (lb) nix Agg (lb) ater (gal)	,			N/A N/A
Details of Sample				(0)				
Date Sampled 1/8/2013	Date Receive	d 1/9/2013					Measured S	pecified
Curing Method One day Field Sample No	ation 11+40 to 10+2 Field/Laboratory C Field Cure Te	ure		np w/ plasti Air 1 Concrete 1 Air Co Unit We	icizer (in) Гemp (°F) Гemp (°F) ntent (%) ight (pcf)	ASTM C 1064 ASTM C 231 ASTM C 138	7.00 40 71 3.90	
Contractor Sevensor Truck No. 1702 Sampled By David Lal	n Environmental Ticket No. hr	3119134			(0)	Before After	9	
Submitted By Melissa V Weather Clear	/andenberg Yd³ Placed	5.0		Time	e Batched Sampled		09:15 11:26 11:20	
Est. Wind (mph) 0 Est. Rh (%) 60	Yos Placed	5.0	т	Time In Tru	ne Placed ck (mins)		11:30 135	
Compressive Streng	th of Concre	ete Cylind	lers					ASTM C 39
Specimen ID Date Tested	Age Dimer (Days) Diameter	isions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf		Compressiv Strength (ps	
0014921-19-C1\1 02/05/13 0014921-19-C1\2 02/05/13	283.99284.00	8.00 8.00	12.50 12.57	U U	77110 78130	2	6170 6220	4000 4000

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Comb	ined	rt
Form No: 18970, Report No: CON:0014921-19-C1	© 2000-2011 QESTLab by SpectraQEST.com Page 1	1 of 1

Engineering •		ild (Dn /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concret	e Test	t Re	eport		Repo	rt No: CON:(0014921-20-C1 Issue No: 2			
Client: SEVEN SERVI 2749 L	ISON ENVI	RONMI ROAD	ENTAL	may not repr reproduced, Industries, In the reported	resent any other lo except in full, with nc. If a non-compli	ocations or elevations nout written permissio iance appears on this	is and materials noted and . This report may not be n by Professional Service report, to the extent that le resolution is outside the			
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager) Date of Issue: 2/14/2013										ger)
Mix Data										
Mix Data Submitter Supplier Plant Mix Identification Specified Design S		Irving 908	g Materials, g Materials,) at age	nc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Amo	unt Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	· · ·					nix Agg (lb) /ater (gal))			N/A N/A
Details of Sa	mple									
Date Sampled General Location Sample Location Curing Method	1/9/2013 Baileys Br Station 4+	anch 50 to 3+	te Received 88 boratory Cur	1/10/2013		np w/ plasti	Temp (°F)	ASTM C 143 ASTM C 1064	Measured S 7.00 7.00 40 65	pecified
Field Sample No Contractor Truck No.	Sevenson 1594	Fie Enviro Tic	ld Cure Tem			Air Co Unit We Batch S	ntent (%) ight (pcf) Size (yd ³)	ASTM C 231 ASTM C 138 Before	4.00 9	
Sampled By Submitted By Weather Est. Wind (mph) Est. Rh (%)	David Lah Melissa V Cloudy 13 75	andenb	erg ³ Placed	5.0	I	Time	Batched Sampled ne Placed ck (mins)	After	08:53 09:35 09:40 47	
Compressive	e Streng	th of	Concret	e Cylind	ers					ASTM C 39
	Date Tested			ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf			
0014921-20-C1\1 0014921-20-C1\2	02/06/13 02/06/13	28 28	4.00 4.00	8.00 8.00	12.57 12.57	U U	81650 76160	2 2	6500 6060	4000 4000

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-20-C1 © 2000-2011 QESTLat	b by SpectraQEST.com Page 1 of 1

Engineering •	STO DU	ild (Dn /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concrete	e Test	t Re	eport		Repo	rt No: CON:0	014921-23-C1 Issue No: 2			
Client: SEVENSON ENVIRONMENTAL SERVICE 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305								resent any other lo , except in full, with nc. If a non-compl	ocations or elevations. nout written permission ance appears on this	s and materials noted and This report may not be to by Professional Service report, to the extent that e resolution is outside the
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager) Date of Issue: 2/13/2013										ier)
Mix Data										
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irvinę 907	g Materials, g Materials, at age	nc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Αmoι	unt Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	cks/yd³)		_	-		nix Agg (lb) /ater (gal))			N/A N/A
Details of Sa	mple									
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By Weather Est. Wind (mph) Est. Rh (%)	upstream	ion 11+4 quarter c Field/La Fie Enviror Tic nier andenb udy	boratory Cur ld Cure Tem nmental ket No.		Slur	np w/ plasti Air 1 Concrete 1 Air Co Unit We Batch 5 Water Ad Time Time	icizer (in) Femp (°F) Femp (°F) ntent (%) ight (pcf) Size (yd ³) Ided (gal) Batched Sampled he Placed	ASTM C 143 ASTM C 1064 ASTM C 231 ASTM C 138 Before After	Measured Sp 2.00 31 61 2.50 9 09:23 10:40 10:27 64	pecified
Compressive	e Streng	th of	Concret	e Cylind	ers					ASTM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf			
0014921-23-C1\1 0014921-23-C1\2	02/12/13 02/12/13	28 28	4.00 4.00	8.00 8.00	12.53 12.53	U U	95740 95260	2 2	7640 7600	4000 4000

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-23-C1 © 2000-2011 QESTLa	b by SpectraQEST.com Page 1 of 1

Engineering • 0	ToBu	mat uild (Dn 🛛				5362 West Indianapoli			
Concrete Test Report								Repo	rt No: CON:	0014921-24-C1 Issue No: 2
Client: SEVEN SERVIO 2749 LO	ISON ENVI	RONMI ROAD	ENTAL	may not repr reproduced, Industries, In the reported	resent any other lo except in full, with nc. If a non-compli	ocations or elevations out written permission ance appears on this	ns and materials noted and s. This report may not be on by Professional Service s report, to the extent that he resolution is outside the			
Project: GM BE BEDFC		PRING ²	18				Approved	R. W Signatory: Alex Star ssue: 2/14/20	ley (Department Mana	ager)
Mix Data										
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irvinę 908	g Materials, g Materials, at age	NC.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Amo	unt Moisture (% N/A N/A
Design Unit Weight Cement Factor (Sa	u ,		_	-		nix Agg (lb) /ater (gal)				N/A N/A
Details of Sa	mple									
Date Sampled General Location Sample Location Curing Method Field Sample No	1/16/2013 Trib #3 ca 10+95 thru One day I	oping ı 10+55 Field/Lal	te Received poratory Cur Id Cure Tem			np w/ plasti Air 1 Concrete 1 Air Co	Temp (°F) Temp (°F) ntent (%)	ASTM C 1064	Measured S 3.00 34 65 5.80	pecified
Contractor Truck No. Sampled By Submitted By Weather	Sevensor 1604 John Stap Melissa V Sunny	Tic oles andenb	ket No. erg	3119183		Batch S Water Ad Time Time	Size (yd ³) ded (gal) Batched Sampled	Before After	9 10:30 11:15	
Est. Wind (mph) Est. Rh (%)			³ Placed	27.0		Tim Fime In True	ie Placed ck (mins)		11:10 40	
Compressive	e Streng	th of	Concret	e Cylind	ers					ASTM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf			
0014921-24-C1\1 0014921-24-C1\2	02/13/13 02/13/13	28 28	4.01 4.01	8.00 8.00	12.60 12.60	U U	89060 90390	2 2	7070 7180	4000 4000

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-24-C1 © 2000-2011 QESTLat	by SpectraQEST.com Page 1 of 1

Engineering •	Consulting	ild (• Test	On ing		Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155 Report No: CON:0014921-25-C1						
Concret	port		Ropo		11.001	Issue No: 2					
Client: SEVEN SERVI 2749 L NIAGA		VICH DLDS	may not rep reproduced Industries, I the reported	resent any other lo , except in full, with nc. If a non-compl	ocations or eleva nout written perminence appears or	ations. This i hission by P n this report	materials noted and report may not be rofessional Service , to the extent that lution is outside the				
Project: GM BE BEDFC	DFORD SF DRD, IN	PRING [·]	18				· ·	R. M. Signatory: Alex Star Issue: 2/20/20	nley (Department I	··· • • • • • • •	<u> </u>
Mix Data											
Mix Data Submitte Supplier Plant Mix Identification Specified Design S Design Unit Weigh	Strength (psi	Irvin 908	g Materials, g Materials,) at age	Inc.	Ce Fl Coa Fir	Material ement (Ib) y Ash (Ib) rse Agg (Ib) ne Agg (Ib) nix Agg (Ib)		Source	A	mount	Moisture (%) N/A N/A N/A
Cement Factor (Sa	icks/yd³)					ater (gal)					N/A
Details of Sa	ample										
Date Sampled General Location Sample Location	1/17/2013 Bailey's Bi Station 7+	ranch Ar		1/18/2013		np w/ plasti	lump (in) cizer (in) ēmp (°F)	ASTM C 143	Measured 3.00 34	Specif	ied
Curing Method Field Sample No	One day l		boratory Cur Id Cure Tem			Concrete T Air Cor	- · · · · ·	ASTM C 1064 ASTM C 231 ASTM C 138	70 5.80		
Contractor Truck No. Sampled By	Sevensor 1616 John Stap	Tic	nmental ket No.	3119196			Size (yd³) ded (gal)	Before After	9		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa V Sunny		erg ³ Placed	36.0	ſ	Time	Batched Sampled e Placed ck (mins)		10:30 11:05 11:00 30		
Compressiv	e Streng	th of	Concret	e Cylind	ers					A	STM C 39
	Date Tested			ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (Ibf				Required Strength (psi)
0014921-25-C1\1	02/14/13	28	4.00	8.00	12.57	U	90630	2	7210)	4000

U

99070

2

7880

7550

4000

Notes	Remarks
 Sampling to ASTM C 172 Specimen(s) Prepared to ASTM C 31 Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined 	Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-25-C1 © 2000-2011 QESTLa	b by SpectraQEST.com Page 1 of 1

12.57

0014921-25-C1\2 02/14/13

28

4.00

Engineering •	Infor To Bu	ild (On /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155							
Concrete	e Tes ⁻	t Re	port					Керо	rt No: CO	N:0014	1921-26-C1 Issue No: 2
Client: SEVEN SERVIO 2749 LI NIAGA		/ICH)LDS	may not rep reproduced Industries, I the reported	resent any other lo , except in full, with nc. If a non-compl	ocations or eleva nout written perm iance appears or	ations. This i hission by P n this report	materials noted and report may not be rofessional Service , to the extent that lution is outside the				
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager)									5		
Mix Data							Date of	Issue: 2/20/20	13		
Mix Data Submitted Supplier Plant Mix Identification Specified Design S	itrength (psi	Irving 908	g Materials, I g Materials, I) at age	nc.	Ce Fl Coa Fir	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	A	mount	Moisture (%) N/A N/A N/A
Design Unit Weigh Cement Factor (Sa	. ,					nix Agg (lb) /ater (gal)					N/A N/A
Details of Sa	mple										
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By	,	anch anch 4++ Field/Lal Fie Environ Tic	te Received 05 to 4+65 boratory Cur Id Cure Tem nmental ket No.			np w/ plasti Air T Concrete T Air Con Unit Wei Batch S Water Ad Time	Temp (°F) Temp (°F) Intent (%) Gght (pcf) Size (yd ³) ded (gal) Batched	ASTM C 143 ASTM C 1064 ASTM C 231 ASTM C 138 Before After	Measured 4.00 27 67 5.50 9 09:37	Specif	ied
Weather Est. Wind (mph) Est. Rh (%)	Sunny	Yd	³ Placed	36.0	ſ		Sampled e Placed ck (mins)		10:24 10:19 42		
Compressive	•		Concret	e Cylind	ers					A	STM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (Ibi				Required Strength (psi)
0014921-26-C1\1	02/15/13	28	4.00	8.00	12.57	U	87260	1	6940		4000

U

87300

2

6950

6950

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Comb	ined Remarks Practure Type / Remarks: 1 = C39: Cones on both ends; C1314: Conical Break, 2 = C39: Vert	
Form No: 18970, Report No: CON:0014921-26-C1	© 2000-2011 QESTLab by SpectraQEST.com Page 1	of 1

12.57

0014921-26-C1\2 02/15/13

28

4.00

8.00

Engineering •	Consulting	ild (• Test	On ing	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155 Report No: CON:0014921-27-C1							
Concret	port		Керо			Issue No: 2					
Client: SEVEN SERVI 2749 L	SON ENVI	ENTAL	may not rep reproduced Industries, I the reported	resent any other lo except in full, with nc. If a non-compl	o the specific locatio ocations or elevatior nout written permiss iance appears on th mpacts the project,	ns. This re ion by Pro is report, t	port may not be fessional Service o the extent that				
Project: GM BE BEDFC	DFORD SF DRD, IN	PRING	18				Approved	R. U. Signatory: Alex Star Ssue: 2/20/20	nley (Department Man	lager)	<u> </u>
Mix Data											
Mix Data Submitte Supplier Plant Mix Identification Specified Design S	Strength (psi	Irvin PSI	g Materials, g Materials,) at age	Inc.	Ce Fly Coa Fin	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb)		Source	Amo	ount	Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	. ,					nix Agg (lb) /ater (gal)					N/A N/A
Details of Sa	ample										
Date Sampled	1/19/2013	B Da	te Received	1/21/2013		S	ilump (in)		Measured S	Specifie	łd
General Location Sample Location	Bailey's Bi Station 4+		ea Station 5+55		Slun	np w/ plasti	icizer (in) Femp (°F)		3.00 41		
Curing Method Field Sample No		-ield/La	boratory Cur eld Cure Tem			Concrete T Air Co	• • • •	ASTM C 1064 ASTM C 231 ASTM C 138	70 5.70		
Contractor Truck No. Sampled By	Sevensor 1692 John Stap	Tic	nmental ket No.	3119217			Size (yd³) Ided (gal)	Before After	9		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Sunny	Yd	³ Placed	18.0	Т	Time	Batched Sampled ne Placed ck (mins)		09:00 09:58 09:52 52		
Compressiv	e Streng	th of	Concret	e Cylind	ers					AS	STM C 39
Specimen ID	Date Tested	Age (Days)		ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf				Required trength (psi)
0014921-27-C1\1	02/16/13	28	4.00	8.00	12.57	U	89440	2	7120		4000

U

93020

2

7420

7270

4000

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-27-C1 © 2000-2011 QESTLa	ab by SpectraQEST.com Page 1 of 1

12.53

8.00

0014921-27-C1\2

02/16/13

28

Engineering •	ToBu	mat uild (On /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concret	e Tes	t Re	eport		Repor	t No: CON:0	014921-29-C1 Issue No: 2			
	RONM ROAD	may not repr reproduced, Industries, Ir the reported	These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.							
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager) Date of Issue: 2/20/2013									2 er)	
Mix Data										
Mix Data Submitter Supplier Plant Mix Identification Specified Design S	2	Irvin PSI	g Materials, g Materials,) at age	Inc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Amou	nt Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	(i)		0			nix Agg (lb) /ater (gal)				N/A N/A
Details of Sa	mple									
Date Sampled	1/23/2013	B Da	te Received	1/24/2013		_			Measured Sp	ecified
General Location Sample Location	Baileys Br Station 0+		station 0+60		Slur	np w/ plasti	ilump (in) icizer (in) Гemp (°F)		4.00 19	
Curing Method Field Sample No	One day l		boratory Cui Id Cure Terr				ntent (%)		67 5.80	
Contractor Truck No. Sampled By	Sevensor 1604 John Stap	Tic	nmental ket No.	3119226		Water Ad	Size (yd ³) Ided (gal)		9	
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Sunny	Yd	³ Placed	27.0	٦	Time	Batched Sampled ne Placed ck (mins)		10:45 11:40 11:35 50	
Compressive	e Streng	th of	Concret	e Cylind	lers					ASTM C 39
	Date Tested		Dimens	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf		Compressive Strength (psi)	•
0014921-29-C1\1 0014921-29-C1\2	02/20/13 02/20/13	28 28	3.99 3.99	8.00 8.00	12.50 12.50	U U	80930 74850	3 2	6470 5990	4000 4000

6230

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear, 3 = C39: Vert cracking/no cones; C1314: Cone & Split,
Form No: 18970, Report No: CON:0014921-29-C1 © 2000-2011 QESTLat	b by SpectraQEST.com Page 1 of 1

Engineering •	Info To Bu	uild (On /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155							
Concret	nort		Repo	rt No: CC	N:001	4921-30-C1					
CONCIEC	pon					Issue No: 2					
Client: SEVENSON ENVIRONMENTAL SERVICE 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305 CC: DAN SEKANOVICH SHANE REYNOLDS AND REYNOLDS NIAGARA FALLS, NY 14305										s report may not be Professional Service ort, to the extent that	
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager)									5		
Mix Data							Date of I	ssue: 3/1/201	3		
Mix Data Submitte	d Bv	Irvin	g Materials,	Inc		Material		Source	A	Amount	Moisture (%)
Supplier	u D)		g Materials,			ement (lb)		Course	,	inount	N/A
Plant			5 ,			y Ash (lb)					N/A
Mix Identification		917			Coa	rse Agg (lb)				
Specified Design S	Strength (psi) 4000) at age	28 days	Fir	ne Agg (lb)	,				
Design Unit Weigh	it (pcf)		Ū		Adr	nix Agg (lb)					N/A
Cement Factor (Sa	acks/yd³)				W	/ater (gal)					N/A
Details of Sa	ample										
Date Sampled	1/24/2013	B Da	te Received	1/25/2013					Measured	Spec	ified
General Location Sample Location	Bailey's B 0+60 thru				Slur	np w/ plast	lump (in) icizer (in) ſemp (°F)	ASTM C 143	4.00 20		
Curing Method	One day	Field/La	boratory Cu	е		Concrete 1	Temp (°F)	ASTM C 1064	68		
Field Sample No	-	Fie	ld Cure Tem	ıp (°F) High		Air Co	ntent (%)	ASTM C 231	5.20	0	
				Low			• • •	ASTM C 138			
Contractor	Sevensor						Size (yd³)	_	9		
Truck No.	1708		ket No.	3119234		Water Ad	ded (gal)	Before			
Sampled By	John Stap	oles						After			
Submitted By	0						Batched		10:35		
Weather	Sunny	V-I	3 Dloogd	27.0			Sampled		11:35		
Est. Wind (mph)		Yd	³ Placed	27.0	-		e Placed		11:30		
Est. Rh (%)	- 01	4 h	0			Fime In Tru	uk (mins)		55		
Compressive	0					- ,	1.0.2		0		ASTM C 39
Specimen ID	Date Tested	Age (Days)		ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf				Required Strength (psi)
0014921-30-C1\1	02/21/13	28	3.99	8.00	12.50	U	83270	2	6660)	4000
0014921-30-C1\2	02/21/13	28	3.99	8.00	12.50	U	83890	2	6710)	4000

6690

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-30-C1 © 2000-2011 QESTL	ab by SpectraQEST.com Page 1 of 1

Engineering •	ToBu	mat uild (On /	Professional Service Industries, Inc. 5362 West 78th Street Indianapolis, IN 46268 Phone: (317) 876-7723 Fax: (317) 876-8155						
Concret		t Re	nort		Repo	rt No: CON:(0014921-32-C1			
										Issue No: 2
SERVI 2749 L	ISON ENVI CE OCKPORT RA FALLS,	ROAD		VICH DLDS	may not rep reproduced, Industries, li the reported	resent any other le except in full, with nc. If a non-compl	ocations or elevations nout written permissio ance appears on this	is and materials noted and . This report may not be n by Professional Service report, to the extent that le resolution is outside the		
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager)									ger)	
Mix Data							Date of I	ssue: 3/1/201	3	-
Mix Data		India	• Motoriolo	laa		Material		Source	4	unt Maintura (0()
Mix Data Submittee Supplier Plant Mix Identification		Irvin 060	g Materials, g Materials, 4000 PSI	Inc.	Ce Fl Coa	ement (lb) y Ash (lb) rse Agg (lb)	Source	Amo	unt Moisture (%) N/A N/A
Specified Design S Design Unit Weigh Cement Factor (Sa	t (pcf)) 4000) at age	28 days	Adr	ne Agg (lb) nix Agg (lb) /ater (gal)	I			N/A N/A
Details of Sa	mple									
Date Sampled	1/29/2013	B Da	te Received						Measured S	pecified
General Location Sample Location Curing Method Field Sample No Contractor Truck No.	Bailey's B Station 0+ Sevensor 1702	98 thru 7 Fie n Enviro	ld Cure Ten	np (°F) High Low 3119245	Slur	np w/ plasti Air 1 Concrete 1 Air Co Unit We Batch 3	Temp (°F) Temp (°F) ntent (%) ight (pcf) Size (yd ³)	ASTM C 143 ASTM C 1064 ASTM C 231 ASTM C 138 Before	3.00 61 74 5.00 9	
Sampled By	John Stap	oles					(3.7)	After		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Overcast		³ Placed	36.0	ī	Time	Batched Sampled ne Placed ck (mins)		09:40 10:40 10:30 50	
Compressive	e Strena	th of	Concret	e Cylind	lers					ASTM C 39
	Date Tested		Dimens	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf			
0014921-32-C1\1 0014921-32-C1\2	02/26/13 02/26/13	28 28	4.00 4.00	8.00 8.00	12.57 12.57	U U	90160 86580	2 2	7170 6890	4000 4000

7030

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-32-C1 © 2000-2011 QESTLa	b by SpectraQEST.com Page 1 of 1

Engineering •		ild (On /				5362 Wes Indianapol			
Concret			nort			Repo	rt No: CON:	0014921-37-C1		
			ροπ							Issue No: 2
Client: SEVENSON ENVIRONMENTAL SERVICE 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305 CC: DAN SEKANOVICH SHANE REYNOLDS These test results apply only to the specific locations and materials noted a may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Servic Industries, Inc. If a non-compliance appears on this report, to the extent tha the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.										s. This report may not be on by Professional Service s report, to the extent that
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager)										ager)
Mix Data							Date of	ssue: 3/26/20	13	
Mix Data Submitte	d By	Irvin	g Materials, I	nc		Material		Source	Amo	ount Moisture (%)
Supplier Plant Mix Identification	·	Irvin 917	g Materials, I	nc.	Ce Fl Coa	ement (lb) y Ash (lb) rse Agg (lb)	Course	74110	N/A N/A
Specified Design S Design Unit Weigh Cement Factor (Sa	t (pcf)) 4000) at age	28 days	Adr	ne Agg (lb) nix Agg (lb) /ater (gal)				N/A N/A
Details of Sa	mple					(0)				
Date Sampled	2/5/2013	Da	te Received	2/6/2013					Measured S	pecified
General Location Sample Location	Spring 18,	access			Slur	np w/ plast		ASTM C 143	5.00 32	
Curing Method Field Sample No	One day I		boratory Cur Id Cure Tem				Гетр (°F) ntent (%) ight (pcf)	ASTM C 1064 ASTM C 231 ASTM C 138	65 5.80	
Contractor Truck No. Sampled By	Sevensor 1798 John Stap	Tic	nmental ket No.	3119261			Size (yd³) Ided (gal)	Before After	9	
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Overcast	Yd	³ Placed	10.0	I	Time	Batched Sampled ne Placed ck (mins)		09:20 10:20 10:10 50	
Compressive	e Streng	th of	Concret	e Cylind	lers					ASTM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (Ibi			
0014921-37-C1\1 0014921-37-C1\2	03/05/13 03/05/13	28 28	3.99 3.99	8.00 8.00	12.50 12.50	U U	73730 70240	2 2	5900 5620	4000 4000

5760

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-37-C1 © 2000-2011 QESTLat	b by SpectraQEST.com Page 1 of 1

Engineering •	Infor To Bu	ild (On /				5362 Wes Indianapol				
Concret	e Test	t Re	port					Repoi	rt No: COr	N:0014	921-38-C1 Issue No: 2
SERVI 2749 L	ISON ENVI CE OCKPORT RA FALLS,	ROAD			SEKANOV IE REYNC		may not rep reproduced Industries, I the reported	resent any other lo except in full, with nc. If a non-compli	ocations or elevation out written perminance appears on	ions. This r ssion by Pr this report,	materials noted and eport may not be rofessional Service to the extent that lution is outside the
Project: GM BE BEDFC	DFORD SF DRD, IN	PRING ²	18				Approved	R. al	ley (Department M		\bigcirc
Mix Data							Date of	ssue: 3/26/20	13		
Mix Data Submitter Supplier Plant Mix Identification Specified Design S Design Unit Weigh Cement Factor (Sa	Strength (psi t (pcf)	Irving 917	g Materials, I g Materials, I) at age	nc.	Ce Fl Coa Fir Adr	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb) nix Agg (lb)	, ,	Source	Ar	nount	Moisture (%) N/A N/A N/A N/A
Details of Sa	• •				vv	/ater (gal)					IN/A
Date Sampled General Location	2/6/2013 Baileys Bri		te Received	2/7/2013	Slur	S np w/ plasti	lump (in)	ASTM C 143	Measured 3.50	Specifi	ed
Sample Location Curing Method Field Sample No	Station 2+	45 thru s Field/La	station 2+95 boratory Cur Id Cure Tem		Jui	Air T Concrete T Air Co	emp (°F)	ASTM C 1064 ASTM C 231 ASTM C 138	35 65 6.00		
Contractor Truck No. Sampled By	Sevenson 1616 John Stap	Tic	ket No.	3119278		Batch S	Size (yd³) ded (gal)		9		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa V Overcast		erg ³ Placed	36.0	٦	Time	Batched Sampled e Placed ck (mins)		09:45 10:30 10:24 39		
Compressive	e Streng	th of	Concret	e Cylind	ers					A	STM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf		Compress Strength (Required Strength (psi)
0014921-38-C1\1	03/06/13	28	4.01	8.00	12.60	U	79200	3	6290		4000

U

79060

3

6290

6290

4000

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 3 = C39: Vert cracking/no cones; C1314: Cone & Split,
Form No: 18970, Report No: CON:0014921-38-C1 © 2000-2011 QESTLat	b by SpectraQEST.com Page 1 of 1

12.57

0014921-38-C1\2

03/06/13

28

4.00

Engineering •	STO DU	ild (Dn /				5362 West Indianapol			
Concrete Test Report										
Client: SEVENSON ENVIRONMENTAL SERVICE CC: DAN SEKANOVICH SHANE REYNOLDS These test results apply only to the specific locations and materials noted a may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Servic Industries, Inc. If a non-compliance appears on this report, to the extent tha the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.										This report may not be by Professional Service report, to the extent that
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager) Date of Issue: 3/26/2013										Jer)
Mix Data										
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irvinę 918	g Materials, g Materials, at age	nc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Αποι	unt Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	cks/yd³)					nix Agg (lb) /ater (gal))			N/A N/A
Details of Sa	mple									
Date Sampled General Location Sample Location Curing Method Field Sample No Contractor Truck No. Sampled By Submitted By Weather Est. Wind (mph) Est. Rh (%)		anch 75 thru s Field/La Fie I Envirou Tic oles andenb	ket No.			np w/ plasti Air 1 Concrete 1 Air Co Unit We Batch 5 Water Ad Time Time	Femp (°F) Femp (°F) ntent (%) ight (pcf) Size (yd ³) Ided (gal) Batched Sampled he Placed	ASTM C 143 ASTM C 1064 ASTM C 231 ASTM C 138 Before After	Measured Sp 3.00 41 65 6.00 9 09:45 10:45 10:40 55	pecified
Compressive	Streng	th of	Concret	e Cylind			s.c (mino)			ASTM C 39
	Date Tested			ions (in) Height	Area (in ²)	Type of Cap	Ultimate Load (lbf			e Required
0014921-39-C1\1 0014921-39-C1\2	03/07/13 03/07/13	28 28	4.01 4.00	8.00 8.00	12.60 12.57	U U	89110 87300	3	7070 6950	4000 4000

7010

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 3 = C39: Vert cracking/no cones; C1314: Cone & Split,
Form No: 18970, Report No: CON:0014921-39-C1 © 2000-2011 QESTLat	by SpectraQEST.com Page 1 of 1

Engineering • 0	all Du	ild (Dn /				5362 Wes Indianapol			
Concrete Test Report										
r							There is the sta	the second second second second second second second second second second second second second second second s		Issue No: 2
Client: SEVENSON ENVIRONMENTAL SERVICE 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305 CC: DAN SEKANOVICH SHANE REYNOLDS 2749 LOCKPORT ROAD NIAGARA FALLS, NY 14305										. This report may not be n by Professional Service report, to the extent that
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager)										ger)
Mix Data							Date of	lssue: 3/26/20	13	
Mix Data Submittee Supplier Plant Mix Identification Specified Design S	,	Irvinę 917	g Materials, I g Materials, I at age	nc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	Amo	unt Moisture (%) N/A N/A
Design Unit Weight Cement Factor (Sa	(pcf)) 4000	a aye	zo uays	Adr	nix Agg (lb) /ater (gal)				N/A N/A
Details of Sa	mple									
Date Sampled	2/8/2013	Da	te Received	2/13/2013					Measured S	pecified
General Location Sample Location Curing Method Field Sample No		+40 thru ⁻ ield/La	oad station 21+9 boratory Cur Id Cure Tem	e	Slur	np w/ plasti Air T Concrete T	icizer (in) 「emp (°F)	ASTM C 143 ASTM C 1064 ASTM C 231	3.00 35 65 4.70	
Contractor Truck No. Sampled By	Sevenson 1802 John Stap	i Enviroi Tic		Low 3119314		Batch \$	ight (pcf) Size (yd³) ded (gal)	ASTM C 138 Before After	9	
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa V Overcast		erg ³ Placed	18.0	ſ	Time	Batched Sampled ne Placed ck (mins)		09:00 09:53 09:48 48	
Compressive	e Streng	th of	Concret	e Cylind	ers					ASTM C 39
	Date Tested		Dimensi Diameter		Area (in²)	Type of Cap	Ultimate Load (lbf			
0014921-40-C1\1 0014921-40-C1\2	03/08/13 03/08/13	28 28	4.00 4.00	8.00 8.00	12.57 12.57	U U	87390 84650	2 2	6950 6740	4000 4000

Notes	Remarks
1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-40-C1 © 2000-2011 QESTLa	b by SpectraQEST.com Page 1 of 1

Engineering •	ToBi	rmati uild (Dn				5362 West Indianapol				
Concret		t Re	nort			Repo	rt No: CON	1:0014	1921-41-C1		
			•				These tests				Issue No: 2
SERVI 2749 L	ISON ENV CE OCKPORT RA FALLS	ROAD			SEKANOV IE REYNC	-	may not rep reproduced, Industries, lindustries, lindustr	resent any other le except in full, with nc. If a non-compl	ocations or elevation nout written permission iance appears on t	ons. This i sion by P his report	materials noted and report may not be rofessional Service t, to the extent that solution is outside the
Project: GM BEDFORD SPRING 18 BEDFORD, IN Approved Signatory: Alex Stanley (Department Manager)											\bigcirc
								ssue: 3/26/20		inager)	
Mix Data											
Mix Data Submittee Supplier Plant Mix Identification	2	Irving 918	g Materials, g Materials,	Inc.	Ce Fly Coa	Material ement (lb) y Ash (lb) rse Agg (lb)	Source	Am	iount	Moisture (%) N/A N/A
Specified Design S Design Unit Weigh Cement Factor (Sa	t (pcf)	i) 4000	at age	28 days	Adn	ie Agg (lb) nix Agg (lb) 'ater (gal)					N/A N/A
Details of Sa	mple										
Date Sampled	2/13/2013	3 Dat	e Received	2/14/2013		_			Measured	Specif	ied
General Location Sample Location Curing Method Field Sample No		40 thru s Field/Lat	tation 6+70 poratory Cu ld Cure Tem	re ip (°F) High Low		np w/ plast Air T Concrete T Air Co	icizer (in) Гemp (°F)	ASTM C 143 ASTM C 1064 ASTM C 231 ASTM C 138	3.50 32 67 5.30		
Contractor Truck No. Sampled By	Sevensor 1604 John Staj	Tic	nmental ket No.	3119348		Batch	Size (yd ³)	Before After	9		
Submitted By Weather Est. Wind (mph)	Melissa V Overcast		erg Placed	45.0	-	Time Tim	Batched Sampled Placed		09:50 10:34 10:27 37		
Est. Rh (%)	0.	4 I	0			ime In Tru	ck (mms)		31		
Compressive				•		T (1.0.2	F (0		STM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf				Required Strength (psi)
0014921-41-C1\1 0014921-41-C1\2	03/11/13 03/11/13	26 26	3.99 4.00	8.00 8.00	12.50 12.53	U U	87250 93490	2 2	6980 7460		

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: 2 = C39: Vert crack/ cone opposite end; C1314: Cone & Shear,
Form No: 18970, Report No: CON:0014921-41-C1 © 2000-2011 QESTLat	b by SpectraQEST.com Page 1 of 1

Engineering •		ild (• Test	On ing				5362 West Indianapol		stries, Inc. rt No: CON:	00149	21-42-C1
Concret	e Tes ⁻	t Re	port					Керо			Issue No: 2
SERVI 2749 L	ISON ENVI CE OCKPORT RA FALLS,	ROAD			SEKANOV IE REYNC		may not rep reproduced, Industries, I the reported	resent any other lo except in full, with nc. If a non-compli	o the specific locatio ocations or elevation nout written permissi iance appears on thi mpacts the project, t	s. This rep on by Prof s report, to	port may not be fessional Service the extent that
Project: GM BE BEDFC	dford Sf)rd, in	PRING [·]	18				· ^	Signatory: Alex Star	Nev (Department Man:	ager)	<u>)</u>
Mix Data							2460 011	0,20,20	10		
Mix Data Submitter Supplier Plant Mix Identification Specified Design S Design Unit Weigh	strength (psi t (pcf)	Irvin 918	g Materials, g Materials,) at age	Inc.	Ce Fly Coa Fin	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb) nix Agg (lb)		Source	Amc	ount	Moisture (%) N/A N/A N/A
Cement Factor (Sa					W	ater (gal)					N/A
Details of Sa Date Sampled	2/14/2013	B Da	te Received	2/15/2013		s	lump (in)	ASTM C 143	Measured S	Specifie	:d
General Location Sample Location Curing Method Field Sample No		40 thru \$ Field/La	Station 6+70 boratory Cur Id Cure Tem			np w/ plasti Air 1 Concrete 1 Air Co	icizer (in) Femp (°F) Femp (°F) ntent (%)	ASTM C 1064 ASTM C 231 ASTM C 138	3.50 36 70 5.80		
Contractor Truck No. Sampled By	Sevensor 1708 John Stap	Tic oles	ket No.	3119368		Batch S Water Ad	Size (yd³) Ided (gal)		9		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa V Partly Clo	oudy	erg ³ Placed	54.0	т	Time	Batched Sampled ne Placed ck (mins)		10:05 10:56 10:52 47		
Compressive	e Streng	th of	Concret	e Cylind	ers					AS	STM C 39
Specimen ID	Date Tested	Age (Days)	Dimens Diameter	ions (in) Height	Area (in²)	Type of Cap	Ultimate Load (lbf				Required rength (psi)
0014921-42-C1\1	03/15/13	29	4.00	8.00	12.57	U	95120	3	7570		4000

90700

3

U

7200

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combin	ed
Form No: 18970, Report No: CON:0014921-42-C1 ©	2000-2011 QESTLab by SpectraQEST.com Page 1 of

0014921-42-C1\2

03/15/13

29

4.01

8.00

12.60

Engineering •	Infor To Bu	ild (On /				5362 Wes Indianapol				
Concrete	e Test	t Re	eport					Repo	rt No: CO	N:0014	921-43-C1 Issue No: 2
SERVI 2749 L	ISON ENVI CE OCKPORT RA FALLS,	ROAD		CC: DAN SHAN	SEKANOV IE REYNC		may not rep reproduced Industries, I the reported	resent any other lo , except in full, with nc. If a non-compl	ocations or eleva nout written perm iance appears or	itions. This i hission by P h this report	materials noted and report may not be rofessional Service , to the extent that lution is outside the
Project: GM BE BEDFC	dford Sf)rd, in	PRING ²	18					JA. DU Signatory: Alex Star Issue: 3/26/20	nley (Department I		\bigcirc
Mix Data											
Mix Data Submitted Supplier Plant Mix Identification Specified Design S		Irving 918	g Materials, g Materials,) at age	Inc.	Ce Fl Coa	Material ement (lb) y Ash (lb) rse Agg (lb) ne Agg (lb))	Source	A	mount	Moisture (%) N/A N/A
Design Unit Weigh Cement Factor (Sa	t (pcf)) 4000	, ar ugo	20 00,0	Adr	nix Agg (lb) /ater (gal)					N/A N/A
Details of Sa	mple										
Date Sampled	2/15/2013	B Da	te Received	2/18/2013		S	lump (in)	ASTM C 143	Measured	Specif	ied
General Location Sample Location	Baileys Br		station 6+70		Slur	np w/ plasti مند ت	cizer (in) emp (°F)		3.50 40		
Curing Method			aboratory C	ure		Concrete T	• • • •	ASTM C 1064	40 70		
Field Sample No	,		ld Cure Tem				ntent (%)	ASTM C 231	5.70		
Contractor Truck No. Sampled By	Sevenson 1714 John Stap	Tic	nmental ket No.	Low 3119396		Batch S	ight (pcf) Size (yd³) ded (gal)	ASTM C 138 Before After	9		
Submitted By Weather Est. Wind (mph) Est. Rh (%)	Melissa V Sunny	andenb	erg ³ Placed	45.0	٦	Time	Batched Sampled e Placed ck (mins)		11:00 11:39 11:34 34		
Compressive	Streng	th of	Concret	e Cylind						Δ	STM C 39
	Date Tested			ions (in) Height	Area (in ²)	Type of Cap	Ultimate Load (Ibi			sive	Required Strength (psi)
0014921-43-C1\1	03/15/13	28	4.00	8.00	12.53	U	89090	-	7110		4000

92780

-

7380

7250

4000

U

Notes 1.Sampling to ASTM C 172 2.Specimen(s) Prepared to ASTM C 31 3.Capping B=Bonded ASTM C 617, U=Unbonded ASTM C 1231, C = Combined	Remarks Fracture Type / Remarks: - = Not Defined,
Form No: 18970, Report No: CON:0014921-43-C1 © 2000-2011	QESTLab by SpectraQEST.com Page 1 of

0014921-43-C1\2

03/15/13

28

4.00

8.00

Appendix C.3

Geosynthetic Clay Liner



Sevenson Environmental Services, Inc.

LETTER OF TRANSMITTAL

2749 Lockport Road Niagara Falls, New York 14305 (716) 284-0431

TO: CRA	DATE: November 27, 2012		
ADDRESS:	JOB NO.: E801		
CITY: Waterloo, Canada	RE: Sevenson Submittal#28		
ATTENTION: Rick Hoekstra			

PLEASE BE ADVISED:

WE ARE SENDING	YOU:	Attached	Under Separate Cover Via The Following:			
PRINTS	PLANS	SHOP DRAWINGS	SAMPLES	SPECIFICATIONS		
ARTWORK	PROOFS	PHOTOGRAPHS	COPY OF LETTER	CHANGE ORDER		

	No. of Copies	Drawing No.	Date	Description
1	3	SES Submittal #28	11/27/12	GSEBentoliner NWL-35 Geosynthetic Clay Liner Manufacturer Literature and Data for the Bailey's Branch and Tributary #3 Capping Project at Spring 18
2				
3				
4				
5				
6				
7				

THESE ARE BEING TRANSMITTED AS INDICATED BELOW:

AS REQUESTED	APPROVED AS IS	SUBMIT COPIES FOR DISTRIBUTION
FOR APPROVAL	APPROVED WITH CORRECTIONS	RETURN CORRECTED
FOR YOUR USE	RETURNED WITH CORRECTIONS	RETURNED AFTER LOAN TO US
FOR YOUR COMMENTS	RESUBMIT COPIES FOR APPROVAL	

COMMENTS:

Please reiew and return one appoved copy of the submittal for our records

Please return all documents if corrections are required

COPIES TO:	SEVENSON ENVIRONMENTAL SERVICES, INC.
	\wedge \bullet .
	Signed <u>NIN II</u>
	Daniel Sekanovich

M:\Submittals\Submittal #27 Gate 31 Turnstile Access Stairs\Submittal 27 Transmittal 20120625.doc

SUBMITTAL FORM

Project: Bailey's Branch and Tributary #3 Capping Project at Spring 18

Contractor: Sevenson Environmental Services 2749 Lockport Road Niagara Falls, N.Y. 14305

Engineer: Conestoga-Rovers & Associates 320 GM Drive Bedford, Indiana 47421

SUBMITTAL NUMBER:	#28	
SECTION:	Detail B (C-08)	
PAGE NUMBER	CRA Drawing C-08	······································
ITEM:	GSE Bentoliner NWL-35 Geosynthetic Cla	y Liner
SUBMITTAL TYPE:	 A - Test Results and/or Certificates B - Manufacturer's Literature or Data C - Shop Drawings D - Operation and Maintenance Instruction E - Samples F - Alternative Product Supporting Data G - Administrative such as schedules, etc. 	SHOP DRAWING REVIEW Submission No. 28 Contract No. 13968 ENGINEER's approval is for the s
DEFICIENCIES:		purpose of ascertaining conformat with general design concerns express in the Contract Documented and its way constitutes approval of the dat design inherent in CONTRACTOR Shop Drawings, responsibility for wal
SUBMITTAL DATE:	11/2712	remains solely with COPTRACTC submitting same. Appraval does a authorize changes to Contra Documents.
RESPONSE REQUIRED:	A.S.A.P	Approved Approved as Noted Not Subject to Review Revise of Resubmit

Certification Statement:: By this submittal, I hereby represent that I have determined and verified all field measurements, 15968 field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.

Signature

11/27/12

PRODUCT DATA SHEET

GSE BentoLiner NWL-35 Geosynthetic Clay Liner

GSE BentoLiner "NWL-35" is a needlepunched reinforced composite geosynthetic clay liner (GCL) comprised of a uniform layer of granular sodium bentonite encapsulated between a nonwoven and a scrim-nonwoven geotextile for dimensional stability. The product is intended for moderate to steep slopes and moderate to high load applications where increased internal shear strength is required.

AT THE CORE:

This composite clay liner is composed of a uniform layer of granular sodium bentonite between a nonwoven and scrimnonwoven textile for dimensional stability.

Product Specifications

Tested Property	Test Method	Frequency	Value	
Geotextile Property				
Cap Nonwoven, Mass/Unit Area	ASTM D 5261	1/200,000 ft ²	6.0 oz/yd² MARV ⁽¹⁾	
Carrier Scrim Nonwoven, Mass/Unit Area	ASTM D 5261	1/200,000 ft ²	6.0 oz/yd² MARV	
Bentonite Property				
Swell Index	ASTM D 5890	1/100,000 lb	24 ml/2 g min	
Moisture Content	ASTM D 4643	1/100,000 lb	12% max	
Fluid Loss	ASTM D 5891	1/100,000 lb	18 ml max	
Finished GCL Property				
Bentonite, Mass/Unit Area ⁽²⁾	ASTM D 5993	1/40,000 ft²	0.75 lb/ft² MARV	
Tensile Strength ⁽³⁾	ASTM D 6768	1/40,000 ft²	45 lb/in MARV	
Peel Strength	ASTM D 6496 ASTM D 4632 ⁽⁴⁾	1/40,000 ft²	5.3 lb/in MARV 35 lb MARV	
Hydraulic Conductivity ⁽⁵⁾	ASTM D 5887	1/Week	5 x 10 ⁻⁹ cm/sec max	
Index Flux ⁽⁵⁾	ASTM D 5887	1/Week	1 x 10 ⁻⁸ m ³ /m ² /sec max	
Internal Shear Strength ⁽⁶⁾	ASTM D 6243	Periodically	500 psf Typical	
	TYPICAL ROLL	DIMENSIONS		
Width x Length ⁽⁷⁾	Typical	Every Roll	15.5 ft x 150 ft	
Area per Roll	Typical	Every Roll	2,325 ft ²	
Packaged Weight	Typical	Every Roll	2,600 lb	

NOTES:

• ⁽¹⁾Minimum Average Roll Value.

• ⁽²⁾At 0% moisture content.

• ⁽³⁾Tested in machine direction.

• ^(a)Modified ASTM D 4632 to use a 4 in wide grip. The maximum peak of five specimens averaged in machine direction.

• ⁽⁵⁾Deaired, deionized water @ 5 psi maximum effective confining stress and 2 psi head pressure.

• ⁽⁶⁾Typical peak value for specimen hydrated for 24 hours and sheared under a 200 psf normal stress.

 $\, \cdot \, {}^{\scriptscriptstyle (7)} \mathsf{Roll}$ widths and lengths have a tolerance of ±1%.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

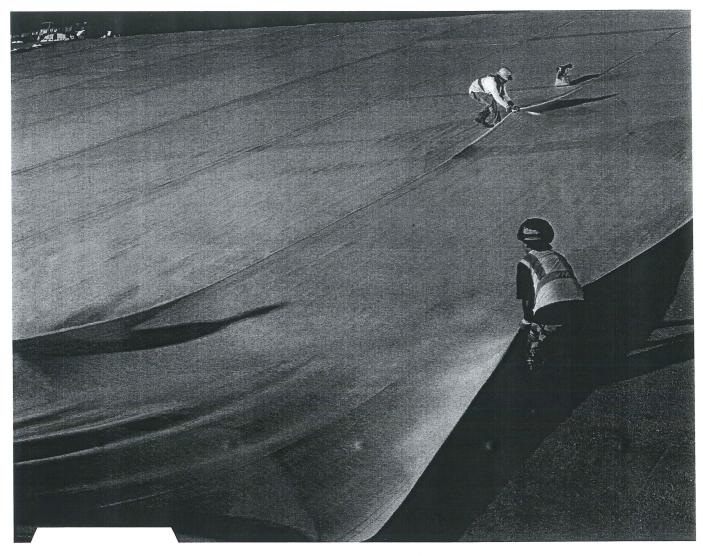
Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.



DURABILITY RUNS DEEP

For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

This Information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this Information. Specifications subject to change without notice. GSE and other trademarks in this document are registered trademarks of GSE Lining Technology, LLC in the United States and certain foreign countries. REV 14JUN2012





BENTOLINER GCL PRODUCTS Installation quality assurance manual

Contents

1.0 INTRODUCTION
2.0 UNLOADING PROCEDURES
3.0 STORAGE
4.0 SUBGRADE PREPARATION
5.0 DEPLOYMENT
6.0 OVERLAPS & SEAMS
7.0 ATTACHMENT DETAILS
8.0 ANCHORING
9.0 REPAIRS
10.0 INSPECTION
11.0 COVER MATERIAL
12.0 HYDRATION & ACTIVATION

1.0 INTRODUCTION

This manual provides an overview of the GSE Installation Quality Assurance procedures consistent with industry accepted practices to ensure that the GSE BentoLiner GCL products installed will best perform for its intended purpose. In addition, all installation work will be performed in strict accordance per the customer's specifications. Please read the procedures below completely before you begin. If you need further clarification, contact the GSE Engineering Support Staff for assistance or please refer to ASTM D 6102, Standard Guide for Installation of Geosynthetic Clay Liners and ASTM D 5888, Standard Guide for Storage and Handling of Geosynthetic Clay Liners. Remember safety first and use safe practices always on every project.

2.0 UNLOADING PROCEDURES

As with all lifting or unloading operations, appropriate equipment and experienced personnel should be employed along with proper safe handling methods. The party responsible for unloading the GSE BentoLiner should contact GSE prior to shipment to determine the correct unloading methods and equipment if different from the preapproved and specified methods as described below.

Lifting GCL rolls can typically be accomplished with by using a 2.5 in - 3.0 in (63 mm - 75 mm) outside diameter (O.D.) steel pipe (preferably solid), with a wall thickness capable of providing sufficient beam strength to support the weight of the roll, which average less than 3,000 lb (1,364 kg) and the length is approximately 18 ft (5.5 m). This core pipe is inserted through the hollow center of the GCL cardboard core. Heavy-duty slings or chains, which are approximately 10 ft (3.1 m) long, each are attached to each end of the pipe, which are then fastened to a I-beam spreader bar or a GSE approved alternative. Care should be taken to ensure that lifting chains or straps do not rub, chafe, or otherwise damage the GCL. A crane, backhoe, front-end loader or another suitable piece of construction equipment can then lift the entire assembly.

An all-terrain, extendable boom forklift, such as a Lull or Caterpillar Telehandler, can be fitted with a special, solid steel "carpet pole" or stinger, typically 14.0 ft (4.3 m) in length having an outside diameter of no more then 3.38 in (8.6 mm). The carpet pole can be inserted into the hollow cardboard core of the GCL roll.

The roll should not be fully suspended until the pole extends through the entire length of the core tube or you run the risk that the core may break creating additional handling and unloading difficulties

A properly structured and supported pole can be used to unload GCL rolls onsite. As an alternative, straps that are appropriately rated can be used as a GSE approved lifting method to unload GCL rolls. Lifting straps are supplied on every roll. Each GCL roll label contains roll weight information that should be consulted in determining appropriate lifting equipment and factors of safety.

The CQA inspector or owner's representative should verify that only appropriate handling equipment is utilized, i.e. equipment that does not pose any danger to personnel or undue risk of damage or deformation to the liner material.

3.0 STORAGE

While stored GCL needs to be kept dry and away from potential flooding or high storm runoff. On the job site storage methods include; storing the rolls tarped on pallets; storing the rolls under roof in a clean, dry protected area; and storing the rolls on a flat, dry, stable surface suitably covered with protective waterproof tarps. Rolls can be stacked as long as it is done in a manner that prevents them from rolling, shifting, or spontaneously moving. Maximum roll height should be determined by CQA personnel, but never more than can be safely managed considering site conditions, equipment and personnel.

Stored rolls should be tarped and remain in their original, unopened plastic shipping sleeves to prevent damage and undue prehydration prior to installation. Any rolls that come in contact with water should be examined by CQA or an owner's representative prior to installation. Prehydrated or physically damaged rolls should be set aside for further examination to determine the plausibility of repair or need to replace.



4.0 SUBGRADE PREPARATION

The surface upon which the GSE BentoLiner is installed should be smooth and free of wheel ruts, debris, roots, sticks, and rocks larger than 1.0 in (25 mm). Site specific compaction requirements should be followed in accordance with the project plans and specifications. At a minimum, the site should be smooth rolled the level of compaction such that installation equipment and other construction vehicles traffic does not cause rutting greater than 1.0 in (25 mm) deep. Furthermore, all protrusions extending more than 0.5 in (12 mm) from the subgrade shall be removed, crushed, or pushed into the subgrade.

In applications where the product is the sole barrier, subgrade surfaces consisting of gravel or granular soils may not be acceptable due to their large void content. For these applications, the subgrade shall be greater than 80% fines and contain no particles larger than 1 in (25 mm). In all high head, water containment applications, i.e. maximum water depth greater than 1 ft (30.5 cm), GSE recommends the use of a coated or laminated GCL such as GSE BentoLiner CNSL.

Immediately prior to deployment of the GCL, the subgrade shall be final compacted to fill in any remaining voids or desiccation cracks and to ensure that no sharp irregularities or abrupt elevation changes exist greater than 1.0 in (25 mm). The surfaces to be lined shall be maintained in this condition and free of standing water. GCL can be deployed on a frozen subgrade, if the subgrade would meet all the conditions as previously outlined if unfrozen.

The subgrade surface and preparation should be inspected and certified by the CQA inspector prior to GSE BentoLiner placement. Upon approval by the CQA inspector, it is the geosynthetic installer's responsibility to communicate to the engineer of any changes in the condition of the subgrade that might render it out of compliance, with any of the requirements of the project specification or ASTM Standard D 6102.

5.0 DEPLOYMENT

As rolls are selected for deployment, the labels should be removed and recorded by the installer, along with any other pertinent information. The rolls should only be transported from the storage area using approved lifting equipment as described in section 2.0. The roll is supported during deployment, so that the fabric designated as the upper surface faces out, away from the installation vehicle. The free end of the roll can then be secured, while the vehicle supporting the roll slowly backs away, deploying the GCL as it moves. Alternatively, the free end can be manually pulled across an area to be lined by the installation crew while the equipment simply suspends the roll. Equipment traveling directly on GCL for deployment of overlying geosynthetics should be limited to lightweight ATVs maximum bearing capacity of 8.0 psi (34.5 kPa) or equivalent.

Successive panels are overlapped according to project specifications and/or within the overlap lines stenciled on the upper surface of each panel. Wherever possible, installation of GSE BentoLiner should begin at high elevation and proceed to low elevation. This allows any precipitation to accumulate and drain quickly without adversely affecting the GCL. The edges of exposed GCL should be weighted down with sandbags or equivalent ballast to prevent uplift in the event of substantially strong winds.

Only as much GSE BentoLiner as can be fully covered by the end of the day should be deployed or such amount that can be covered in a reasonably short time in the event of heavy precipitation. When GCL is being installed under a geomembrane, the leading edge should be folded back under the membrane at the end of the construction day. Temporary ballasting, such as sandbags, to prevent uplift and the infiltration of runoff water should secure the leading edge of the membrane.

GSE BentoLiner panels should be installed in a relaxed condition, free of wrinkles and folds. When fitting the product into small areas or around construction details, use a sharp utility or hook blade knife to cut the liner to the appropriate dimensions. Adjacent panels should overlap at the edges as described in section 6.0 below.

6.0 OVERLAPS & SEAMS

Unless specified differently adjacent lengthwise (longitudinal) seams should be overlapped a minimum of 6.0 in (150 mm). Granular bentonite should be used to augment all overlapped seams. Loose granular bentonite is placed between ajoining panels into the overlap area at a rate of 0.25 lb per linear foot (350 g per linear meter) of seam. Widthwise overlaps at the butt ends of rolls should be a minimum 12.0 in (300 mm). Seams should be shingled in a down slope direction, so that water flows across the seam from upslope sheet to the down slope sheet.

When the liner is cut to fit in small areas, i.e. into corners or around structures, adjacent panels should overlap a minimum of 1.0 ft (300 mm), adding abundant loose granular bentonite into the overlapped areas.

7.0 ATTACHMENT DETAILS

he product should be installed around penetrations, structures, pipes, structures and other appurtenances according to the contract drawings. GSE BentoLiner may be secured to appurtenances by use of a stainless steel batten or clamps, mechanical fasteners, or other appropriate device if necessary to minimizing movement. The use of additional granular bentonite or bentonite paste is recommended to maximize the seal around structures or protuberances.

8.0 ANCHORING

GSE BentoLiner is typically anchored in a trench around the perimeter of the lined area, which provides the required pullout resistance. In most cases, GCL can be anchored in the same trench as any adjacent geosynthetic liner components (if used). Dimensions and locations of the trench should be provided in the project drawings. Alternately, the material may be anchored by deploying additional run out of material, a minimum of 3.0 ft (1.0 m), past the slope crest and toe. Typically GCL should not be deployed in tension. The force holding the GCL in place should be provided by friction between the GCL and adjacent materials

Steps should be taken to ensure that precipitation does not accumulate in the trench prior to backfilling. The GCL should only cover the front face and bottom of the anchor trench. The trench should be back filled and properly compacted prior to placing cover soil on the slopes.

9.0 REPAIRS

In the event an area of GSE BentoLiner becomes damaged, torn, or punctured during installation, the affected area should be repaired. On relatively level surfaces, the damaged area should be covered with a separate piece of GSE BentoLiner extending at least 12.0 in (300 mm) beyond the damaged area in every dirRection. Granular bentonite should be used to augment the patch overlays as is required for all other seams. Patches on side slopes can be temporarily secured with construction adhesive such as Liquid Nails or tape.

Areas that are exposed to standing water or excess precipitation with resulting bentonite hydration, typically as defined as greater than 30% moisture, prior to soil covering, should be examined for bentonite displacement and damage by subsequent activities. If it is determined that the GCL has been hydrated and damaged, the GCL should be covered with new material over the affected area or removed and replaced. All GSE BentoLiner material exposed to hydrocarbon fuels, chemicals, pesticides, non-compatible leachates, or other harmful liquids during the installation should be removed and replaced with non-affected material.

10.0 INSPECTION

Prior to soil covering the panels, penetrations and any other details should be visually inspected to ensure full coverage and proper orientation. Once the installed GSE BentoLiner material has been approved the next layer of geosynthetics or soil covering may be applied.

11.0 COVER MATERIAL

Only the amount of GSE BentoLiner GCL that can be anchored, inspected, and covered the same day should be installed. In cases where the GSE BentoLiner GCL is the sole hydraulic barrier, the GCL should be covered with the specified thickness of cover soil (a minimum 1.0 ft (300 mm)) immediately following deployment. Where GSE BentoLiner GCL is used in conjunction with other membrane components, it should be covered with the geomembrane after placement, as soon as possible to protect it from the climatic elements.



BentoLiner GCL Products



When GSE BentoLiner is used with no overlying geomembrane, the soil cover should be placed within 2.5 ft (800 mm) of the leading edge of the GCL. The leading edge can then be covered with plastic sheeting that is folded under the exposed edge approximately 12.0 in (300 mm). Sand bags or suitable ballast should be placed on the liner to hold the plastic in place and to partially confine the GCL. The next morning the ballast and the plastic can be removed and subsequent rolls of GCL placed as described in section 5.0.

Cover soil placed directly on GCL should have a gradation to not damage or puncture the GCL. Cover soil should be free of all rocks greater than 0.75 in (18 mm) diameter, sharp or angular objects, sticks, roots or debris. Appropriate placement methods should be used at all times to protect the GCL. Compatibility of GSE BentoLiner GCL with the soil should be verified. Cover material should be pushed across the seams from top to bottom to prevent the cover material from lodging between the overlapped panel seams.

12,0 HYDRATION & ACTIVATION

In applications where the product is used as the sole hydraulic barrier, such as secondary containment, the GCL must first be hydrated with fresh water. Non-aqueous chemicals will not activate the bentonite. Therefore, bentonite hydration via rainwater or sprinkler and irrigation is necessary. When hydrated, the GSE BentoLiner is an excellent barrier to hydrocarbon fuels, fertilizers, and other such chemicals.

Only after the cover material has been placed should the GSE BentoLiner be allowed to hydrate. Once hydration has occurred no vehicles should be allowed to traffic the area directly above the GCL, unless minimum 1.0 ft (300 mm) separation exists between the GCL and the vehicle to adequately distribute the vehicle load. This should be increased to a minimum of 2.0 ft (600 mm) in high traffic areas such as roadways.

Periodic inspection of the liner to ensure proper coverage and adequate moisture content is recommended when GSE BentoLiner is used alone under a minimum 1.0 ft (300 mm) depth of cover soil. In arid regions, it may be necessary to irrigate the containment area, at a predetermined interval and/or a laminated or coated GCL used and deployed with the plastic component up in order to minimize dessication and wet – dry cycling.