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General Motors LLC

Sediment Remedial Work Plan

Former General Motors Assembly Plant Site
Sleepy Hollow, New York

November 2012

ARCADIS

Certification Statement

I Mark O. Gravelding, P.E., certify that I am currently a New York State registered professional engineer and that this *Remedial Work Plan* was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

November 14, 2012
Mark O. Gravelding, P.E. Date
NYS PE License No. 069985-1

ARCADIS of New York, Inc.
6723 Towpath Road, P.O. Box 66
Syracuse, NY 13214-0066
315.671.9671

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Sleepy Hollow, New York

Prepared for:
General Motors LLC

Prepared by:
ARCADIS of New York, Inc.
6723 Towpath Road
P O Box 66
Syracuse
New York 13214-0066
Tel 315 446 9120
Fax 315 449 0017

Our Ref.:
B0064462.0001

Date:
November 2012

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Acronyms and Abbreviations i

1. Introduction 1

1.1 Purpose 1

1.2 Site Location and Proposed Land Use 3

1.3 Relevant Guidance and Approvals 4

1.4 Contractor Plans 5

1.5 Document Organization 6

2. Remedial Action Work Tasks 7

2.1 Remedial Action Project Team 7

2.2 Mobilization 7

2.3 Submittals 8

2.4 Site Preparation 8

2.4.1 Clearing 8

2.4.2 Erosion and Sedimentation Controls 8

2.4.3 Turbidity Curtains and Oil Booms 9

2.4.4 Dust, Vapor, Odor, and Noise Controls 10

2.4.4.1 Use of Chemical Suppressants 11

2.4.4.2 Noise Mitigation 11

2.4.5 Additional Work Tasks 12

2.5 Water Treatment 12

2.5.1 Water Collection and Storage 13

2.5.2 Solids/Oil and Grease Removal 13

2.5.3 Metals Removal 13

2.5.4 Neutralization/Precipitation 14

2.6 West Parcel Storm Sewer Pipe Cleaning 14

2.7 Survey 15

2.8 Excavation Support and Protection 16

2.9 Sediment Excavation 17

2.10 Sediment Stabilization 19

2.11 Transportation and Disposal 20

2.12 Backfill 20

2.13 Relocation of Millings Pile 21

2.14 Demobilization 22

2.15 Construction Observation and Quality Assurance 22

2.15.1 Community Air Monitoring Plan (ARCADIS) 23

2.15.2 Sediment Sampling and Analysis Plan 23

2.15.3 Turbidity Monitoring 23

2.15.4 On-Site Observation 24

2.15.5 Field Changes and Clarifications 26

2.16 Contingency Plan 27

2.17 Health and Safety 27

2.18 Permitting 27

2.19 Site Security 27

3. Reporting 29

3.1 Daily Progress Reports 29

3.2 Daily Observation Reports 30

3.2.1 Problem and/or Deficiency Identification and Correction Action Documentation 30

3.2.2 Photo Documentation 31

3.3 Weekly Meeting Minutes 32

3.4 Monthly Progress Reports 33

3.5 Construction Completion Report 33

4. Schedule 34

5. References 35

Tables

Table 2-1 Key Personnel

Table 2-2 Summary of Permits

Figures

Figure 1 Site Location Map

Figure 2 Aerial View

Figure 3 Dredging Sequence (Contractor Figure)

Figure 4 Site Plan (Contractor Figure)

Contract Drawings

Cover Sheet

G-100 General Notes, Abbreviations, and Survey Control

G-101 Existing Site Features

G-102 Site Preparation Plan

G-200 Removal Area/Turbidity Curtain Plan

G-201 OF-1 Sewer Lines

G-300 Cross Sections A-A' and B-B'

G-301 Cross Sections C-C' and D-D'

G-400 Miscellaneous Details

G-401 Miscellaneous Details

Appendices

A Contractor Plans

B Community Air Monitoring Plan

C Health and Safety Plan

D Sediment Sampling and Analysis Plan

E Preliminary Project Schedule

Acronyms and Abbreviations

BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BUD	Beneficial Use Determination
CAMP	Community Air Monitoring Plan
cy	cubic yards
ESCs	Erosion and Sedimentation Controls
GPS	Global Positioning System
GMC	General Motors Corporation
GM LLC	General Motors LLC
HASP	Health and Safety Plan
MLC	Motors Liquidation Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
ORP	Oxidation-Reduction Potential
QA	Quality Assurance
QC	Quality Control
RF	Riverfront Development
Roseland	Roseland/Sleepy Hollow, LLC
RWP	Remedial Work Plan
Sediment RWP	Sediment Remedial Work Plan
SEQR	State Environmental Quality Review
Site	Former General Motors Assembly Plant
TCLP	Toxicity Characteristic Leaching Procedure
VCA	Voluntary Cleanup Agreement

1. Introduction

1.1 Purpose

This Sediment Remedial Work Plan (Sediment RWP) has been prepared by ARCADIS on behalf of General Motors LLC (GM LLC), in accordance with Brownfield Cleanup Agreements (BCAs) with the New York State Department of Environmental Conservation (NYSDEC) for the investigation and remediation of the Former General Motors Assembly Plant Site located at 199 Beekman Avenue, Village of Sleepy Hollow, New York (Site). Figure 1 shows a map of the Site location.

This Sediment RWP follows the acceptance of the Remedial Work Plan (RWP) for the entire site (ARCADIS 2012) by NYSDEC in their Decision Document issued June 8, 2012. The final approved RWP (June 2012) described the remedial approach for the future land development and the remedial approach for sediments in on-site sewers and in the Hudson River adjacent to the site.

The purpose of this Sediment RWP is to provide detailed design and implementation plans for the execution of the sediment component of the approved RWP. Sediment remediation includes dredging of sediments from the Hudson River and removal of sediments from on-site storm sewers.

The Decision Document described the sediment remedy as follows:

- Removal of sediment will occur over an approximately 0.8-acre portion of the Hudson River near Outfall OF-1. The removal area will extend 150 feet upstream and downstream of the outfall and will be bounded by the shoreline and the existing Tarrytown Harbor channel. Removal will extend to cut elevations of approximately 17.5 feet below mean sea level.
- This dredging will maximize mass removal based on remedial investigation sampling results and a graphical evaluation of the data and will remove approximately 4,400 cubic yards (cy) of metals contaminated sediment.
- The freshwater lowest effect levels established in the NYSDEC Technical Guidance for Screening Contaminated Sediments would be met within the delineated removal area to a significant depth (4-10 ft).
- To provide environmental controls, turbidity curtains will be used and water quality monitoring will be conducted during the sediment removal operations. Verification samples will be collected to document the quality of sediments left in-place following dredging.

- Following removal, dredged sediment will be placed on a pre-constructed staging area on the West Parcel. Dredged material will be segregated to remove debris and material not suitable for disposal and staged to facilitate dewatering, stabilization, and sampling for waste characterization and evaluation of treatment and requirements. Water generated during the dredging and dewatering activities will be treated on site using a portable water treatment system. Treated water will then be discharged to the Hudson River.
- The dredged area of the Hudson River will be backfilled with in-kind material; likely sand to within 2 feet of the final grade and 2 feet of fine material to the final grade on top of the sand. The final elevations of the restored dredged area will be the same as it was prior to dredging activities. The habitat zones disturbed during these remedial activities will be restored to current conditions.
- During the Hudson River sediment dredging, a 30-foot section of the 48-inch storm sewer that discharges at OF-1 will be cleaned out to remove accumulated sediments. It is estimated that this cleanout will extend from the outfall to the first upstream manhole (approximately 30 feet). The sediment will be placed in the West Parcel staging area where it will be sampled for waste characterization purposes prior to disposal. In addition, a site-wide storm sewer inspection, including the collection of any necessary sediment samples for laboratory analysis, will be completed during the cleanout of the 48-inch storm sewer to determine sediment removal from other areas of the system that may be required to meet the remedial action objectives and avoid recontamination of the dredged area.

The Decision Document, as it relates to sediments, was supported by the NYSDEC-approved Sediment Remedial Investigation Report, Sediment Alternatives Analysis Report and the Remedial Work Plan for the entire site (ARCADIS 2012). After the Decision Document was issued, the following modifications to the sediment remedy were proposed during the design phase and are included in this Sediment RWP:

- GM LLC was granted a Beneficial Use Determination (BUD) from NYSDEC on July 24, 2012 to re-use sediments removed during the remedial project for on-site beneficial use as upland intermediate fill above the water table and below the final cover system, subject to meeting quality conditions outlined in the BUD. The temporary handling, stabilization and onsite placement of these sediments is described in this Sediment RWP.
- The backfill elevation described in this Sediment RWP was designed to provide a minimum of 2 feet of cover in excavated areas rather than restoration to current conditions at outlined in the Decision Document. This

revised concept was developed after assessing the current bathymetric conditions. The proposed design provides effective backfill thickness and slope to the dredged area without overfilling a traditionally depositional area. The proposed grade will transition with the future grade within the adjacent Tarrytown Harbor navigation channel, which is periodically maintained at a lower elevation by the US Army Corps of Engineers. The perimeter of the backfill areas are designed to slope at a stable grade (5:1) to match the surrounding, undisturbed grades. This design will limit sloughing of/provide stability for adjacent undisturbed areas. The backfill elevation will also allow for natural in-filling of the area with river sediments.

- GM LLC decided to increase the extent of storm sewer cleanout specified in the Decision Document to remove residual sediments, as described in this Sediment RWP. Up to 10,000 linear feet of storm sewer lines and associated catch basins on the West Parcel will be cleaned to remove residual sediments and process the removed material along with river sediments for onsite beneficial use in accordance with the BUD. The East Parcel and South Parcel storm sewers are excluded from this Sediment RWP because those systems do not directly discharge to the Hudson River.
- GM LLC's remedial contractor determined that it would be more efficient to obtain a permit and discharge treated water to the municipal sewer system rather than to the Hudson River, Alternatively, the remedial contractor may elect to collect untreated water and pump to tanker trucks for offsite disposal at a permitted wastewater treatment facility.

1.2 Site Location and Proposed Land Use

The Site is situated on the eastern shore of the Hudson River (Figure 1) and occupies an area of approximately 96.2 acres within the Village of Sleepy Hollow. The Site (Figure 2) is comprised of three, non-contiguous parcels: 1) the former main assembly plant area referred to as the West Parcel (approximately 66.2 acres); 2) the eastern parking lot referred to as the East Parcel (approximately 28.3 acres); and 3) the former salaried employee parking lot referred to as the South Parcel (approximately 1.7 acres). The Hudson River sediments to be removed during this project are located along the shoreline of the West Parcel and the adjacent waterfront walkway owned by the Village of Sleepy Hollow immediately south of the West Parcel (Figure 2).

The contemplated use of the Site is restricted (by deed restrictions/environmental easement) mixed commercial and restricted residential development, with public open space, including public access to the waterfront and municipal public works operations.

The Site is located in the Village of Sleepy Hollow's RF – Riverfront Development Zoning district, which allows for a mixed use development of residential and commercial properties consistent with the RF zoning, as determined by the Village of Sleepy Hollow, lead Agency for State Environmental Quality Review (SEQR) of the proposed redevelopment of the Site (Findings Resolution adopted by the Village on July 24, 2007).

General Motors Corporation (GMC) and their former development partner Roseland/Sleepy Hollow, LLC (Roseland) initiated formal NYSDEC review of Site environmental conditions in a Voluntary Cleanup Agreement (VCA) signed in November 2002. The VCA applied to the entire Site and included investigation of the Hudson River adjacent to the West Parcel. In June 2004, the project transitioned from the Voluntary Cleanup Program to the Brownfield Cleanup Program (BCP). During the transition, two separate BCAs were signed in May 2005, one for the East Parcel and the other for the West Parcel. The BCA for the West Parcel also includes the South Parcel and the Hudson River as an identified offsite area of interest to the West Parcel. On April 1, 2009, Roseland terminated its participation in the BCAs and the Site redevelopment. On June 1, 2009, GMC filed for bankruptcy. On July 10, 2009 in accordance with an order from the Bankruptcy court, GMC changed its name to Motors Liquidation Corporation (MLC) and sold its interest in the Sleepy Hollow site to a newly formed company, General Motors LLC (GM LLC). GM LLC was added to the BCAs in 2010 and intends to complete the sediment remedial actions required by the BCAs and select a new partner to implement the remaining land-based remedial actions and construct the redevelopment project.

1.3 Relevant Guidance and Approvals

This Sediment RWP has been prepared in conformance with the BCAs for the Site and is consistent with the following documents, where applicable:

- Draft Brownfield Cleanup Program Guide (NYSDEC, May 2004)
- DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, May 2010)
- Title 6 of the New York State Compilation of Codes, Rules and Regulations Part 375 (6NYCRR Part 375)
- Decision Document issued by NYSDEC, June 8, 2012

- Beneficial Use Determination for Site Sediments issued by NYSDEC, July 24, 2012

- Nationwide Permit Determination and Special Conditions issued to GM LLC by the Department of Army, New York District Corps of Engineers, August 22, 2012

- General Concurrence (Federal Consistency-Coastal Zone Management) issued by New York State Department of State, August 27, 2012

- Water Quality Certificate Issued by NYSDEC (pending)

1.4 Contractor Plans

This RWP was prepared in participation with the Remedial Contractor, Sevenson Environmental Services, Inc. The Contractor has provided the Engineer with the following plans for review:

- Proposed Implementation Plan, includes the following components:
    - Excavation Support Installation Plan
    - Staging/Access Area Construction Plan
    - Storm Sewer Cleaning Plan
    - Dredging Plan
    - Material Stabilization Plan
    - Erosion, Sediment, Dust, and Odor Control Plan
    - Backfill Plan
    - Site Restoration Plan
    - Water Handling and Disposal Plan
    - Turbidity Control Plan
- Contingency Plan
- Health, Safety, and Environmental Response Plan
- Sampling and Analysis Plan
- Spill and Contamination Prevention Plan
- Quality Control Plan
- Storm Sewer Cleanup Plan
- Excavation Support Plan

The Contractor Plans are provided in Appendix A.

1.5 Document Organization

This Sediment RWP is organized as follows:

Section	Purpose
Section 1 — Introduction	Provides the purpose and scope of this report, Site description, project background, and document organization.
Section 2 — Remediation Construction Approach	Summarizes the approach to construction, including health and safety, site preparation and work areas, construction methods, environmental controls, and quality assurance and quality control (QA/QC).
Section 3 — Remedial Action Project Team, Schedule, and Reporting	Summarizes the current anticipated project team, schedule, and reporting during the implementation of the construction activities.
Section 4 — References	Lists sources referenced in this Sediment RWP.
Appendix A — Contractor Plans	Provides Contractor plans provided to the Engineer for review.
Appendix B — Community Air Monitoring Plan	Provides procedures for air monitoring during construction.
Appendix C — Health and Safety Plan	Provides project health and safety procedures for site visitors and construction observation activities.
Appendix D — Sediment Sampling and Analysis Plan	Provides procedures for turbidity monitoring, post-dredging sediment sampling and dredged material profile sampling.
Appendix E — Preliminary Project Schedule	Provides the anticipated mobilization, construction, and post-construction schedules.

2. Remedial Action Work Tasks

2.1 Remedial Action Project Team

Table 2-1. Summary of Remedial Action Project Team

Role	Party	Description
Owner	GM LLC	Responsible for implementing and completing the remedial activities described in this RWP
Engineer	ARCADIS	Retained by General Motors to serve as the Design Engineer (including Engineer of Record) for implementation of the remedial activities, including construction observation and environmental monitoring
Remedial Contractor	Sevenson Environmental Services, Inc.	Retained by General Motors for implementation of the remedial construction activities
Regulatory Agency	NYSDEC	Serve as lead regulatory agency and receive, review, and approve of written notices, reports, plan and other required documentation

2.2 Mobilization

Several work tasks will be performed prior to and during the mobilization of equipment and personnel to the site. These tasks include:

- Site security (see section 2.19) will be established and joint site access with the Village of Sleepy Hollow will be coordinated.
- Contacting Dig Safely of New York to ensure that no underground utilities are located within the excavation areas
- Installing temporary facilities and utilities, including field office trailers, associated equipment (telephone, Internet, air monitoring, etc.) and temporary sanitary facilities
- Performing a topographic survey to establish pre-existing site conditions in upland staging areas and performing bathymetric survey of the excavation area
- Obtaining outstanding permits
- Mobilizing the necessary equipment and temporary support facilities required to perform the removal of sediment via mechanical means

- Mobilizing necessary personnel and conducting required training and medical monitoring
- Installing project signs

2.3 Submittals

The Contractor will provide the Engineer with various plans, qualifications, and material submittals. The Engineer will review these items and request resubmittals, as necessary.

2.4 Site Preparation

Following mobilization of personnel and equipment, the Contractor will commence preparation of the site to allow performance of the work. Anticipated activities are discussed in the following sections.

2.4.1 Clearing

Clearing activities at the site will be minimal. Where necessary, existing vegetation will be removed from areas affected by sediment remediation activities, including trees and brush along the shoreline. Existing perimeter fencing will be removed as necessary to provide access to the offshore work areas from the shoreline.

2.4.2 Erosion and Sedimentation Controls

Erosion and sedimentation controls (ESCs) will be installed at the site for the following purposes:

- Minimize exposure of bare soil
- Preserve existing vegetative cover
- Prevent soil from leaving the site
- Stabilize disturbed areas soon after final grading
- Limit runoff velocities
- Divert run-on water away from disturbed areas
- Reduce sedimentation

ESCs will include silt fence and hay bales. In areas where silt fence cannot be installed due to the existing pavement and concrete slab, hay bales will be wrapped in geotextile to form a barrier to surface flow. Low points and other areas where water is observed

to pass through the barrier will be augmented with additional wrapped bales, sand bags, or other measures required by and approved by the Engineer.

The Contractor will construct sediment barriers at curb inlets and catch basins, as appropriate. In the event that work is conducted near the road that could impact off-site drains, the off-site drains will have protection measures installed, including installation of siltation curtains to mitigate sediment flow into the drain system. In addition, the Contractor will maintain absorbent booms on-site for use in preventing contaminated materials from entering the drainage system in the event of a spill.

2.4.3 Turbidity Curtains and Oil Booms

A turbidity curtain system will be designed by the Contractor, installed, and maintained for the duration of the in-water remedial activities. This system will encompass the entire dredge area (Figure 3). The system will include an oil boom installed as part of the curtain for containment and additional booms within the perimeter of the curtain for sorbing free oil and sheen should a petroleum spill occur.

To help support the curtain against the current, H-piles will be installed by a barge mounted crane with a vibratory hammer attachment. Conceptually, pile spacing will be 25 feet on center for sections oriented to the angle of the current and 50 feet on center when oriented parallel to the current. Pile lengths are estimated at approximately 25 feet.

The curtain will be installed utilizing a barge-mounted crane. The turbidity curtain sections first will be connected onshore to provide proper depth coverage when deployed. As the curtain is pieced together on the shoreline, it will be fed into the water and gradually pulled out utilizing a boat. A land-based crane or excavator may also assist with the deployment by gradually feeding the curtain off of the bank and into the water. Once the entire curtain has been fed into the water, the boat operator will haul the curtain into the necessary position. After the curtain is in the proper position, surrounding the dredge areas, it will be anchored at the necessary locations to limit movement.

Under no circumstances will the turbidity control system be anchored to the existing shoreline bulkhead or on private property without approval by the affected property owners. The turbidity control system will not infringe upon the federally-defined navigation channel.

After the necessary anchors have been deployed and the curtain is in a satisfactory position, the vinyl straps that hold the curtain against the float will be removed and the curtain will extend into place. Additional anchors may be utilized and/or removed as needed. The curtain will be inspected routinely and maintained as required throughout the dredging and backfill work.

The containment boom is prefabricated into the top portion of the turbidity curtain. Separate absorbent booms will be attached to the inside of the containment booms. The absorbent booms will be a minimum of 8 inches in diameter and will be placed such that there are no gaps to allow the potential migration of oil/sheens outside the boom. The Contractor will maintain the absorbent boom and change out the boom, as appropriate, to prevent the release of oil/sheens outside the boom until the restoration activities are completed.

2.4.4 Dust, Vapor, Odor, and Noise Controls

The Contractor will make every effort to limit dust, vapor, odors, and noise during the work and to comply with the Community Air Monitoring Plan (CAMP). The following controls will be used:

- Activities that may generate dust, vapor, or odors will only be performed during normal working hours
- Vehicles transporting materials and material stockpiles will be covered/tarped on-site when possible, and accordance with DOT requirements when transporting materials offsite
- Stockpiled sediment will be covered at the end of each work shift
- Access roads will be maintained and watered, as required
- Workers will notify supervisors of dusty conditions whenever they are visually observed, or otherwise indicated by community air monitoring, and request dust suppression support, if needed
- A street sweeper or street cleaner will be mobilized to the site, as necessary, to clean pavement surfaces to mitigate soil/sediment tracking and dust generation during or at the conclusion of the project
- Material loaded into trucks will not be dropped from heights above the truck body
- Truck tires and bodies will be cleaned of material prior to leaving the loading/unloading area and, if necessary, again prior to leaving the site
- Excavated material that spills onto the ground will be cleaned immediately

- Complaints of noise or odor from the village or local community will be reported to the Engineer and responded to accordingly with appropriate follow-up and noted in the daily construction activity report
- If dust, vapor, or odor becomes problematic or result in exceedance of CAMP alert levels, work may be slowed or stopped until a solution can be implemented
- Chemical suppressants will be used if necessary for odor control, subject to prior approval by the Engineer.

2.4.4.1 Use of Chemical Suppressants

Use of chemical dust, odor, and vapor suppressants shall be done in accordance with the recommended end-uses for those products. Rusmar product AC-645 will be used for chemical suppression needs. Sevenson will have a pneumatic foam unit (Model 400/25) onsite while work is being performed. The manufacturer recommended application rates will be used as a maximum level. Material Safety Data Sheets (MSDSs) for all chemical suppressant materials used at the Site will be reviewed and approved by the Engineer and GM LLC. Prior to application, site personnel will determine and evaluate if the use of the dust suppressant could interfere with other site monitoring activities or cause other harm to the environment (e.g., runoff into critical habitat for threatened or endangered fish).

2.4.4.2 Noise Mitigation

Noise will be generated during construction activities in such operations as transportation of materials and operation of heavy construction equipment. Onsite personnel will be provided protection against the effects of hazardous noise exposure whenever sound-pressure levels exceed 85 dB(A) steady-state expressed as a time-weighted average (TWA) or 140 dB(A) impulse. Personnel operating or working around construction equipment will utilize hearing protection and will be enrolled in a hearing conservation program that meets the requirements of OSHA regulation 29 CFR 1910.95.

The work will be conducted in accordance with applicable Sleepy Hollow noise ordinances. Overall noise levels from construction should be similar to noise from routine traffic in the area. The following noise mitigation measures will be implemented, at a minimum:

- A vibratory method will be used to drive sheet piles, which will produce less noise than using a drop hammer and is expected to meet the requirements of the local ordinances
- Construction equipment will be maintained in good working order to prevent loud or explosive noises
- The Contractor will hold routine meetings with staff about the importance of keeping conversations on and around the water to a normal conversation level and avoiding the use of foul language
- The Contractor will limit early morning work, particularly sewer cleaning, to limit noise impacts on the local community

In the event of a noise complaint, the noise level will be further monitored and the operations at the site will be modified, as necessary, to rectify the issue.

2.4.5 Additional Work Tasks

Additional work tasks will be performed during the site preparation phase. These tasks include:

- Installation of the temporary sheet pile wall (refer to Section 2.8)
- Construction of the temporary sediment staging area (refer to Section 2.9)
- Installation and maintenance of temporary construction fencing around work areas, as necessary for site safety and access control (refer to Appendix C)

2.5 Water Treatment

The Contractor intends to containerize wastewater and either discharge to the Westchester County sewer system or ship offsite for treatment. Batches of collected water will be sampled to determine if discharge to the sewer system is allowable without treatment in accordance with permit requirements provided by the county.

As a contingency, should the volume and quality of water dictate that onsite treatment is necessary, a wastewater treatment facility will be designed to process 75 gallons per minute of contact water generated during the remediation activities. The treatment facility would be assembled onsite and would remove oil and grease, suspended solids, and metals. Treated water would be discharged to the Westchester County sewer system via an onsite manhole, in accordance with requirements provided by the county.

The water collection tanks and treatment system (if required) will be installed in a lined containment pad approximately 75' x 75' in size, and fabricated with a 40-mil HDPE liner, covered on both sides with a cushion layer of 8-ounce non-woven geotextile fabric and a 6-inch protective layer of Item 4 stone on top for the equipment operation. The location of the wastewater collection/treatment facility is shown on Figure 4.

The following sections describe the contingency water treatment system.

2.5.1 Water Collection and Storage

Two 20,000-gallon storage tanks will be provided to collect water from the various work areas and provide for some initial settlement of fines that may be carried with the water. Additional storage tanks will be added as necessary as additional space is available at the site.

2.5.2 Solids/Oil and Grease Removal

The system has been designed to first remove suspended solids and oil and grease by gravity in the Oil-Water Separator, which removes these materials by settling out most suspended solids and by flotation of oil and grease. The Oil-Water Separator will also serve as an equalization tank for flow and load variations. Flow will be pumped from the tank and the flow rate measured prior to entering the downstream processes.

2.5.3 Metals Removal

Following solids and oil and grease removal, the process next addresses metals. Metals reduction will be accomplished by first reducing the wastewater pH to 2-3 using sulfuric acid. The acid addition will be in-line, followed by a static mixer to quickly achieve full mixing, and a mix tank to provide sufficient detention time. A downstream pH controller will control the acid addition.

Next, a reducing agent (Ferrous sulfate) will be utilized. Ferrous sulfate will remove heavy metals such as lead by the iron co-precipitation process. Ferrous sulfate will also be added in-line, followed by a static mixer and mix tank. Ferrous sulfate addition will be controlled by an Oxidation-Reduction Potential (ORP) controller.

At this point, heavy metals such as lead are captured in an iron-metal bond to be removed in the following chemical precipitation step.

2.5.4 Neutralization/Precipitation

In order to finally remove lead and other metals, the wastewater must be first neutralized to a pH of approximately 7.5 - 8.5. This allows hydroxides of chromium, iron-lead, and other metals complexed with iron to precipitate and be removed. Sodium hydroxide will be used for this purpose. The sodium hydroxide, or caustic, will be injected in-line, followed by a static mixer and mix tank. As with acid, the caustic addition will be controlled by a pH controller. The controller will be set to control pH at 7.5 - 8.5. Polymer will be added downstream prior to a flash mixer and flocculation tank, to facilitate settling of the hydroxide flocculants.

The metal-hydroxide solids will be settled and removed in an inclined-plate clarifier unit. Sludge will be pumped from the unit using an air-operated diaphragm General Motors pump. Sludge will be mixed with the excavated material for disposal. The mixture will be sampled and analyzed to determine if the material meets the requirements for onsite disposal, as described in Sections 2.10 and 2.11. Materials that do not meet the requirement for onsite disposal will be disposed offsite at a permitted waste management facility.

2.6 West Parcel Storm Sewer Pipe Cleaning

The network of storm sewers and associated manholes and catch basins on the West Parcel will be cleaned to remove sediment and associated wash waters. The removed materials will be placed in the on-site staging area for stabilization and water treatment through the on-site facility. Once the sewers are cleaned, a video camera will be placed in the sewers for final confirmation and documentation.

The sewer cleaning equipment utilized will be based on the diameter of the sewer line and the access to the pipe and manholes. A water jet hose line will be utilized for smaller size pipes, while a drag line and/or a vacuum truck will be used for the large diameter pipes.

The initial task is to prevent the flow of water from the Hudson River from entering the sewer system from Outfall OF-1. Sheet piling or another barrier will be used to block the OF-1 outlet. Sections of pipe will be isolated via manholes to prevent back flow of water and to capture sediment and water.

The sediment will be jetted with water obtained from a local fire hydrant. A permit will be obtained in order to obtain access to the fire hydrant water. A vacuum truck or

comparable type unit will vacuum the sediment and water into the truck. The sewer line will be jetted repeatedly until sediments are sufficiently removed as accepted by the Engineer. Once the sewer is clean, a video camera will be placed into the line for confirmation that sediments have been removed to the extent practicable. The sewer lines will remain plugged until larger sections are cleaned.

A bypass pump system will be installed in the system from one manhole to another to maintain water flows into other sewer lines and prevent additional flows into the work area. The removed water and sediment will be transported via the vacuum truck to the on-site staging area where the material will be transferred to the containment area for processing. The silts and fines will be allowed to settle out from the water before the water is pumped to the temporary on-site water treatment facility via a submersible pump. The sediment will be temporarily staged for gravity draining and then will be blended with a reagent prior to on-site stockpiling. Recirculation of wash water for additional sewer cleaning will be allowed.

In general, work will progress from the far end of the site to the outfall at the river. Once major runs of pipe are cleaned, the bypass pump system will be removed and relocated. The sewer line plugs will also be removed and relocated to the next work area. Upon completion, the sewer lines and manholes will be video inspected and the results will be submitted to the Engineer for review.

2.7 Survey

The following survey activities will be performed by the Contractor:

- Location and protection of existing benchmarks
- Survey control for construction and documentation purposes
- Layout of additional survey controls, grid coordinate locations, lines, grades, and elevations necessary for the proper construction, documentation and testing of the work
- Pre-construction survey to document existing conditions
- Interim monitoring throughout construction activities via Global Positioning System (GPS) units attached to the dredging equipment
- Verification of existing conditions, dredging depths, and horizontals limits through performance of a post-construction survey, ensuring specified layer thicknesses are used during backfill activities, and performing as-built surveys of constructed site features (e.g. final grades, storm sewer pipe locations, invert locations, and the extent and grades of relocated sediments)

- Survey to verify the grades of both the final dredged and backfilled surfaces for use as acceptance of the completed work
- Provide bathymetric drawings to confirm that work was performed according to the specifications and to ensure that the dredging elevations were met
- Providing final survey to the Engineer, sealed and signed by licensed surveyor
- For all surveys, the Contractor will use the New York State Plane Coordinate System North American Datum 83 northing and easting coordinates in U.S. Survey feet
- For all surveys, the Contractor will use the vertical datum National Geodetic Vertical Datum 88 in U.S. Survey feet

2.8 Excavation Support and Protection

Prior to the installation of the temporary sheet pile wall, the shoreline will be cleared of trees, brush and debris. The sheet piling required for the work will be imported by truck and staged on the asphalt area adjacent to the river. It is anticipated that AZ-18, or greater, hot rolled sheet piling will be utilized for the required shoring. The sheet piling will be inspected prior to use to ensure it is visibly clean and free of soil, debris or oil.

The alignment of the excavation support system will be surveyed and the shoreline will be inspected for large rock or debris that may inhibit the installation of the sheets. The Contractor will remove visual obstructions with a track excavator with a grapple attachment and the material will be placed in the on-site staging area for proper disposition or replacement.

A crane with a vibratory hammer will be utilized to install the temporary sheet pile wall on the western end of the removal area. Due to access restrictions with the Ichabod Landing property, the easternmost sheets will be installed with a crane located on barges within the Hudson River. This same crane will be utilized for dredging and will be equipped with a Cable Arm bucket.

The final design of the excavation support system will be provided by the Contractor and will be signed and sealed by a Professional Engineer licensed in New York State.

Once the sediment and backfill operations are completed, the sheetpiles will be removed by the same equipment used for installation, cleaned, and removed from the site.

2.9 Sediment Excavation

In anticipation of the removal of approximately 4,400 cy of impacted sediment, the Contractor will construct a material staging pad that is 100-feet-wide by 200-feet-long with 2-foot-high berms along the entire perimeter (see Figure 4). The berm will be constructed of existing on-site concrete millings. The pad will be constructed with a layer of 40-mil HDPE liner protected on both sides with a layer of 8-ounce non-woven geotextile fabric. A 4-inch protective layer of stone will be placed to provide a suitable work surface for material stabilization and handling. Concrete millings also will be used to create unloading and mixing areas within the staging area that will be placed on the west side of the pad where the crane will be direct dumping the dredged material.

A secondary material staging pad will be constructed at the west end of the GM parcel, where stabilization and staging of the sediments for sampling will take place. This staging area will be constructed in the same manner as the primary material staging area discussed above. The secondary staging area will be constructed adjacent to the onsite disposal area in an existing sub-grade area. This location will provide protection from the wind, which will limit dust migration during blending activities. The sediments will be transferred to the secondary material staging area with trucks or off-road haulers with sealed tailgates.

The Contractor initially will mobilize a crane, which will be located on shore, to help with the unloading of steel sheetpiles and the waste water treatment components. This equipment will be used to unload sediment from the hopper barge located in the Hudson River (see Figure 3). An additional crane will be located on a deck barge in the river and will be responsible for dredging the impacted sediment. This crane will be set up with an environmental dredging bucket with GPS capabilities that will enable the operator to monitor work progress in real time to ensure that the dredging location and depths have been achieved.

Once the site mobilization and setup operations have been completed, initial survey and layout have been performed, proper work zones have been delineated, and the Engineer and NYSDEC have been notified, the Contractor will initiate the dredging of the impacted sediments in a systematic fashion (Figure 3).

As noted, sediment removal will be accomplished using a crawler crane located on a deck barge within the river. This crane will be equipped with a GPS unit capable of providing X and Y coordinates with depth control. The environmental clam bucket and GPS software will allow the crane operator to visually track the location of the bucket in

real time on the screen located in the cab of the crane. The Contractor will download the excavation limits into the GPS software. Once the excavation limits have been installed in the unit, the Contractor will commence removal.

As sediments are dredged, the material removed will be placed into an adjacent hopper barge, which will be 37 x 150 feet long. As shown on Figure 3, the removal of the sediments will take place in 4 phases, starting from the shoreline and working out to the sediment removal limits. The dredging will start on the west side and progress east. The capacity of the hopper barge is roughly 600 to 800 cy, so it will require two moves per phase to complete the sediment removal. The dredging operation will be aided by a tug boat, which will help move the barges into the tight work quarters within the contained sediment removal area.

As the excavation progresses, the crane located on shore, which will be staged at a safe distance from the bank of the river, will be responsible for off -loading sediments from the hopper barge. The sediments will be placed into the unloading area that will be fabricated on the west end of the removal area (Figure 4). Within the swing radius of the clam bucket between the hopper barge and the material staging pad, the Contractor will deploy a sacrificial piece of plastic/liner on the ground in order to contain spillage of the excavated materials during loading into the staging area. The material will gravity dewater while on the barge; this water will be pumped to 20,000-gallon storage tanks on the site for holding prior to disposal/treatment.

As a contingency during dredging operations, if hardpan or debris is encountered, the Contractor may temporarily utilize a conventional clam bucket that has the ability to remove firm sediment or debris that may prove too difficult to be removed with the environmental clam bucket. This may be the case along the shoreline where rip rap has been placed and where sheet piling is to be installed. On the west end, the hopper barge may require additional draft, so sediments may initially be removed using a clamshell bucket attached to the crane situated on shore. Sediment or debris removed for this contingency will be placed into the staging area and processed from there (Figure 4).

After the Contractor has removed the necessary amount of sediment from a given area, a licensed land surveyor will perform an as-built survey using conventional survey practices. The final as-built will be compared to the pre-construction survey to provide the final dredge elevation and removal volumes. The as-built surveys and the equipment with GPS capabilities will provide an accurate verification of dredge depths

and material volumes, and will help ensure that the Contractor does not exceed the specified dredge tolerances (+/- 3 inches in any direction).

Surveys will be performed prior to commencing debris removal activities, after completion of dredging activities/prior to backfilling activities, and after completion of backfilling activities. As-built surveys will be performed using conventional survey methods. The information provided by the GPS system on the crane will be used for informational and quality control purposes only.

Mechanical dredging will be performed in a manner such that re-suspension of sediments and sediment loss over dredged areas is minimized. The following dredging components will be controlled and are key elements to the operator training programs for the dredging operations:

- Lift speed: Bucket should be lifted slowly through the water column
- Cycle time: Cycle times should typically be between 1 and 3 minutes
- Excavation Depth: Dredge cuts will not be more than 2 feet to limit overfilling the dredge bucket, which could cause re-suspension
- Excavation path: Dredging will be performed so that dredge material from the bucket is not deposited in un-excavated areas.

It is expected that the dredge areas contain some debris, such as concrete, stone, and drift wood, that will be removed in order to remove the impacted sediment. The Contractor will use the clamshell bucket and/or environmental bucket to pick up the debris and to place it on the material staging pad for handling, characterization, and disposal. In the event material cannot be removed with the clam bucket, the extent of the impact from the debris will be evaluated by the Engineer to determine if additional removal efforts are necessary or if the debris can be left in place.

Backfilling will commence after the sediment removal is complete, as confirmed by GM LLC and the Engineer based on a review of the post-dredging survey data to confirm that the target dredging depths have been achieved.

2.10 Sediment Stabilization

Prior to mobilization, the Engineer will collect two 5-gallon bucket samples of shallow river bottom sediments (collected to approximately 1.5 ft± in depth via push cores) at a representative accessible location within 15-feet of OF-1. The Contractor will blend the samples with potential stabilization agents, including Portland cement. Samples will be

collected of each blended material and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals. This initial testing will provide an opportunity to work with blending agents in advance of full scale stabilization in order to effectively optimize on-site reuse of disposed materials.

On the material staging pad, a Komatsu PC 220 excavator will be used to blend an appropriate amount of a stabilization agent to solidify the material to the extent necessary. Once the material sets up to the point where it can be handled, it will be relocated and placed in 500 cy stockpiles for profile sampling and TCLP analyses. Once the profile sampling results have been received and the material is visually observed to pass the paint filter test (or equivalent), a second PC 220 excavator will transfer the material into a dump truck that will transport the material into the on-site placement area. It is expected that the majority of the material will be able to be placed on-site as beneficial re-use.

If analytical results dictate that a given 500 cy stockpile is classified as a RCRA characteristic material, equipment used to handle that material will be decontaminated prior to use on other materials.

2.11 Transportation and Disposal

A BUD has been approved for the materials removed under this project (July 24, 2012). Stabilized material will be transported to and placed in the selected on-site placement area. Offsite transportation and disposal will be limited to materials that do not meet the BUD requirements.

Characterization samples will be collected from every 500 cy of stabilized material and analyzed for TCLP metals. If analytical results dictate that the material requires off-site disposal, the material will be transported to an appropriately-licensed offsite facility. Paperwork for offsite transportation and disposal, including bills of lading and manifests, will be coordinated by the Contractor. The Engineer is authorized to sign such paperwork on behalf of GM LLC. The Contractor will provide a daily summary sheet to log critical information for each transported load (load number, truck ID number, weight, etc.).

2.12 Backfill

Following sediment removal activities, the crane and environmental clamshell bucket will be used to backfill the excavation area. Backfill will be delivered by barge and

placed directly into the excavation area utilizing the barge mounted crane. The backfill barge will be brought inside the turbidity curtain prior to commencing backfill. Backfilling will be initiated as soon as possible after sediment removal operations are complete, including documentation sampling and surveying, and the area has been approved for backfill. Backfill will be placed to the vertical and horizontal limits shown on Drawings G-200, G-300 and G-301. Once the backfill placement operations have been completed, conventional survey methods will be performed by a licensed surveyor to confirm that the targeted backfill elevations have been achieved, as documented in the as-built drawings and to determine the appropriate quantities for payment.

Off-site materials brought on-site for use as fill must be from a certified New York State Department of Transportation (NYSDOT) source, certified by the supplier as native material, or tested to show that the material is free of contamination and meets sediment quality criteria specified by NYSDEC. In the latter case, one representative sample will be collected per 500 cy of backfill material and analyzed by an Environmental Laboratory Approval Program-certified laboratory for volatile organic compounds, semivolatile organic compounds, polychlorinated biphenyls, pesticides/herbicides, and inorganics to demonstrate that the off-site materials are suitable for use on-site.

The backfill material will be similar to the native material that is being removed. Backfill material generally will meet the following gradation criteria:

Sieve Size	Percent Passing
6-inch	100%
No. 4	50-90%
No. 200	20-40%

2.13 Relocation of Millings Pile

A pile of approximately 40,000 cy of concrete millings is currently located along the western shoreline of the Site (Figure 4). As an optional work item, GM LLC may elect to reduce the size of the pile by relocating a portion of the millings to other suitable on-site locations within the West Parcel. The material would be loaded into trucks using an excavator for transport to the interim placement areas. It is anticipated that existing open areas, including open concrete lined pits and trenches within the building slabs and readily accessible sub-slab cavities, would be sufficient in volume to accept this

volume of material and additional concrete slab removal would not be necessary to create additional storage space.

2.14 Demobilization

Once the entire scope of work has been completed, the Contractor will commence decontamination and demobilization of all site facilities, equipment, and personnel. The Contractor also will remove any remaining ESCs and dispose of any remaining material at an appropriately-licensed offsite facility.

2.15 Construction Observation and Quality Assurance

This section provides details on the duties of each team member, including position descriptions, responsibilities, and experience requirements. Table 2-1 below identifies the key Quality Assurance/Quality Control (QA/QC) personnel and their roles.

The Contractor and subcontractors will be responsible for implementing the remedial construction as described in this Sediment RWP. The Engineer will be responsible for documenting, in accordance with this Sediment RWP, that the remedial activities are conducted in a manner consistent with the Contract Documents.

Table 2-1– Key Personnel

Function	Contact Name	Organization
Government Agency	Jason Pelton (PT)	NYSDEC
Owner	Jim Hartnett (PT)	General Motors, LLC
Engineer-of-Record	Mark O. Gravelding, P.E. (PT)	ARCADIS
Engineering Project Manager	Raymond M. Kapp (PT)	ARCADIS
Senior Engineer	Lance S. Ketcham, P.E. (PT)	ARCADIS
Project Engineer	Eric Dievendorf, P.E. (PT)	ARCADIS
Two Construction Observers	David Foster (FT) Albina Redzepagic (FT)	ARCADIS
Contractor's Project Manager	Jim Pazderski (FT)	SES
Contractor's Health and Safety Officer	Wyatt Beougher (FT)	SES

Function	Contact Name	Organization
Laboratory(ies)	Jamie Capaci (OS) Jill Miller (OS)	Test America

PT = Anticipated to be on-site part-time

FT = Anticipated to be on-site full-time

OS = Off-site role

2.15.1 Community Air Monitoring Plan (ARCADIS)

Air monitoring will be conducted during sediment remediation activities in accordance with the Community Air Monitoring Plan (CAMP; Appendix B), the Health and Safety Plan (HASP; Appendix C), and the Contract Documents to address and document potential exposures to specific site constituents. The Engineer's on-site observers will perform the air monitoring described in the CAMP, document that the air monitoring activities are performed in accordance with the CAMP, HASP, and Contract Documents, and document air monitoring exceedances in the daily construction report. Air monitoring exceedances will immediately be brought to the attention of the Contractor to address corrective actions and subsequently communicated to Remedial Action Project Team. Air monitoring results and corrective actions planned/taken will be included in the daily observation report.

2.15.2 Sediment Sampling and Analysis Plan

Sediment samples will be collected and analyzed after completion of removal activities in a given area, prior to backfill installation, in accordance with the Sediment Sampling and Analysis Plan (Appendix D), the Health and Safety Plan (HASP; Appendix C), and the Contract Documents to document residual sediment concentrations of site constituents. The Engineer will perform sediment sampling activities described in the Sediment Sampling and Analysis Plan.

2.15.3 Turbidity Monitoring

Turbidity monitoring will be performed to identify and respond to potential water column impacts that may result from sediment dredging and backfilling activities. The Engineer will perform turbidity sampling twice daily, once during each phase of the tidal cycle (ebbing tide and flooding tide). This sampling will include field measurement of turbidity upstream and downstream of dredging activities, with sampling location designations dependent on the tide. In-situ turbidity measurements will be collected at surface, mid-

water, and near bottom (2 feet off the bottom) with a combination water quality meter (YSI 6920, TROLL 9500, or equivalent).

In the event that downstream turbidity exceeds upstream turbidity by 50 NTU, monitoring will be increased. Based on monitoring results, additional controls may be needed and work may be slowed or stopped. The project team will be notified of turbidity exceedances and determine the appropriate response actions. Typical response actions include:

- If a downstream reading is greater than 50 NTU above an upstream reading, additional monitoring will be conducted 15 to 30 minutes later. If the additional data are within the required limits, no additional corrective actions are required.
- If the additional data do not meet the required limits, the Contractor will slow work. The Contractor may also inspect the turbidity curtain at this time and repair/replace sections, as needed. This determination will be made by the Contractor based on factors such as the magnitude of the exceedance and visual observation of turbidity outside the curtain.
- Once the pace of work has slowed and, if necessary, repairs and inspections are complete, the Engineer will wait another 30 minutes and conduct additional monitoring. If the additional data are within the required limits, no additional corrective actions are required. The original pace of work may resume the next morning or if the data collected during the following tidal cycle are within the required limits, whichever occurs first. The Engineer will wait 30 minutes after the original pace resumes and conduct additional monitoring to confirm that the resumed pace meets the required limits.
- If the additional data collected after slowing work do not meet the required limits, the Contractor will stop in-water activities. If such action was not already taken, the Contractor will inspect the turbidity curtain and repair/replace sections, as needed. The upstream and downstream points will continue to be monitored every 15-30 minutes once inspection and repairs/replacement are complete. Work may resume once two consecutive readings meet the required limits or the next morning, whichever occurs first. The Engineer will resume monitoring at the frequency of twice daily following acceptance of the two consecutive readings.

2.15.4 On-Site Observation

The Engineer's On-site Observer will be responsible for daily observation of sediment remediation activities and will serve under the direction of the Engineer-of-Record. The

Engineer's On-site Observer will be knowledgeable of the project requirements and objectives, Contract Documents, construction/remediation techniques, and performance of associated QA/QC methods. The Engineer's On-site Observer will have the following responsibilities related to implementation of this Sediment RWP:

- Attend the pre-construction meeting
- Attend daily tailgate safety meetings
- Attend weekly progress meetings and prepare meeting minutes for distribution to the attendees
- Review daily construction reports prepared by the Contractor
- Serve as the contact person for the Engineer
- Maintain routine contact with members of the Remedial Action Project Team regarding conformance with QC requirements
- Review field and laboratory QA/QC testing results for conformance with the project specifications detailed in the Contract Documents
- Interpret data to determine areas that are in conformance and nonconformance with the project specifications detailed in the Contract Documents, and determine areas that require rework and/or repair
- Coordinate the activities of other members of the Engineer's team while on-site
- Prepare Daily Observation Reports including relevant sampling results and field data and provide to the Engineer for review and distribution to the Remedial Action Project Team by noon the following work day.
- Perform or observe (as appropriate) and document field sampling for QA/QC testing
- Monitor the delivery of samples to the laboratory for testing
- Document laboratory testing at the frequency established in this Sediment RWP

- Observe construction materials delivered to the work area to determine general conformance with material specifications
- Observe and record procedures used for installation and monitoring of erosion and sediment control measures
- Observe and record procedures for implementation of the remedial construction
- Perform required water column turbidity monitoring
- Perform required sediment sampling per the Sediment Sampling and Analysis Plan (Appendix D)
- Perform air monitoring and sampling activities per the requirements in the CAMP (Appendix B)
- Observe and review data from vibration monitoring and optical surveying
- Record on-site activities that could result in damage to the work and report these activities to the Remedial Action Project Team immediately as they are noted
- Take color photographs, as needed, to document observations, problems, deficiencies, and work in progress
- Prepare Monthly Progress Reports

In addition to the Engineer's observation activities, the Contractor will submit a Quality Control (QC) Plan to ensure compliance with the Contract Documents for review by GM LLC and the Engineer.

2.15.5 Field Changes and Clarifications

During construction, it may be necessary to clarify or change portions of the design. Such information will be prepared by the Engineer, reviewed by GM LLC, and provided to the Contractor in the form of a Field Order. Where changes to the information in this RWP are required, the Engineer will discuss the changes with DEC prior to issuing the Field Order.

2.16 Contingency Plan

The Contractor will submit a Contingency Plan to address general project contingencies (e.g., spills, emergencies) for review by GM LLC and the Engineer. The Contingency Plan will be maintained on site.

2.17 Health and Safety

Appendix C provides the project HASP prepared by the Engineer to address health and safety for the Engineer's On-site Observers. This HASP is applicable to on-site observation activities and to Site visitors.

The Contractor will submit a Contractor's HASP to address Site health and safety related to the sediment remediation activities. Both HASPs will be maintained on site.

2.18 Permitting

Permits that will be required to perform the work are summarized below in Table 2-2. These permits must be obtained prior to implementing the design.

Table 2-2 Summary of Permits

Permitting Agency	Required Permit	Permit Timing	Acquired By
United States Army Corps of Engineers	Authorization to Dredge	Received August 22, 2012	Engineer
New York State Department of State	General Concurrence	Received August 27, 2012	Engineer
Village of Sleepy Hollow	Local Excavation / Demolition Building Permit	Expected prior to mobilization	Contractor
NYSDEC	Beneficial Use Determination	Received July 24, 2012	Engineer
NYSDEC	Water Quality Certification	Expected prior to mobilization	Engineer
Westchester County	Waste Discharge Permit	Expected prior to mobilization	Contractor

2.19 Site Security

The Contractor will be responsible for Site security. The existing fence will be maintained and gates will be locked outside of working hours. Additionally, trailers and

equipment will be locked outside of working hours. Security guards will be provided by the Contractor on weekends and the Village of Sleepy Hollow Police Department operates regular patrols of the Site. The Contractor will coordinate with the Village of Sleepy Hollow regarding joint access to areas of the site.

3. Reporting

Contractor work activities and Engineer QA/QC activities will be documented by the following reports:

- Daily Progress Reports (Contractor)
- Daily Observation Reports (Engineer)
- Weekly Meeting Minutes (Engineer)
- Monthly Progress Reports (Engineer)
- Final Completion Report (Engineer)

Reports and construction data generally will be uploaded to an electronic file shared server by the Engineer accessible to the entire Remedial Action Project Team. The system will have the capability of requesting email notification when documents are uploaded to the shared server.

3.1 Daily Progress Reports

The Contractor will provide daily progress reports by noon the following work day to GM LLC and the Engineer for review. The progress reports will include the following information:

- Date, project name, location, and phone number and names of people on-site
- Chronological description of work in progress, including notices to or requests from the Engineer or other parties
- Documentation of daily activities
- Photographs of work activity occurring on site (if taken)
- Quantities (approximate) of materials removed, generated, used, placed and disposed of
- Documentation of manpower, material, and equipment used
- Results of data collected and corrective actions taken or planned
- Health and Safety observations, issues and corrective actions
- Time work starts and ends, in addition to the time of work stoppages related to inclement weather, insufficient equipment or personnel, or other reasons
- Data on weather conditions, including temperature, humidity, wind direction and speed, cloud cover, and precipitation
- Contractor's workforce, equipment, and materials delivered to or removed from the work area
- Other appropriate information to be shared with Remedial Action Project Team including required items discussed elsewhere in this Plan

3.2 Daily Observation Reports

The Engineer will provide a daily observation report summarizing each day's construction activities and air monitoring activities by noon the following work day. The daily observation report will contain the following information:

- Date, project name, location, and phone number and names of people on-site
- Results of CAMP air monitoring including exceedances and corrective actions planned/taken
- Chronological description of work in progress, including notices to or requests from the Contractor
- Results of testing and inspections performed on-site
- Problem and/or deficiency identification and documentation describing corrective actions taken for field problems and/or nonconformance with the Contract Documents
- List of laboratory samples collected, marked, and delivered to the laboratory and references to test data submitted to the Engineer by the laboratory
- Record of communications with other on-site parties, outside companies, regulatory agencies, or consultants regarding the day's construction activities
- Record of calibrations or standardizations performed on field testing equipment, including actions related to and results of recalibrations
- Other appropriate information to be shared with Remedial Action Project Team including required items discussed elsewhere in this Plan

3.2.1 Problem and/or Deficiency Identification and Correction Action Documentation

Daily observation reports prepared by the Engineer and Daily Progress Reports by the Contractor will include documentation of problems and/or deficiencies noted during remediation activity (e.g., when construction material or activity is observed or tested that does not meet the requirements set forth in the Contract Documents) and documentation of corrective action employed by the Engineer or Contractor to address the problems and/or deficiencies. The reports will be cross-referenced to the reports, data sheets, forms, and checklists that contain data or observations leading to the determination of a problem and/or deficiency. Problem and/or deficiency identification and corrective action documentation may include the following information:

- Description of the problem and/or deficiency, including reference to supplemental data or observations related to the determination of the problem and/or deficiency
- Location of the problem and/or deficiency, including how and when the problem and/or deficiency was discovered
- Corrective action taken to resolve the problem and/or deficiency
  - If the corrective action has already been implemented, observations and documentation showing that the problem and/or deficiency was resolved will be included.
  - If the problem and/or deficiency has not been resolved by the end of the day upon which it was discovered, then the documentation will state that the problem and/or deficiency was unresolved at the end of the day.

If the problem and/or deficiency has not been resolved, then the Remedial Action Project Team will discuss the corrective actions necessary to resolve the problem and/or deficiency as soon as possible. The Engineer will determine if the problem and/or deficiency indicates a situation that might require changes to the Contract Documents and/or this Sediment RWP. If this situation develops, a meeting will be held with the appropriate project personnel to determine if revisions to the Contract Documents and/or this Sediment RWP should be made. Revisions to the Contract Documents and/or Sediment RWP will be reviewed by the Engineer-of-Record.

3.2.2 Photo Documentation

The Contractor and Engineer will take photographs to document observations, problems, deficiencies, and work in progress. Photographs will be in digital format and will be uploaded to the project shared server.

The following information will be documented in the daily construction report or a log book for each photograph:

- Date and time
- Location where photograph was taken
- Description of the subject matter

3.3 Weekly Meeting Minutes

A progress meeting will be held weekly at the work area, unless other frequency is deemed appropriate by the entities involved with implementing the sediment remedial activities. The meeting will be attended by GM LLC; the Contractor's Project Manager, Site Superintendent, and Site Safety Officer, the Engineer's Project Manager, Project Engineer, and Engineer's On-site Observer; and appropriate subcontractor representatives. Appropriate regulatory agency personnel also will be invited to the progress meeting. The purpose of this meeting is to review significant work activities that could affect the progress of the work and overall schedule, and discuss action items from prior week's agenda until they are recorded as completed. The potential agenda topics of the progress meeting include:

- Approval of minutes from last project meeting/schedule for next meeting
- Safety/safe work practices
- Review of work progress since previous meeting
- Field observations, problems, and conflicts
- Air monitoring data review
- Community/regulatory feedback
- Problems that impede the construction schedule
- Review of off-site fabrication and delivery schedules
- Corrective measures and procedures to regain the projected schedule
- Revisions to the construction schedule
- Progress and schedule during succeeding work period
- Coordination of schedules
- Review of submittal schedules
- Maintenance of quality standards
- Pending changes and substitutions, including potential Change Orders
- Review proposed changes for the effect on the construction schedule, completion date, and other Contract Documents
- Critical/long-lead items

The Engineer will upload the progress meeting minutes to the shared server no later than two work days after each project meeting.

3.4 Monthly Progress Reports

Monthly progress reports will be prepared by the Engineer to summarize construction activities per month. This will include a calendar month summary of the Contractor's Daily Progress Reports and Engineer's Daily Observation Reports.

3.5 Construction Completion Report

A Construction Completion Report documenting remedial activities will be assembled by the Engineer at the end of construction in accordance with Section 5.8 of DER-10 (NYSDEC 2010). The Construction Completion Report will be stamped, certified, and signed by a Professional Engineer licensed in New York State. This report will contain the following information:

- Description of the remedial activities, including deviations (if any) from the NYSDEC-approved RWP
- Engineer-reviewed Contractor submittals
- Record Drawings, stamped and signed by a Professional Engineer licensed in New York State, showing the volume of impacted material removed and areas where impacted material remains
- Documentation associated with off-site disposal of waste materials generated during implementation of the work, including quantities and disposal locations
- QA/QC documentation
- Summaries of monitoring results obtained during construction (e.g., turbidity, air, vibration)
- Laboratory data summaries
- Representative photographs taken during construction
- Copies of regulatory permits and other regulatory agency correspondence
- Progress meeting minutes
- Engineer-of-Record's certification statement

4. Schedule

The projected schedule for sediment remediation activities is included as Appendix E. The schedule assumes production rates of 250 cy per day for sediment removal and between 250 and 300 cy per day for backfill. The schedule assumes six 10-hour work days per week to complete the work for an estimated 3-month remedial action program. No shift work is anticipated for this operation.

5. References

ARCADIS 2012. Remedial Work Plan, General Motors LLC, Former General Motors Assembly Plant Site, Sleepy Hollow, New York. June.

New York State Department of Environmental Conservation (NYSDEC). 2004. Draft Brownfield Cleanup Program Guide.

NYSDEC. 2010. DER-10, Technical Guidance for Site Investigation and Remediation. New York State Department of Environmental Conservation. May.

NYSDEC. 2012. Decision Document, Former General Motors North Tarrytown Brownfield Cleanup Program. June.

ARCADIS

Figures

REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., WHITE PLAINS, NY, 1967, PHOTOREVISED 1979.

2000' 0 2000'

Approximate Scale: 1" = 2000'

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK
SEDIMENT REMEDIAL WORK PLAN

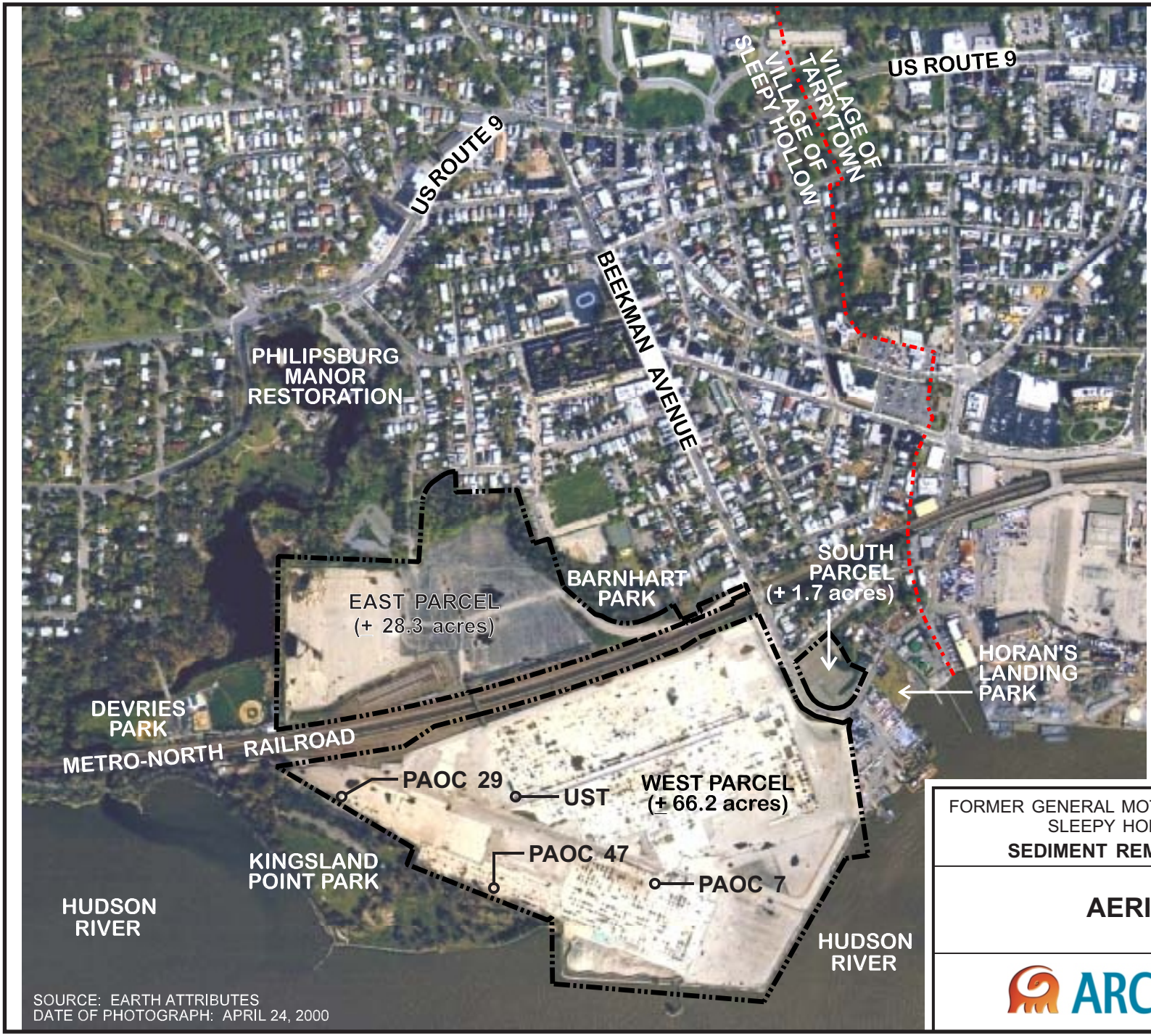
SITE LOCATION MAP

ARCADIS

FIGURE
1

09/26/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00060/CDR/64460N02.CDR

09/26/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00060/CDR/64462G01.CDR



LEGEND:

SITE BOUNDARY

TOWN LINE

REFERENCE:
FIGURE FROM DEIS FOR LIGHTHOUSE LANDING AT SLEEPY HOLLOW, NOVEMBER 2004, PREPARED BY DIVNEY TUNG SCHWALBE.

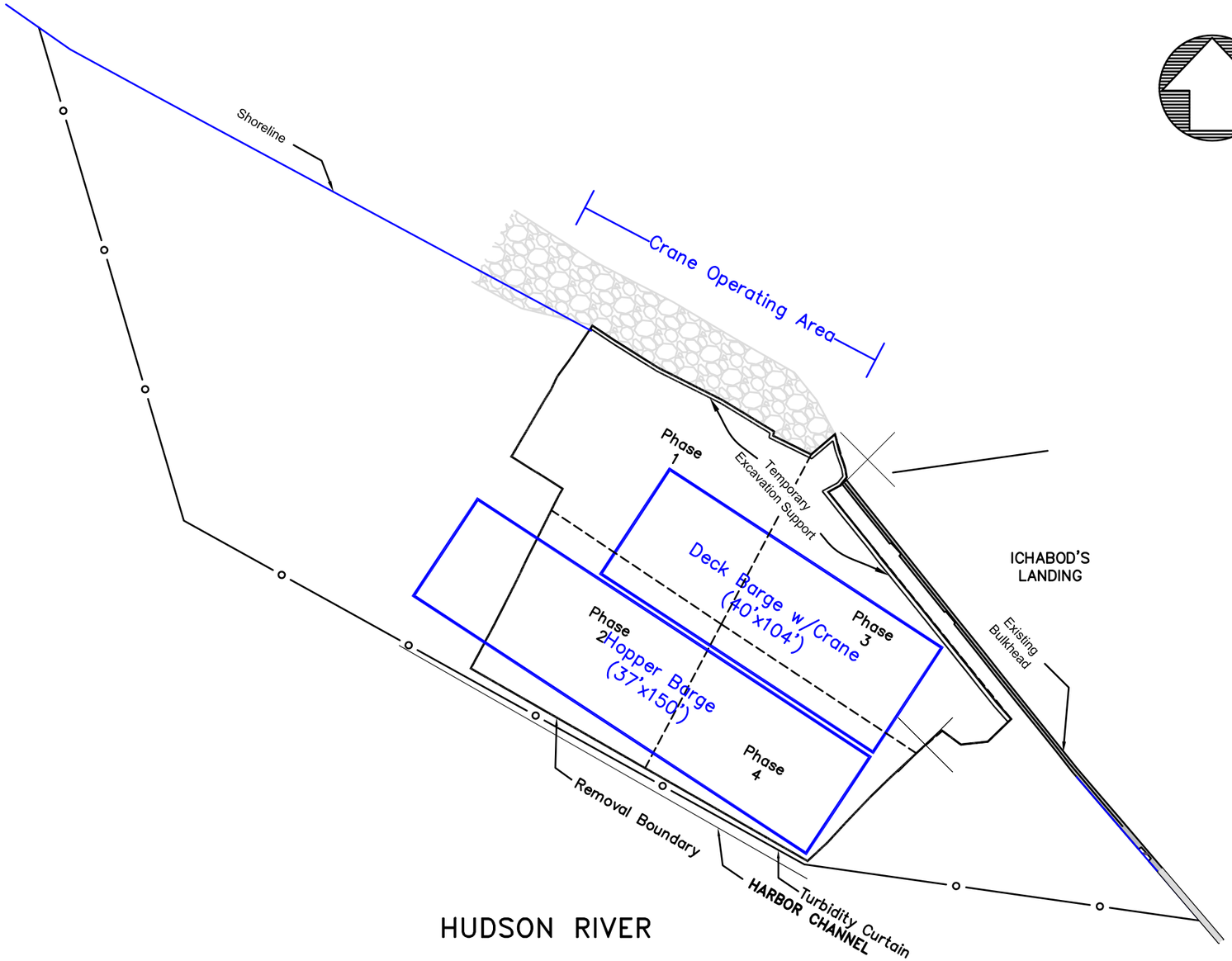
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL WORK PLAN

AERIAL VIEW

ARCADIS

FIGURE
2



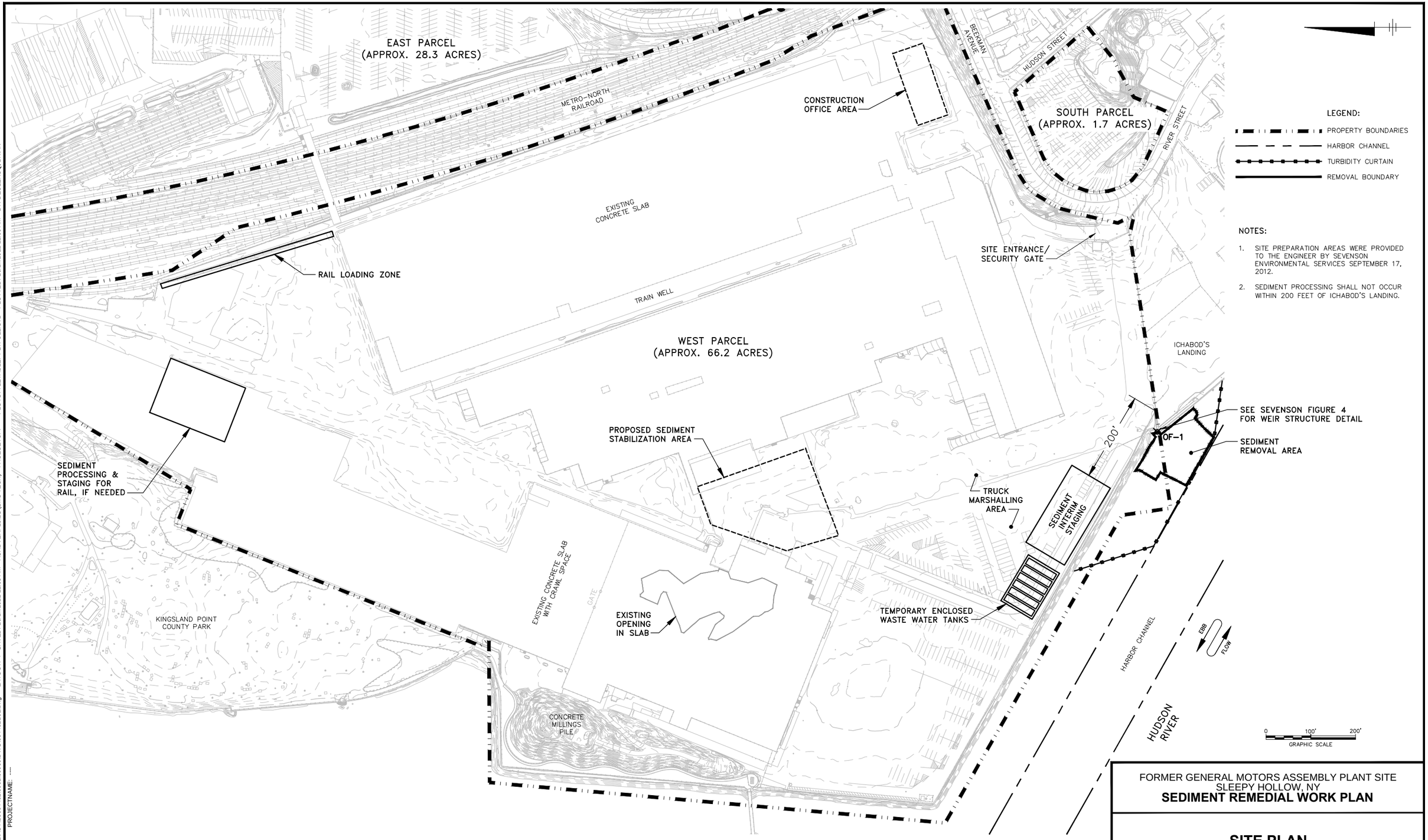
Dredging Sequence

General Motors, LLC
Sediment Remediation
Sleepy Hollow, New York

SEVENSON ENVIRONMENTAL SERVICES, INC.

Figure 3

DATE:	10/4/12
DRAWN BY:	C. Bigelow
CHECKED BY:	G. Giancola
CAD FILE:	Sed
SCALE:	As Shown



LEGEND:

- PROPERTY BOUNDARIES
- HARBOR CHANNEL
- TURBIDITY CURTAIN
- REMOVAL BOUNDARY

NOTES:

1. SITE PREPARATION AREAS WERE PROVIDED TO THE ENGINEER BY SEVENSON ENVIRONMENTAL SERVICES SEPTEMBER 17, 2012.
2. SEDIMENT PROCESSING SHALL NOT OCCUR WITHIN 200 FEET OF ICHABOD'S LANDING.

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NY

SEDIMENT REMEDIAL WORK PLAN

SITE PLAN

ARCADIS

FIGURE
4

CITY: SYRACUSE, NY DIV/GROUP: ENV/IM-DV DB: B. DECLERCQ, P. LISTER PM/TM: J. MESSINGER TR: J. MELWIKI LYR:ON=*;OFF=*REF*
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XREFS: IMAGES: PROJECTNAME: ----
064462X03

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Contract Drawings

CITY: SYRACUSE, NY DIV/GROUP: ENV CAD DB: B.DECLERCQ LD: B.DECLERCQ PIC: PM: TM: LYR:ON=*;OFF=*REF*
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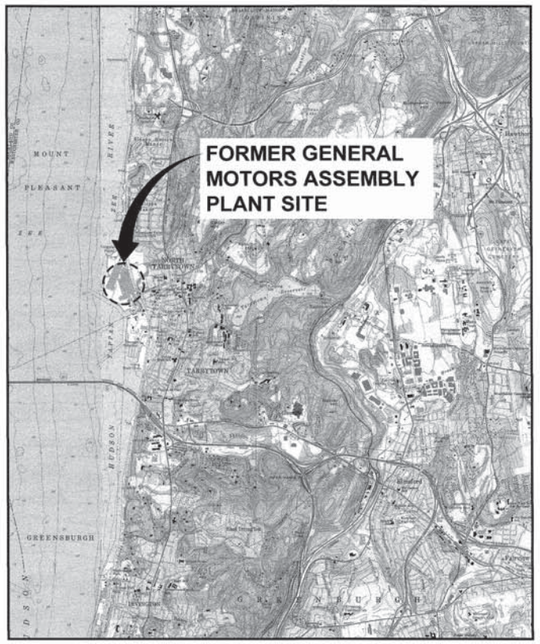
CONTRACT DRAWINGS

SEDIMENT REMEDIATION
SLEEPY HOLLOW, NEW YORK



REFERENCE: BASE MAP USGS 7.5 MINUTE QUADRANGLE., WHITE PLAINS, NEW YORK - WESTCHESTER CO. (1967, PHOTOREVISED 1978)

LOCATION MAP

0 4000' 8000'

GRAPHIC SCALE

NEW YORK

GENERAL MOTORS, LLC

DATE ISSUED

JULY 2012

DATE REVISED

AUGUST 2012 1 2

SEPTEMBER 2012 3

OCTOBER 2012 4

ARCADIS

ARCADIS OF NEW YORK, INC.

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

INDEX TO DRAWINGS

	COVER SHEET	
	G-100	GENERAL NOTES, ABBREVIATIONS, AND SURVEY CONTROL
	G-101	EXISTING SITE FEATURES
4 3 2 1	G-102	SITE PREPARATION PLAN
4 3 1	G-200	REMOVAL AREA / TURBIDITY CURTAIN PLAN
2 1	G-201	WEST PARCEL STORM SEWERS
4	G-300	CROSS SECTIONS A-A' AND B-B'
	G-301	CROSS SECTIONS C-C' AND D-D'
	G-400	MISCELLANEOUS DETAILS
	G-401	MISCELLANEOUS DETAILS

GENERAL WORK SEQUENCE:

1. MOBILIZE EQUIPMENT AND PERSONNEL
2. PREPARE SITE AND INSTALL NECESSARY SITE CONTROLS
3. IMPROVE/INSTALL ACCESS ROADS
4. PERFORM WEST PARCEL STORM SEWER CLEANING
5. DREDGE SEDIMENT
6. TRANSPORT DREDGED SEDIMENT FOR DEWATERING
7. DEWATER AND STABILIZE SEDIMENT FOR OFFSITE TRANSPORT AND DISPOSAL
8. PLACE BACKFILL
9. DEMOBILIZE

GENERAL NOTES:

1. BASE MAP INFORMATION TAKEN FROM CHAS H. SELLS, INC. 1997 SURVEY.
2. BATHYMETRY SURFACE WAS SURVEYED AND PROCESSED BY LAND SURVEYING P.C. AND LANDMETRICS ENGINEERING. THE SURVEY WAS PERFORMED ON APRIL 13, 2012 USING A TRIMBLE GEO XT DIFFERENTIAL GPS SYSTEM, OHMEX SONARMITE 200KHZ ECHO SOUNDER. THE SURVEY WAS PROCESSED BY HYPACK SOFTWARE AND WAS PROVIDED TO ARCADIS MAY 18, 2012.
3. ALL ELEVATIONS ARE IN FEET AND ARE REFERENCED TO NAVD88 VERTICAL DATUM.
4. HORIZONTAL DATUM IS NEW YORK STATE PLAN COORDINATE SYSTEM NAD83 NY EAST 3101.
5. HARBOR CHANNEL PROVIDED TO ARCADIS BY USACE, MARCH 2012. SURVEY WAS COMPLETED JUNE 6 AND 7, 2011. FILE NO. 25.
6. TIDAL DATUMS RECEIVED FROM LAND SURVEYING P.C. AND LANDMETRICS ENGINEERING MAY 18, 2012. TIDAL DATA WAS AVERAGED FROM NOAA TIDAL BENCH MARKS AT ALPINE, HUDSON RIVER, NJ: STATION 8530095, AND GRASSY POINT, HAVERSTRAW BAY, HUDSON RIVER, NY: STATION 8518924 FOR TIDAL EPOCH: 1983–2001. LOCAL ELEVATION DIFFERENCES BETWEEN NAVD88 AND NGVD 29 WERE COMPUTED USING CORPSCON 6.
7. LOCATIONS OF WEST PARCEL STORM SEWERS ARE APPROXIMATE. MANHOLE AND PIPE LOCATIONS WERE APPROXIMATED USING THE SELLS 1997 SURVEY AND VARIOUS HISTORICAL SITE MAPS THAT WILL BE PROVIDED TO CONTRACTORS. CONTRACTOR IS RESPONSIBLE FOR VERIFYING STORM SEWER LOCATIONS.
8. ALL LOCATIONS, INCLUDING PROPERTY LINES, ARE APPROXIMATE, REFLECT AVAILABLE INFORMATION, ARE PROVIDED FOR REFERENCE ONLY, AND ARE SUBJECT TO FIELD VERIFICATION.
9. THE CONTRACTOR SHALL PROMPTLY NOTIFY THE OWNER AND ENGINEER, UPON DISCOVERY, AND BEFORE CONDITIONS ARE FURTHER DISTURBED, OF PHYSICAL CONDITIONS AT THE SITE WHICH DIFFER MATERIALLY FROM THOSE INDICATED ON THE CONSTRUCTION DOCUMENTS AND CONTRACT DRAWINGS.
10. THE CONTRACTOR SHALL PROMPTLY, AFTER DISCOVERING, GIVE WRITTEN AND ORAL NOTICE TO THE OWNER AND ENGINEER OF DELAYS IN PROJECT SCHEDULE DUE TO EQUIPMENT MALFUNCTION, WEATHER, OR GENERAL FAILURE TO MEET PRODUCTION STANDARDS.
11. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL SAFETY PROGRAMS FOR THEIR EMPLOYEES, SUBCONTRACTORS, AND ANY OTHER PERSONS WHO MAY BE AFFECTED THEREBY. THIS INCLUDES THE PREPARATION OF A SITE–SPECIFIC HASP PRIOR TO ANY WORK AT THE SITE.
12. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF ANY ISSUED AGENCY APPROVALS AND ANY APPLICABLE STATE OR FEDERAL LAW OR REGULATION.

SITE PREPARATION:

1. PRIMARY SITE ACCESS SHALL BE AS SHOWN ON DRAWING G–101. ACCESS TO LAUNCH DREDGE EQUIPMENT SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVALS FOR SUCH ACCESS.
2. THE CONTRACTOR SHALL ESTABLISH, MAINTAIN, AND PROTECT THE PROJECT LIMITS, INCLUDING SUPPORT ZONES, EXCLUSION ZONES, AND CONTAMINATION REDUCTION ZONES FOR EACH AND EVERY PHASE OF WORK AS PART OF THIS CONTRACT.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION AND/OR MAINTENANCE OF ABOVE– AND UNDERGROUND UTILITIES DURING CONSTRUCTION. LOCATIONS OF KNOWN UTILITIES ARE APPROXIMATE. THE LOCATION OF ALL ABOVE– AND UNDERGROUND UTILITIES MUST BE VERIFIED IN THE FIELD PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE UTILITY COMPANIES FOR THE TEMPORARY REMOVAL, RELOCATION, AND REPLACEMENT OF ANY UTILITY POLES, GUY WIRES, UNDERGROUND UTILITIES, AND/OR OVERHEAD WIRES THAT FALL WITHIN THE LIMITS OF CONSTRUCTION, OR THAT MAY INTERFERE WITH THE WORK.
4. ALL VEGETATION NOT IDENTIFIED FOR REMOVAL SHALL BE PROTECTED DURING CONSTRUCTION.
5. THE INSTALLATION AND MAINTENANCE OF TEMPORARY SEDIMENT AND EROSION CONTROLS THROUGHOUT CONSTRUCTION AND RESTORATION ACTIVITIES SHALL BE PROVIDED, AS NECESSARY. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN SEDIMENT AND EROSION CONTROL IMMEDIATELY DOWNGRADIENT OF WORK LIMITS. AT A MINIMUM, SEDIMENT AND EROSION CONTROLS TO CONSIST OF SILT FENCE AND OR STRAW BALES IN ACCORDANCE WITH BEST MANAGEMENT PRACTICES. THE CONTRACTOR IS RESPONSIBLE FOR ANY SEDIMENT AND EROSION CONTROL MEASURES REQUIRED BY REGULATORY AUTHORITIES REGARDLESS OF WHETHER OR NOT THEY ARE EXPLICITLY STATED IN THE CONSTRUCTION DRAWINGS.
6. THE CONTRACTOR SHALL INSTALL AND MAINTAIN FULL DEPTH TURBIDITY CURTAINS DOWNSTREAM OF THE WORK AREA FOR TURBIDITY CONTROL THROUGHOUT REMEDIAL ACTIVITIES, WITH A LAYOUT AS SHOWN IN DRAWING G–200. THE CONTRACTOR SHALL INSTALL AND MAINTAIN SORBENT BOOMS LASHED TO TURBIDITY CURTAINS.
7. CONSTRUCTION FENCING SHALL BE PLACED AROUND ACCESSIBLE PORTIONS OF THE LIMITS OF WORK.
8. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ALL ABOVE–GROUND DEBRIS, BRUSH, LOGS, TREES, STUMPS, REFUSE, AND RUBBISH FROM WITHIN THE CONSTRUCTION WORK LIMITS, AS REQUIRED TO PERFORM THE WORK. WITHIN THE WORK LIMITS, TREES, SHRUBS, AND OTHER DENSE VEGETATION SHALL BE REMOVED TO GROUND SURFACE. TREES, AND SHRUBS SHALL BE CHIPPED ON SITE; WOODCHIPS MAY BE USED AS MULCH DURING SITE RESTORATION ACTIVITIES. GRUBBING OF STUMPS AND ROOT STRUCTURES WITHIN THE NEW CHANNEL AREA SHALL BE PERFORMED DURING EXCAVATION; STUMPS AND ROOT STRUCTURES SHALL BE STOCKPILED IN AN UPLAND AREA OF THE SITE. GRUBBING OF STUMPS AND ROOT STRUCTURES IN THE RIVER SHALL NOT BE PERFORMED TO ENHANCE STABILITY.
9. THE CONTRACTOR SHALL AT ALL TIMES KEEP THE CONSTRUCTION AREAS FREE FROM ACCUMULATIONS OF WASTE MATERIALS OR RUBBISH; AND PRIOR TO COMPLETION OF THE WORK, REMOVE ANY RUBBISH FROM THE PREMISES AND ALL TOOLS, EQUIPMENT, AND MATERIALS.
10. THE CONTRACTOR SHALL MAINTAIN SUITABLE TRAFFIC SAFETY SIGNS, EQUIPMENT, AND MANPOWER TO PROVIDE TRAFFIC CONTROL. THE CONTRACTOR SHALL PROVIDE ALL LABOR AND EQUIPMENT NECESSARY TO MAINTAIN THE ROADWAYS FREE OF DIRT AND/OR DEBRIS RESULTING FROM PROJECT OPERATIONS.
11. THE CONTRACTOR SHALL MINIMIZE DUST THAT RESULTS FROM THE REMEDIAL ACTIVITIES WITH THE USE OF WATER OR OTHER PRODUCTS, AS APPROVED BY THE OWNER.
12. IF THE CONTRACTOR DAMAGES ANY ITEMS OTHER THAN ITEMS SPECIFIED FOR REMOVAL, ITEM SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER DISPOSAL OF ALL DEMOLISHED ITEMS EXCEPT THOSE IDENTIFIED FOR REUSE IN THE CONSTRUCTION DRAWINGS.

WATER MANAGEMENT:

1. WATER GENERATED DURING EXCAVATION ACTIVITIES, INCLUDING, BUT NOT LIMITED TO, DEWATERING OF SOILS/SEDIMENTS, AND DECONTAMINATION FLUIDS, SHALL BE COLLECTED AND TREATED.
2. THE CONTRACTOR SHALL PROVIDE A TREATMENT SYSTEM TO MEET THE REQUIREMENTS PRESENTED ON DRAWING G–401.
3. THE CONTRACTOR MAY DEWATER SEDIMENT AT THE SEDIMENT PROCESSING AND STAGING AREAS IDENTIFIED ON DRAWING G–102.
4. ACCEPTABLE DEWATERING AND MATERIALS STABILIZATION METHODS INCLUDE GRAVITY DEWATERING AND BLENDING WITH PORTLAND CEMENT OR ANOTHER MATERIAL IF PRIOR APPROVAL IS GIVEN BY THE OWNER AND THE ENGINEER.
5. SUPERNATANT WATER THAT ACCUMULATES IN THE MATERIAL TRANSPORT BARGE SHALL BE TREATED IN THE ON–SITE WATER TREATMENT SYSTEM PRIOR TO DISCHARGE.
6. LIQUIDS FROM DECONTAMINATION SHALL BE COLLECTED AND TREATED IN THE ON–SITE WATER TREATMENT SYSTEM PRIOR TO DISCHARGE.

DEMOBILIZATION:

1. UPON COMPLETION OF CONSTRUCTION, THE WORK AREA SHALL BE LEFT IN A CLEAN, NEAT, AND ORDERLY CONDITION.
2. ALL EQUIPMENT THAT COMES IN CONTACT WITH DREDGED MATERIALS, INCLUDING WATER, SHALL BE DECONTAMINATED BEFORE DEMOBILIZATION FROM THE SITE.
3. THE CONTRACTOR SHALL RESTORE TO PRE–CONSTRUCTION CONDITIONS ALL SUPPORT AREAS THAT ARE IMPACTED BY CONSTRUCTION ACTIVITIES, INCLUDING BUT NOT LIMITED TO, EQUIPMENT AND MATERIALS STORAGE AREAS, MATERIAL LOADING AND STAGING AREAS, PARKING AREAS, AND LOCATIONS OF OFFICE TRAILERS, EXCEPT AS NOTED OTHERWISE.
4. ALL SURFACES DAMAGED OR DESTROYED AS A RESULT OF WORK PERFORMED SHALL BE RESTORED TO THEIR PRE–CONSTRUCTION CONDITION IN A TIMELY MANNER AND PRIOR TO THE CONTRACTOR DEMOBILIZATION. ANY DAMAGE CAUSED BY THE CONTRACTOR NOT INDICATED IN THE WORK SHALL BE REPAIRED TO PRE–CONSTRUCTION CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.
5. THE CONTRACTOR SHALL PROVIDE THE ENGINEER AND OWNER WITH A POST–CONSTRUCTION SURVEY OF AREAS DISTURBED DURING THE WORK.
6. EROSION CONTROL MATTING SHALL BE PLACED ON RESTORED UPLAND AREAS THAT HAVE A 2:1 (H:V) OR STEEPER SLOPE.
7. DEMOBILIZATION OF ALL MATERIALS, EQUIPMENT, AND PERSONNEL UTILIZED AND BROUGHT TO THE SITE DURING MOBILIZATION AND CONSTRUCTION ACTIVITIES SHALL OCCUR ONCE THE PROJECT IS COMPLETED AND ACCEPTED BY THE CONSTRUCTION MANAGER. DECONTAMINATION OF ALL MATERIALS, EQUIPMENT, AND PERSONNEL SHALL BE CONDUCTED AS SPECIFIED WITHIN THE FINAL DESIGN REPORT AND CONSTRUCTION DRAWINGS. ALL TEMPORARY FACILITIES SHALL BE REMOVED.

SEDIMENT REMOVAL:

1. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, ACCESSORIES, AND APPURTENANCES NECESSARY TO COMPLETE DREDGING OF SEDIMENT AND RELATED WORK SHOWN ON THE DRAWINGS.
2. DEBRIS IS ANTICIPATED TO BE PRESENT IN THE DREDGE AREA BUT HAS NOT BEEN DELINEATED. DEBRIS IDENTIFICATION SHALL BE CONDUCTED DURING DREDGING ACTIVITIES BY THE CONTRACTOR. DEBRIS SHALL BE REMOVED AND DISPOSED OF.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRANSPORTATION, DEWATERING, AND DISPOSAL OF ALL DREDGED MATERIAL.
4. TURBIDITY MONITORING SHALL BE CONDUCTED BY OTHERS UP– AND DOWNSTREAM OF CAPPING ACTIVITIES.

BACKFILLING:

1. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, ACCESSORIES, AND APPURTENANCES NECESSARY TO COMPLETE BACKFILLING OF SEDIMENT AND RELATED WORK SHOWN ON THE DRAWINGS.
2. TURBIDITY MONITORING SHALL BE CONDUCTED BY OTHERS UP– AND DOWNSTREAM OF CAPPING ACTIVITIES.

STORM SEWER CLEANING:

1. THE CONTRACTOR SHALL DETERMINE THE EXISTING MANHOLE CONDITIONS AND PROVIDE TO ENGINEER FOR REVIEW.
2. THE CONTRACTOR SHALL PROVIDE MEANS AND METHODS FOR CLEANING THE EXTENT OF THE PIPELINES SHOWN IN DRAWING G–201 IN THE CONTRACTOR PIP.
3. THE CONTRACTOR SHALL PROVIDE SEQUENCE OF PIPE CLEANING RELATIVE TO SEDIMENT REMOVAL ON THE HUDSON RIVER IN CONTRACTOR PIP.
4. THE CONTRACTOR SHALL CONDUCT POST–CLEANING VIDEO INSPECTION TO VERIFY.
5. IF NECESSARY, CONTRACTOR SHALL ABANDON PIPES/CULVERTS IN PLACE PER THE STEPS PROVIDED IN THE RFQ.

ABBREVIATIONS:

AMSL	ABOVE MEAN SEA LEVEL
AOS	APPARENT OPENING SIZE
APPROX	APPROXIMATE
BW	BOTTOM OF WALL
CONC	CONCRETE
E	EASTING
EPS	EXPANDED POLYSTYRENE
GPM	GALLONS PER MINUTE
H:V	HORIZONTAL:VERTICAL
IN	INCHES
INV	INVERT
LB	POUNDS
MAX	MAXIMUM
MH	MANHOLE
MHHW	MEAN HIGH HIGH WATER
MHW	MEAN HIGH WATER
MIN	MINIMUM
MLW	MEAN LOW WATER
MLLW	MEAN LOW LOW WATER
N	NORTHING
NAD83	NORTH AMERICAN DATUM, 1983
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NO	NUMBER
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
OF	OUTFALL
OZ	OUNCES
PVC	POLYVINYLCHLORIDE
TW	TOP OF WALL
TYP.	TYPICAL
USACE	UNITED STATES ARMY CORPS OF ENGINEERS

DATUM TABLE

DESCRIPTION	NGVD 29	NAVD 88	NOAA MLLW
NGVD 29	0.00	–0.98	0.89
NAVD 88	0.98	0.00	1.87
MHHW	3.06	2.08	3.95
MHW	2.78	1.80	3.67
MSL	1.10	0.12	1.99
MLW	–0.71	–1.69	0.18'
NOAA MLLW	–0.89	–1.87	0.00'

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Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985-1
State: NY | Date Signed: 7/17/2012 | Project Mgr: LSK
Designed by: ESD | Drawn by: BKD | Checked by:

STATE OF NEW YORK · MARK OWEN GRAVELDING · LICENSED PROFESSIONAL ENGINEER · NO. 069985-1

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FORMER GENERAL MOTORS ASSEMBLY PLANT SITE • SLEEPY HOLLOW, NY
SEDIMENT REMEDIATION REQUEST FOR QUOTATION

GENERAL NOTES, ABBREVIATIONS, AND SURVEY CONTROL

GENERAL

ARCADIS Project No.
B0064462.0001.00060

Date
JULY 2012

ARCADIS OF NEW YORK
6723 TOWPATH ROAD
P.O. BOX 66
SYRACUSE, NEW YORK
TEL. 315.446.9120

G-100

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064462X03

EAST PARCEL
(APPROX. 28.3 ACRES)

METRO-NORTH RAILROAD

BLEEKMAN AVENUE

HUDSON STREET

SOUTH PARCEL
(APPROX. 1.7 ACRES)

RIVER STREET

SITE ACCESS

EXISTING
CONCRETE SLAB

WEST PARCEL
(APPROX. 66.2 ACRES)

ICHABOD'S
LANDING

OF-1

EXISTING
CONCRETE SLAB

KINGSLAND POINT
COUNTY PARK

GATE

EBB
FLOW

HARBOR CHANNEL

HUDSON
RIVER

1"=100' 100' 0 100' 200'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

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Professional Engineer's Name
MARK O. GRAVELDING
Professional Engineer's No.
069985-1

State	Date Signed	Project Mgr.
NY	7/17/2012	LSK
Designed by ESD	Drawn by BKD	Checked by

STATE OF NEW YORK · MARK OWEN GRAVELDING · LICENSED PROFESSIONAL ENGINEER · NO. 069985

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FORMER GENERAL MOTORS ASSEMBLY PLANT SITE • SLEEPY HOLLOW, NY
SEDIMENT REMEDIATION REQUEST FOR QUOTATION

EXISTING SITE FEATURES

GENERAL

ARCADIS Project No.
B0064462.0001.00060

Date
JULY 2012

ARCADIS OF NEW YORK
6723 TOWPATH ROAD
P.O. BOX 66
SYRACUSE, NEW YORK
TEL. 315.446.9120

G-101

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EAST PARCEL
(APPROX. 28.3 ACRES)

METRO-NORTH RAILROAD

RAIL LOADING ZONE

SEVENSON LUNCH TRAILER

SEVENSON

ENGINEER/OWNER

BEEKMAN AVENUE

HUDSON STREET

SOUTH PARCEL
(APPROX. 1.7 ACRES)

RIVER STREET

SITE ACCESS

EXISTING CONCRETE SLAB

TRAIN WELL

WEST PARCEL
(APPROX. 66.2 ACRES)

ICHABOD'S LANDING

SEE DRAWING G-200

SEDIMENT REMOVAL AREA

OF-1

200'

TRUCK MARSHALLING AREA

SEDIMENT PROCESSING & STAGING

TEMP. WWT AREA

SEDIMENT PROCESSING & STAGING FOR RAIL, IF NEEDED

POTENTIAL CRAWL SPACE AVAILABLE FOR BUD SEDIMENTS

EXISTING CONCRETE SLAB

KINGSLAND POINT COUNTY PARK

EXISTING OPENING IN SLAB

GATE

CONCRETE MILLINGS PILE

HARBOR CHANNEL

EBB

FLOW

HUDSON RIVER

LEGEND:

- PROPERTY BOUNDARIES
- HARBOR CHANNEL
- TURBIDITY CURTAIN
- REMOVAL BOUNDARY

NOTES:

1. SITE PREPARATION AREAS WERE PROVIDED TO THE ENGINEER BY SEVENSON ENVIRONMENTAL SERVICES SEPTEMBER 17, 2012.
2. SEDIMENT PROCESSING SHALL NOT OCCUR WITHIN 200 FEET OF ICHABOD'S LANDING.

100' 0 100' 200'
1"=100'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
4	10/16/12	CONTRACTOR PROPOSED LAYOUT - SEE ARCADIS FIGURE 4	ESD	.
3	9/17/12	ADDED TRAILER LOCATIONS AND STAGING AREAS, UPDATED NOTES	ESD	.
2	8/2/12	ADDED TRAIN WELL CALLOUT	ESD	.
1	8/3/12	ADDED SEDIMENT DISPOSAL AREA AND SLAB OPENING BOUNDARY	ESD	.

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Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985-1
State: NY
Date Signed: 10/17/12.
Project Mgr.: LSK
Designed by: ESD
Drawn by: BKD
Checked by: .

STATE OF NEW YORK MARK OWEN GRAVELDING NO. 069985-1 LICENSED PROFESSIONAL ENGINEER

ARCADIS
ARCADIS OF NEW YORK, INC.

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FORMER GENERAL MOTORS ASSEMBLY PLANT SITE • SLEEPY HOLLOW, NY
SEDIMENT REMEDIATION REQUEST FOR QUOTATION

SITE PREPARATION PLAN

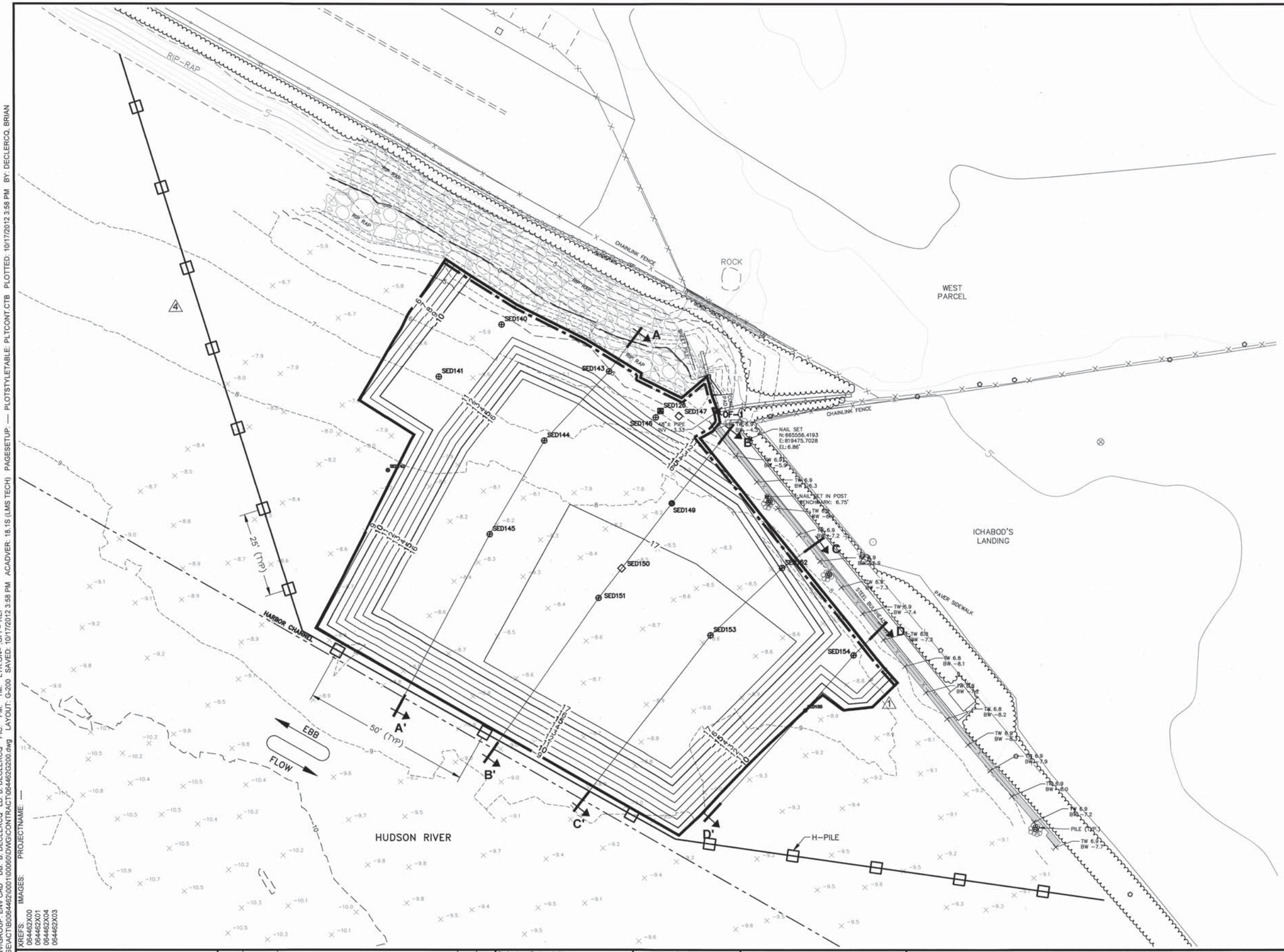
GENERAL

ARCADIS Project No.
B0064462.0001.00060

Date
JULY 2012

ARCADIS OF NEW YORK
6723 TOWPATH ROAD
P.O. BOX 66
SYRACUSE, NEW YORK
TEL. 315.446.9120

G-102



LEGEND:

- TEMPORARY SUPPORT
- REMOVAL BOUNDARY
- MSL
- HARBOR CHANNEL
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- REMOVAL MAJOR CONTOUR
- REMOVAL MINOR CONTOUR
- FENCE
- RIPRAP
- CONCRETE WALL
- GUIDERAIL
- SPOT EL./TOP–BOT. WALL
- ELEVATION MARK SET
- WOOD PILES
- OUTFALL LOCATION
- TURBIDITY CURTAIN (1 / G-401)
- GEOTECHNICAL CORE
- SHALLOW SEDIMENT SAMPLE LOCATION
- BENTHIC BIOTA SAMPLE LOCATION
- BIOTISSUE SAMPLE LOCATION
- SEDIMENT CORE LOCATION
- SEDIMENT CORE LOCATION–OF–1 GRID

SEDIMENT REMOVAL NOTES:

1. THE ONE FOOT REMOVAL CONTOURS SHOWN ON THIS PLAN INDICATE THE DREDGE ELEVATIONS.
2. CONDUCT REMOVAL AND BACKFILL ACTIVITIES IN A MANNER THAT LIMITS SLOUGHING.

TURBIDITY CURTAIN NOTES:

1. THE TURBIDITY CURTAIN SHOWN IS CONCEPTUAL. CONTRACTOR MAY PROPOSE AN ALTERNATE AND EQUIVALENT.
2. THE TURBIDITY CURTAIN SHOWN ASSUMES H–PILE ANCHORS AT 25–FT O.C. SPACING FOR THE UPSTREAM AND DOWNSTREAM BOUNDARIES, AND 50–FT O.C. ALONG THE HARBOR CHANNEL.
3. TURBIDITY CURTAIN SHALL BE ANCHORED AT MHHW LINE. CURTAIN SHALL BE INSTALLED AT 45 DEGREE ANGLE FROM THE SHORELINE, ORIENTED AS SHOWN.
4. TURBIDITY CURTAIN WILL BE TIED INTO THE SHORELINE AT THE SITE RIP RAP ON THE WESTERN SIDE OF THE REMOVAL AREA AND AT THE ICHABOD'S LANDING BULKHEAD ON THE EASTERN SIDE. THE ICHABOD'S LANDING BULKHEAD EXTENDS FROM OUTFALL OF–1 TO THE SOUTHEAST BY APPROXIMATELY 315 FEET (NOT SHOWN).

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XREFS: 0644622X00 0644622X01 0644622X04 0644622X03
IMAGES: PROJECTNAME: —

15' 0 15' 30'
1"=15'

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No.	Date	Revisions	By	Ckd
4	10/16/12	TURBIDITY CURTAIN EXTENDED - SEE ARCADIS FIGURE 4	ESD	.
3	9/18/12	CHANGED SCALE AND UPDATED NOTES	ESD	.
2	8/2/12	EXTENDED TEMPORARY SUPPORT ALONG ICHABOD'S LANDING BULKHEAD	ESD	.

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Professional Engineer's Name: **MARK O. GRAVELDING**
Professional Engineer's No.: 069985-1
State: NY
Date Signed: 10/17/12
Project Mgr.: LSK
Designed by: ESD
Drawn by: BKD
Checked by: .

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FORMER GENERAL MOTORS ASSEMBLY PLANT SITE • SLEEPY HOLLOW, NY
SEDIMENT REMEDIATION REQUEST FOR QUOTATION

REMOVAL AREA / TURBIDITY CURTAIN PLAN

GENERAL

ARCADIS Project No.: B0064462.0001.00060
Date: JULY 2012

ARCADIS OF NEW YORK
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SYRACUSE, NEW YORK
TEL. 315.446.9120

G-200

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EAST PARCEL
(APPROX. 28.3 ACRES)

WEST PARCEL
(APPROX. 66.2 ACRES)

SOUTH PARCEL
(APPROX. 1.7 ACRES)

METRO-NORTH RAILROAD

BEEKMAN AVENUE

HUDSON STREET

RIVER STREET

SITE ACCESS

ICHABOD'S LANDING

EXISTING CONCRETE SLAB

ABANDONED INDUSTRIAL WASTE LINE

12" PLUG

MH

MH-1

MH-2

MH-3

OF-1

OF-3 (ABANDONED)

48" CMP

8" CMP

6" PVC

EXISTING CONCRETE SLAB

KINGSLAND POINT COUNTY PARK

GATE

HARBOR CHANNEL

HUDSON RIVER

EBB FLOW

XREFS: IMAGES: PROJECTNAME: ----
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0644462X02 pink 03850024.tiff
0644462X03 yellow 29070173.tiff

LEGEND:

- PROPERTY BOUNDARIES
- STORM SEWER
- MANHOLE

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. EXTENT OF STORM SEWER PIPELINES SHOWN IS CONCEPTUAL. PIPELINE LOCATIONS WERE ESTIMATED USING HISTORICAL MAPPING AND SURVEYS. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF STORM SEWER LOCATIONS FOR WEST PARCEL PIPE CLEANING WORK TASK.

1"=100' (100' 0 100' 200')

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No.	Date	Revisions	By	Ckd
1	8/2/12	ADDED GRID LINES FROM HISTORICAL FOUNDATION PLAN (1961)	ESD	.
2	8/2/12	EXTENDED STORM SEWER LINES	ESD	.

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Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985-1
State: NY | Date Signed: 10/17/12 | Project Mgr.: LSK
Designed by: ESD | Drawn by: BKD | Checked by: .

STATE OF NEW YORK MARK OWEN GRAVELDING LICENSED PROFESSIONAL ENGINEER NO. 069985

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WEST PARCEL STORM SEWERS

GENERAL

ARCADIS Project No.: B0064462.0001.00060
Date: JULY 2012

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TEL. 315.446.9120

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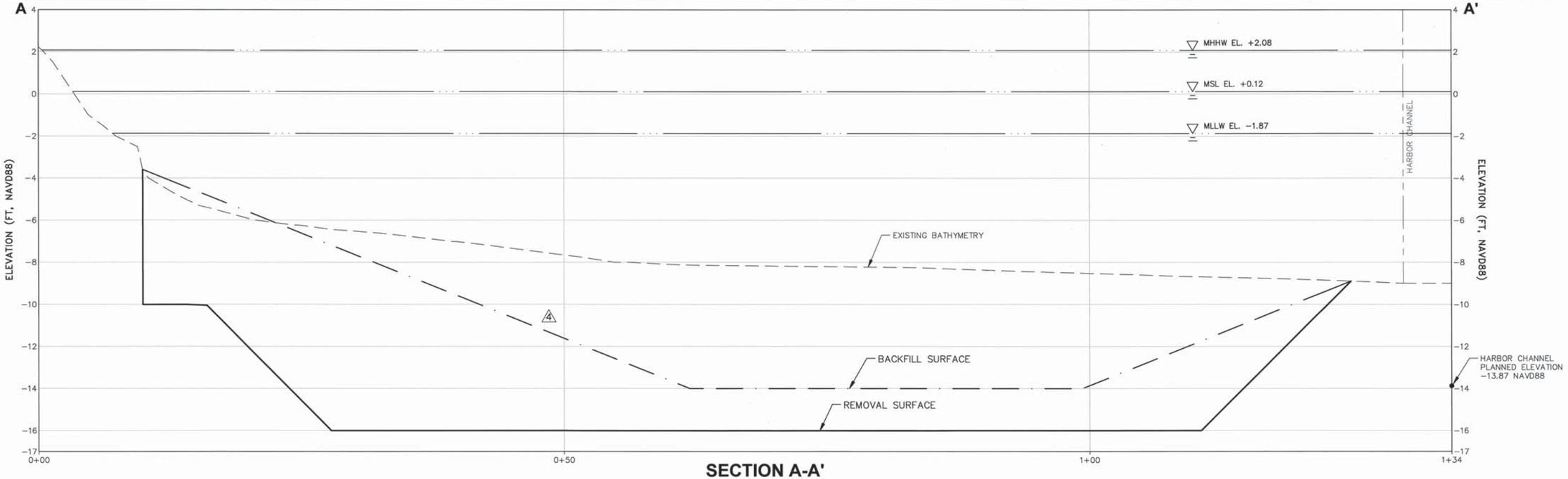
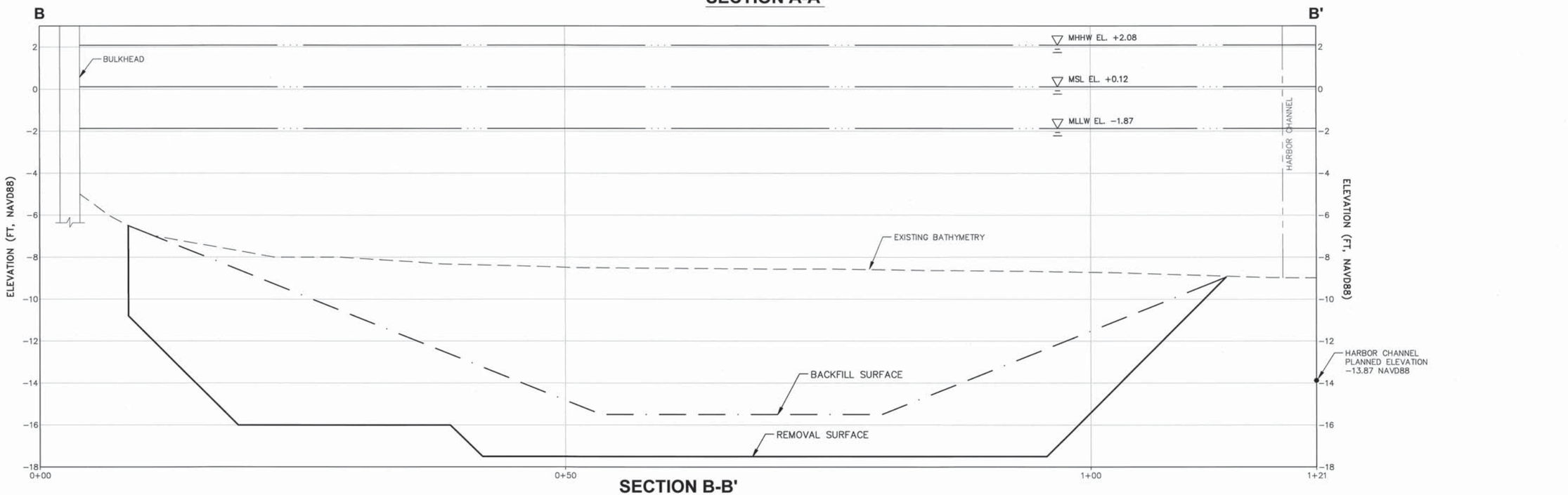


SECTION A-A'



SECTION B-B'

5' 0 5' 10'
HORIZONTAL SCALE: 1"=5'
2.5' 0 2.5' 5'
VERTICAL SCALE: 1"=2.5'

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4	10/16/12	REVISED BACKFILL EL.	ESD	.

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Designed by: ESD | Drawn by: BKD | Checked by: .

STATE OF NEW YORK · MARK OWEN GRAVELDING · 069985-1 · LICENSED PROFESSIONAL ENGINEER

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CROSS SECTIONS A-A' AND B-B'

GENERAL

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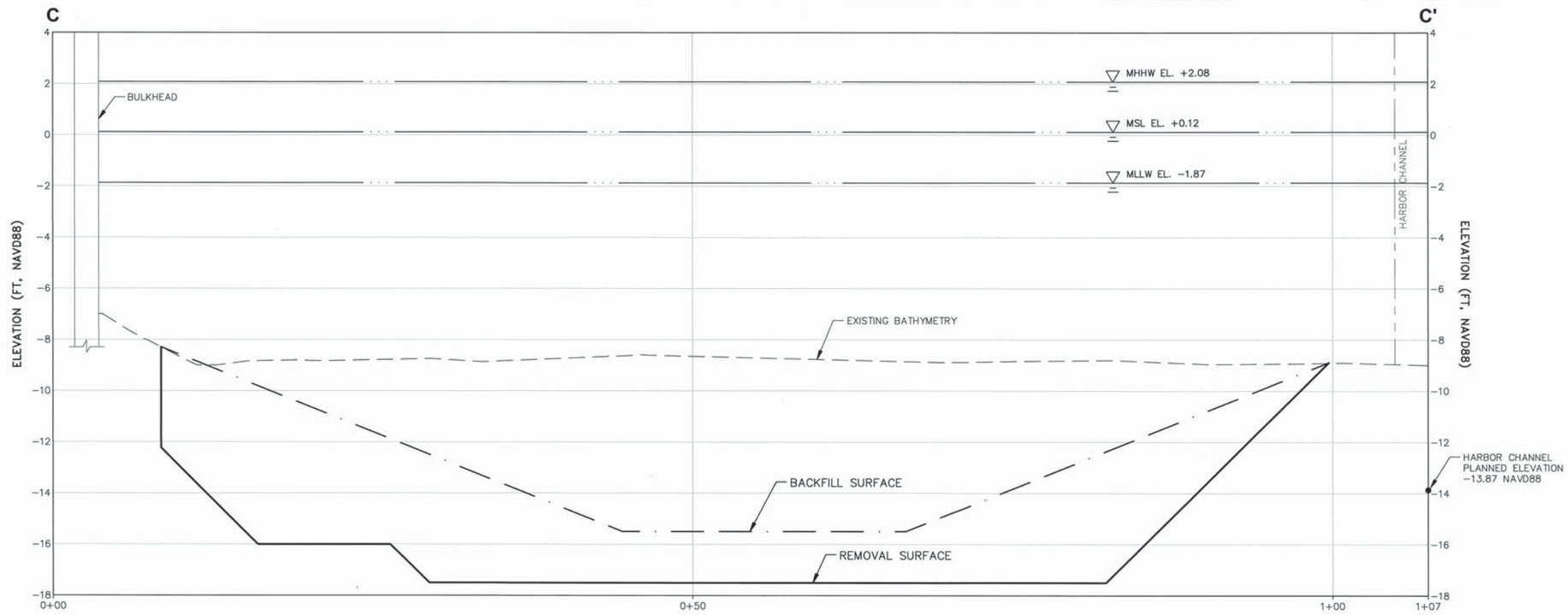
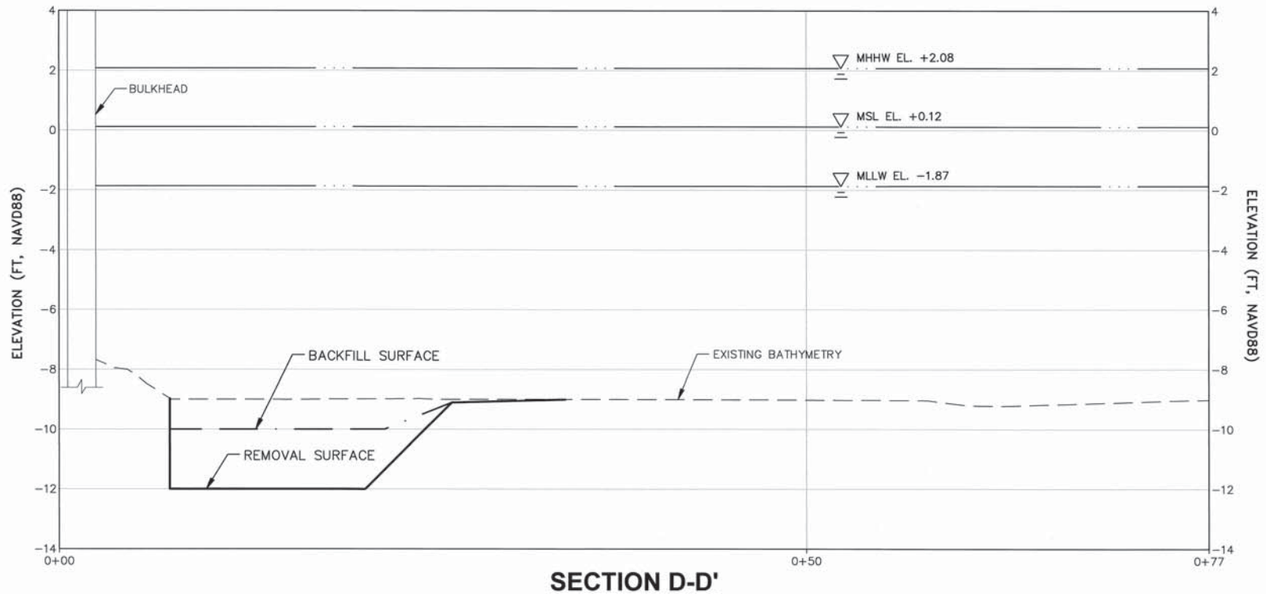


SECTION C-C'



SECTION D-D'

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XREFS: 064462X00 064462X02 CV3
IMAGES:
PROJECTNAME: —

5' 0 5' 10'
HORIZONTAL SCALE:1"=5'
2.5' 0 2.5' 5'
VERTICAL SCALE:1"=2.5'
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CROSS SECTIONS C-C' AND D-D'

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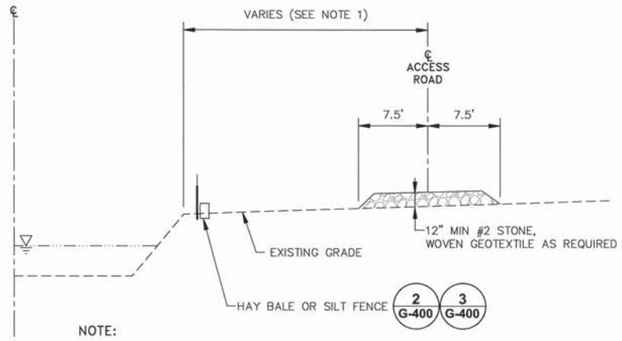
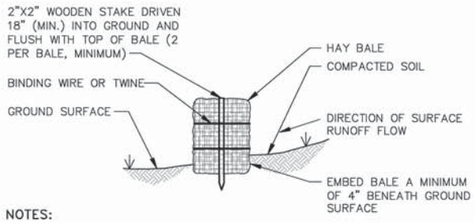


NOTE:

1. DIMENSION VARIES TO ACCOMMODATE EXISTING FEATURES AND TOPOGRAPHY.
2. PLACEMENT OF FILL FOR ACCESS ROADS SHALL BE AS REQUIRED TO SUPPORT CONSTRUCTION EQUIPMENT.
3. INSTALL CONSTRUCTION ENTRANCE/EXIT PAD AT ALL ACCESS POINTS TO PAVED ROADS. CONSTRUCT IN ACCORDANCE WITH DETAIL 6 ON DRAWING G-400.

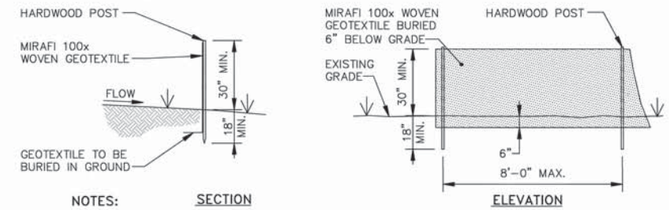
TYPICAL ACCESS ROAD (1)
NOT TO SCALE



NOTES:

1. HAY BALES SHALL ONLY BE USED AS REQUIRED.
2. BALES SHALL BE PLACED TIGHTLY TOGETHER, END TO END, TO FORM A CONTINUOUS BARRIER IN SELECTED AREAS.
3. THE INTEGRITY OF THE HAY BALES WILL BE MAINTAINED FOR THE PROJECT DURATION AND UNTIL ADEQUATE VEGETATIVE GROWTH IS ESTABLISHED.
4. STOCKPILE ANY EXCAVATED MATERIAL ONSITE FOR USE AS BACKFILL UPON COMPLETION.

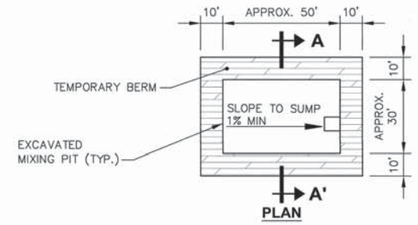
HAY BALE (2)
NOT TO SCALE

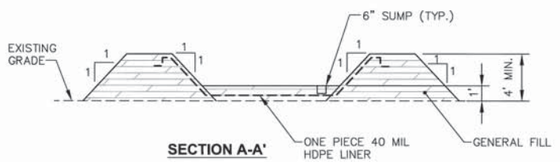


NOTES:

1. ACCUMULATIONS OF SEDIMENT ADJACENT TO SILT FENCES WILL BE PERIODICALLY REMOVED THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITIES.
2. SILT ACCUMULATIONS SHALL BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE-HALF OF THE HEIGHT OF SILT FENCE.
3. THE INTEGRITY OF SILT FENCING WILL BE MAINTAINED FOR THE PROJECT DURATION AND UNTIL ADEQUATE VEGETATIVE GROWTH IS ESTABLISHED.

SILT FENCE (3)
NOT TO SCALE

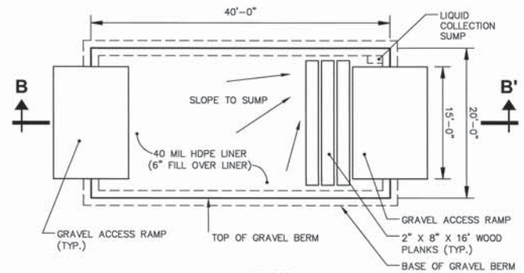


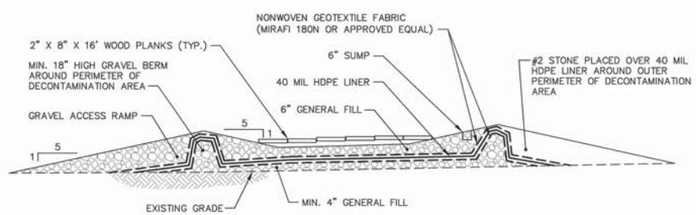


NOTES:

1. CONSTRUCT ON EXISTING GRADE OVER AN AREA SIZED FOR THE AMOUNT OF MATERIAL TO BE STAGED. ENSURE AREA TO BE LINED IS FREE OF DEBRIS, STONES, AND SHARP OBJECTS.
2. PLACE LINER OVER THE EXISTING SURFACE AND ANCHOR INTO TEMPORARY BERMS.
3. PLACE A 1'-THICK LAYER OF GENERAL FILL OVER THE LINER. THE FILL WILL BE FROM AN APPROVED SOURCE.
4. PLACE GENERAL FILL AS SHOWN TO FORM BERMS.
5. THE TEMPORARY SEDIMENT STAGING AREA SHOULD BE SLOPED TO DRAIN TO A LOW POINT SUCH THAT ANY ACCUMULATED WATER CAN BE COLLECTED.
6. WHEN CONSTRUCTION IS COMPLETE, REMOVE ALL MATERIAL ABOVE THE LINER AND DISPOSE OF IT WITH EXCAVATED MATERIALS. REMOVE THE LINER AND DISPOSE OF IT WITH THE COVER MATERIAL.

TEMPORARY SEDIMENT STAGING AREA (4)
NOT TO SCALE





NOTES:

1. DECONTAMINATION AREA SHALL HAVE A GENERAL SLOPE TOWARD A COLLECTION SUMP TO FACILITATE THE COLLECTION OF WASH FLUIDS.
2. UPON COMPLETION OF CONSTRUCTION ACTIVITIES, THE DECONTAMINATION AREA, INCLUDING HDPE LINER, IS TO BE REMOVED BY THE CONTRACTOR FOR DISPOSAL WITH EXCAVATED MATERIALS.
3. WOOD PLANKS SHALL BE PLACED ABOVE THE GRAVEL DRAINAGE LAYER THROUGHOUT THE WORKING SURFACE OF THE DECONTAMINATION AREA TO PROVIDE A STABLE SURFACE FOR VEHICLES AND EQUIPMENT TO BE DECONTAMINATED.

DECONTAMINATION AREA (5)
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Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985-1

State	Date Signed	Project Mgr.
NY	7/17/2012	LSK
Designed by: ESD	Drawn by: BKD	Checked by: .

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MISCELLANEOUS DETAILS

GENERAL

ARCADIS Project No.: B0064462.0001.00060
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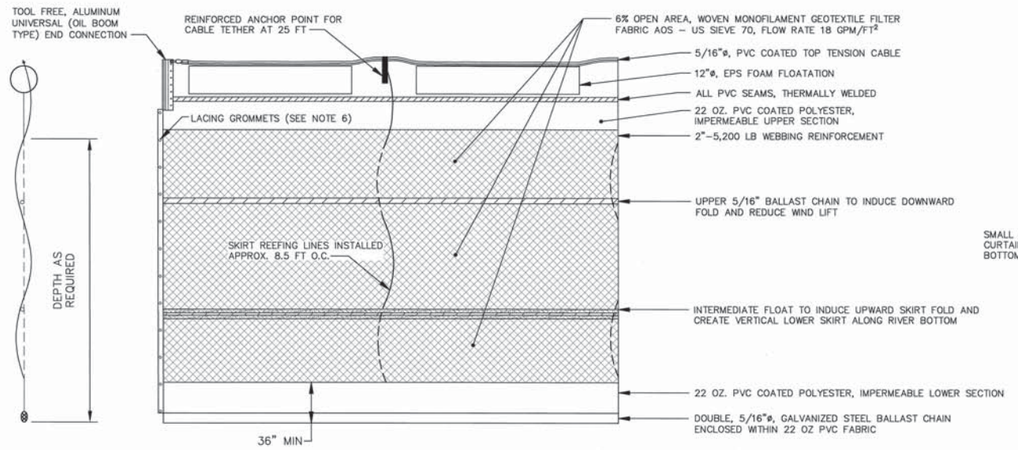
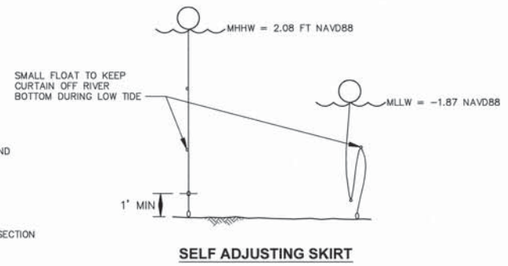




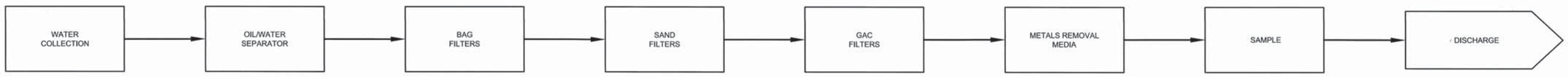
SELF ADJUSTING SKIRT

NOTES:

1. THE TURBIDITY CURTAIN DETAIL PROVIDED HEREON IS CONCEPTUAL. THE CONTRACTOR MAY PROPOSE AN ALTERNATE TURBIDITY CURTAIN OR OTHER APPROPRIATE TURBIDITY CONTROL SYSTEM AT THE REVIEW AND APPROVAL OF THE ENGINEER. THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR MEETING THE PERFORMANCE CRITERIA FOR A TURBIDITY CONTROL SYSTEM AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
2. TURBIDITY CURTAIN TO BE PLACED AROUND DREDGING AREA PRIOR TO INITIATION OF CONSTRUCTION ACTIVITIES.
3. SELF ADJUSTING SKIRT PREVENTS THE LOWER SKIRT FROM LAYING OUT ACROSS THE BOTTOM AT LOW TIDE. LOWER BALLAST CHAIN WILL BE IN CONTACT WITH THE MUD LINE AT LOW TIDE.
4. PLACE IN ACCORDANCE WITH THE LAYOUT PROVIDED ON DRAWING G–200.
5. ABSORBENT BOOMS SHALL BE INSTALLED ALONG THE PERIMETER OF THE TURBIDITY CURTAIN IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
6. THE TURBIDITY CURTAIN SHOWN ASSUMES H PILE ANCHORS WITH THE LAYOUT SHOWN ON DRAWING G–200. ATTACH THE CURTAIN TO THE H–PILES AT THE LACING GROMMETS USING METHODS SUGGESTED BY THE MANUFACTURER. POTENTIAL ATTACHMENT METHODS COULD INCLUDE CABLE CLAMPS, ATTACHED RINGS AND CABLE TETHERS, OR FLOATING CABLE RINGS.
7. BOTTOM BALLAST OF CONCEPTUAL TURBIDITY CURTAIN WILL REMAIN CLEAR OF MUDLINE APPROXIMATELY 1 FOOT DURING MEAN HIGH WATER (+1.80 NAVD88).

TURBIDITY CURTAIN DETAILS (1)

NOT TO SCALE



NOTES:

1. THE SYSTEM SHALL MEET ALL APPLICABLE DISCHARGE REQUIREMENTS.

SCHEMATIC WATER TREATMENT PROCESS FLOW DIAGRAM (TYPICAL) (2)

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State: NY | Date Signed: 7/17/2012 | Project Mgr.: LSK
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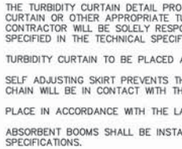

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P.O. BOX 66
SYRACUSE, NEW YORK
TEL. 315.446.9120

G-401

Appendix A

Contractor Plans

ARCADIS

Sevenson Environmental Services
Proposed Implementation Plan

Section 1 – Sediment Remedial Work Plan (RWP)

Work Plan for the Sediment Remediation

Sevenson is pleased to present the attached work plan in accordance with the requirements set forth in the Request for Quotation and the associated project documentation provided by Arcadis. This plan will provide a summary of the means and methods Sevenson is proposing for the construction and waste management services required to complete remedial activities at the Former General Motors Corporation North Tarrytown Assembly Plant at 199 Beekman Avenue, Sleepy Hollow, New York.

Remedial Action Work Tasks

Work Task 1A – General Conditions and Supervision

Under this work task, Sevenson will take actions to address the General Conditions and supervision for the project in accordance with the Contract Drawings and the specifications including, but not limited to:

1. **Attend project meetings, including a pre-construction meeting, daily site-safety/coordination meetings, and weekly progress meetings between the Owner, the Engineer, NYSDEC and Sevenson.**

Sevenson will attend the progress meetings and will be prepared to discuss pertinent topics such as deliveries of materials and equipment, progress of the work and provide two week scheduling for future work activities.

2. **Actions to address General Conditions, such as Environmental Protection Procedures, Erosion and Sedimentation Controls, Protection of Air Quality and Noise Control.**

Erosion and Sediment Control Plan

The objective of this plan is to state the soil erosion and sediment control measures Sevenson will implement on the Sleepy Hollow site to prevent and minimize erosion and sedimentation. Soil, water, and other natural resources will be protected from degradation and depletion that often result from land-disturbing development activities through the use of measures outlined in this Soil Erosion and Sediment Control Plan.

The soil erosion and sediment control measures described herein are designed based on the following principles:

Minimize exposure of bare soil;

- Preserve existing vegetative cover wherever possible;
- Prevent soil from leaving the site through the use of silt fences, hay bales, and/or stone (as necessary);
- Stabilize disturbed areas soon after final grading;
- Keep runoff velocities low;
- Divert run-on water away from disturbed areas; and
- Reduce sedimentation by utilizing erosion control practices on site.

This plan is based on NYS DOT Specification Section 712-01. The approved Soil Erosion and Sediment Control Plan, which is included in this work plan and will be kept on site at all times for inspection by General Motors and their designated representatives. Revisions to the approved plan will be submitted to General Motors and their designated representatives for approval.

i. Plan Implementation

All erosion and sediment controls will be put into effect and functional prior to commencement of any earthwork activities. Once in place, Sevenson's Quality Control Manager, or his representative, will be responsible for the inspection of all control measures daily and after each

rain event. Any items found noncompliant with this plan will either be repaired or replaced immediately.

The Quality Control Manager has the authority to stop work until these repairs are completed. He will also maintain a log of his inspections and a list of deficiencies found, and the corrective action(s) taken.

ii. Plan Components

Siltation and erosion control practices will be consistent with currently acceptable practices, including the placement of silt fencing and hay bales to mitigate sedimentation transport; the use of berms and trenches to re-direct surface water run-off/run-on to prevent contamination of adjacent properties; and the use of absorbent booms, where applicable, to prevent the flow of contaminated liquids from entering navigable waterways and/or storm sewer pathways.

Sevenson will also perform the following activities:

- Installation of silt sacks in affected, on site, catch basins.
- Surface drainage from cuts and fills within the limits of the work will be graded to control surface water flow (i.e., mitigate run-off and run-on) and mitigate soil erosion.
- Sedimentation barriers will be installed using siltation fencing and/or hay bales around the perimeter of the work areas. All sedimentation barriers will be inspected, documented and maintained until interim site restoration is completed.
- Previously established grades will be maintained in a true and even condition.
- Any piece of equipment coming into contact with contaminated soils will be decontaminated with a pressure washer at the equipment decontamination station, which will be located within the perimeter berms of one of the two material staging pads. All equipment will be inspected prior to leaving the decontamination area and prior to authorization to leave the site.

- Sevenson or its subcontractors will immediately clean up any uncontaminated mud or soil tracked from the site onto roadways.
- All soil erosion and sediment control measures (silt fence, hay bales, trenches, berms, etc.) will be installed prior to any major soil disturbances, or in their proper sequence, and maintained until permanent protection is established.
- All work will be performed in accordance with the New York Standards and Specifications for Erosion and Sediment Controls manual.
- Any changes to the approved SESCP will require the submission of revised SESCPs to General Motors and their designated representatives. The revised plans must meet all current soil erosion and sediment control standards.

iii. Site Sediment Controls

The following control devices will be constructed as indicated below and installed in the order shown:

Silt Fence

Sevenson will install silt fencing along the down slope sides of the work areas, or as required. The lower edge of the silt fencing will be buried a minimum of six inches. Installation will be as recommended by the manufacturer. The silt fencing will be monitored daily for silt accumulation and when the silt build up causes the silt fence to either bulge, or accumulates half way up the silt fence, the silt will removed, placed on the site and re-graded.

Inlet Protection

Sevenson will construct sediment barriers at curb inlets as appropriate. In the event that backfill work is conducted near the road that could impact any off-site drains, the off-site drains will have protection measures installed, including installation of siltation curtains to mitigate sediment flow into the drain system. In addition, Sevenson will maintain absorbent booms on-

site for use in preventing contaminated materials from entering the drainage system in the event of a spill.

Stockpiles

Silt fencing will be placed to surround all stockpiles and Sevenson will prevent the migration of surface water to the disturbed areas through use of berms, temporary swales, etc.

iv. Additional Measures

Immediately upon recognizing that unforeseen circumstances pose the potential for accelerated erosion or sedimentation, Sevenson will use appropriate Best Management Practices to eliminate the potential for accelerated erosion and sedimentation. Sevenson will supplement the above control devices with, but not limited to, oil booms, hay bales, rock dams, erosion control matting, riprap lining and/or sedimentation basins. Should the need arise to pump sediment laden water, Sevenson will use Best Management Practices to discharge the water through sediment control devices, such as hay bales, silt fence, etc. prior to discharging the water over non-disturbed vegetative areas.

v. Removal

Removal of the erosion and sediment controls will be accomplished as the items are no longer needed. Inlet protection structures and silt fencing around stockpiles will be removed once stockpiles are depleted.

Remaining soil erosion controls will be removed upon General Motors and their designated representative's approval. The last sedimentation controls to be removed are the curb inlet protection and the perimeter silt fencing. Any disturbances due to the removal of the silt fence, or other control item, will be repaired, or stabilized immediately.

vi. Final Restoration, Maintenance, and Acceptance

Following the completion of all remedial activities the site will be restored. Site restoration will include the repair of any site areas damaged or disturbed during the completion of remedial activities, and cleaning all work areas to remove all materials and waste.

Siltation barriers, straw mulch, or soil erosion control blankets and fabric will be used to prevent siltation of areas beyond the work limit. All washed out areas will be re-graded to final grades.

vii. Final Inspection

Sevenson will request that a Final Inspection be held by General Motors and their designated representatives to determine that deficiencies noted in the preliminary inspection have been corrected.

Dust, Odor and Vapor Control Plan

This Dust, Odor and Vapor Control Plan has been prepared by Sevenson to address the control of fugitive and airborne Dust, Odor and Vapor (DOV) emissions from the Sleepy Hollow Project Site (the Site). This Plan complies with the State of New York rules for controlling fugitive Dust, Odor and Vapor emissions as specified. The primary objective of this plan is to formulate a strategy for controlling, to the greatest extent practicable, fugitive or airborne DOV emissions at the Site. This will be accomplished by identifying specific sources and activities that have the highest potential to produce or generate fugitive or airborne DOV emissions. This plan describes the engineering controls necessary to minimize and control DOV emissions from those sources and activities. This plan is prepared to address the control of fugitive DOV emissions at the Site that are a result of current remediation activities. As necessary, the scope of this plan will be revised to reflect changes in Sevenson's DOV control strategy as site conditions or activities may change in the future.

As a precautionary and control measure for this project, this Dust, Odor and Vapor Control Plan will be used as a standard operating procedure. This plan will be used:

- To eliminate origins of Dust, Odor and Vapor from the site;
- To identify potential Dust, Odor and Vapor migration pathways;
- To monitor for Dust, Odor and Vapor produced by site activities; and
- To implement corrective actions as the need arises.

The plan has attempted to include all foreseeable situations and planned work areas/activity tasks. In addition, the plan provides an approach to those situations that cannot be anticipated at the time of its preparation. The plan is prepared and submitted with the understanding that it can be modified to accommodate actual site conditions as they arise. This plan will be implemented in conjunction with the project Health and Safety Plan.

i. Potential Fugitive Dust, Odor and Vapor Sources

Sevenson has identified the following project work areas/tasks as potential sources of fugitive Dust, Odor and Vapor emissions. They are as follows:

Mobilization

During site mobilization, the following tasks will be performed, which have potential for producing Dust.

- Delivery of equipment and materials.

Site Preparation

The following site preparation activities may generate Dust, Odor and Vapor:

- Installation of erosion and sediment controls

- Installation of excavation support system
- Construction of soil staging areas

Excavation

The following excavation activities may generate Dust, Odor and Vapor:

- Excavation/Dredging
- Transportation of waste to stockpile area
- Stabilization of dredged sediments
- Stockpiling of stabilized sediments

Backfill

The following activities may generate Dust.

- Transportation of clean fills on site.
- Placement / compaction of clean fill
- Transport and Placement of stabilized sediment as structural fill in open excavations

Demobilization

The following activities may generate dust:

- Removal of temporary facilities
- Removal of equipment from site

ii. Dust, Odor and Vapor Control and Mitigation Procedures

The following methods will be used to prevent conditions conducive to Dust, Odor and Vapor generation and suppress dust, odor and vapor should it occur. The methods below are presented in accordance with project functions or specific work areas.

Worker Training and Practices

- Educate, train and reinforce workers at daily safety meetings of the necessity to perform their tasks in a manner that does not generate dust, odor or vapor
- Stress the importance and reinforce the need to keep assigned work areas clean, neat, and dust, odor and vapor-source free as a standard operational procedure during all work activities on an ongoing basis
- Maintain dust, odor and vapor suppression in assigned work areas
- Ensure that workers notify supervisors of dusty conditions whenever they are visually observed and request dust suppression support if needed.

Mobilization

- Insure trucks delivering materials (stone, gravel, etc.) are covered/tarped;
- Maintain access roads as required;
- Enforce speed limits of 10mph suitable to access roads to minimize fugitive dust;
- Routinely apply water to cover high traffic areas (haul roads and site access roads) with water spray from water truck or local hoses. This procedure will help prevent soil from accumulating on surfaces or from drying.

Site Preparation

- Routinely apply water to access roads, as necessary, with a water spray.
- Backfill trenches with clean fill material.

Excavation/Dredging

- Routinely apply water to access roads;
- Enforce speed limits to access roads to minimize fugitive dust;
- Routinely apply water to cover high traffic areas with water spray from water truck or local hoses to prevent clean soils from accumulating and drying.

- Place polyethylene on the ground surface where trucks are loaded;
- Material loaded into trucks should not be dropped from heights above the truck body;
- Broom or sweep truck tires used to haul material off site prior to leaving the site.
- Immediately clean excavated material spilled on the ground surface and sweep the road as required;
- Routinely remove any material that accumulates around equipment and work areas;
- Cover stockpiled materials with polyethylene at the end of each workday as storage areas become full or during periods of high winds. The polyethylene sheeting will be anchored with sand bags or comparable method to prevent the sheeting from being blown away;
- Cover (tarp) loaded trucks
- Employ the use of chemical suppressants as necessary

Backfill

- Routinely apply water to access roads with a water spray. Broom sweep asphalt road areas where water has been applied;
- Enforce speed limits to minimize fugitive dust;
- Ensure delivery trucks (delivering backfill materials, etc.) are covered
- Routinely apply water to the backfill materials for moisture control.
- Transfer accumulated solids to stockpile/disposal area.

iii. Best Management Practices

The following Best Management Practices (BMPs) will also be followed to help minimize and control dust, odor and vapor emissions at the Site to the greatest extent possible:

Roads — All onsite traffic will be restricted to specific designated roads that will be delineated with cones or barriers. Off-road travel will only be authorized on a case-by-case basis (e.g.,

access to a remote monitoring well, etc.). Traffic speed (10mph) will also be restricted to an appropriate level on all designated roads. All designated roads will be considered as high potential dust source areas, and as such, will be a priority for dust controls watering.

Hours of Operation—This Plan will be in effect during all hours of operation at the Site. During non-business hours, there will be no activities generating dust; therefore, dust control actions will be restricted to hours of operation only. However, as a Best Management Practice, if high winds are evident at the close of a business day (or immediately prior to a weekend, holiday, etc.), site personnel should evaluate vulnerable areas and implement controls as appropriate to minimize off-hours emissions.

iv. Monitoring and Corrective Action

Sevenson will implement all dust-monitoring/correction programs. Daily site safety meetings will reinforce the need for all workers to be cognizant and responsive to conditions or activities that generate visible dust. The area foreman and supervisors will be notified immediately if dust is observed or if conditions exist where dust could be a problem. The initial step of the program is to visually observe the infraction and then to follow the procedures noted in the Site Health and Safety Plan to rectify the issue.

The sequential corrective action task list for the elimination of fugitive dust at this site is presented below:

- Reduce the pace of, or cease, dust producing activity until the problem is corrected.
- Notify the area supervisor of dust conditions and implement dust suppression procedures.
- Remove accumulated dirt and soil from problematic areas, and/or cover, enclose, or isolate dust, odor and vapor-generating areas/surfaces to shield them from wind, sunlight or heat sources.
- Increase frequency, volume, and/or coverage of water misting and sprays to prevent soil and dirt from drying.

- Provide additional dust, odor and vapor suppression systems and operating personnel during the task duration.
- Modify operating procedures and methods to eliminate problematic conditions.
- Increase level of worker awareness and instruct them on implementation of any new or modified operating procedures.
- Report and document all procedural modifications and results.
- Perform routine audits of dust, odor and vapor suppression methods and work areas for dust, odor and vapor sources.

Sevenson's Project Manager, Superintendent and Site Safety Officer have the responsibility and authority to implement this Dust, Odor and Vapor Control Plan.

3. Supervision of Personnel

Sevenson will administer the project utilizing a management team from Sevenson's main office located in Niagara Falls, New York. This team specifically will consist of the following personnel whose resumes have been included in Attachment #1 of this work plan:

Vice President – Officer in Charge – Alan Elia
On Site Project Manager – James Pazderski
Superintendent – Dan Dragonette
QA/QC Officer – Brad Weiser
Health and Safety Officer – Wyatt Beougher

The local trades to be utilized will consist of Operators from Local 137; Laborers from Local 60; and Teamsters from Local 456; all of whom Sevenson has worked with in the past.

Although Sevenson will be managing the majority of work in house, specialty items such as surveying, off site T&D, electrical, sewer cleaning, excavation support design and laboratory testing will be performed by others.

4. Actions related to the Health and Safety Plan, personal protective equipment and training.

All Health and Safety related issues will be contained in the Site Specific Health and Safety Plan, which is required to be submitted 20 days prior to mobilization.

Work Task 1C – Mobilization and Demobilization

Prior to the commencement of contaminated sediment removal by mechanical means, it is Sevenson's intention to meet the requirements of Specification by performing the following tasks:

- Contact Dig Safely of New York to ensure that no underground utilities are located within the excavation;
- Installation of temporary facilities and utilities including field office trailers, associated equipment (computer, air monitoring, etc.) and temporary sanitary facilities;
- Perform a topographic survey to establish pre-existing site conditions and field locate upland staging areas and any existing conditions related to the sewer cleaning work (i.e. catch basins, manholes, etc.)
- Obtain local Village of Sleepy Hollow permits and confirm with the engineers that all necessary state and local permits required to conduct the work have been obtained and are in place;
- Deploy turbidity curtain around the perimeter of the dredge area prior to conducting sediment removal in these areas;
- Mobilize the necessary equipment and temporary support facilities required to perform the removal of sediment via mechanical means;
- Mobilize necessary Sevenson management / field personnel and local union personnel. Conduct initial medical monitoring activities with necessary job physicals and site awareness briefings;

- Construct the temporary waste water treatment system, material handling and storage pads as required to perform this work and as shown in the attached figures;
- Interface with Arcadis for supporting the dredging operations with the air monitoring plan, sediment sampling, re-suspension sampling, and/or post dredging sampling;
- Installing project signs;
- Providing the necessary site security.

Once the entire scope of work has been completed for the remediation of the site sediments, Sevenson will commence with the decontamination and demobilization of all site facilities and equipment as required. If it has been determined that there will be no beneficial reuse for the staging and water treatment pads that have been constructed on a subsequent phase of work, Sevenson will decontaminate, stockpile, and either recycle or dispose of the material off site as appropriate prior to restoring the asphalt and fencing around the north west bulkhead and departing from site.

Work Task 1E - Site Preparation

Following mobilization of personnel and equipment, site preparation at the site will consist of the following activities:

- Removal of trees and brush along the alignment of the temporary sheet pile wall;
- Install silt fence as needed and in accordance with the Erosion and Sedimentation Control Plan;
- Installation of the temporary sheet pile wall as indicated on the Contract Drawings;
- Placement of turbidity curtain and containment booms outside the dredge area;
- Survey and layout the alignment of the sewer cleaning activities;
- Construction of the temporary sediment staging area;
- Installing and replacing, as necessary, chain link security fencing and associated gates;

- Installing and maintaining temporary construction fencing around work areas and;
- Removing debris generated during the performance of site preparation activities, as necessary, including offsite disposal.

Please see Sevenson Drawing 3 which is a Site Plan that outlines the location of the various work areas of the site, which has been included as an attachment to this document.

Work Task 1F – Water Treatment

It is Sevenson's intent to initially collect and store water in a series of (6) 20,000 gallon storage tanks located on GM's west parcel at the onset of the project. The initial 20,000 gallon batch of collected water will be sampled and analyzed. Once the initial batch report has been reviewed, if the results meet the Westchester County POTW discharge requirements, the analytical data from the first tank will be forwarded to Mr. Bob Cea of the Westchester County POTW to obtain discharge authorization before releasing any water to the POTW. Thereafter, discharge can continue with sampling being conducted on a bi-weekly basis to ensure discharge parameters continue to be achieved. Any water that does not meet Westchester County POTW requirements will be pumped in to tanker trucks for off-site disposal at a permitted wastewater treatment facility.

Per Mr. Bob Cea, no formal permit is required for discharge into the sanitary sewer system as long as preliminary and interim sample testing indicates the water meets the required discharge standards. .

Sevenson will also provide a portable wastewater treatment facility as site needs dictate. The details of the wastewater treatment are included below. The preference however, is to either discharge the water to the County sewer system or dispose of the wastewater off-site at a licensed disposal facility.

If needed, the proposed General Motors Sleepy Hollow wastewater treatment facility will be designed to process 75 gpm of wastewater from the remediation activities from the General Motors site. The treatment facility has been designed to remove oil and grease, suspended solids and metals. A description of the proposed facility follows.

This system will be installed in a lined containment pad approximately 75' x 75' in size, and fabricated with a 40' mil layer of liner covered on both sides with a cushion layer of 8 ounce non-woven geotextile fabric, and a 6" protective layer of item 4 stone on top for the equipment to rest on.

Water Collection and Storage

Six 20,000 gallon storage tanks will be provided to collect water from the various work areas and provide for some initial settlement of any fines that may be carried with the water. Additional storage tanks will be added as necessary as space is not a concern at the site.

Solids/Oil and Grease Removal

The system has been designed to first remove suspended solids and oil and grease by gravity in the Oil-Water Separator, which removes these contaminants by settling (most suspended solids) and by flotation of oil and grease. The Oil-Water Separator will also serve as an equalization tank for flow and load variations. Flow will be pumped from the tank and the flow rate measured prior to entering the downstream processes.

Metals Removal

Following solids and oil and grease removal, the process next addresses metals. Metals reduction will be accomplished by first reducing the wastewater pH to 2-3, using sulfuric acid. The acid addition will be in-line, followed by a static mixer to quickly achieve full mixing, and a mix tank to provide sufficient detention time. A downstream pH controller will control the acid addition.

Next, a reducing agent, which will be Ferrous sulfate, will be utilized. Ferrous sulfate will remove heavy metals such as lead by a process known as iron co-precipitation. Ferrous sulfate will also be added in-line, followed by a static mixer and mix tank. Ferrous addition will be controlled by an Oxidation-Reduction Potential (ORP) controller.

At this point, heavy metals such as lead are captured in an iron-metal bond to be removed in the following chemical precipitation step.

Neutralization/Precipitation

In order to finally remove lead and other metals, the wastewater must be first neutralized to a pH of approximately 7.5-8.5. This allows hydroxides of chromium, iron-lead and other metals complexed with iron to precipitate and be removed. Sodium hydroxide will be used for this purpose. The sodium hydroxide (or caustic) will be injected in-line, followed by a static mixer and mix tank. As with acid, the caustic addition will be controlled by a pH controller. The controller will be set to control pH at 7.5-8.5. Polymer will be added downstream prior to a flash mixer and flocculation tank, to facilitate settling of the hydroxide flocs.

The metal-hydroxide solids will be settled and removed in an inclined-plate clarifier (IPC) unit. Sludge will be pumped from the unit using an air-operated diaphragm General Motors pump. Sludge will be mixed with the excavated material for disposal.

Prior to the organo-clay and GAC vessels, the wastewater will be filtered in bag filters to remove solids and to reduce the frequency of backwashing. A polishing bag filter will be added downstream to capture any carbon fines and adsorbed organics.

Flow will be measured and totalized prior to discharge.

Sevenson anticipates construction water volumes during this operation will amount to between 10,000 and 20,000 gallons per day. The waste water treatment system will be run as required to

keep up with the influent volumes during the short duration of time in which dredging and sewer cleaning will be taking place. It is assumed that after the initial batch sample has been processed, reviewed and accepted, that continuous discharge can commence with monthly discharge monitoring thereafter.

In 2007, Sevenson received approval to discharge treated water to the POTW. Sevenson will secure this approval again and will utilize information learned in 2007 to help with the process.

Work Task 1G – West Parcel Storm Sewer Pipe Cleaning

The following plan will detail the work sequence, equipment utilization and methodologies to properly clean manholes, catch basins and sewers and to properly contain the removed sediments and associated waters in the on-site staging area and water treatment facility. Sevenson will subcontract the sewer cleaning work to National Water Main Cleaning Company. Once the sewers are cleaned, a video camera will be placed in the sewers for final confirmation and documentation.

The sewer cleaning equipment utilized will be based on the diameter of the sewer line and the access to the pipe and manholes. The smaller size pipes may use a water jet hose line, while the large diameter would use a drag line and/or a vacuum truck.

The initial task is to prevent the flow of water from the Hudson River from entering the sewer system from the outfall. The manhole onsite leading to outfall #1 will be temporarily plugged with sand bags or a plug type barrier. Work will begin upstream of the system depending on the size of the sewer line. Sections will be isolated to prevent back flow of water and to capture sediment and water.

The sediment will be water jetted or mechanically dragged to a manhole or opening. A vacuum truck or comparable type unit will vacuum the sediment and water into the truck. The line will be repeatedly water jetted until clean. Once the sewer is clean, a video camera will be placed into

the line for confirmation that it is clean. The sewer lines will remain plugged until larger sections are cleaned.

A bypass pump system will be installed in the system from one manhole to another to maintain water flows into other sewer lines to prevent additional flows into the work area. The water and sediment removed will be transported via the vacuum truck to the onsite staging area. The material will be dumped into the containment area for processing. The silts and fines will settle out from the water and the decant water will be pumped to 20,000 gallon frac tanks via a submersible pump. The sediment will be temporarily staged for gravity draining and then will be blended with a reagent prior to onsite stockpiling.

Two crews may be required to maintain the schedule and proper sequence of the cleaning. In general, work will progress from the far end of the site to the outfall at the river. Once major runs of pipe are cleaned, the bypass pump system will be removed and relocated. The sewer line plugs will also be removed and relocated to the next work area.

On completion, the sewer lines and manholes will be photographed and the results will be submitted to the engineer for review.

All equipment will be thoroughly decontaminated at the primary material staging pad and will be inspected by the on-site Health and Safety Officer who will verify that the equipment is clean and ready for removal from the site.

Sewer Cleaning Containment Structure

It is National's intent to start with the up gradient pipes and work downstream, cleaning sections as they go.

Some of the downstream sections, particularly the 48" section that discharges at the outfall structure, will be cleaned into a containment structure that will be installed prior to the sewer cleaning work.

Please see Sevenson figure 4 which has been included as an attachment to this document for the layout and details associated with this containment structure.

The containment system will consist of steel sheet piling that will be installed in addition to the temporary excavation support sheeting that will be installed along the bulkhead and the GM property in which dredging will be performed.

The temporary excavation support sheeting at the outfall will be driven to an elevation just below the invert elevation of the outfall pipe. Sevenson will then install additional sheeting to essentially “close off” an area directly in front of the outfall to contain any water and sediments that are discharged from the sewer cleaning work and any bypass waters as necessary.

As shown on the Figure 4 details, the sheeting will be installed with two weirs installed at an elevation to promote settling within the contained area. An additional two rows of silt curtain will be installed as further protection against any turbid water that may flow over the weir structure.

It is important to note that all sewer cleaning work will be completed prior to dredging activities. Therefore, the settled sediments will be removed from an area that requires dredging anyway. These sediments, as they accumulate, will be removed with a long stick excavator and placed on the lined staging area located on GM property for proper handling and testing.

It is also important to note that the double row of silt curtain just outside the weir structure will be installed in addition to the turbidity containment structure fully encompassing the dredge area.

Work Task 1H – Survey

The following survey activities will be the responsibility of Sevenson:

- Survey control for construction and documentation purposes. Sevenson will protect all survey points and benchmarks.

- The layout of any additional survey controls, grid coordinate locations, lines, grades and elevations necessary for the proper construction, documentation and testing of the work. Survey activities will include: verifying existing conditions, dredging depths and horizontals limits through performance of a post construction survey, ensuring specified layer thicknesses are used during backfill activities and performing as-built surveys of all constructed site features (e.g./ final grades, storm sewer pipe locations and invert locations).
- All survey related work will be sealed and signed by a New York State Licensed Surveyor.
- Performing bathymetric and topographic surveys to verify the grades of the final dredged surface for use as acceptance of the completed work.
- Bathymetric drawings to confirm that work was performed according to the specifications and to ensure that the dredging elevations are met. Daily quantities of sediment removed and weekly mapping of the area will be provided.

The pre-construction survey will be provided by others that will be used to document pre-existing conditions. Sevenson will perform interim monitoring during construction activities. A Global Positioning System (GPS) attached to the dredging equipment will verify that all dredging depths are being met as specified along the completed areas. Sevenson will perform post bathymetric surveys to confirm that the required design dredge elevations have been met and the required terms of the Contract are completed.

Work Task 1I – Excavation Support and Protection

Prior to the installation of the temporary sheet pile wall, the shoreline will be cleared of trees, brush and debris. The sheet piling required for the work will be trucked in and staged on the asphalt staging area adjacent to the river.

The alignment of the wall will be surveyed as per the design documents. The shoreline will be inspected for large rock or debris that may inhibit the installation of the sheets. Sevenson will

remove visual obstructions with a track excavator and a grapple attachment and the debris will be placed in the onsite staging area for proper disposition.

A 150 ton crane with a vibratory hammer will be utilized to install the temporary sheet pile wall on the western end of the removal area. Due to access restrictions with the Ichabod Landing property, the easternmost sheets will be installed with the 120 ton crane located on barges within the Hudson River. This same 120 ton crane will be utilized for dredging and will be equipped with a Cable Arm bucket.

It is anticipated that AZ-18, hot rolled sheet piling will be utilized for the required shoring.

Glynn Geotechnical, who has extensive experience at the site due to the previous Sevenson work performed in 2007, has already been contacted and will be providing the design information needed for the sheeting work. This work will include an Excavation Support Installation Plan that will be signed and sealed by a Professional Engineer from Glynn that is registered in New York State.

Once the sediment and backfill operations are completed, the sheets will be pulled, cleaned and removed from the site.

Work Task 2A – Sediment Excavation

In anticipation of the removal of a minimum of 4400 cubic yards of impacted sediment, Sevenson will construct a primary material staging pad that is approximately 100' wide by 200' long with 2' high berms along the entire perimeter. The berm will be constructed with onsite millings. The pad will be constructed with a layer of 40 mil liner protected on both sides with a layer of 8 ounce non-woven geotextile fabric; and a 4" protective layer of item 4 stone will be placed to provide a suitable work surface for material handling. Additional concrete millings will also be used on top of the asphalt to create a dump pit that will be placed on the west side of the pad where the crane will be direct dumping the dredged material.

A secondary staging area will be constructed similar to the primary pad where the stabilization of the sediments will occur. The sediments will be transferred to the secondary pad with the use of tandems or off road haulers with sealed tailgates. The secondary pad will be located adjacent to the BUD placement area, inside the cut out floor slab. The secondary pad is being utilized to maintain a suitable distance from the nearby residents for the stabilization work.

Sevenson will initially mobilize a 150 to 200 ton crawler, which will be located on shore. The crane will help with the unloading of steel and the waste water treatment components, but will be used primarily to unload the sediment barge hopper located in the Hudson River as shown in Sevenson Figure 1 which has been included as an attachment to this document. An additional crane will be located on a deck barge within the river and will be responsible for the dredging of the impacted sediment. This crane will be set up with an environmental dredging bucket with GPS capabilities that will enable the operator to monitor work progress in real time to ensure that the dredging location and depths have been achieved.

Once all of the site mobilization and setup operations have been completed, initial survey and layout has been performed, and proper work zones have been delineated, Sevenson will initiate the dredging of the impacted sediments in a systematic fashion. Please see attached Sevenson Drawing 2 as a reference.

As noted, sediment removal will be accomplished using a 120 ton crawler crane located on a deck barge within the river. This crane will be equipped with a Global Positioning System (GPS) capable of providing X and Y coordinates with depth control. The environmental clam bucket and GPS software will allow the crane operator to visually track the location of the bucket in real time on the screen located in the cab of the crane. Sevenson will download the excavation limits into the GPS software that has been obtained from the topographic survey that will establish control. Once the excavation limits have been installed in the unit, Sevenson will remove the required amount of sediment from the area. As sediments are dredged, the material removed will be placed into an adjacent hopper barge, which is 37 x 150 feet long. As shown in the attached Sevenson Drawing 2, the removal of the sediments will take place in 4 phases, starting from the shoreline and working out to the sediment removal limits. The dredging will

start on the east side and progress west. The capacity of the hopper barge is roughly 600 to 800 cy, so it will require 2 moves per phase to complete the sediment removal. The dredging operation will be aided by a tug boat, that will help jockey the barges into the tight work quarters within the silt curtain contained sediment removal area.

As the excavation progresses, the 150 to 200 ton crane located on shore, that will be staged at a safe distance from the bank of the river, will be responsible for off -loading the sediments from the hopper barge and the sediments will be placed into the dump pit that will have been fabricated on the west end of the removal area. Within the swing radius of the clam bucket between the hopper barge and the material staging pad, Sevenson will deploy a sacrificial piece of plastic/liner on the ground in order to contain any spillage of the excavated materials while they are being loaded into the dump bin. Sevenson has assumed a production rate of 250 cubic yards per day and has incorporated an extra day or two into the schedule for movement of barges and curtains as necessary. Sevenson would anticipate working 6 – 10 hour work days to complete the work. No shift work is anticipated for this operation as it is not impacted by the tides.

As a contingency during dredging operations, if hardpan or debris is encountered, Sevenson may elect to temporarily utilize a conventional clam bucket that has the ability to remove firm sediment or debris that may prove too difficult to be removed with the environmental clam bucket. This may be the case along the shoreline where rip rap has been placed and where sheet piling is to be installed. On the west end as well, the hopper barge may require additional draft, so sediments may initially be removed using a clam bucket and the 150 to 200 ton crane situated on shore. Any sediment or debris removed will be dumped into the contained staging area and processed from there.

After Sevenson has removed all the required sediment from the dredge removal area and the necessary dredge depths have been achieved, a NYS licensed land surveyor will perform an as-built survey using conventional survey practices. The final as-built will be compared to the preconstruction survey and provide Sevenson with not only the final dredge elevation, but volume calculations as well. The as-built surveys and the equipment with GPS capabilities will

provide all parties with an accurate verification of dredge depths and material volumes, and will help ensure Sevenson does not exceed the dredge tolerances required in the Specifications.

Surveys will also be performed prior to commencing any debris removal activities; after completion of dredging activities and prior to backfilling activities, and after completion of backfilling activities. All as-built surveys will be performed using the conventional survey methods. The information provided by the GPS system on the crane will be used for informational and quality control purposes only.

Mechanical dredging will be performed in a manner such that re-suspension of sediments and sediment loss over dredged areas is minimized. The following dredging components shall be controlled and are key elements to the operator training programs for the dredging operations:

- Lift speed: Bucket should be lifted slowly through the water column.
- Cycle time: Cycle times should typically be between 1 and 3 minutes.
- Excavation Depth: Dredge cuts shall not be more than 2-feet to prevent overfill that may cause re-suspension.
- Excavation path: Dredging will be performed so that any dredge material from the bucket is not deposited in un-excavated areas.

It is expected that the dredge areas contain some debris of concrete, stone, and drift wood that is required to be removed in order to remove the impacted sediment. Sevenson would use the clam bucket and/or environmental bucket to pick up the debris and to place it on the material staging pad for future handling, characterization and disposal. In the event material cannot be removed with the clam bucket, divers would be used to rig the item with the appropriate hardware for removal with the crane.

Backfilling will commence after all the sediment removal is complete and upon receipt of General Motors/Engineers approval of this request.

Work Task 2B – Sediment Stabilization

On the material staging pad, a PC 220 excavator will then be used to blend an appropriate amount of Portland cement to solidify the material to the extent necessary. Once the material sets up to the point where it can be handled, it will be relocated and stockpiled in 500 CY piles for profile sampling and additional curing. Once the profile sampling has been received and the material passes paint filter tests, a second PC 220 excavator will transfer the material into a dump truck that will transport the material across the site and into the placement area as determined by General Motors. It is expected that the majority of the material will be able to be placed on site as beneficial re-use.

If the analytical results dictate that the material requires off-site disposal, the material will either be trucked out or placed in a secondary staging area adjacent to the rail siding. The amount of material requiring off-site disposal will ultimately determine whether trucking or rail will be used.

If rail transportation and disposal is required, once the rail road cars are on site, two laborers will install a fitted plastic “burrito” style liner with the flaps draping over the side of the car being loaded to protect the side of the rail car from contamination. Once the liner is installed, a loader with a bucket scale will be used to install approximately 100 tons of material in each of the 7 or 8 rail cars placed. Upon completion of loading, the liner flap will be reinstalled and secured as appropriate with blocks, sand bags, or rope prior to off-site shipment and disposal.

Work Task 2C and 2D – Transportation and Disposal

Due to the fact that the stabilized material has been approved for beneficial re-use at the site, it is anticipated that on-site placement will be the primary disposal means.

If sample results dictate that on site placement is not feasible and the volume requiring off-site disposal becomes too large to simply take out by truck, the rail option will be used. It is anticipated that trucks will be utilized, if approved, if quantities dictate as such.

The stabilized sediments will be sampled in the material storage pad and will either be placed as beneficial re-use or will be taken to a lined staging area adjacent to the railroad siding.

Sevenson will coordinate for the transportation and disposal of the stabilized sediments via rail as necessary. Sevenson will load stabilized sediment directly into railcars for off-site disposal to an appropriate, approved facility. Sevenson will load the railcars with a front end loader. If required, Sevenson will equip each railcar with a plastic liner for containment purposes.

Rail was the main transportation and disposal method utilized in 2007, so Sevenson is intimately aware of the requirements and will follow the procedures as outlined and approved previously.

All paperwork (bills of lading and/or manifest) will be coordinated by Sevenson and a daily summary sheet will be provided to log critical information for each transported load (load number, rail car ID number, weight, etc.).

Work Task 2E – Backfill

Following sediment removal activities, the crane and environmental clamshell bucket will be used to backfill the excavation area. It is anticipated that between 250 and 300 cubic yards of backfill will be placed per day. It is anticipated at this time that backfill will be delivered by barge and unloaded and placed utilizing the barge mounted crane. Backfilling will be initiated as soon as possible after the sediment removal operations are complete and the area has been approved for backfill. Once the backfill placement operations have been completed, conventional survey methods will be performed by a licensed NYS surveyor to confirm that the targeted backfill elevations have been achieved and to determine the appropriate quantities for payment.

Off-site materials brought on-site for use as fill must be from a certified NYSDOT source, certified by the supplier as native material, or sampled and analyzed by an Environmental

Laboratory Approval Program (ELAP) certified laboratory for VOC's; Semi VOC's; PCB's; Pesticides and Herbicides; and Inorganics to demonstrate that the off-site materials are suitable for use on site. One representative sample will be collected for each 500 cubic yards of backfill and for each new backfill material if laboratory analytical testing is performed. For materials to be placed as fill underwater, the laboratory analytical results will be compared by the Engineer to the sediment screening criteria guidance values (In-Water and Riparian Management of Sediment and Dredged Material (TOGS 5.1.9), dated November 2004). For materials to be placed above the high water mark, the laboratory analytical results will be compared by the Engineer to the ecological soil cleanup objectives (6 NYCRR Part 375, Table 6.8(b), Restricted Use Soil Cleanup Objectives, Protection of Ecological Resources). The laboratory used to analyze imported fill material will be New York State Department of Health ELAP certified for the parameters being analyzed. Prior to importing fill materials to the site, Sevenson will submit certifications or a laboratory test report for material type that indicates the grain size profile of the material. Sevenson will provide this data to the Engineer at least two weeks prior to bringing any selected fill material on site.

If obtaining backfill from a virgin source, it is anticipated that one sample for the aforementioned criteria will suffice. If obtaining fill from a non-virgin source, a suitable sampling frequency will be negotiated depending on the source of the material and the site being remediated.

Selected fill materials will meet the characteristics and be placed as shown on the contract drawings.

Work Task 2F and 2G– Turbidity Curtains and Containment Booms

Sevenson is responsible for the design, installation, maintenance and removal of the turbidity control system. The system will remain in place for the duration of the in-water remedial activities and will encompass the entire dredge area.

Sevenson will utilize Glynn Geotechnical to perform the design. Sevenson has worked with Glynn on many turbidity control and sheeting designs over the years and Glynn is very familiar with the site due to the work performed by Sevenson in 2007.

Sevenson understands that the turbidity control system noted in the contract drawings is conceptual and that Sevenson is responsible for the ultimate design. Sevenson has used similar containment systems in the past and would expect that the Glynn design will be similar to the system noted in the drawings. The narrative below thus takes this into consideration.

Prior to the commencement of dredging operations, Sevenson will furnish and install the necessary lengths of turbidity curtain, as well as supplemental absorbent and hard oil boom around the sediment removal area. The curtain will be installed utilizing the 120 ton crawler crane located on a deck barge which will be maneuvered with help from a tug boat. The turbidity curtain sections will first be connected onshore according to the curtain profile to assure proper depth coverage when it is deployed. As the curtain is pieced together on the shoreline, it will be fed into the water and gradually pulled out utilizing a boat. A land based crane or excavator may also assist with the deployment by gradually feeding the curtain off of the bank and into the water. Once the entire curtain has been fed into the water, the boat operator will drag the curtain into the necessary position. After the curtain is in the proper position, encapsulating the dredge areas, it will be anchored at the necessary locations on the curtain sections to prohibit migration.

To help support the curtain against the current, Sevenson will drive H-piles with the barge mounted crane with a vibratory hammer attachment. The conceptual layout uses pile spacing of 25 feet on center for sections oriented to the angle of the current and 50 feet on center when oriented parallel to the current. Pile lengths are estimated at approximately 25 feet, but these details will be confirmed with Glynn.

Under no circumstances will the turbidity control system be anchored to the existing shoreline bulkhead or on private property without the appropriate approvals. The turbidity control system will also not infringe upon the federally defined navigation channel.

After all of the necessary anchors have been deployed and the curtain is in a position that is satisfactory to Sevenson, the vinyl straps that hold the curtain against the float will be removed and the curtain will extend into place. Additional anchors may be utilized and/or removed as needed. It is Sevenson's experience that turbidity curtains in a high current, tidal area tend to experience significant bellowing. The curtain will be inspected routinely and maintained as required during the short period the dredging and backfill work are taking place.

Turbidity monitoring will be performed by ARCADIS and is described in the ARCADIS Sampling and Analysis Plan.

As for the containment boom, it will be installed along the entire length of the turbidity curtains. The absorbent booms will be a minimum of 8 inches in diameter and will be placed such that there are no gaps to allow the potential migration of oil/sheens outside the boom.

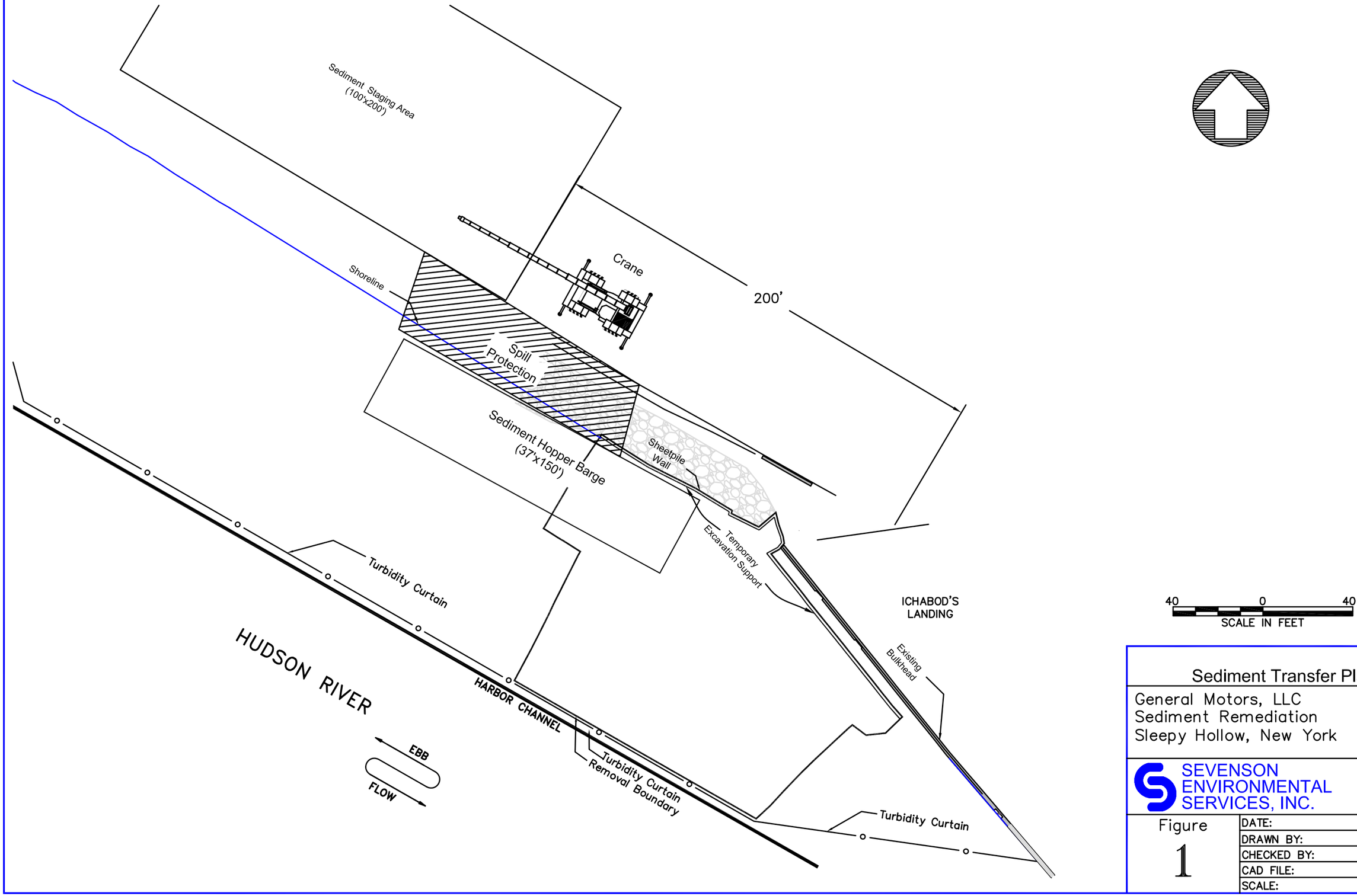
Sevenson will maintain the absorbent boom and change out the boom, as appropriate, to ensure that no release of oil/sheens outside the boom until the restoration activities are completed.

List of Contractor's Equipment

The equipment required to perform the Interim Remedial Measures at the Sleepy Hollow, New York site are as follows:

150-200 Ton Track Crane	Rented	Local Rental Yard
ICE 612 Vibratory hammer with Power Pack	Owned	Niagara Falls, NY
Drott 30-Ton Cherry Picker	Rented	Local Rental Yard
Komatsu PC 220 Backhoe	Owned	Niagara Falls, NY
Komatsu PC 400 Backhoe	Owned	Niagara Falls, NY
Work Boat	Owned	Niagara Falls, NY
Komatsu WA 320 R.T. Loader	Owned	Niagara Falls, NY
Komatsu WA 450 Loader	Owned	Niagara Falls, NY
Komatsu D-58 – Bulldozer	Owned	Niagara Falls, NY
Ingersoll-Rand SPF 56 Vibratory Roller	Owned	Niagara Falls, NY
Dump Truck	Owned	Niagara Falls, NY
Kenworth 2500 Gallon Water Truck	Owned	Niagara Falls, NY
Manlift/Bucket Truck	Rented	Local Rental Yard
Sectional Barges	Owned	Niagara Falls, NY
Tug Boat	Rented	Local Rental Yard
All major components of the water treatment system.	Owned	Niagara Falls, NY

Should the identified equipment become unavailable prior to mobilization, similar equipment will be obtained from Sevenson's existing fleet or rented from a local source.



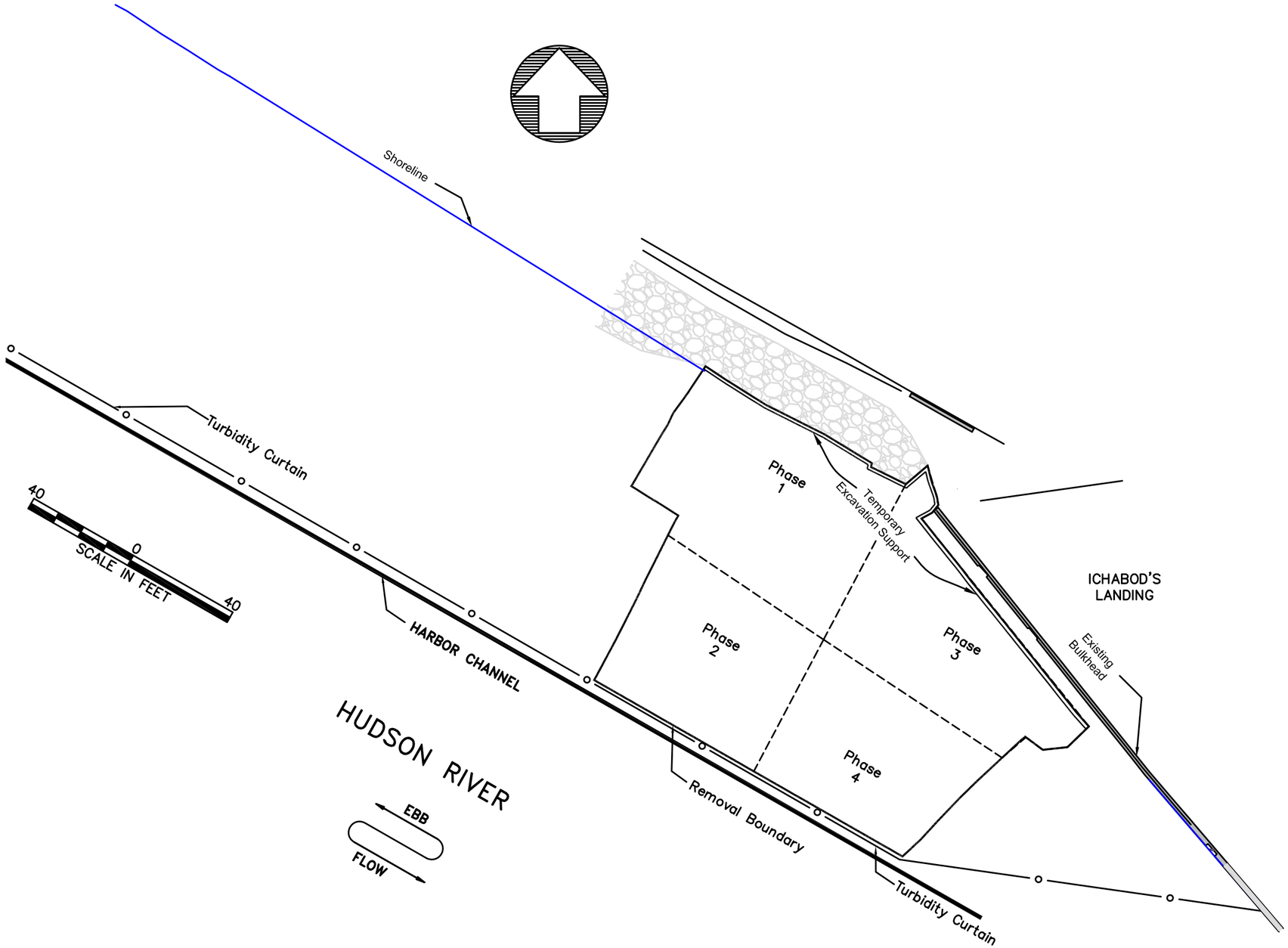
Sediment Transfer Plan

General Motors, LLC
Sediment Remediation
Sleepy Hollow, New York

SEVENSON ENVIRONMENTAL SERVICES, INC.

Figure 1

DATE:	8/9/2012
DRAWN BY:	C. Bigelow
CHECKED BY:	G. Giancola
CAD FILE:	Sed
SCALE:	As Shown



Dredging Sequence

General Motors, LLC
Sediment Remediation
Sleepy Hollow, New York

SEVENSON ENVIRONMENTAL SERVICES, INC.

Drawing
2

DATE:	11/1/2012
DRAWN BY:	
CHECKED BY:	
CAD FILE:	Sed
SCALE:	As Shown

ARCADIS

Sevenson Environmental Services
Contingency Plan

General Contingency Plan

Table of Contents:

I. Emergency Contact List; Responsible Personnel; and Proper Notification Procedures..... 2

II. Spill Prevention; Control and Countermeasures..... 3

III. Emergency Vehicular Access/Egress; Routes to Local Hospital; and Evacuation Procedures of Personnel from the Work Site..... 6

IV. Procedures for the immediate stoppage of discharge from the dredging area to the Hudson River in the event of an environmental spill 7

V. Flood Control Contingency Plan 7

VI. Procedures for encounters with relatively intact drums or vessels..... 8

Tables

Table 1- Project Emergency Contact Information Sheet 9

Figures

Figure 1- Route to Hospital..... 10

Attachments

Attachment 1 – Oil Discharge Reporting Fact Sheet

General Contingency Plan

I. EMERGENCY CONTACT LIST; RESPONSIBLE PERSONNEL; AND PROPER NOTIFICATION PROCEDURES

Attached to this document is a complete list of the Emergency Contact Numbers for the representatives from General Motors, ARCADIS, Sevenson Environmental Services, Inc., and the local emergency contacts that need to be notified in the event of a job site emergency.

The responsible project personnel that can be notified 24 hours per day; 7 days per week via their cell phones in the event of an emergency are as follows:

Mr. Dan Dragonette – Superintendent – Sevenson Environmental Services
Cell Phone # 716 – 609 – 0571

Mr. Jim Pazderski – Project Manager – Sevenson Environmental Services
Cell Phone # 716 – 308 - 8406

Procedures for emergency notifications are as follows:

1. If the emergency involves what is believed to be a very severe or life threatening injury to any project personnel or pedestrians, notify the Sevenson's project supervision immediately either in person or via cell phone or radio, so they can call 911. The 911 operator will need the name of the caller, the physical address of the site, and the nature of the emergency so the appropriate rescue personnel and equipment can be dispatched.
2. Have an escort waiting at the site entrance to guide the emergency personnel directly to the injured person.
3. After emergency personnel have been notified as appropriate, Sevenson will then immediately notify both General Motors and ARCADIS personnel who will follow-up as required.

II. SPILL PREVENTION; CONTROL AND COUNTERMEASURES

Spill prevention is the most important aspect of the Spill Prevention; Control and Countermeasures Program. A Spill Control and Response Plan has been prepared for this project under separate cover. The following outlines the contents of that plan.

Spill Prevention:

1. Obtain a copy of the Material Safety Data Sheet for every substance that is to be either transported to, or stored on site such as diesel fuel, radiator fluid, hydraulic oil, gasoline, etc., and store this information in a conspicuous place where it can be accessed by all site personnel.
2. Review the MSDS sheets for each material that is to be either used or stored on site to ensure proper handling and storage procedures are in place.
3. Ensure that the employees handling the various materials have been properly trained and are familiar with the hazards associated with the handling of these materials.
4. Notify the local Fire and Rescue Station of the materials that are being stored on site so they know how to properly respond in the event of an emergency.
5. Install Spill Kits in each of the operations and storage areas that at a minimum contain absorbent pads, speedy dry, absorbent boom, a shovel, plastic sheeting, catch pans, and duct tape. These spill kits should be properly labeled and kept with a full inventory of cleanup supplies at all times.
6. Perform routine inspections and maintenance on all pieces of equipment working on both land and water to try and identify potential maintenance issues ahead of time in an effort to prevent a spill.
7. To prevent the migration of water based spills into the Hudson River via the storm sewer pipes, a sheet pile weir will be installed in conjunction with the temporary excavation support sheeting. In the event a spill occurs that gets into the storm system, the outfall area will be isolated until the spill can be contained and proper clean up measures are implemented.

8. As an additional measure, both hard and absorbent oil booms will also be installed in front of each of the outfalls prior to the start of work as a preventative measure in the event of a water based spill.
9. During material transport operations, all vehicles will be inspected prior to leaving the loading area and dumping area to ensure that no contaminated material is on the tail gates or tires of the vehicle, and that the tail gates have been properly secured to ensure no contaminated material spills onto the public road ways.

Spill Control and Countermeasures:

All spills are to be reported immediately to the Site Safety Officer and Site Superintendent who will oversee the initial response and clean up, and then to General Motors and ARCADIS so proper reporting procedures can be implemented with the State of New York and National Response Center.

Control Measures for Various Situations

In the event of a spills or leaks encountered while working on land the following procedures will be followed:

1. If the spill is generated from a piece of equipment, the operator will shut the machine down immediately to prevent the loss of the remaining fluids.
2. A catch pan and a sheet of plastic or absorbent pad from a spill kit will be immediately placed underneath the leak to contain as much of the fluid as possible. Absorbent material will be placed over ground spills to prevent the fluid from soaking into the ground.
3. Absorbent pads, booms, and dry material (i.e., speedy dry, the Green Stuff®, etc.) should be used as necessary to absorb up as much of the residual fluid as possible.

4. Immediately repair or cap the broken hose or fitting and move the machine to access residual fluid and remove contaminated surrounding soils. Ensure that all residual fluid has been wiped off of the machine before placing back into service.
5. Shovel visually contaminated soil into a suitable container (drum or a luggar box). Inspect the ground ensure that no residual sheen or fluid is remaining. Materials used in the cleanup (pads, booms, plastic, speedy dry, etc), will be placed in the container(s).
6. Properly label (contents, collection date, time), and store the container(s). Samples may need to be collected from the containers for disposal. Contact Ken Paisley at 716-284-0431 for sample protocols.

   *** If the spill is generated from something other than a piece of equipment such as a fuel can, oil drum, etc., utilize steps 2, 3, 5, and 6.

In the event of a spill that occurs on the water the following procedures will be followed:

1. If generated from a piece of equipment on a barge, control the source of the leak to the extent possible with the standard spill kit materials as discussed above.
2. If the fluids/liquids migrate from the barge into the river, hard oil booms will be deployed around the spill to contain the sheen to the extent possible and to prevent it from migrating to other parts of the river.
3. Absorbent oil boom and absorbent pads will be deployed inside the hard oil boom to absorb as much of the free product as possible.
4. The absorbent materials will be changed out as necessary until all of the visible sheen has been removed from the water.
5. Once all of the visible sheen has been removed, remove all of the contaminated absorbent materials and place in a proper storage container for sampling and future offsite disposal.
6. Contact the National Response Center at 800-424-8802 and report it online at http://www.nrc.uscg.mil/. The NYSDEC Spill Response should also be contacted at 800-457-7362. Any spill, regardless of the size must be reported the National

Response Center as soon as practical. See Attachment 1 for the EPA Oil Discharge Reporting Fact Sheet.

III. EMERGENCY VEHICULAR ACCESS/EGRESS; ROUTES TO LOCAL HOSPITAL; AND EVACUATION PROCEDURES OF PERSONNEL FROM THE WORK SITE

Emergency Vehicle Access and Egress

It is not anticipated that any road restrictions or closings will be required to the complete the project. If a series of lane restrictions or road closures are necessary to complete the work, each one of these closures or restrictions will be portable in nature which will enable them to be quickly relocated in the event that access is required for an emergency vehicle to attend to an injured worker or a fire. Emergency vehicle access will be available at the property entrance on Beekman Avenue. In the event of an emergency, an employee will be posted at the main road to escort the rescue vehicle on to the site to avoid any potential delay in the emergency response.

Route to Local Hospital:

The route to Phelps Memorial Hospital is as follow:

1. Exit the site and turn LEFT onto Beekman Avenue.
2. Make a LEFT onto N. Broadway (US 9)
3. The hospital is 1.3 miles north on the LEFT.

Figure 1 provides a map and driving directions to the hospital.

Evacuation of Personnel from the Work Site:

In the event of a major work site emergency, a natural disaster, etc., all employees will be instructed to use the Sevenson break trailer as a rally point so a roll call can be taken to account for all of the employees, and also so further instructions can be given as required. The rally point is located in the southeast corner of the support zone.

IV. PROCEDURES FOR THE IMMEDIATE STOPPAGE OF DISCHARGE FROM THE DREDGING AREA TO THE HUDSON RIVER IN THE EVENT OF AN ENVIRONMENTAL SPILL

1. As part of the site set up, Sevenson will be installing a silt curtain to block suspended contaminated sediment from entering into the non-remedial areas of the river. The silt curtain has a floating boom on the water's surface that will prevent oil based fluids from leaving the dredging area in the event of an accidental release. Oil boom will be kept on all water borne vessels and work platforms for rapid deployment in the event of an accidental release.
2. In the event of an environmental spill, Sevenson's Site Superintendent will immediately order the oil booms to be deployed to stop all discharge from the source to the dredging area of the river or the dreading area to the rest of the river until the spill can be abated.

V. FLOOD CONTROL CONTINGENCY PLAN

In the event flood conditions are realized on site, Sevenson will remove all material that pose a risk to rising waters (fuel cans, fuel tanks, etc.) to a location above the flood level. The concrete building slabs are above the local 100 year flood elevation for the site, so the chances of implementing this plan are remote.

VI. PROCEDURES FOR ENCOUNTERS WITH RELATIVELY INTACT DRUMS OR VESSELS

1. Should a drum or vessel be encountered, Sevenson will stop work immediately and notify the Site Superintendent and Health and Safety Officer who will notify General Motors and ARCADIS.
2. The immediate work area will be evacuated until the Site Safety and Health Officer can don the proper PPE, inspect the drum, and perform air monitoring as required to further identify the hazards. An SCBA or in line breathing air cart will be available on site to enable the Site Safety and Health Officer to safely enter the breathing area to collect air monitoring data and to inspect the item.
3. Once the potential hazards have been properly identified, if the item is determined to be non explosive, after donning the proper PPE, an operator and a laborer will use either a sling, a choker, or the bucket of the excavator to remove the item and to place it into an over pack container. The over pack container will be sealed, labeled, and transported to a designated storage area until additional sampling can be performed for profile and disposal purposes.
4. Once the item has been successfully removed, excavation work will resume as normal.

Table 1- Project Emergency Contact Information Sheet

General Motors Sleepy Hollow Sediment Project Emergency Contact Information Sheet					
Contact Name	Title	E-mail Address	Telephone #		Cell Phone #
General Motors Contacts:					
Mr. Jim Hartnett	Project Representative		315-463-2391		315-856-0211
ARCADIS Contacts:					
Mr. Raymond Kapp	Principal Scientist		201-797-7400		845-346-6454
Mr. Eric Dievendorf	P.E.		315-671-9595		315-497-5126
Sevenson Contacts:					
Mr. Dan Dragonette - ***	Superintendent	ddragonette@sevenson.com	Field Office # TBD		716-609-0571
Mr. James Pazderski	Project Manager	jpazderski@sevenson.com	Field Office # TBD		716-308-8406
Mr. Wyatt Beougher	Site Safety	wbeougher@sevenson.com	Field Office # TBD		724-977-6037
Dr. Paul Hitcho, CIH	Dir. H&S	pjhitcho@sevenson.com	716-284-0431		716-998-9797
Mr. Paul Jung, CSP	Corp. H&S	pjung@sevenson.com	716-284-0431		716-609-1767
Local Emergency Contacts:					
Police			911		914-631-0800
Sleepy Hollow Fire Department			911 Emergency		914-366-5119 Non-Emergency
Ambulance			911		
Phelps Memorial Hospital	Hospital		914-366-3000		

Responsible Personnel

Mr. Dan Dragonette and Mr. Jim Pazderski will be available at all times via cell phone in the event of an emergency situation.

Figure 1- Route to Hospital

Depart Site and make LEFT turn onto Beekman Ave

Turn LEFT onto N. Broadway (US 9)

Arrive at Phelps Memorial
701 N. Broadway
914-366-3000

Attachment 1 -
Oil Discharge Reporting Fact Sheet

United States Environmental Protection Agency
Office of Emergency Management (5104A)
EPA-550-F-06-006
December 2006
www.epa.gov/emergencies

Oil Discharge Reporting Requirements

How to Report Oil Discharges to the National Response Center and EPA

If a facility or vessel discharges oil to navigable waters or adjoining shorelines, waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or Deepwater Port Act of 1974, or which may affect natural resources under exclusive U.S. authority, the owner/operator is required to follow certain federal reporting requirements. These requirements are found in two EPA regulations – 40 CFR part 110, Discharge of Oil regulation, and 40 CFR part 112, Oil Pollution Prevention regulation. The Discharge of Oil regulation provides the framework for determining whether an oil discharge to inland and coastal waters or adjoining shorelines should be reported to the National Response Center. The Oil Pollution Prevention regulation, part of which is commonly referred to as the "SPCC rule," identifies certain types of discharges from regulated facilities that also need to be reported to EPA. Although these reporting requirements were not changed by EPA's recent modifications of the SPCC rule, this Fact Sheet will help facilities with the Reportable Discharge History criterion associated with the qualified facility option and the oil-filled operational equipment option offered in the recent SPCC modifications.

Who is subject to the Discharge of Oil regulation?

Any person in charge of a vessel or of an onshore or offshore facility is subject to the reporting requirements of the Discharge of Oil regulation if it discharges a harmful quantity of oil to U.S. navigable waters, adjoining shorelines, or the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or Deepwater Port Act of 1974, or which may affect natural resources under exclusive U.S. authority.

What is a "harmful quantity" of discharged oil?

A harmful quantity is any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water's surface, or leaves sludge or emulsion beneath the surface. For this reason, the Discharge of Oil regulation is commonly known as the "sheen" rule. Note that a floating sheen alone is not the only quantity that triggers the reporting requirements (e.g., sludge or emulsion deposited below the surface of the water may also be reportable).

Under this regulation, reporting oil discharges does not depend on the specific amount of oil discharged, but instead can be triggered by the presence of a visible sheen created by the discharged oil or the other criteria described above.

To whom do I report an oil discharge?

A facility should report discharges to the National Response Center (NRC) at 1-800-424-8802 or 1-202-426-2675. The NRC is the federal government's centralized reporting center, which is staffed 24 hours per day by U.S. Coast Guard personnel.

If reporting directly to NRC is not practicable, reports also can be made to the EPA regional office or the U.S. Coast Guard Marine Safety Office (MSO) in the area where the incident occurred.

When must I report to NRC?

Any person in charge of a vessel or an onshore or offshore facility must notify NRC immediately after he or she has knowledge of the discharge.

What information do I need to report?

NRC will ask a caller to provide as much information about the incident as possible including:

- Name, organization, and telephone number
- Name and address of the party responsible for the incident
- Date and time of the incident
- Location of the incident
- Source and cause of the discharge
- Types of material(s) discharged
- Quantity of materials discharged
- Danger or threat posed by the discharge

- Number and types of injuries (if any)
- Weather conditions at the incident location
- Other information to help emergency personnel respond to the incident

How are reports to NRC handled?

NRC relays information to an EPA or U.S. Coast Guard On Scene Coordinator (OSC), depending on the location of the incident. After receiving a report, the OSC evaluates the situation and decides if federal emergency response action is necessary.

If I report a discharge to NRC, do I also report to EPA?

If a facility is regulated under the SPCC rule and has a reportable discharge according to EPA regulations (see below), it must be reported to both NRC and EPA.

What are the oil discharge reporting requirements in the SPCC rule?

Any facility owner/operator who is subject to the SPCC rule must comply with the reporting requirements found in §112.4.

A discharge must be reported to the EPA Regional Administrator (RA) when there is a discharge of:

- More than 1,000 U.S. gallons of oil in a single discharge to navigable waters or adjoining shorelines
- More than 42 U.S. gallons of oil in each of two discharges to navigable waters or adjoining shorelines occurring within any twelve-month period

When determining the applicability of this SPCC reporting requirement, the gallon amount(s) specified (either 1,000 or 42) refers to the amount of oil that actually reaches navigable waters or adjoining shorelines, not the total amount of oil spilled.

What do I need to submit to EPA?

The owner/operator must provide the following:

- Name and location of the facility
- Owner/operator name
- Maximum storage/handling capacity of the facility and normal daily throughput
- Corrective actions and countermeasures taken, including descriptions of equipment repairs and replacements
- Adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary
- Cause of the discharge to navigable waters, including a failure analysis
- Failure analysis of the system where the discharge occurred
- Additional preventive measures taken or planned to take to minimize discharge reoccurrence
- Other information the RA may reasonably require

An owner/operator must also send a copy of this information to the agency or agencies in charge of oil pollution control activities in the state in which the facility is located.

What happens after a facility submits this information to EPA?

The EPA Regional Administrator will review the information submitted by the facility and may require a facility to submit and amend its SPCC Plan. Facilities and equipment that qualified for the new streamlined requirements may lose eligibility for those options as determined by the Regional Administrator. A state agency may also make recommendations to EPA for a facility to amend its Plan to prevent or control oil discharges.

For More Information

Review the Discharge of Oil regulation (40 CFR part 110)
http://www.gpoaccess.gov/cfr/

Review the Oil Pollution Prevention regulation (40 CFR part 112)
http://www.gpoaccess.gov/cfr/

Visit the EPA Office of Emergency Management Web site
www.epa.gov/emergencies

Call the Superfund, TRI, EPCRA, RMP, and Oil Information Center
(800) 424-9346 or (703) 412-9810
TDD (800) 553-7672 or (703) 412-3323
www.epa.gov/superfund/resources/infocenter

To Report an Oil or Chemical Discharge

Contact the National Response Center
(800) 424-8802 or (202) 267-2675
TDD (202) 267-4477
http://www.nrc.uscg.mil/index.html

ARCADIS

Sevenson Environmental Services
Health, Safety and Emergency Response Plan

Health, Safety, and Environmental Response Plan

For

Sediment Removal
Former General Motors Assembly Plant Site
Sleepy Hollow, New York

PREPARED BY

SEVENSON ENVIRONMENTAL SERVICES, INC.

September 4, 2012

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Plan Objective 1
1.2 Safety and Health Policy Statement 1
1.3 Drug and Alcohol Policy 1
1.4 Project Safety and Health Expectations 2
1.5 Project Safety and Health Compliance Program 2
1.6 Project Safety Incentive Program 3
1.7 References 3
1.8 Health and Safety Plan Revisions 3
1.9 Site Information 4

2.0 ORGANIZATION AND RESPONSIBILITIES 5

2.1 Corporate Project Manager 5
2.2 Project Manager 5
2.3 Site Superintendent 5
2.4 Safety and Health Manager (SHM) 6
2.5 Site Safety and Health Officer (SSHO) 6
2.6 Subcontractors 7

3.0 HAZARD/RISK ANALYSIS 7

3.1 Site Tasks and Operations 8
3.2 Hazards 8
3.2.1 Safety/Physical Hazards 9
3.2.1.1 Electrical 9
3.2.1.2 Heavy Equipment/Vehicle Traffic 10
3.2.1.3 Material Handling 10
3.2.1.4 Hand and Power Tools 11
3.2.1.5 Noise Exposure 12
3.2.1.6 Slip/Trip/Fall 12
3.2.1.7 Cold Stress 12
3.2.1.8 Fires/Explosions Hazard 15
3.2.1.9 Fall From Elevation 15
3.2.1.10 Working On or Near Water 16
3.2.2 Chemical Hazards 16
3.2.2.1 Operational Chemical Hazards 16
3.2.2.2 Contaminate Chemical Hazards 16
3.2.3 Biological Hazards 16

4.0 SAFETY AND HEALTH TRAINING 17

4.1 Site-Specific Training 17
4.1.1 Initial Session 17
4.1.2 Periodic Sessions 18
4.2 Safety Meetings 18
4.3 Hazard Communication Training 18
4.4 HAZWOPER Training 18
4.5 First Aid/CPR Training 18

5.0 INJURY/MEDICAL SUPPORT 18

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) 19

6.1 PPE Hazard Assessment 19
6.1.1 Head Protection 20
6.1.2 Hand Protection 20
6.1.3 Eye/Face Protection 20
6.1.4 Footwear 20
6.2 Levels of Protection 20
6.2.1 Level D 20
6.2.2 Level C 21
6.3 Initial Levels Protection 21

7.0 ACCIDENT PREVENTION PROCEDURES/PRACTICES 21

7.1 Medical and First Aid Requirements 21
7.2 Hazardous Substances 22
7.3 Fall Protection 22
7.4 Electrical 24
7.5 Lockout and Tagout 25
7.6 Motor Vehicles and Mechanized Equipment 26
7.7 Hand and Power Tools 27
7.8 Fire Protection and Prevention 30
7.9 Sanitation 31
7.10 Confined Space Entry 32
7.11 Welding and Cutting 33
7.12 Stairways and Ladders 34
7.13 Materials Handling, Storage, Use, and Disposal 35
7.14 Signs, Signals, and Barricades 37
7.15 Cranes and Hoists 38
7.16 Housekeeping 39
7.17 Working On or Over Water 39
7.18 Severe Weather 40
7.18.1 High Winds 40
7.18.2 Lightning 41
7.18.3 Tornadoes/Hurricanes 41

8.0 AIR MONITORING 41

9.0 MEDICAL SURVEILLANCE 42

10.0 SITE CONTROL MEASURES 42

10.1 Site Entry and Exit Control Log 42
10.2 Personal Hygiene and Sanitation 42
10.3 Decontamination Procedures 42
10.3.1 Personal Decontamination 42
10.3.2 Decontamination Procedures on Vessels 43
10.3.3 Disposition of Materials 43

11.0 EMERGENCY CONTINGENCY PLAN 43

11.1 Pre-Emergency Planning....44
11.2 Personnel Responsibilities....44
11.3 Evacuation Routes and Procedures....44
11.4 Medical Treatment/First Aid....45
11.5 Emergency Alarms/Notifications and Procedures....45
11.6 Implementation of the Plan....48
11.6.1 Conditions for Implementation....48
11.6.1.1 Fire or Explosion....48
11.6.1.2 Material Spills....49
11.6.2 Initial Action....49
11.6.3 Corrective Action....49
11.6.4 Follow-through....49
11.7 Spill Response and Control Plan....49
11.7.1 Prevention....50
11.7.2 Reporting....50
11.7.3 Spill Response Equipment....51
11.7.4 Confinement and Containment....51
11.7.5 Cleanup....51
11.8 Report/Review....52

12.0 WORKING ON OR NEAR WATER....52

12.1 Definitions....52
12.2. Small Boat Operation....53
12.3. Class A and Class 1 Boats....53
12.4. Boat Safety Equipment for Class 2, Class 3, Boats and Barges....54
12.5. Safe Boating Operations for Class A and Class 1 Boats....54
12.6. Safe Boating Operations for Class 2 and Class 3 Boats and Barges....54
12.7. Boating Accidents....55

13.0 INSPECTION AND REPORTING....55

13.1 Safety and Health Inspections....55
13.2 Daily Safety and Inspections Log....56
13.3 Certification of Worker/Visitor Acknowledgment....56
13.4 Incident Reports....56
13.5 Weekly Safety Meeting/Daily Tool Box Talks....56
13.6 Monthly Exposure Report....57
13.7 Safety and Health Phase-Out Report....57

FIGURES

Figure 1 – Site Map *4*
Figure 2 – Route to Hospital Map *46*

TABLES

Table 1 – Minimum Clearance From Energized Overhead Electrical Lines *9*
Table 2 – Wind Chill Index *13*
Table 3 – Maximum Daily Time Limits for Exposure at Low Temperatures *14*
Table 4 – Work/Warm-up Schedule *14*
Table 5 – Real Time Air Monitoring *41*
Table 6 – Emergency Telephone List *47*

ATTACHMENTS

Attachment 1 – Activity Hazard Analysis
Attachment 2 – Safety and Health Forms
Attachment 3 – Chemical Information Sheets

Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists'
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
cm	Centimeter
CO	Carbon Monoxide
COPC	Principal Chemical of Concern
CPR	Cardiopulmonary Resuscitation
dB(A)	Decibels A level
DEET	N-Diethyl-m-toluamide
EMS	Emergency Medical Service
GFCI	Ground Fault Circuit Interrupter
HSERP	Health, Safety and Environmental Response Plan
IDLH	Immediately Dangerous to Life and Health
lb	Pound
LEL	Lower Explosive Limit
m	Meter
MSDS	Material Safety Data Sheets
ml	Milliliter
mph	Miles per hour
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
O_2	Oxygen gas
PEL	Permissible Exposure Limit
PPE	Personal Protective Equipment
ROPS	Roll Over Protective Structure
SCBA	Self-Contained Breathing Apparatus
SHM	Safety and Health Manager
SOPs	Standard Operating Procedures
SOR	Safety Observation Report
SPA	Safe Plan of Action
SSHO	Site Safety and Health Officer
TBD	To Be Determined
USEPA or EPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Sevenson Environmental Services, Inc. (Sevenson), has prepared this Health, Safety and Environmental Response Plan (HSERP) for the work to be conducted at the Sediment Removal Project, Sleepy Hollow, New York.

The work covered under this plan consists of mobilization/demobilization of equipment to and from the site, sheet pile installation, sewer cleaning, mechanical dredging of the sediment, stabilization of dredged material, loading and transport of the stabilized material to an approved landfill, and water treatment.

1.1 Plan Objective

The objective of this HSERP is to define the requirements and designate protocols to be followed during the work at the Sediment Removal Project. Applicability extends to Sevenson personnel and Sevenson's subcontractors. Work performed under this contract will comply with applicable Federal, State, and Local Safety and Occupational Health laws and regulations. Through careful planning and implementation of corporate and site-specific safety protocols, Sevenson will strive for zero accidents and incidents on the project.

1.2 Safety and Health Policy Statement

Sevenson's management is committed to the safety of each and every employee. There is no place at Sevenson for an employee who will not work safely or who will endanger the safety of his fellow workers. It is essential that all Managers and Supervisors insist on the maximum safety performance and awareness of all employees under their direction by enthusiastically and consistently administering all safety rules and regulations. It is Sevenson's policy to take the necessary actions in engineering, planning, designing, assigning and supervising work operations, to create a safe work-site. Sevenson will:

- Maintain safe and healthful working conditions.
- Provide and assure the use of all necessary personal protection equipment to ensure the safety and health of site employees.
- Require that site work be planned to provide a range of protection based on the degree of hazards encountered under actual working conditions.
- Provide site workers with the information and training required to make them fully aware of known and suspected hazards that may be encountered, and of the appropriate methods for protecting themselves, their co-workers, and the public at large.

1.3 Drug and Alcohol Policy

Sevenson is committed to providing a safe, efficient, and productive work environment for all employees. Using or being under the influence of drugs or alcohol on the job may pose serious safety and health risks. To help ensure a safe and healthful working environment, employees may be asked to provide body substance samples (such as urine and/or blood) to determine the illicit or illegal use of

drugs and alcohol. Refusal to submit to drug testing may result in disciplinary action, up to and including termination of employment.

Copies of the above drug testing policy (Sevenson's Substance Abuse Program) is available to **all employees**. Employees will be asked to sign an acknowledgement form indicating that they have received a copy of the drug testing policy. Questions concerning this policy or its administration should be directed to the Human Resources Department.

1.4 Project Safety and Health Expectations

The safety and health of workers, the public, and the protection of the environment is a fundamental responsibility of Sevenson. Sevenson will:

- Promote project safety with an objective of zero accidents.
- Manage activities in a proactive way that effectively increases the protection of site workers, the public, and the environment.
- Reduce safety and health risk by identifying and eliminating hazards from site activities.
- Carry out site activities in a manner that complies with all applicable safety, health, and environmental laws and regulations.

1.5 Project Safety and Health Compliance Program

Compliance with the requirements of applicable Federal, State, and local laws will be accomplished through a combination of written programs, employee training, workplace monitoring, and system enforcement. Continued and regular inspections by supervisors and safety personnel, as well as upper management with total involvement in the safety program will produce an atmosphere of voluntary compliance. However, disciplinary action for violations of project requirements will be taken, when necessary.

All site personnel and visitors entering the site will be required to read and verify compliance with the provisions of this HSERP and specific appendices. In addition, visitors will be expected to comply with relevant Occupational Safety and Health Administration (OSHA) requirements such as training, medical surveillance, and use of personal protective equipment. In the event that a person does not adhere to the provisions of the HSERP, he/she will be requested to leave the work area. All nonconformance incidents will be recorded in the Daily Safety and Inspection Log.

The Site Safety and Health Officer (SSHO) will conduct surveillance on a daily basis of all work areas and subcontractor's activities to ensure that safety and health is properly implemented. In addition, any reports from employees concerning unsafe work practices, acts, or conditions will be investigated promptly. Unsafe acts, practices, or conditions will be reported to the responsible supervisor at the time of inspection.

The safe and efficient work practices of this company require a spirit of teamwork and cooperation from all employees. Also required are uniform standards of expected behavior. Employees who refuse or fail to follow the standard set forth by this plan, the Sevenson Corporate Health and Safety Plan and/or regulatory standards, will subject themselves to disciplinary action up to, and including

discharge. In cases not specifically mentioned, employees are expected to use good judgment and refer any questions to their supervisors.

1.6 Project Safety Incentive Program

It is expected that all employees perform their assigned tasks in a safe and healthful manner. Therefore, safe work performance is a key element in an employee's review of his/her suitability for continued employment.

In addition to individual incentives there are also awards given to crews who have completed a project without a lost time accident or illness. These awards have included dinners, jackets, hats, and sweatshirts.

1.7 References

During development of this HSERP, consideration was given to current safety and health standards as defined by the United States Environmental Protection Agency (USEPA), Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH). Specifically, the following reference sources have been utilized in the development of this HSERP:

- OSHA Regulations: 29 CFR 1910 and 1926;
- NIOSH Pocket Guide to Chemical Hazards, August 2006;
- NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1983).

In addition to the above-referenced documents, Sevenson has established a comprehensive and realistic Safety, Health, and Environmental Program based on past experience, sound engineering practice, employee training, and enforcement of Safety and Health regulations to prevent unreasonable Safety and Health risks. For specific procedures/programs associated with this project, refer to the Sevenson Corporate Health and Safety Plan. A copy of the Sevenson Corporate Health and Safety Plan will be on site.

1.8 Health and Safety Plan Revisions

The development and preparation of this HSERP has been based on site-specific information provided to Sevenson. Should any unforeseen hazard become evident during the performance of the work, the SSHO will bring such hazard to the attention of the Engineer both verbally and in writing for resolution as soon as possible. In the interim, Sevenson will take necessary actions to maintain safe working conditions in order to safeguard on-site personnel, visitors, the public, and the environment. Modifications of any portion or provision of the HSERP will be requested in writing by the SSHO, and authorized in writing. No changes to the HSERP will be allowed until the item has been reviewed and an addendum prepared and approved by the Safety and Health Manager.

1.9 Site Information

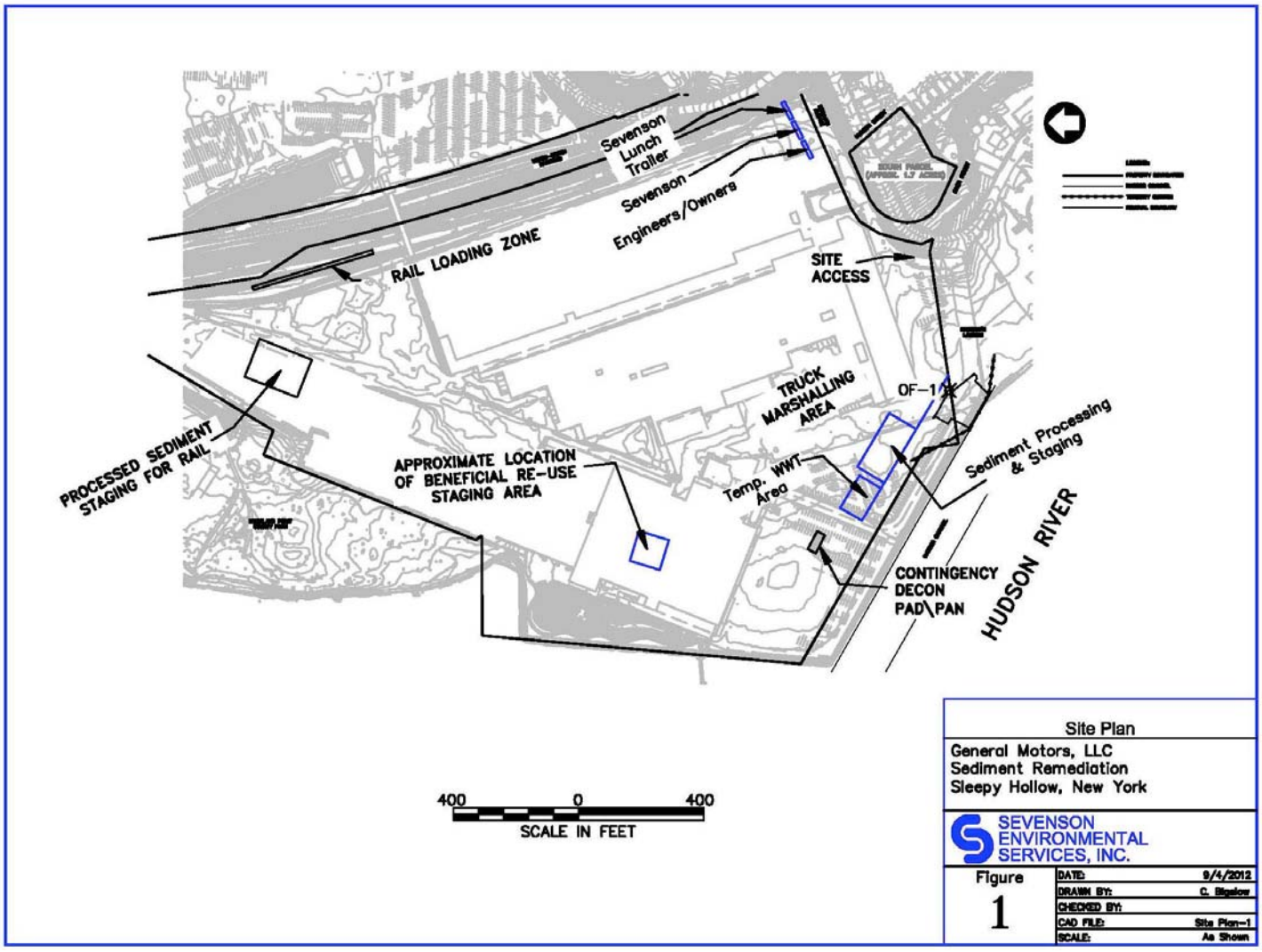
The site is the former General Motors Corporation North Tarrytown Assembly Plant located at 199 Beekman Avenue, Tarrytown, New York.

Remedial activities include sediment removal in the Hudson River near outfall OF-1 and within the former process/combined sewer system discharging to OF-1.

The major contaminants are lead and chromium. The highest reported concentrations are lead (8420 mg/kg) and chromium (1960 mg/kg).

Figure 1 depicts the various site work zones.

Figure 1 – Site Map



2.0 ORGANIZATION AND RESPONSIBILITIES

While the Sevenson Safety and Health Department directs and supervises the overall Safety, Health and Environmental Program, the responsibility for Safety and Health extends throughout our organization from top management to every employee. For this reason, it is each person's duty to notify the management personnel if a hazardous condition is identified and to make a "stop work" call if the condition represents an immediate danger to life or health, until the SSHO can make a further determination. The following are the Sevenson project personnel positions and responsibilities for this project. Refer to ***Figure 2 – "Organizational Chart"***.

- **Corporate Project Manager:** Alan R. Elia, Jr.
- **Project Manager:** James Pazderski
- **Site Superintendent:** Dan Dragonette
- **Safety and Health Manager:** Paul Hitcho, Ph.D., CIH
- **Occupational Physician:** Dr. Peter Greaney
- **Site Safety and Health Officer:** Wyatt Beougher

2.1 Corporate Project Manager

The Corporate Project Manager directs and manages all aspects of the project in compliance with all contract and technical requirements. The Corporate Project Manager will monitor and control all subcontractors to achieve optimal performance and ensure safe, high quality performance that complies with all contract requirements.

2.2 Project Manager

The Project Manager reports to the Corporate Project Manager. His responsibilities include coordinating project activities with the Site Superintendent and serving as the primary liaison with the Engineer. The Project Manager prepares all correspondence, submittals, and other documentation required for the project; coordinates schedules; and administers the contract. The Project Manager prepares reports and documentation, supervises inspection personnel, and reviews and approves procurement and subcontract activities.

2.3 Site Superintendent

The Site Superintendent supervises and coordinates all construction crew activities relating to site preparation, dredging, contaminated material handling, and restoration. The Site Superintendent has the operational responsibility for the implementation of the HSERP on this project. This includes establishing an attitude of concern for safety matters by initiating prompt corrective action of hazards brought to his attention, and ensuring that the project safety and health requirements are initiated and observed by all project personnel.

The Superintendent plans and requires that all work be performed in compliance with this HSERP, the Sevenson Corporate Health and Safety Plan and all applicable local, state, and federal regulations. He

will impress upon all subcontractors' supervisory personnel a sense of responsibility and accountability of each individual to maintain a safe workplace and to work in a safe manner.

2.4 Safety and Health Manager (SHM)

Responsible to the Chief Executive Officer, the Safety and Health Manager formulates, administers and coordinates programs for the company to reduce the risk of loss due to employee injury, regulatory non-compliance, general liability, fire, theft, or damage. The Safety and Health Manager develops written detailed policies and procedures covering elements in the Safety, Health and Environmental Program. The Safety and Health Manager will:

- Be responsible for the development, implementation, oversight, and enforcement of the HSERP.
- Visit the site as needed to audit the effectiveness of the HSERP and be available for emergencies.
- Provide onsite consultation as needed to ensure that the HSERP is fully implemented.
- Coordinate any modifications to the HSERP with the Site Superintendent, the SSHO, and the Engineer.
- Be responsible for evaluating and recommending changes to engineering controls, work practices, and Personal Protective Equipment (PPE).

2.5 Site Safety and Health Officer (SSHO)

Under the direction of the Safety and Health Manager, the SSHO will be responsible for the implementation of this HSERP and for the daily coordination of safety activities with the Site Superintendent and the Engineer to ensure that the planned work objectives reflect adequate safety and health considerations. The SSHO will maintain a complete copy of this plan (and its supplements and addenda) at the site during all field activities and assure that all workers and visitors are familiar with it. He will perform site-specific training and briefing sessions for employee(s) prior to the start of field activities at the site and a briefing session each day before starting work. He will ensure the availability, proper use and maintenance of specified personal protective equipment and other safety and health equipment. He will maintain a high level of safety awareness among team members and communicate pertinent matters to them promptly. The SSHO will:

- Assist and represent the Safety and Health Manager in on-site training and the day-to-day on-site implementation and enforcement of the accepted HSERP.
- Be assigned to the site on a full time basis for the duration of field activities. The SSHO will have no duties other than Safety and Health related duties.
- Have the authority to ensure site compliance with specified safety and health requirements, Federal, state and OSHA regulations; and all aspects of the HSERP. This includes, but is not limited to, activity hazard analyses, use of PPE, site control, standard operating procedures used to minimize hazards, safe use of engineering controls; the emergency response plan, spill containment program, and preparation of records. This will be accomplished by performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log.

- Stop work activities if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.

- Consult and coordinate any modifications to the HSERP with the Safety and Health Manager, the Site Superintendent and the Engineer.

- Conduct accident investigations and prepare accident reports.

- Review results of daily quality control inspections and document safety and health findings in the Daily Safety Inspection Log.

- Coordinate with Site Management and the Safety and Health Manager, recommend corrective actions for identified deficiencies, and oversee the corrective actions.

2.6 Subcontractors

Subcontractors utilized during activities at the Sediment Removal Project are covered by this HSERP and will be provided a copy of the plan prior to commencing work. The Sevenson SSHO will verify that subcontractor employee training; medical clearance, and respirator fit test records are current and will monitor and enforce compliance with the established plan and standard operating procedures. As with all site personnel, subcontractors will be briefed on the provisions of this plan and attend all daily toolbox and weekly safety meetings.

Sevenson will continually monitor a subcontractor's safety performance. Sevenson will observe subcontractors for hazards or unsafe practices that are both readily observable and occur in common work areas. The SSHO will note subcontractor work practices on the daily Safety and Health report. If non-compliance or unsafe conditions or practices are observed, the subcontractor safety representative will be notified and corrective action will be required. The subcontractor will determine and implement necessary controls and corrective actions. If repeat non-compliance/unsafe conditions are observed, the subcontractor will be required to stop affected work until adequate corrective measures are implemented.

3.0 HAZARD/RISK ANALYSIS

Below is a general summary of the risks that this HSERP addresses during work at the Sediment Removal Project. This is a summary of the major anticipated risks and is not intended to be a complete listing of all potential risks that may be encountered during the project.

1. Contact or exposure to chemicals in the process and handling of contaminated materials

2. Working around heavy equipment (struck by, caught in equipment, crane operation)

3. Exposure to hazards associated with working on or near water (drowning)

4. Materials handling and transfer (ergonomic issues)

5. Heavy lifting (strains, sprains)

6. Biological hazards (plants, animals, insects)

7. Pressure systems (hydraulic lines)

8. High noise levels

9. Cuts/lacerations (saws, wire rope, utility knives, etc.)

10. Exposure to temperature extremes (cold stress)

11. Severe weather conditions (high winds, precipitation, and lightning)

12. Hazards associated with watercraft such as boats, barges, work platforms (falling overboard, collisions with other watercraft and stationary objects)

3.1 Site Tasks and Operations

Sevenson has developed an Activity Hazard Analysis (AHA) for the major phases of the work. A major phase of work is defined as an operation involving a type of activity presenting hazards not experienced in previous operations, or where a new subcontractor or work crew is to perform the specified phase. The analysis will define the activity being performed and identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard. An AHA will also be prepared when new tasks are added; job situations change, or when it becomes necessary to alter safety requirements; refer to ***Attachment 1 - "Activity Hazard Analysis".*** Work will not proceed on a particular task/work area until the AHA has been reviewed and site personnel understand the hazards and controls of the activity to be performed.

Additionally, Sevenson has a real-time hazard identification program known as the Safe Plan of Action (SPA), which is found in ***Attachment 2 – "Health and Safety Forms"***. While the AHA is used as a training/auditing tool, the SPA is a planning tool for the work crew to address the details of a work process or activity and any potential changing conditions. The superintendent or foreman as well as the work crew participate in developing the SPA at the daily tailgate meeting.

Sevenson will also implement its Safety Observation Report (SOR) Program. In this program all site personnel are encouraged to report either a workplace condition and/or behavior. This report will be logged, and if it is negative, a responsible person will be assigned to investigate and correct it. A completion date is assigned and the situation is discussed at the daily safety meeting. In this way Sevenson hopes to obtain worker buy in to its safety program and employ all available resources to detect unsafe conditions and/or acts. The SOR form and SOR tracking form is in ***Attachment 2- "Health and Safety Forms".***

Sevenson's "Take 2 Program" will also be in effect. A worker before he begins any task is to review how it is to be accomplished, the hazards present, and the safety and health controls that are to be implemented. If there is any question that the specific task cannot be safely accomplished, he is to stop and ask his foreman the proper steps to be followed.

3.2 Hazards

The following potential hazards may be encountered during the work activities at the project.

3.2.1 Safety/Physical Hazards

Potential safety hazards include: working on or near water, electrical, crane and heavy equipment operation, heavy equipment/vehicle traffic, material handling, hand and power tools, noise exposure, slip/trips/falls, cold stress, and falls from elevation. Safety/Physical hazards associated with the project are presented below.

3.2.1.1 Electrical

Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if contacted or severed during site operations. A minimum distance of 10 feet will be present between overhead wires and equipment. This distance will vary according to voltage, the greater the voltage, the greater the clearance between any part of the equipment and the power line; refer to ***Table 1 - Minimum Clearance from Energized Overhead Electrical Lines***. When required, a spotter will be utilized to maintain a safe distance between equipment and overhead wires. The basic rule is, "Don't locate equipment in a position where it can come in contact with overhead power lines." Maintain the required distance from the lines. Overhead electrical power lines will be considered energized unless the person owning such line, or operating officials of the electrical utility supplying the line assures that it is not energized and it has been visibly grounded.

Table 1 – Minimum Clearance From Energized Overhead Electrical Lines

Nominal System Voltage	Minimum Rated Clearance
0 to 50 kV	10 Feet (3 m)
51 to 200 kV	15 Feet (4.5 m)
201 to 300 kV	20 Feet (6 m)
3001 to 500 kV	25 Feet (7.5 m)
501 to 750 kV	24 Feet (10.5 m)
751 to 1000 kV	31 Feet (13.5 m)

There are various means of insulating the wires, as well as barriers and alarms that may be available to reduce the risk of injury to workers, but the use of such devices does not change the requirements of any other applicable standards or laws. In addition, these and other measures (such as grounding the equipment itself) may not be fully effective and may create a false sense of security. Only the utility company is authorized to de-energize, insulate, or handle the lines. No one else may attempt these operations.

Electrical equipment used on-site may also pose a hazard to workers. Whenever possible, Sevenson will use low-voltage equipment with ground-fault interrupters and watertight, corrosion-resistant connecting cables to help minimize this hazard. In addition, lightning is a hazard during outdoor operations, particularly for workers handling metal containers or equipment. In the event of an electrical storm, all operations will cease for the duration of the storm.

No employee will be permitted to work in the proximity of any part of an electrical power circuit unless the person is protected against electric shock by de-energizing the circuit and grounding it, or it has been locked and tagged out. These procedures will be utilized when work has to be performed on energized equipment.

All electrical wiring and equipment will be intrinsically safe for use in potentially explosive environments and atmospheres. Ground-fault circuit interrupters are standard for use at the site.

Utilities that cross under the river will be identified prior to the start of intrusive water work. If underwater utilities are located in the work area they shall be marked with buoys or other acceptable means to alert work crews of their location. No intrusive work will be allowed within 5 feet of an underwater utility unless approved in advance by the Engineer.

3.2.1.2 Heavy Equipment/Vehicle Traffic

Considerations for controlling the movement of personnel and equipment in a construction area are vitally important to any project as injuries may occur while working with or adjacent to such equipment. This category includes all operations that utilize moving heavy equipment: excavators, loaders, dozers, cranes, and trucks. Sevenson will take every precaution necessary to ensure the safety of on-site personnel during traffic movement operations.

All workers will adhere to all applicable standards and regulations while operating heavy equipment at the site. Operators will be trained and experienced in the use and maintenance of the equipment they are operating. Equipment will be inspected on a daily basis to identify any worn parts, and/or unsafe conditions. Inspections will be documented using the Equipment Checklist; refer to ***Attachment 2 – Safety and Health Forms***. Any unsafe equipment will be removed from service until safety defects can be corrected. Equipment operators will not leave their machine unattended while it is running. All equipment will have electronic backup alarms. Each piece of equipment will be equipped with a 1A:10B:C fire extinguisher. No vehicles or equipment will be operated in a careless or unsafe manner. Personnel will wear high visibility reflective vests when working around equipment/vehicles. All personnel will stay a minimum of four feet clear of the operational area of the equipment.

During construction activities, it is often necessary to have a worker direct the operator. In these cases, close communication between the operator and the laborer is of critical importance. One designated person will give signals to the operator of both equipment and vehicles in the work area. Workers should not take any action unless they have made eye contact with the operator and clearly communicated their intentions. In addition, all machines are equipped with back-up alarms, which are checked daily and repaired immediately. Truck traffic will be controlled by a flagger/spotter, as required.

Maintenance and inspection of vehicles and heavy equipment is a vital part of the overall safety program. Sevenson has a fully staffed equipment maintenance shop that handles all preventative and overhaul work for our entire vehicle and equipment fleet. As part of the preventative maintenance, all equipment is checked for properly functioning safety devices (e.g., backup alarms, brakes, lights, fire extinguishers, etc.). Before each piece of equipment leaves the shop it must pass a safety checklist. All rental equipment is subjected to a similar inspection when delivered to the job site. Any piece of rental equipment that fails the inspection must be repaired by the vendor before it is accepted for use. In addition, all equipment is inspected in the field prior to the start of each day's activities. If a superintendent, operator, or safety officer detects a defect, the equipment is taken out of service and a properly qualified mechanic is dispatched from the shop to make the repairs on-site. All heavy equipment used at the site will be equipped with rollover protective structures (ROPS).

3.2.1.3 Material Handling

Various materials and equipment may be handled manually during project operations. Care should be taken when lifting and handling heavy or bulky items to avoid back injuries. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries:

- The size, shape, and weight of the object to be lifted must first be considered. Multiple employees or the use of mechanical lifting devices are required for heavy objects.
- The anticipated path to be taken by the lifter should be considered for the presence of slip, trip, and fall hazards.
- The feet will be placed far enough apart for good balance and stability (typically shoulder width).
- The worker will get as close to the load as possible. The legs will be bent at the knees.
- The back will be kept as straight as possible and abdominal muscles should be tightened.
- Twisting motions should be avoided when performing manual lifts.
- To lift the object, the legs are straightened from their bending position.
- A worker will never carry a load that cannot be seen over or around.

When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered. When two or more workers are required to handle the same object, workers will coordinate the effort so that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, will face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines will be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves will be used if necessary.
- The hands and object will be free of oil, grease, and water which might prevent a firm grip, and the fingers will be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.
- The item will be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.

3.2.1.4 Hand and Power Tools

Hand and power tools are used for various site activities. Procedures for using hand and power tools are as follows:

- Persons using power tools will be trained in their use.
- All tools must be double insulated or used with a ground fault circuit interrupter.
- Only tools in good condition will be used.
- Tools will be kept clean.
- Guards and shields will be kept on all tools.
- Air couplings will be secured.

- Proper eye protection is critical when using power tools. At a minimum, safety glasses will be required during site operations. Where appropriate, full-face shields will be utilized in addition to the glasses.

3.2.1.5 Noise Exposure

Noise is generated during construction activities in such operations as transportation of materials and operation of heavy construction equipment. Noise has been defined as unwanted sounds. The human ear can tolerate a certain amount of sound without any harmful effects. Personnel will be provided protection against the effects of hazardous noise exposure whenever sound-pressure levels exceed 85 dB(A) steady-state expressed as a time-weighted average (TWA) or 140 dB(A) impulse.

It is usually safe to assume that if you need to shout to be heard at arm's length, the noise level is at 90 dB (A) or above. Personnel operating or working around construction equipment will utilize hearing protection. Sevenson personnel are enrolled in a Hearing Conservation Program that meets the requirements of OSHA regulation 29 CFR 1910.95.

3.2.1.6 Slip/Trip/Fall

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but all injuries can be prevented by the following prudent practices:

- Spot-check the work area to identify hazards.
- Establish and utilize a pathway, which is most free of slip and trip hazards.
- Beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain.
- Carry only loads that you can see over.
- Keep work areas clean and free of clutter, especially in storage areas and walkways.
- Communicate hazards to on-site personnel.
- Secure all loose clothing, ties, and remove jewelry while around machinery.
- Report and/or remove hazards.
- Keep a safe buffer zone between workers using equipment and tools.

3.2.1.7 Cold Stress

Cold injury (frostbite and hypothermia) and impaired ability to work are hazards to persons working outdoors in low temperatures at or below freezing. Extreme cold for a short time may cause severe injury to exposed body surfaces (frost nip or frostbite), or result in profound generalized cooling (hypothermia). Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible to frost nip or frostbite.

Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low

temperature. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked. The wind chill factor is the cooling effect of any combination of temperature and wind velocity or air movement. ***Table 2 – Wind Chill Index*** should be consulted when planning for exposure to low temperatures and wind. The wind chill index does not take into account the specific part of the body exposed to cold; the level of activity, which affects body heat production; or the amount of clothing being worn.

When practicable, the most sedentary tasks should be carried out during the warmest part of the day. If necessary, a light-work rotation schedule should be instituted or the work area heated. Heavy work that will cause heavy sweating resulting in wet clothing must also be monitored. The work/rest regimen consists of alternating periods of work and rest. The duration of these alternating periods will depend on the environmental conditions at the job site, (i.e., the Wind Chill Temperature, duration, and type of activities performed).

Table 2 – Wind Chill Index

Wind (mph)	Actual Temperature (°F)												
	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25
	Equivalent Temperature (°F)												
5	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40
10	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47
15	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51
20	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55
25	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58
30	22	16	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60
35	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62
40	20	13	6	-1	-8	-15	-22	-29	-36	-42	-50	-57	-64

Wind Chill (°F) = 35.74 + 0.6215T - 35.75(V0.16) + 0.4275T(V0.16)
T = Air Temperature (°F)
V = Wind Speed (mph)

Frostbite occurs in 15 minutes or less

Table 3 - Maximum Daily Time Limits for Exposure at Low Temperatures gives the recommended time limits for working in various low temperature ranges.

Table 3 – Maximum Daily Time Limits for Exposure at Low Temperatures	
Temperature Range (°F)	**Maximum Daily Exposure**
30 to 0	No limit, providing that the person is properly clothed.
0 to -30	Total work time: 4 hours. Alternate 1 hour in and 1 hour out of the low-temperature area.
-30 to -70	Two periods of 30 minutes each at least 4 hours apart. Total low temperature work time allowed is 1 hour.
-70 to -100	Maximum permissible work time is 5 minutes during an 8-hour working day. At these extreme temperatures, completely enclosed headgear, equipped with a breathing tube running under the clothing and down the leg to preheat the air, is recommended.

Table 4 - Work/Warm-up Schedule applies to any 4-hour work period with moderate to heavy work activity, warm-up periods of ten (10) minutes in a warm location and an extended break (e.g., lunch) at the end of the 4-hour period in a warm location. For light-to-moderate work (limited physical movement) apply schedule one step lower. For example, at -35°C (-30°F) with no noticeable wind, a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period.

Table 4 – Work/Warm-up Schedule											
Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph wind		15 mph wind		20 mph wind	
°C (approx.)	°F (approx.)	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks
-26 to –28	-15 to –19	(Norm. Breaks) 1		(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4
-29 to –31	-20 to –24	(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4	30 min	5
-32 to –34	-25 to –29	75 min	2	55 min	3	40 min	4	30 min	5	Non-Emergency Work Should Cease	
-35 to –37	-30 to –34	55 min	3	40 min	4	30 min	5	Non-Emergency Work Should Cease			
-38 to –39	-35 to –39	40 min	4	30 min	5	Non-Emergency Work Should Cease					
-40 to -42	-40 to -44	30 min	5	Non-Emergency Work Should Cease							
-43 & below	-45 & below	Non-Emergency Work Should Cease									

To guard against cold injuries, workers should wear appropriate clothing and use warm shelters for removing personal protective equipment. The personnel decontamination trailer will be used as a warm shelter when required. The SSHO may periodically monitor workers' physical conditions, specifically checking for symptoms of frostbite

Wet clothing can reduce the body's core temperature faster than just cold air alone. Rain gear will be made available to workers at the Site to prevent their clothing from becoming wet during rain events or performing activities where they could get wet. Employees will be encouraged to bring extra clothing to change into in the event they become wet. Employees who become soaked with water will be required to change into dry clothing before they can return to work.

3.2.1.8 Fires/Explosions Hazard

When required, the SSHO will establish areas approved for welding, cutting, and other hot work. Hot work (welding, burning, cutting, etc.) conducted on-site must comply with the following Hot Work Procedures. A Hot Work Permit will be obtained from the SSHO. All personnel will be protected from welding radiation, flashes, sparks, molten metal, and slag. All welding, burning, and cutting equipment will be inspected daily by the operator. Defective equipment will be tagged and removed from service, replaced or repaired, and re-inspected before again being placed in service. All welders will be properly trained in the safe operation of their equipment, safe welding/cutting practices, and welding/cutting respiratory and fire protection.

Cutting or welding will NOT be permitted in the presence of explosive atmospheres (mixtures of flammable/combustible gases, vapors, liquids, or dusts with air), or explosive atmospheres that may develop inside un-cleaned or improperly prepared drums, tanks, or other containers, and equipment which has previously contained such materials.

Where practical, all combustible material will be relocated at least 35 feet away from the hot work site. Where relocation is impractical, combustibles will be protected with flame-proofed covers or otherwise shielded. At a minimum, two fully charged and operable fire extinguishers appropriate for the type of possible fire (4A:80B:C), will be available at the work area.

A hot work permit will be completed by the SSHO, reviewed with personnel who will perform the hot work, and posted near the work area. The hot work permit is good only for the date issued and is valid only for the work shift for which it is issued. If at any time during the hot work operation a change in conditions at the work site is suspected, such as a release of flammable gases or vapors in the work area, work will be stopped immediately and the SSHO will be notified. Such work stoppage invalidates the hot work permit, and a new permit will be completed after inspections and tests have been performed by the SSHO; **r*efer to Attachment 2 – Safety and Health Forms for the Hot Work Permit.***

3.2.1.9 Fall From Elevation

To prevent falls and injuries when employees work in areas where fall hazards cannot be eliminated by reasonable means, personnel will be required to use a full body harness and shock-absorbing lanyard. Personnel will make maximum use of primary fall protection systems, such as scaffolding and scissors lifts. These systems will be equipped with standard guardrails and safe means of access/egress.

Before any employee attempts to work in an area where a risk of falls exists, they must equip themselves with suitable fall-arresting equipment. Personnel riding on or working from a man lift or scissors lift must secure their safety lanyards to the basket at all times.

The fall protection equipment will be properly fitted and will not restrict the movements of the worker. Full safety harnesses are required for any work performed over six (6) feet in elevation unless work is being performed from a ladder. Work from portable ladders or fixed ladders less than 24 feet in height that are set up and properly used do not require fall protection. However, if fall protection can be properly utilized, it will be.

Self-retractable lifelines (SRLs) shall be used in lieu of the traditional 6-foot shock absorbing lanyard. SRLs typically only allow a maximum fall distance of two feet when the attachment point is located at the same height or higher than the D-ring on the full body harness.

3.2.1.10 Working On or Near Water

During the course of the project a significant amount of the work will be conducted on or around water. Prior to commencement of any activities on the water, watercraft will be inspected, radio communication with shore personnel will be established, rescue procedures reviewed, and Coast Guard approved personal flotation devices (PFDs) issued to workers. All equipment and operating personnel will meet or exceed U.S. Coast Guard requirements for safety. Prior to performing work on the water a float plan and applicable AHAs will be completed and reviewed by boating personnel. (see section 7.18)

3.2.2 Chemical Hazards

3.2.2.1 Operational Chemical Hazards

Operational chemicals will be brought to the project-site for use in activities supporting the construction activities. For example, some of these chemicals are used for the treatment and stabilization of contaminated material. The use of operational chemicals is regulated by OSHA under the Hazard Communication Standard (29 CFR 1910.1200). Material Safety Data Sheets (MSDSs) for operational chemicals are kept on file in the project office trailer. An inventory list of the anticipated operational chemicals (Hazardous Chemical Inventory List) for use at the site will be maintained at the site and updated as new material is received. As these chemicals are brought on site, controls will be implemented to protect workers from their effects.

3.2.2.2 Contaminate Chemical Hazards

The primary contaminates of concern (COPC) are lead and chromium. Chromium affects the eyes, skin, and respiratory system. Lead affects the blood, kidneys, and nervous system.

The principal route of exposure is inhalation but contact, and ingestion also play a role.

3.2.3 Biological Hazards

Since the project occurs at a plant location and on the water there is a limited potential for encountering biological hazards such as bites from ticks, spiders, rodents, and snakes, and exposure to poison ivy and oak. However, flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while project activities occur. Mosquito bites can be effectively prevented by the use of insect repellants containing DEET. Please note that there are some concerns with the use of DEET on skin and associated potential adverse health effects. Treatment for insect bites and bee stings can be affected by the use of commercially prepared ointments. Personnel who are allergic to bee stings will notify the SSHO prior to working on the project.

4.0 SAFETY AND HEALTH TRAINING

4.1 Site-Specific Training

All personnel working at the Site during construction activities will review this HSERP with the SSHO. Personnel will sign an acknowledgment form to document their review and agreement to comply with the provisions of the HSERP. All visitors must sign the Visitor's Log and wait in the Sevenson field office for a briefing before entering the Site.

The SSHO will be responsible for ensuring Site visitors are trained in the hazards associated with the Site, to explain emergency procedures, and instruct them in the use of protective gear required during the visit. Vendors who specialize in electrical, hydraulics, or mechanical equipment may enter the exclusion zone to perform maintenance on equipment when escorted by a competent person.

4.1.1 Initial Session

Prior to commencement of onsite field activities, all site employees will attend a site-specific safety and health training session. This session will be conducted by the SSHO or designee, to ensure that personnel are familiar with the requirements of this HSERP. The initial session will consist of the contents of this HSERP and specific procedures developed for the project. The SSHO or designee will also provide initial site-specific training for replacement employees.

As a minimum the site-specific training will include:

- Explanation of the Overall HSERP.
- Health and Safety Personnel and Organization.
- Physical hazards associated with the project.
- Selection, use, and limitations of available safety equipment and proper procedures for its use.
- PPE fitting to determine proper size for individuals.
- Site rules and regulations.
- Work zone establishment and markings.
- Site communication and the “Buddy System”.
- Emergency preparedness procedures.
- Review applicable Sevenson Standard Operating Procedures.
- Site Specific Hazard Communication.
- Review of OSHA’s Lead Standard; Lead Awareness Program.
- Boating/water safety rules and procedures.
- Cold stress programs.

4.1.2 Periodic Sessions

Periodic training will be provided at least weekly and prior to each change of operation. The training will address safety and health procedures, work practices, any changes to HSERP, review activity hazard analysis, work task or schedule, and review of safety discrepancies and accidents.

4.2 Safety Meetings

A well-ordered flow of information is essential to a good safety program. Sevenson, through a program of safety meetings at all levels, intends to accomplish the goals of safety awareness, education, and participation.

The SSHO will conduct daily safety meetings with ALL on-site personnel. An opportunity will be provided for employees to voice safety-related concerns. The SSHO will submit a synopsis of each meeting including topics covered, safety-related concerns, action items to be addressed, status of previous items, and a signed attendance list.

4.3 Hazard Communication Training

OSHA's standard for hazard communication requires that all workers be informed of potentially hazardous materials used in their work area. Sevenson provides employees with information and training on hazardous chemicals at their work site at the time of their initial assignment, annually, and whenever a new chemical is introduced into their work site that could present a potential hazard. Personnel are briefed on the general requirements of the OSHA hazard communication standard and duty-specific hazards by their immediate supervisor before they begin any duties on the work site. Personnel transferred from another site are also briefed on the duty-specific hazards by their immediate supervisor before they begin any duties on the work site.

4.4 HAZWOPER Training

All personnel who work in the Exclusion Zone and have the potential to come into contact with contaminated material must have participated in a 40-hour HAZWOPER training course as outlined in OSHA regulations 29 CFR 1910.120 and 1926.65. In addition to the initial 40-hour course personnel are required to have an 8-hour annual refresher course. Supervisors will have completed an 8-hour supervisory course.

4.5 First Aid/CPR Training

At least one person will be required to complete first aid and cardiopulmonary resuscitation (CPR) training and receive the appropriate certification. First aid/CPR training certificates shall be approved by the American Red Cross, the American Heart Association, the National Safety Council, or be certified by a medical professional. Additionally, First Aid/CPR qualified personnel will have received blood borne pathogen training as required by 29 CFR 1910.1030. Wyatt Beougher is certified in first aid and CPR.

5.0 INJURY/MEDICAL SUPPORT

As a follow-up to an injury all employees are entitled to and encouraged to seek medical attention and physical testing. Any employee, who develops a time loss illness exceeding one working day, or injury during the period of the contract, must be evaluated by the occupational health physician. A written

statement indicating the employee's fitness, signed by the occupational physician must be submitted prior to the employee entering the work site.

Sevenson's medical consultant has established a relationship with Industrial Medical Associates (280 N. Central Avenue, Suite 15, Hartsdale) which is a local occupational clinic. All minor, non-emergency injuries will be treated at this clinic. Through the use of this clinic it is anticipated that there will be no unnecessary treatment of injuries. When injured workers are released back to work with restrictions, these restrictions will be accommodated so that unnecessary lost workday cases are avoided.

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section provides an outline of the PPE and guidelines that will be implemented to minimize chemical, physical, and biological exposures and accidents during construction activities. Where engineering and administrative controls do not eliminate all job hazards, employees will (where appropriate) wear PPE.

These include items such as, hard hats, face shields, safety goggles, glasses, hearing protection, foot guards, gloves, etc. The SSHO will ensure that equipment selected will meet the following requirements:

- It will be appropriate for the particular hazard.
- It will be maintained in good condition.
- It will be properly stored when not in use to prevent damage or loss.
- It will be kept clean, fully functional, and sanitary.
- Must meet all applicable ANSI standards.

Personal clothing and jewelry can present additional safety hazards. Supervisors will ensure that workers wear appropriate clothing, which will not interfere with the PPE. Sevenson will provide proper PPE to all employees.

6.1 PPE Hazard Assessment

Selection of the appropriate PPE is a complex process, which should take into consideration a variety of factors. Key factors involved in this process are identification of the hazards, or suspected hazards, and the performance of the PPE materials in providing a barrier to these hazards. The amount of protection provided by PPE is hazard specific. It is anticipated that the following levels of protection will be utilized at this site.

- **Level D:** provides minimal protection against chemical hazards. A work uniform consisting of coveralls and/or long pants and sleeves may be worn in any area without the potential for significant respiratory or skin contact hazards.
- **Modified Level D**: provides protection against skin contact of chemical hazards. It entails Level D protection plus gloves, boots, and protective coverall.

- **Level C**: provides protection against inhalation hazards from chemicals. It entails Modified Level D protection plus an air purifying respirator.

Personal Protective Equipment alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound work practices.

6.1.1 Head Protection

All personnel will wear a hard hat that meets the requirements and specifications in ANSI Safety Requirements for Industrial Head Protection Z89.1-1969. Exceptions to this requirement are personnel in the site office and rest and eating areas.

6.1.2 Hand Protection

Outer gloves used on the Site for construction activities will be either chemical resistant or general purpose. The appropriate glove will be determined by the SSHO for a specific work task. Chemical resistant gloves will be selected using appropriate chemical degradation guides. Cotton or leather work gloves will be worn when work activities require the handling of sharp and rough-surfaced objects. Welder's gloves or any other special type of gloves are considered outer gloves and are to be worn over inner gloves.

6.1.3 Eye/Face Protection

All personnel on site will wear eye protection. All eye/face protection provided will be ANSI Z87-1989 approved.

6.1.4 Footwear

Footwear will meet ASTM F2413-11and will be worn for all field activities.

6.2 Levels of Protection

The level of protection must correspond to the level of hazards known or suspected for the specific work activity. The anticipated level of protection for work in which there will be no contact with sediment is Level D. Where there is potential for contact with sediment, Modified D level of protection will be used. Where there is the potential for inhalation of contaminated material above the action limit, Level C PPE will be used.

6.2.1 Level D

Level D equipment, used as appropriate, is as follows:

- Work uniform (Long pants and Shirt)
- Hard hat
- Steel-toed safety boots (with disposable overboots, as required)
- Safety glasses

- Leather or heavy cloth gloves (as needed)
- Reflective safety vest
- Class I, III, or V personal flotation device (water work)

6.2.2 Level C

Level C equipment, used as appropriate, is as follows:

- Same as Level D plus
- Air purifying respirator with high efficiency particulate cartridges.

6.3 Initial Levels Protection

The anticipated level of protection based upon contaminant concentration and potential for exposure are as follows:

Task	Level of Protection
Mobilization/Demobilization	D
Installation of Temporary Facilities/Utilities	D
Site Preparation/Sheet Pile	D
Construction of Staging and Treatment Areas	D
Sediment Removal	D
Treatment, Remediation and Transport	D
Surveying	D
Water Treatment	D

7.0 ACCIDENT PREVENTION PROCEDURES/PRACTICES

7.1 Medical and First Aid Requirements

Applicable Standards:

OSHA 29 CFR 1926.23, & 1926.50

First-aid kits/stations and required contents are maintained in a serviceable condition. Unit-type kits have all items in the first-aid kit individually wrapped, sealed, and packaged in comparable sized packages. First-aid stations will be located as close as practicable to the highest concentration of personnel. First-aid stations will be well-marked and available to personnel during all working hours. First-aid stations will be equipped with a first-aid kit, the size of which will be dependent upon the number of personnel normally employed at the work site.

Emergency telephone numbers and Route to the Area Hospital will be clearly posted and easily visible at all times. There should be OSHA posters prominently displayed and warning signs posted for any known or potential hazard(s) present. MSDSs must be available on the job site at all times.

7.2 Hazardous Substances

Applicable Standards:

OSHA 29 CFR 1926.53 & 1910.1200

When hazardous substances are used in the workplace, the hazard communication program dealing with MSDSs, labeling, and employee training will be in operation. MSDS materials will be readily available for each hazardous substance used. A training program, plus regular question and answer sessions on dealing with hazardous materials will be given to keep employees informed. The program will include an explanation of what an MSDS is and how to use and obtain one; MSDS contents for each hazardous substance or class of substances; explanation of the "Right to Know"; identification of where employees can see the employer's written hazard communication program and where hazardous substances are present in their work area; the health hazards of substances in the work area, how to detect their presence, and specific protective measures to be used; as well as informing them of hazards of non-routine tasks.

7.3 Fall Protection

Applicable Standards:

OSHA 29 CFR 1926.500, 501, 502, 503; 1926.106

To access high and low places on jobsites a variety of equipment may be used such as ladders, scaffolding, suspended platforms, aerial lifts, stairways, and climbing lines. The use of these access systems often presents fall hazards. In addition, employees may be exposed to falls while working on elevated structures, climbing onto and off of equipment, and even while walking by falling through holes or by slipping or tripping.

To protect employees when they are exposed to fall hazards, some form of fall protection must be used. The most common forms of fall protection are guardrails, personal fall arrest systems, hole covers, and safety nets. Any one, or all of these forms of fall protection may be used on construction worksites. The current OSHA standards also require that employees receive training regarding fall protection issues, and that the training is documented. An alternate fall arrest program may be implemented in cases where none of the traditional methods of fall protection are feasible. Components of our fall protection plans are listed below:

Personal Fall Arrest System - The three main parts of a personal fall arrest system are the body belt or harness, the SRL or lanyard, and a suitable anchorage. Particular attention must be paid to the anchorage point(s) to ensure that they are capable of supporting 5,000 lb. (22.2 kN) or two times the maximum load on an engineered system.

Guardrail Systems - Guardrail systems consist of a toprail, midrail, and if necessary a toeboard. Guardrail systems can be made of various materials.

Training - All employees must receive training on the nature of the fall hazards at the site and on how to avoid falls. Employees should be familiar with the use of all personal fall arrest systems and must wear the equipment when necessary.

The requirements of all applicable OSHA regulations notwithstanding, the minimum fall protection requirements on our projects may include the following:

- All fall protection systems must meet the requirements of Part 1926, Subpart M.

- For situations where SRLs cannot be used because they are interrupted, double lanyards are necessary to ensure that the worker is continuously protected from falling by attaching one lanyard ahead of the discontinuity prior to unhooking the trailing lanyard.

- Climbing on forms, false work, or the structure to gain access to work areas is expressly prohibited. However, it is not intended to prohibit the use of ladders for access to work areas, provided the operation is in compliance with OSHA Part 1926 Subpart X and other relevant requirements.

- Where scaffolds are necessary to provide temporary access to work areas, they must be in compliance with §1926.451. Scaffolds must include a toprail, midrail, and toeboard in compliance with 1926.451, on all open sides and ends. Personal fall arrest systems meeting the criteria of Part 1926 Subpart M are required to protect workers during installation and removal of the railings, and in situations where physical restrictions preclude installation of a standard railing.

- Fall protection is required for open sides or ends of roofs and for openings in floors, as required in Part 1926 Subpart M. In no case will a height of fall 6 feet (1829 mm) or greater from the side, end, or opening in a floor remain unprotected.

- All workers in approved personnel aerial lifts must use a personal fall arrest system meeting the criteria of Part 1926 Subpart M, with the lanyard attached to the boom or basket, as required by OSHA 1926.556.

- Because falls from structural members constitute a serious and clearly recognizable hazard, fall protection for all steel or concrete beams and other structural elements must be in place prior to erection. This will provide fall protection for workers involved in the initial erection and in subsequent operations until the deck forms are in place. This fall protection will consist of personal fall arrest systems, safety nets, or other means meeting the requirements of Part 1926 Subpart M.

- During the initial connection of structural elements, workers exposed to moving members will be required to tie off only if they are not exposed to a greater risk from the moving member. Initial connection is defined as that period during placement or removal of structural members while the member is supported by a crane or other lifting device.

- Instances in which it is impossible to provide fall protection for workers are rare. Where an individual worker must rig the fall protection system, and it cannot be accomplished from an aerial lift or by tying-off to the existing structure, momentary exposure to a fall hazard may be unavoidable. It is essential that adequate planning of construction procedures minimize such occurrence of unprotected exposure to fall hazards. It is equally essential that the fall protection systems utilized actually enhance safety, rather than creating a secondary hazard.

7.4 Electrical

Applicable Standards:

OSHA 29 CFR 1926.400 through 449, 1910.301 through 399, 1926.550(a)(15)

Electricity is a serious workplace hazard that must be respected at all times. It is important to remember that exposure to even a little electric current can kill! The best protection around electricity is distance -- ample distance between the worker and the conductive materials. The following safe work practices and procedures will help prevent electrical accidents on the jobsite.

Workers should observe and strictly obey all warning and danger signs around electrical apparatus. They should never close a switch that has a danger tag on it signed by or placed there by someone else. Untrained people must not open any electrical enclosures. The one exception is that the door on a circuit breaker panel board may be opened to operate the switches, but other types of electrical enclosures should not be opened.

Extension cords or any power tools or equipment must not be used when the cords are frayed, worn out, or the wires are bare. Defective equipment should be reported to the supervisor and turned in for repair. Report all unguarded or broken light bulbs. Do not hang lights by their cords unless the light was designed to be suspended in that manner.

Installation Safety Requirements: Live parts of electrical equipment operating at 50 volts or more must be guarded against accidental contact. Entrance to rooms and other guarded locations containing exposed live parts must be marked with conspicuous warning signs forbidding unqualified persons from entering. All pull boxes and breaker boxes must be labeled to indicate the equipment they switch. Electric installations that exceed 600 volts and that are open to unqualified persons must be made with metal-enclosed equipment or enclosed in a vault or area controlled by a lock. In addition, equipment must be marked with appropriate caution signs.

Conductors and equipment must be protected from overcurrent in accordance with their ability to safely conduct current, and the conductors must have sufficient current carrying capacity to carry the load. Fuses and circuit breakers must also be located or shielded so that employees will not be burned or otherwise injured by their operation.

All wiring components and utilization equipment in hazardous locations must be maintained in an explosion-proof condition without loose or missing screws, gaskets, threaded connections, seals, or other impairments to a tight condition. Unless identified for use in the operating environment, no conductors or equipment can be located:

- In damp or wet locations.
- Where exposed to gases, fumes, vapors, liquids, or other agents having a deteriorating effect on the conductors or equipment.
- Where exposed to excessive temperatures.

Ground Fault Circuit Interrupters To ensure electrical safety from shocks on all construction sites, all 120-volt, single-phase, 15- and 20-amp receptacle outlets must be protected by ground fault circuit interrupters (GFCIs), or assured equipment grounding conductor program must be established. In an

assured equipment-grounding program, one or more **competent persons** must be designated to implement and enforce the following assured equipment grounding safety procedures at all construction jobsites.

Each 120-volt extension cord, tool, piece of equipment, and receptacle needs to be inspected and tested before first use, before equipment is returned to service following repairs, and before equipment is used after any incident that can be reasonably suspected to have caused damage.

Each extension cord, tool, or piece of equipment should be visually inspected by the user before each day's use to determine signs of damage. Equipment found to be damaged or defective (frayed or damaged insulation, crushed cable, loose or missing covers or screws, and missing ground prong on plugs, etc.) must not be used until repaired. Equipment suspected to be damaged or defective should be inspected and tested prior to use.

Overhead Transmission and Distribution Lines - A significant hazard on construction jobsites is the accidental contact of moving equipment with live overhead power distribution and service lines. Where work must be done near live lines, the movement of all equipment such as cranes, excavators and other equipment must be guided by an observer who can observe the clearance of the equipment from energized lines and give timely warning to equipment operators. The minimum clearance between live lines and any jobsite equipment is 10 feet (3.0 m), and the clearance increases with increasing line voltages. See Table 1 for minimum clearance from energized overhead transmission lines.

7.5 Lockout and Tagout

Applicable Standards:

OSHA 29 CFR 1926.417 & 1910.147

Whenever maintenance, servicing, or repairs are done to equipment, tools and machinery, there is a potential for injury from the accidental energization or movement of the equipment. Prior to beginning any work on equipment, steps must be taken to identify the energy sources present in the equipment, and to ensure that the energy sources are neutralized.

Hazardous energy sources fall into categories such as electrical, pneumatic, hydraulic, and potential (gravity, springs, etc.). One simple control in the construction industry has been to unplug cord-connected equipment. Vehicles and other motorized equipment can be protected from accidental starting by disconnecting the battery. Other controls include the use of identifiable padlocks on disconnects, breaker switches, and valves. Stored energy has the potential for release with great kinetic force and potential for injury.

All machinery or equipment capable of movement must be de-energized or disengaged and blocked or locked out during cleaning, servicing, adjusting or setting up operations, whenever required. The lockout procedure requires that stored energy (i.e. mechanical, hydraulic, air) be released or blocked before equipment is locked out for repairs. Appropriate employees are provided with individually keyed personal safety locks. Employees are required to keep personal control of their key(s) while they have safety locks in use. Employees must check the safety of the lockout by attempting a start up after making sure no one is exposed. Where the power disconnector does not also disconnect the

electrical control circuit, the appropriate electrical enclosures must be identified. The control circuit can also be disconnected and locked out.

Temporary electrical service installation will be performed by a qualified electrician. Work may only be performed on de-energized equipment. Lockout/Tagout procedures will be implemented to assure the safety of personnel during electrical work activities.

Underground electric lines will be located and clearly marked. These utilities will be protected, removed, or relocated as needed to do the work safely. The excavation work will not be allowed to endanger the underground utility or the people doing the work. Barricades, shoring, or other supports as needed, will protect utilities left in place that are exposed by the excavation.

7.6 Motor Vehicles and Mechanized Equipment

Applicable Standards:

OSHA 29 CFR 1926.600 through 606, 1926.1000 through 1003

Many potential hazards are associated with the use of motor vehicles and mechanized equipment on construction projects. Motor vehicles may be involved in accidents due to mechanical failures or operator errors, resulting in injuries to operators themselves or to bystanders. To minimize accidents resulting from the use of motor vehicles, the following safety procedures need to be implemented and enforced on all company projects:

- All equipment left unattended at night, adjacent to highways or construction areas should have lights, reflectors, and/or barricades to identify location of the equipment.
- Supervisory personnel will ensure that all machinery and equipment is inspected prior to each use to verify that it is in safe operating condition.
- Rated load capacities and recommended rules of operation must be conspicuously posted on all equipment at the operator's station.
- Wire rope must be taken out of service when one of the following conditions exist:
  - In running ropes, six random distributed broken wires in one lay or three broken wires in one strand or one lay.
  - Wear of one-third the original diameter or outside individual wires.
  - Kinking, crushing, hoist caging, heat damage, or any other damage resulting in distortion of the rope structure.
  - In standing ropes, more than two broken wires in one lay in sections beyond connections, or more than one broken wire at an end connection.
- An 1A:10B:C rated fire extinguisher or higher should be available at all operator stations.
- When vehicles or mobile equipment are stopped or parked, the parking brake must be set. Equipment on inclines must have the wheels chocked as well as the parking brake set.

- All vehicles or combinations of vehicles must have in operable condition at least:
  - Two headlights.
  - Two taillights.
  - Brake lights.
  - Audible warning device at operator's station.
  - Seat belts properly installed.
  - Appropriate number of seats for occupants.
  - Service, parking, and emergency brake system.
- Operators should not travel in reverse with motor equipment having an obstructed rear view unless:
  - The vehicle is equipped with an audible, functioning reverse signal alarm.
  - The vehicle is backed up only under the guidance of an observer who says that it is safe to do so.
- Only those trained in the use of a specific type of machinery should be allowed to operate the machinery. Operators of heavy equipment and trucks greater than 26,000 lbs (11,794 kg) gross vehicle weight used in traffic must have a commercial driver's license.
- Materials handling equipment such as scrapers, front-end loaders, dozers, and similar equipment must be provided with Rollover Protective Structures (ROPS).
- Accessible areas within the swing radius of cranes, backhoes, and other rotating machinery need to be barricaded to prevent employees from being struck or crushed by the rotating parts of the machinery or their loads.
- Employees should not ride on or in motor vehicles unless seats with seat belts are provided.

7.7 Hand and Power Tools

Applicable Standards:

OSHA 29 CFR 1926.300 through 307

Tools are such a common part of construction work that it is difficult to remember that they may pose hazards. Workers must learn to recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent injuries from those hazards. To prevent accidents resulting from the use of hand- and power-operated hand tools, management personnel need to implement and enforce the following safe work procedures on all construction jobsites.

Broken, defective, burned, or mushroomed tools should not be used. They should be reported and turned in for replacement. The proper tool and equipment should be selected and used for each task. For example, a wrench should not be used as a hammer or a screwdriver as a chisel. Leaving tools on

scaffolds, ladders, or any overhead working surfaces is hazardous because they may fall. Racks, bins, hooks, or other suitable storage space must be provided to permit convenient arrangement of tools. Striking two hardened steel surfaces together is hazardous because pieces of metal may break off (i.e., two hammers, or a hammer and hardened steel shafts should not be struck together). The practice of throwing tools from one location to another, from one employee to another, or dropping them to lower levels will be prohibited. When it is necessary to pass tools or material under the above conditions, suitable containers and/or ropes must be used.

Wooden tool handles must be sound, smooth, in good condition and securely fastened to the tool. Sharp-edged or pointed tools should never be carried in employee's pockets. Only non-sparking tools will be used in locations where sources of ignition may cause a fire or explosion. Tools requiring heat-treating should be tempered, formed, dressed, and sharpened by workmen experienced in these operations. Tools designed to accommodate guards must be equipped with such guards when in use.

All rotating, reciprocating or moving parts of equipment (belts, gears, shafts, flywheels, etc.) must be guarded to prevent contact by employees using such equipment. Guarding must meet requirements set forth in ANSI B15.1-1953. All hand-held power tools (e.g., circular saws, chain saws, and percussion tools) without a positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when pressure is released. A positive "on-off" control must be provided on platen sanders, grinders with wheels 2 inches in diameter or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws, and jigsaws with blade shanks ¼ in wide or less.

A momentary contact "on-off" control must be provided on all hand-held powered drills, tapers, fasteners drivers, horizontal, vertical and angle grinders with wheels greater than 2 inches in diameter. Besides safety hazards, the use of power tools sometimes creates potential health hazards as well. The use of jackhammer and chiseling equipment often results in silica and nuisance dust exposures that can sometimes be controlled by wetting the work surfaces. Many times, however, the use of dust/mist respirators is required to prevent overexposures.

In addition to dust hazards, the hand vibration inherent in the use of some power tools may result in a restriction of blood flow to the hands and fingers, causing numbness or tingling. If workers consistently experience these symptoms after the use of power tools, they should contact their supervisor so that steps may be taken to prevent further harm to the nerves and blood vessels in their hands. The use of a different tool, changes to the offending tool to reduce vibrations, and/or the use of special gloves may be recommended to deal with the vibration problems.

Electric Tools - Electric tools present several dangers to the user; the most serious is the possibility of electrocution. The following safe work procedures for electric tools must be implemented and enforced at all company construction projects. Tools must (1) have a three-wire cord with ground and be grounded, or (2) be double insulated, or (3) be powered by a low-voltage isolation transformer. A Ground Fault Circuit Interrupter (GFCI) must be used or the tool must be double insulated to prevent the worker from electrical shock hazards. Never remove the third prong from the plug. Electric tools should be operated within their design limitations.

In general, gloves and safety footwear are recommended during use of electric tools. However, gloves should not be worn when they are a potential entanglement hazard with reciprocating or rotating tools.

When not in use, tools should be stored in a dry place. Electric tools should not be used in damp or wet locations.

Powered Abrasive Wheel Tools - Power abrasive wheel tools present a special safety problem because they may throw off flying fragments. The following safe work procedures for powered abrasive wheel tools need to be implemented and enforced at all company construction projects. Portable grinding tools must be equipped with safety guards to protect workers from flying fragments as well as the moving wheel surface. Inspecting and sound- or ring-testing abrasive wheels prior to mounting is required to ensure that they are free from cracks or defects. Checking to ensure that the abrasive wheel RPM rating is appropriate for the tool will also help prevent wheel failures. The following work rules are appropriate for using a powered grinder:

- Always use eye protection and a face shield.
- Turn off the power when not in use.
- Never clamp a hand-held grinder in a vise.
- To prevent the wheel from cracking, the user should ensure that it fits freely on the spindle.
- Grinding wheel users should never stand directly in front of the wheel during start-up because there is always a possibility that the wheel may disintegrate (explode) when accelerating to full speed.

Pneumatic Tools - Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders. The following safe work procedures for pneumatic tools must be implemented and enforced at all company construction projects. Pneumatic tools that shoot nails, rivets, or staples and operate at pressures more than 100 lbs/in^2 must be equipped with a special device to keep fasteners from being ejected unless the muzzle is pressed against the work surface. Eye protection is required and face protection recommended for employees working with pneumatic tools.

Hearing protection is required when working with noisy tools such as jackhammers. When using pneumatic tools, users should check to see that the tools are fastened securely to the hose to prevent the hose from becoming disconnected. All hoses exceeding ½" inside diameter must have a safety device at the supply source or branch line to reduce pressure in the event of hose failure.

Airless spray guns that atomize paints and fluids at high pressures (1,000 lbs or more per in^2) must be equipped with automatic or visual manual safety devices that will prevent pulling the trigger until the safety device is manually released. Workers operating a jackhammer are required to wear safety glasses, safety footwear, and hearing protection. Compressed air guns should never be pointed toward anyone. A safety clip or retainer must be installed to prevent attachments from being unintentionally shot from the barrel of the tool.

Liquid-Fueled Tools - Liquid-fueled tools are usually powered by gasoline. Vapors that can burn or explode and give off dangerous exhaust gases are the most serious hazards associated with liquid-fuel tools. The following safe work procedures for liquid-fueled tools need to be implemented and enforced at all company construction projects.

Gas or fuel should be handled, transported, and stored in approved flammable liquid containers. These containers, also known as safety cans, are no more than 5 gallons in capacity and have a spring-closing lid and spout cover that will safely relieve internal pressure when subjected to fire exposure. Before refilling the tank for a fuel-powered tool, the user must shut down the engine and allow it to cool to

prevent accidental ignition of hazardous vapors. Effective ventilation and/or personal protective equipment is necessary when using a fuel-powered tool inside a closed area. Fire extinguishers must be readily available in the work area.

7.8 Fire Protection and Prevention

Applicable Standards:

OSHA 29 CFR 1926.150 through 159

Fire on construction projects is a constant hazard that can cause loss of life, equipment and material. To assist in preventing fires on construction projects, all personnel must comply with the following safe work practices and procedures:

Fire Protection **-** Access to all available firefighting equipment must be maintained at all times. Firefighting equipment must be inspected monthly and maintained in operating condition. Defective or exhausted equipment must be replaced immediately. All firefighting equipment should be conspicuously located at each jobsite. One fire extinguisher, rated not less than 2A, should be provided for each 3,000 ft^2 of the protected work area. Travel distance from any point of the protected area to the nearest fire extinguisher must not exceed 100 feet. Extinguisher exposed to freezing conditions will be protected from freezing. Employees should not remove or tamper with fire extinguishers installed on equipment or vehicles or in other locations unless authorized to do so or in case of fire. After using a fire extinguisher, it must be recharged or replaced with another fully charged extinguisher. Extinguishers must be selected based on the anticipated fire hazards. To aid in the proper selection of fire extinguishers, the classes of fires are as follows:

- Class A (wood, paper, trash) - use water, dry chemical, or foam extinguisher.
- Class B (flammable liquids, gas, oil, paints, grease) - use foam, carbon dioxide, or dry chemical extinguisher.
- Class C (electrical) - use carbon dioxide or dry chemical extinguisher.
- Class D (combustible metals) - use dry powder extinguisher only.

Fire Prevention - Internal combustion engine-powered equipment should be located so that exhausts are away from combustible materials. Smoking is prohibited at all projects. Project will be conspicuously posted, "No Smoking or Open Flame." Portable battery-powered lighting equipment must be approved for the type of hazardous locations encountered. Combustible materials must be piled no higher than 20 feet (6.1 m). Depending on the stability of the material being piled, this height may be reduced.

Portable fire extinguishing equipment, suitable for anticipated fire hazards on the jobsite, must be provided at convenient, conspicuously accessible locations. Firefighting equipment must be kept free from obstacles, equipment, materials, and debris that could delay emergency use of such equipment. Employees should familiarize themselves with the location and use of the project's firefighting equipment. All oily rags, wastes, and similar combustible materials must be placed in metal containers. The containers must be emptied on a daily basis. Storage of flammable substances on equipment or vehicles should be prohibited unless such unit has adequate storage area designed for such use.

Flammable and Combustible Liquids **-** Explosive liquids, such as gasoline, will not be used as cleaning agents. Gasoline and similar combustible liquids must be stored, transported, and handled in approved and labeled containers in well-ventilated areas free from heat sources. Approved wooden or metal storage cabinets must be labeled in conspicuous lettering, "Flammable-Keep Fire Away." Storage in an approved storage cabinet should not exceed 60 gallons of flammable, or 120 gallons of combustible liquids. Storage of containers will not exceed 1,100 gallons in any one pile or area. Separate piles or groups of containers by a 5 feet clearance. Never place a pile or group within 20 feet of a building. A 12-feet wide access way must be provided within 200-feet of each container pile to permit approach of fire control apparatus.

The use of flammable liquids and spray finishing needs to conform to the requirements of 1926.66 and 1926.152. Paints and reducers should be stored away from heat sources and out of the sun. Airless spray-painting apparatus should be of a type approved for hazardous locations. Any electrically or fuel-powered equipment used to mix, convey, and spray flammable and combustible liquids must carry an approval from a nationally recognized testing laboratory. Pneumatically operated equipment is usually suitable for use with flammable and combustible finishes.

Fire Extinguishers **-** Portable fire extinguishers are provided in adequate number and type (4A:80B:C) and are located throughout the site. Fire extinguishers are located in readily accessible locations. Fire extinguishers are recharged regularly and the date of last inspection noted on their tags. Extinguishers should be placed free from obstructions or blockage. All extinguishers must be fully charged and in their designated places unless in use. All employees are periodically instructed in the use of extinguishers and fire protection procedures. Fire Extinguishers will be located in the following areas:

- ***Support Zone (Field):*** (1) 4A:80B:C multipurpose dry chemical type fire extinguishers.
- ***Decontamination Reduction Zone:*** (2) 4A:80B:C multipurpose dry chemical type fire extinguishers.
- ***Exclusion Zone:*** (1) 4A:80B:C multipurpose dry chemical type fire extinguishers.
- ***Equipment:*** All of Sevenson's heavy equipment will be supplied with ABC multipurpose dry chemical type fire extinguishers.

7.9 Sanitation

Applicable Standard:

OSHA 29 CFR 1926.51

Employees should not be required to perform work under unsanitary conditions. Adequate supplies of potable water will be provided at the jobsite. Containers used for drinking water will be clearly marked and not used for any other purpose. Cups must not be shared by employees. Outlets for non-potable water (i.e., firefighting purposes) are not to be used by employees for drinking, washing, or cooking purposes. All construction projects must have an adequate number of toilets on the jobsite Hand washing facilities need to be provided in near proximity to the jobsite. Hand washing facilities should also be present when employees are applying paints, coatings, herbicides, and insecticides or in other operations where contaminants may be harmful to the employees.

7.10 Confined Space Entry

Applicable Standards:

OSHA 29 CFR 1910.146, 1926.21(b)(6)

A confined space is a space that is large enough and so configured that an employee can physically enter and perform assigned work, has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits) and is not designed for continuous employee occupancy. Simply working in a confined space is not necessarily a hazard. However, if certain hazardous conditions exist prior to, or are created during entry, then the confined space must be treated with utmost care.

Conditions that make a confined space especially dangerous (i.e., make it a permit-required space) are:

- Contains or has the potential to contain a hazardous atmosphere.
- Contains a material that has the potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized serious safety or health hazard.

A hazardous atmosphere includes spaces that may expose employees to flammable gases, vapors, mists, or dusts; to an oxygen deficiency (<19.5 percent) or oxygen enriched environment (>23.5 percent); to air contaminants in excess of the PEL, or to any other atmospheric condition that is an immediate danger to life and health (IDLH).

When a permit-required space is present, the following hierarchy of controls should be used on the space:

- Avoid entry.
- Eliminate the hazards that make the confined space a permit-required space. Ventilation, lockout/tagout, block and bleed, and other procedures can be used to eliminate hazards. Hazard elimination must be verified by air monitoring and other test procedures.
- Eliminate the hazards to the point that only atmospheric hazards remain. Use the "atmospheric hazard only" procedures entry system discussed in 1910.146(c)(5).
- Minimize and control hazards to the fullest extent possible, and enter only after the requirements of a full permit entry have been satisfied.

Employees must receive training on confined spaces so that they will acquire the understanding, knowledge, and skills necessary for a safe entry into the confined space. Confined space training will be documented.

7.11 Welding and Cutting

Applicable Standards:

OSHA 29 CFR 1926.350 through 354

Welding and cutting operations present various safety and health hazards. Welding and cutting operations on lead-painted surfaces often create lead fumes by "boiling off" the lead. These lead fumes may cause lead poisoning if inhaled or ingested in excessive amounts. Other metal fumes such as iron oxide, chromium, zinc, manganese, and cadmium may also be present during welding and cutting operations. Safety hazards such as fire may result in fatalities, serious injuries, and/or property damage. Therefore, in an effort to eliminate or reduce the hazards associated with welding and cutting operations, the following rules and procedures should be included and enforced in any welding safety program.

Welding and Cutting - Only qualified welders should be authorized to do welding, heating, or cutting. Inspect work areas for fire hazards and proper ventilation before welding or cutting. Avoid welding or cutting sparks and hot slag. Be alert to hot surfaces and avoid touching metal surfaces until they have cooled. Place compressed gas cylinders in an upright position and secure in place to prevent dropping or falling. Handle with extreme care and do not store near any sources of heat. Remove any combustibles when welding or cutting must be done. If removal is not feasible, cover combustibles with a noncombustible material. When welding near any combustible material, another employee must be posted to serve as a fire watch. Make sure this person has a fire extinguisher available and keep him/her in the area after welding/cutting is completed until all danger of fire is past.

A hot-work permit system may be used at some jobsites, such as welding in permit-required confined spaces containing hazardous materials. When working in the vicinity of welding operations, wear approved eyewear and avoid looking directly at the flash as serious flash burns could result. When opening valves on tanks that have regulators installed, be sure the pressure adjustment screw is all the way out and do not stand in front of the regulator. An internal failure could rupture the regulator and cause the adjustment screw to become a missile.

Primers, paints, and other coatings should be removed, where feasible, from the area to be heated and for at least 4 inches on all sides.

Gas Welding and Cutting - When transporting, moving, and storing compressed gas cylinders, always ensure that the valve protection caps are in place and secured. Secure cylinders on a cradle, sling board, or pallet when hoisting. Never hoist or transport the cylinders by means of magnet or choker slings. Move cylinders by tilting and rolling them on their bottom edges. Do not allow cylinders to be dropped, struck, or come into contact with other cylinders violently. Secure cylinders in an upright (vertical) position when transporting by powered vehicles. Do not hoist cylinders by lifting on the valve protection caps. Do not use bars under valves or valve protection caps to pry cylinders loose when frozen. Use warm, <u>not boiling</u>, water to thaw cylinders loose.

Remove regulators and secure valve protection caps prior to moving cylinders, unless cylinders are firmly secured on a special carrier intended for transport. Close the cylinder valve when work is finished, when cylinders are empty, or when cylinders are moved at any time. Secure compressed gas cylinders in an upright position (vertical) except when cylinders are actually being hoisted or carried. Oxygen cylinders should be stored at least 20 feet from other combustible materials such as acetylene.

Alternatively, oxygen and fuel gas cylinders may be separated by a 5 feet-high non-combustible barrier with at least a 30-minute fire resistance rating.

Arc Welding and Cutting - Use only manual electrode holders that are specifically designed for arc welding and cutting. All current-carrying parts passing through the portion of the holder must be fully insulated against the maximum voltage encountered to ground. All arc welding and cutting cables must be completely insulated, flexible type, and capable of handling the maximum current requirements of the work in progress. Employees should report any defective equipment to their supervisor immediately and refrain from using such equipment. Shield all arc welding and cutting operations, whenever feasible, by noncombustible or flameproof screens to protect employees and other persons working in the vicinity from the direct rays of the arc.

Fire Prevention - Welders should locate the nearest fire extinguisher in their work area in case of a fire emergency. Fire extinguishing equipment must be immediately available in the work area. Never use matches or cigarette lighters to light torches. Use only friction lighters to light torches. Never strike an arc on gas cylinders. Move objects to be welded, cut, or heated to a designated safe location. If the objects cannot be readily moved, then all movable fire hazards in the vicinity must be taken to a safe place or otherwise protected. Fuel lines should have flashback arrestors. Do not weld, cut, or heat where the application of flammable paints or the presence of other flammable compounds, or heavy dust concentrations creates a hazard. Additional employees must be assigned to guard against fire while the actual welding, cutting, or heating is being performed when the operation is such that normal fire prevention precautions are not sufficient. Prior to applying heat to a drum, container, or hollow structure, provide a vent or opening to release any built-up pressure during the application of heat. Never cut, weld, or heat on drums, tanks, process lines, or containers that have contained flammable liquids until they have been purged and cleaned.

7.12 Stairways and Ladders

Applicable Standards:

OSHA 29 CFR 1926.1050 through 1060

Stairways and ladders are a major source of injuries and fatalities among construction workers. Because of the potential hazards involved in using stairways and ladders, the following safety practices and procedures need to be implemented and enforced at all construction projects. Ladders that project into passageways or doorways where they could be struck by personnel, moving equipment, or materials being handled must be secured to prevent accidental displacement or be protected by barricades. Workers should always face the ladder and use both hands when going up and down ladders. Materials and tools should be lowered or raised by a rope or other mechanical means. Hold on to the railing on stairways. The areas around the top and base of ladders must be free of tripping hazards such as loose materials, trash, and electrical cords. The same holds true for the bottom of stairways and on stairway platforms.

Ladders - Ladders must be capable of supporting four times the maximum intended load. Ladder rungs, cleats, and steps must be parallel, level, and uniformly spaced (not less than 10” nor more than 14”). Do not tie or fasten ladders together to provide longer sections unless they are specifically designed for such use. All stepladders must be equipped with a metal spreader or locking device. Do not paint wooden ladders, except to stencil for identification. Maintain ladders free from oil, grease, and other slipping hazards. Ladders must extend at least 3 feet above the upper landing surface and be

secured. The horizontal distance for the base of the ladder should extend 1 foot for every 4 feet in vertical distance. Wood job-made ladders must be used at an angle so that the horizontal distance is one-eighth the working length of the ladder. Do not use ladders on slippery surfaces unless they have been properly secured or provided with slip-resistant feet. Do not move, shift, or extend ladder while occupied. Never stand on the top step of a stepladder.

A competent person on a periodic basis and after any occurrence that could affect their performance must inspect ladders. Ladders with structural defects must be tagged with "Do Not Use" or similar language and withdrawn from service until repaired. Never use a metal ladder when working on electrical equipment or near electrical equipment where contact is possible. Any employee who uses a ladder or stairway must receive training by a **competent person** in the following areas:

- Types of fall hazards.
- Correct procedures for erecting, securing, maintaining, and disassembling fall protection systems.
- Proper construction (man-made), use, placement, and handling.
- Maximum intended load-carrying capacities.
- Requirements contained within 29 CFR 1926 Subpart X.

Stairways **-** Stairways that are not permanent parts of the structure must have landings of not less than 30 inches in the direction of travel. A platform must be provided where doors or gates open directly on a stairway. Metal pan landings and metal pan treads must be filled in with wood or other materials if they are to be used prior to being finished. Maintain all parts of stairways free from hazardous projections, such as protruding nails. Eliminate slippery conditions on stairways before the stairways are used to reach other levels.

7.13 Materials Handling, Storage, Use, and Disposal

Applicable Standards:

OSHA 29 CFR 1926.250 through 252

In the handling of materials, employees must know the following: There must be safe clearance for equipment through aisles and doorways. Vehicles must be shut off and brakes must be set prior to loading or unloading. Containers of combustibles or flammables, when stacked while being moved, must be separated by dunnage sufficient to provide stability. Trucks and trailers will be secured from movement during loading and unloading operations. Hand trucks must be maintained in safe operating condition. Chutes must be equipped with sideboards of sufficient height to prevent the handled materials from falling off. At the delivery end of rollers or chutes, provisions must be made to brake the movement of the handled materials. Hooks with safety latches or other arrangements will be used when hoisting materials, so that slings or load attachments won't accidentally slip off the hoist hooks. Securing chains, ropes, chokers, or slings must be adequate for the job to be performed. When hoisting material or equipment, provisions must be made to assure no one will be passing under the suspended loads.

Stack, rack, block, interlock, or otherwise secure all materials and supplies to prevent sliding, falling, or collapse. Post the maximum safe load limits for floors within buildings and structures in a

conspicuous location. Never exceed the maximum safe load limit. Keep aisles and passageways clear to provide for the free and safe movement of material handling equipment and employees. Use ramps, blocking, or grading when a difference in road or working levels exists to ensure the safe movement of vehicles between the two levels. Do not place material within 6-feet of any hoistway or floor opening inside buildings under construction, nor within 10-feet of an exterior wall that does not extend above the material being stored. Stack bagged materials by stepping back the layers and cross-keying the bags at least every 10 bags high. Do not store materials on scaffolds or runways in excess of supplies needed for immediate operations. Remove all nails from used lumber prior to stacking. Stack lumber on level and solidly supported sills. Do not stack lumber higher than 20-feet (16-feet if handled manually).

Stack and block structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, so as to prevent spreading or tilting. Attach handles or holders to the load to reduce the possibility of pinching or smashing fingers. Unload materials close to the point of final use to avoid unnecessary lifting. Do not stack non-compatible materials in the same pile.

Manual Materials Handling - Employees working alone should not attempt to lift or move a load that is too heavy for one person - get help! When working with materials stored in silos, hoppers, tanks, or similar storage areas, be aware that confined spaces may exist. Attach handles or holders to the load to reduce the possibility of pinching or smashing fingers. Wear protective gloves and clothing (i.e., aprons), if necessary, when handling loads with sharp or rough edges. When pulling or prying objects, workers should be properly positioned. Riding loads, slings, the ball, crane hook, or other material hoisting equipment is prohibited.

Engineering Controls - Engineering controls should be used, if feasible, to redesign the job so that the lifting task becomes less hazardous. This includes reducing the size or weight of the object lifted, changing the height of a pallet or shelf, or installing a mechanical lifting aid

OSHA standard 1926.251 provides guidance about the limitations and uses of slings used in conjunction with other material handling equipment for the movement of material by hoisting. Slings covered by this standard include those made of alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope, and synthetic web (nylon, polyester, and polypropylene). Some general work practices related to rigging include:

- Rigging equipment must be inspected prior to use on each shift and during its use to ensure that it is safe. Defective rigging equipment will be removed from service.

- Rigging equipment must not be loaded in excess of its recommended safe working load. The standard provides load capacity tables for various types of slings and associated hardware.

- Rigging equipment, when not in use, must be removed from the immediate work area.

- Custom rigging must be marked to indicate the safe working loads and will be proof-tested prior to use to 125 percent of their rated load.

In addition to these general guidelines, the standard has specific requirements related to alloy steel chains, wire rope, natural and synthetic rope, and synthetic webbing. Employees performing rigging work should be adequately trained in the safety and functional aspects of rigging for materials handling operations.

7.14 Signs, Signals, and Barricades

Applicable Standards:

OSHA 29 CFR 1026.200 – 203

The use of signs, signals, and barricades is essential to make employees aware that an immediate or potential hazard exists. Both traffic and health hazards such as airborne lead are examples of hazards on bridge renovation/demolition sites that require signs and other devices. The following sections discuss the primary ways that employees are made aware of hazards in their work areas.

Accident Prevention Signs/Tags - Signs, signals, regulated areas, and barricades must be used on each construction project as appropriate.

Danger Signs are used wherever an immediate hazard (i.e., exposed electrical conductor) exists. The danger signs must have red as the predominant color in the upper panel and a white lower panel for additional sign wording.

Caution Signs are used to warn against potential hazards or to caution against unsafe practices. The caution signs must have yellow as the predominant color with a black upper panel (yellow lettering of "caution" on the upper panel) and a yellow lower panel for additional sign wording.

Exit Signs, when required, should be in legible red ¾" (1.9 cm) stroke letters, not less than 6" (15.2 cm) high, on a white field.

Safety Instruction Signs, when used, must be white with a green upper panel and white lettering to convey the principal message. Any additional wording must be in black lettering on the white background.

Directional Signals must be white with a black panel and a white directional symbol. Any additional wording must be in black lettering on the white background.

Traffic Signs must be posted at points of hazards in all construction areas. All traffic control signs or devices must conform to the DOT MUTCD and ANSI D6.1-1971, *Manual on Uniform Traffic Control Devices for Streets and Highways.*

Accident Prevention Tags are used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc.

Out of Order Tags are used to designate equipment that requires repair or maintenance. Equipment with such a tag may not be used until the tag is removed.

Signaling - Flagmen or other appropriate traffic controls must be provided for operations where signs, signals, and barricades do not provide the necessary protection on or adjacent to a highway or street. Signaling directions must conform to DOT *Manual on Uniform Traffic Control Devices* (MUTCD) and ANSI D6.1-1971, *Manual on Uniform Traffic Control Devices for Streets and Highways*. Stop/Slow sign paddles must be used by flagmen when hand signaling. Red flags, at least 18 in^2, may be temporarily used in traffic control. Flagmen are required to wear a red or orange reflective warning vest and a hard hat while flagging. Required signs and symbols must be visible at all times when work is being done, and removed or covered promptly when the hazard no longer exists.

Cones, Barrels, Barricades, and Barriers - Channeling devices such as cones, barrels, or barricades are required for jobsite roadways presenting a hazard to motorized equipment or vehicles. Barriers may also provide a greater degree of work zone protection. Consult traffic control resources such as the DOT MUTCD for guidance on establishing and working in road construction work zones.

7.15 Cranes and Hoists

Applicable Standards:

OSHA 29 CFR 1926.1400 - 1501

The target goal of a crane safety program is zero crane accidents. To achieve this goal, the following safe work procedures must be implemented and enforced at all company projects:

- Crane operators are required to comply with crane manufacturer's specifications and limitations applicable to the operation of any and all cranes, derricks, and hoists.
- Rated load limits and recommended operating speeds, special hazard warnings, or instructions must be posted on all equipment.
- Hand signals to crane and derrick operators must conform to the applicable ANSI standard for the type of crane being used.
- A **competent person** who is knowledgeable in proper crane setup and operation activities must inspect all machinery and equipment prior to each use, and during use, to ensure it is in safe operating condition.
- Any defective parts must be repaired or replaced before use.
- A **competent person** who is knowledgeable in crane inspection techniques must perform an annual inspection of the hoisting machinery and provide a copy of the dates and results of inspections for each hoisting machine and piece of equipment to the site superintendent.
- All moving parts or equipment (belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheel, etc.) must be guarded to prevent contact by employees.
- Accessible areas within the swing radius of the rotating superstructure of the crane must be barricaded to prevent an employee from being struck or crushed by the crane.
- Exhaust pipes must be guarded or insulated to prevent contact by employees.
- Windows in cabs must be of safety glass, or equivalent, that introduces no visible distortions.
- Where necessary, a ladder or steps must be provided to allow access to a cab roof.
- Platforms and walkways must have anti-skid surfaces.
- A 3A:40B:C rated fire extinguisher must be accessible at all operator stations or cabs of equipment. No part of a crane or load is permitted within 10 feet (3.0 m) of electric power lines, except where electrical distribution and transmission lines have been de-energized and visibly

grounded. A person will be designated to observe clearance of the equipment and provide timely warning to the crane operator.

- No employee is permitted to work beneath a suspended load.
- Employees that are required to work with in the fall zone of an operation such as sheet pile threading, shall have completed a Fall Zone Training course.

As part of a crane safety program, site superintendents will develop a working knowledge of the client's requirements for operating construction cranes, derricks, or hoists on project property. Interview prospective crane operators prior to site employment to ascertain competence and qualifications and check the prospective crane operator's past experience with previous employers, if possible. The Superintendent or his designee will conduct daily inspections to observe compliance with established company and client crane and rigging procedures and immediately shut down any crane operations that jeopardize the safety of any jobsite personnel.

7.16 Housekeeping

Applicable Standard:

29 CFR 1910.25

A policy of trash removal and the maintenance of good housekeeping practices should be implemented on all jobsites. The accumulation of construction debris may pose a significant fire hazard in addition to tripping and falling hazards.

Good housekeeping practices are the result of planning and organization. All personnel on the site must work together to maintain a clean worksite. The prompt removal of waste materials will permit a free flow of traffic through the work areas. Daily, or more frequent, inspections will be conducted by the general contractor to verify that the housekeeping controls are in place and being enforced.

Housekeeping activities in themselves may pose health hazards such as exposures to dusts, biological agents, and discarded chemicals. Liquid and solid waste chemicals must be placed in leak-proof containers for proper disposal.

7.17 Working On or Over Water

Applicable Standard:

29 CFR 1926.106

Some of the work conducted during this scope of work will be performed on or around water. This presents unique hazards and will be thoroughly addressed in all AHAs and Safe Plans of Actions; consideration will be given to the elements of 29 CFR 1926.106, and any applicable Coast Guard Regulations.

Personnel shall use Coast Guard approved Type I, III, or V PFDs while working over or on water where a drowning hazard exists.

Type II PFDs are not approved to be worn during activities at this project because the capability of a Type II PFD for turning unconscious wearers to a face-up position is not as effective as a Type I PFD.

Most Type III and V PFDs are not as effective as Type I in turning an unconscious wearer face up, but they are generally less bulky and restrictive, and are typically the PFD of choice in a marine work environment.

The use of inflatable PFDs is discouraged due to questionable reliability and maintenance requirements. In any case, the SSHO is available to help users select the appropriate type and style for the particular activity being conducted. The SSHO has the authority to prohibit the use of a particular PFD if it is damaged or otherwise not fit for use.

Each watercraft or work platform shall be equipped with at least one Type IV PFD, designed to be thrown to a person in the water and grasped and held by the user until retrieved from the water. Life rings or horseshoe buoys are two common examples of a Type IV PFD. The SSHO prior to use must approve each style of Type IV PFD. Type IV PFDs shall have at least 90 feet of 3/8-inch solid braid polypropylene line, or equivalent attached to it.

For on shore areas or docks where PFDs are required, at least one Type IV PFD with 90 feet of 3/8-inch solid braid polypropylene line, or equivalent attached to it, shall be at intervals of not more than 200 feet.

At least one lifesaving skiff (a powered John Boat or other smaller boat used in emergencies), shall be immediately available at locations where employees are working over or adjacent to water (based on an assessment by the SSHO for adjacent work).

OSHA has established the following criteria for determining when a lifesaving skiff is to be considered 'immediately available':

- The skiff must be in the water or capable of being quickly launched by one person.
- There must be at least one person present and specifically designated to respond to water emergencies and operate the skiff at all times when there are employees above water.
- When the operator is on break, another operator must be designated to provide the requisite coverage while employees are above water.

The designated operator must either man the skiff at all times or remain in the immediate area such that the operator can quickly reach the skiff and get underway.

7.18 Severe Weather

7.18.1 High Winds

If high winds are forecast, work on the River shall stop before the winds become hazardous. Workers shall go to an appropriate shelter. In the event that a Small Craft Advisory is issued by the National Weather Service, work onboard vessel(s) will be halted and the vessel(s) will return to shore as quickly as possible. If a Small Craft Advisory is issued before work commences, work will be rescheduled following lifting of the advisory. Work from a vessel will be conducted at the discretion of the vessel operator/Captain and will cease if Force 6 winds (Strong Breeze) as defined on the Beaufort Wind

scale (20 to 33 knots and waves 5 to 7 feet with whitecaps) are reported by National Weather Service. If an evacuation is enacted, an account for all persons will be conducted before leaving the Site.

7.18.2 Lightning

Work will not be permitted on the Hudson River, open areas, near trees or other equipment outside during lightning storms. Work will cease and field personnel provided appropriate shelter until the storm passes. Work shall not resume until at least 30 minutes after lightning was last observed. A lightning detection meter shall be utilized at the Site to monitor for storms that may produce lightning. When an approaching storm is within 20 minutes of the Site, water operations will be suspended. All waterborne personnel will be brought to shore to seek appropriate shelter.

7.18.3 Tornadoes/Hurricanes

In the event of a tornado or hurricane watch/warning all activities will be immediately suspended and workers brought to shore. In the event of a tornado warning all site activities will be suspended immediately and all workers will seek appropriate shelter.

8.0 AIR MONITORING

The primary chemical of concerns for this project is lead and chromium. The OSHA permissible exposure limit for lead is .050 mg/m^3 and chromium is 1 mg/m^3. A real time monitoring program using a particulate monitor will be implemented. This program will determine the amount of airborne particulate, and this result can be used as an indicator of airborne lead and chromium. An action level can be calculated using the following equation:

$$\text{Dust Action Level}\,(mg/m^3) = \frac{(1.0E06\,mg/kg)(\text{Safety Factor})}{\text{Sum of [concentration mg/kg/Exposure Limit]}}$$

Using the highest reported concentration for lead (8420 mg/kg) and chromium (1960 mg/kg) and a safety factor of 4, the dust real time action level is 1.5 mg/m^3.

Table 5 summarizes the real time monitoring program.

Table 5 – Real Time Air Monitoring

Instrument	Location	Level	Action
Dust Meter	**Breathing Zone**	**1,500 ug/m^3 above background**	**Continue Work no respiratory protection required.**
		1,500 ug/m^3 – 7,500 ug/m^3	**Upgrade to Level C**
		>7,500 ug/m^3	**Cease activity, implement dust control.**

A personal monitoring program to determine worker exposure to lead and chromium will also be implemented. Two workers exposure per week will be determined by following NIOSH 7300 sampling and analysis procedure for lead and chromium.

9.0 MEDICAL SURVEILLANCE

All workers who enter the Exclusion Zone and have the potential to come into contact with contaminated material will participate in Sevenson's medical surveillance program. The content of the medical examination will be determined by Sevenson's occupational physician. The program consists of an initial examination with annual follow up examinations.

10.0 SITE CONTROL MEASURES

10.1 Site Entry and Exit Control Log

All site personnel on this project will undergo safety orientation by the SSHO prior to starting work at the site. This training will include general site safety rules, hazardous locations, personal protective equipment guidelines, and onsite emergency procedures. All site personnel will satisfy the following requirements before initiating work onsite within the Exclusion or Contamination Reduction Zones:

- Receive a briefing on all aspects of the HSERP.
- Are properly dressed, equipped, and trained in accordance with all personal protective guidelines.
- Complete the entry / exit log.

10.2 Personal Hygiene and Sanitation

An adequate supply of potable water will be provided to the employees working at the Site. Clearly labeled potable containers will be used to dispense drinking water. Containers will be cleaned at the beginning of each day. The containers will be equipped with taps to access the water. Clean disposable cups will be provided daily.

Portable toilet facilities will be provided on-site for employees and will be located in the Support Zone. There will also be facilities for washing hands and face after exit from the Exclusion Zone and prior to eating, drinking, or smoking.

10.3 Decontamination Procedures

10.3.1 Personal Decontamination

- For work activities conducted on boats and barges, personnel will exit the boat/barge onto a floating dock adjacent to the site, or other acceptable location (e.g., remote dock pre-arranged for barge return).
- An area will be designated as the break areas by the SSHO. Personnel returning from the exclusion zone must complete a decontamination procedure before entering the break area. This will include washing of face and hands at a minimum.
- If there is a rip or tear in an individual's protective clothing and if there is contact with potentially contaminated material, the person will return to the decontamination zone as soon as possible, wash the affected skin area, and report the incident to the SSHO. The SSHO will then determine and authorize, if appropriate, whether the employee is to don new protective clothing (or to tape small rips or tears) and return to the work area. Exposed skin is to be washed at the

decontamination zone boot wash area before showering. Note: consideration must be made during cold weather months. Workers will be sheltered from cold temperatures prior to exposing skin areas for decontamination.

- The SSHO will monitor the effectiveness of the decontamination procedures and, if found ineffective, will take appropriate steps to correct deficiencies.

- It must be understood that the decontamination process is flexible. Changes occur on site that can be overlooked during planning stages. The SSHO should be prepared to alter (add or delete a step or process) the decontamination sequence or equipment. Extra decontamination equipment (spares) as well as a local supplier should be readily available for items such as brushes, rags, soap, buckets, hoses, etc.

10.3.2 Decontamination Procedures on Vessels

The following steps will be taken with regard to the performance of decontamination activities on vessels:

1. Deck Wash – Prior to initiating decontamination, the deck of the ship will be sprayed off to remove visible signs of contamination.

2. Equipment Wash – Equipment used during sediment remedy activities and to monitor personnel exposures will be cleaned to remove visible signs of contamination. Equipment may be sprayed with water to remove sediments. Air monitoring or other sensitive equipment may be wiped with a damp disposable wipe.

3. Outer Protective Clothing Wash – Scrub boots, gloves and outer layer of protective clothing with wash solution and scrub brush to remove visible signs of contamination.

4. Partial Removal of Outer Protective Clothing – If there is a potential heat stress hazard due to ambient conditions, the SSHO may allow a partial removal of outer protective clothing in order to protect site personnel. During this decontamination step, personnel will remove the outer gloves and roll outer protective clothing down to the waist and away from the upper body.

10.3.3 Disposition of Materials

- Contaminated equipment collected in plastic bags will be taken to the site.

- Bagged disposable material from personnel unit will be placed in container for off-site disposal

11.0 EMERGENCY CONTINGENCY PLAN

This section describes the emergency response plan that will be implemented by Sevenson employees to handle emergencies. The nature of the project and the activities planned for the site are such that there is little potential for an emergency, which would result in a significant release of hazardous substances, and in any way threaten the adjoining community. However, there is always the potential at any construction site for emergency situations to occur which threaten the on-site workers. Possible examples of emergency situations during construction activities include man overboard, equipment fires or contact of equipment with overhead power lines. In all of these cases, procedures will be implemented to minimize the possibility of an emergency situation. The procedures outlined below

are designed to ensure that the workforce reacts quickly and appropriately to emergency situations, thereby protecting the health and well-being of the individual workers. It is expected that modifications may be necessary upon actual site set-up and conditions.

NOTE: In the event of a serious or life threatening emergency the primary consideration is the immediate health of the individual rather than routine contamination controls. Standard contamination control protocols shall not interfere with the prompt medical attention required of a seriously injured worker.

11.1 Pre-Emergency Planning

During the site safety briefings held daily, all employees will be informed of the location of this plan, the procedures outlined in this plan, and the communication systems and evacuation routes to be used during an emergency.

On a continual basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency.

11.2 Personnel Responsibilities

All on-site employees have a role in mitigating an emergency incident. The Site Superintendent has primary responsibility for responding to and directing emergency response operations to correct emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. He is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. The SSHO will assist and advise the Site Superintendent, and will direct any emergency medical responses.

The following is an outline of job titles and corresponding responsibilities during an emergency.

- The Site Superintendent directs emergency response activities and serves as liaison with appropriate Client representative's personnel and subcontractors. In the event of an emergency the Site Superintendent will be the Incident Commander.

- The SSHO recommends that work be stopped if any operation threatens worker or public health or safety and advises Site Manager of emergency procedures if necessary. Provides emergency medical care on site. Notifies emergency services. The SSHO will assume the responsibility of Incident Commander if the Site Superintendent is off-site.

11.3 Evacuation Routes and Procedures

In the event of an emergency that necessitates an evacuation of the site, on-site personnel will be notified by hand-held or mobile two-way radios to leave the area by immediate emergency exit. An alternate method of communication will be the use of a portable air horn sounded in regularly spaced, repeated blasts. During an evacuation, all non-emergency radio transmissions will cease. The SSHO, in conjunction with the Site Superintendent, will control the scene until the appropriate municipal and state agencies arrive. Since site conditions, (i.e., wind direction, precipitation, and work location), change often, the SSHO will determine the appropriate evacuation procedures.

All personnel will assemble/muster at the Contamination Reduction Zone or Support Zone. Access to the site will be restricted.

11.4 Medical Treatment/First Aid

The SSHO will be trained in CPR and First Aid and have first aid kits for use in a medical emergency. First Aid Kits will be located in the main support area and at the work activity locations. Eyewash stations (water treatment and stabilization pad) will be of the pressurized, 15-minute discharge type. On-site employees have a basic knowledge of first aid and will assist the Site Superintendent and SSHO. Community emergency services (EMS, Fire, and Police) will be notified immediately if their resources are needed on site.

If necessary, the injured or sick party will be taken to Phelps Memorial Hospital– Please refer to ***Figure 2 – "Route to Hospital Map"***, for directions to the area hospital. Route to the area hospital will be posted and easily visible at all times.

11.5 Emergency Alarms/Notifications and Procedures

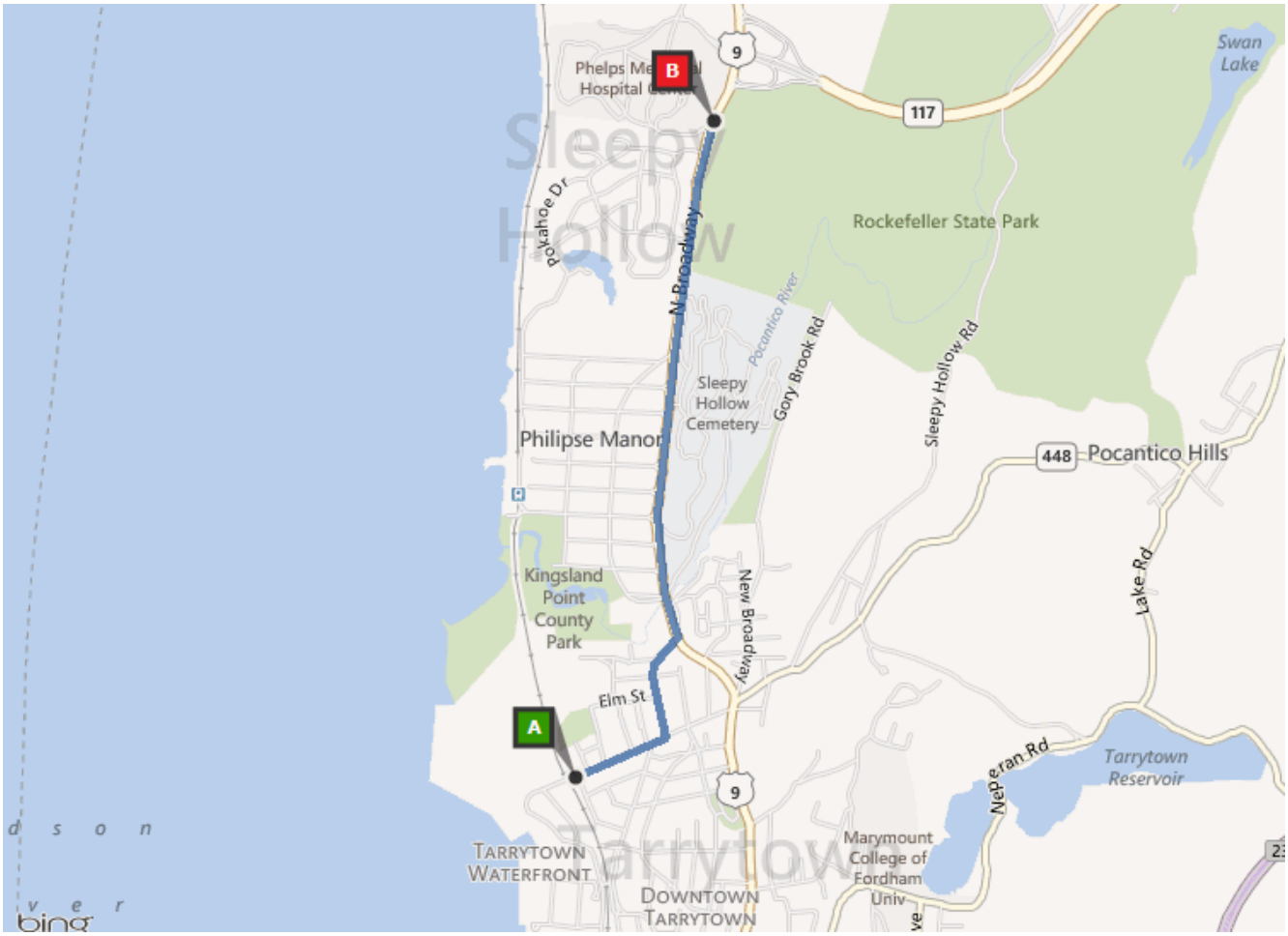
When any emergency occurs on-site the SSHO and Site Superintendent will be notified immediately. The Site Superintendent or the SSHO will notify the client and his representatives. Please refer to the ***Table 7 – "Emergency Telephone Numbers"*** for emergency telephones. Emergency Telephones will be posted and easily visible at all times.

To notify any site workers of an emergency, workers can be signaled by way of hand held or mobile two-way radios or as a backup, the use of an emergency alarm (portable air horn).

Primary emergency communications will flow through the radio network. A secondary Site evacuation alarm may consist of one long blast on a horn, every 10 seconds. Any time an alarm system is activated Site personnel will extinguish any nearby ignition source and prepare for emergency response activities.

The observer of the emergency condition will brief the responding personnel as to the nature and location of the event. When the Site Superintendent or SSHO have assessed the situation, a decision whether or not to implement emergency contingency procedures will be made. If Emergency Contingency Procedures are not implemented, supervisory personnel will give the "All Clear" verbally. The "All Clear" will be used to indicate a return to normal (non-emergency) conditions following emergency response activities.

Figure 2 – Route to Hospital Map



Directions to Hospital

A - 199 Beekman Avenue, Tarrytown, New York

B – 701 N Broadway, Sleepy Hollow, NY - Phelps Memorial Hospital

Distance, Time: 1.9 mile, 6 minutes

1. Depart Beekman Ave toward Clinton St 0.3 mi
2. Turn left onto Pocantico St 0.3 mi
3. Turn left onto US-9 / N Broadway 1.4 mi
4. Arrive at 701 N Broadway, Sleepy Hollow, NY - The last intersection is Phelps Ln
   If you reach Arch Hill, you've gone too far

Table 6 – Emergency Telephone List	
Police	911
Ambulance	911
Fire	911; 715-732-5170
Hospital – **Phelps Memorial Hospital Center** **701 N Broadway, Sleepy Hollow, NY**	914-366-3000
Dr. Greaney – Occupational Physician (Work Care)	714-456-2154
Occupational Clinic **Industrial Medical Associates** **280 North Central Avenue** **Hartsdale, NY**	**914-437-9430**
General Motors	
James Hartnett	315-436-2391 (cell)
Sevenson Environmental Services, Inc.	
Paul Hitcho – Safety and Health Manager	716-284-0431(office) 716-998 9797(cell)
Alan R. Elia – Officer in Charge	716-284-0431 (office) 716-628-2816 (cell)
James Pazderski – Project Manager	716-308-8406 (cell)
Dan Dragonette – Site Superintendent	7 16-609-0571(cell)
Wyatt Beougher – Site Safety Officer	724-977-6037 (cell)
Arcadis	
Raymond Kapp	824-346-6454 (cell)
Eric Dievendorf	315-497-5126 (cell)
Other	
Dig Safely NY	800-962-7962 or 811
National Response Center	800-424-8802
CHEMTREC	800-424-9300

11.6 Implementation of the Plan

There is a logical sequence of steps to follow in responding to emergencies, which should be followed by site personnel. This sequence involves identifying the emergency, investigating the extent of the emergency, deciding on the proper initial course of action, taking corrective action to rectify the situation, and following up with a post-emergency investigation.

Equipment breakdowns, power failures, injuries, and natural disasters are usually rather dramatic and will capture the individual's attention immediately upon occurrence. In other cases, the individual may have prior warning of impending emergencies through weather reports in the case of natural disasters and trends in equipment performance in the case of some breakdowns.

Some emergency situations exist long before the operator is aware that an emergency exists. These cases may produce situations, which then become immediate and obvious. For example, unattended equipment may have minor breakdowns which go unnoticed; further operation thus leading to complete breakdown of the equipment resulting in possible injury to the unwary bystander.

In the event of a fire, explosion, accidental material release, or any other emergency, response activities will be initiated following the evaluation of the event. An assessment of the situation will be performed by the SSHO immediately upon notification. The Superintendent/SSHO is authorized to commit resources to the extent detailed in this plan. If it is determined that an emergency situation exists, he will then implement the appropriate emergency response activities.

11.6.1 Conditions for Implementation

The contingency plan will be activated by the Superintendent/SSHO immediately in the event of a fire or explosion, or emissions of toxic chemicals in excess of limits set forth by Federal, State, and local agencies. In the event of a spill or material release, it will be up to the Superintendent/SSHO to make a determination as to when emergency conditions exist, as opposed to routine maintenance of the site. His determination will depend upon the location of the spill, the size of the spill, weather conditions and the proximity of the release to workers, the community and environmental receptors.

Once it becomes apparent that an emergency situation exists or that a disaster is impending, the Site Superintendent or his designee should immediately be notified and an immediate investigation conducted. Assessment of the emergency should include assessing the severity of the situation and collecting enough information to make an initial action decision.

Assessing the emergency should include identifying injured persons (if any), damage to buildings and equipment, noting potential impending damage if corrective action is not taken immediately, and itemizing resources required to correct the situation.

11.6.1.1 Fire or Explosion

Although the potential for fire or explosion is minimal, sources of risk do exist. These sources include welding gases, gasoline for portable equipment, diesel fuel for the heavy equipment and combustible debris. In the event of an explosion, possible emergency conditions would exist. Unless extinguished immediately, a fire or explosion will trigger implementation of these procedures.

11.6.1.2 Material Spills

Material spills could occur during truck loading and from vehicle accidents. Additionally, equipment fueling operations could produce spills. Ultimately, a spill could contaminate receiving surface water or cause a release of vapors to the air. A spill of fuel could also ignite. A small spill should be cleaned up immediately, but should not trigger activation of these procedures. Should an on site spill occur, the immediate response will include closing off the source of the spill, if possible, application of the sorbent material or sand bagging, and street sweeping, as appropriate. Any spill that results in a discharge to off site surface water will be contained with sorbent booms as needed. All spills will be investigated, and a written report will be provided to the regulatory agencies in accordance with applicable regulations.

11.6.2 Initial Action

Once the extent of the emergency is known, the Superintendent and the SSHO will make an immediate decision as to what initial steps should be taken to remedy the emergency situation. This first action, in the case of large-scale emergencies, usually consists of notifying responsible authorities and/or calling for the necessary assistance in order of priority.

The individual(s) should not unduly endanger him or herself or others by attempting tasks for which the proper equipment is not available or with which he or she is unfamiliar. In all cases, if in doubt, wait until qualified help arrives before taking action.

11.6.3 Corrective Action

When help arrives, the site superintendent/SSHO should immediately inform those called of the pertinent details of the situation. Corrective action should be continued until the situation is either under control or completely rectified. If corrective actions will take considerable time, a long-term effort to complete the task should be developed.

11.6.4 Follow-through

After the situation is corrected, the cause of the emergency event is to be determined and review of the corrective actions taken, etc. In the case of equipment failure, if negligence was not a factor, then revising maintenance procedures would be the most likely first preventive step. For natural disasters that cannot be prevented from recurring, the procedures followed in dealing with them can be reviewed to develop more effective action plans. The entire event, along with all of the responses, will be thoroughly documented for review by management and project supervisory personnel.

11.7 Spill Response and Control Plan

The purpose of this section is to define practices and procedures for the prevention, containment, and cleanup of accidental discharges of hazardous substances during the project. These substances include construction materials typically found on any construction site, such as lubricating fluids, diesel fuel, gasoline, etc.

Spill prevention applies to all types of spills and can be described as the first and simplest approach to spill control. Human error is a major contributing factor to spills and releases. An awareness of spill consequences, preventive measures, and countermeasures will greatly reduce spill occurrences. A sound prevention program includes careful work practices, constant inspection, and immediate

notification and correction of deficiencies. In the event that a spill does occur, proper containment and cleanup procedures must then be followed in order to reduce the effect of the spill.

11.7.1 Prevention

Prevention of unnecessary spills is of first priority. Prevention measures include:

- Operators and drivers will exercise extreme caution when transporting material around the site.
- When removing hoses from machines an appropriate and adequate supply of absorbents will be on hand. A supply of the following absorbents will be kept on-site, oil sorbent booms, rolls and pillows, universal towels and sheets, and vermiculite.
- Hoses will be capped when not connected to their appropriate fitting.
- All containers will be inspected daily for decay. No open container will be exposed to rainfall, snowfall, etc. without being emptied and cleaned of residue.
- All equipment will be inspected for leaks before and after service.
- Storage of material such as fuels, oils, and solvents on-site will be limited to the minimum required. All fluids will be stored in individual fluid containers appropriate and approved for the material. Most of the individual fluids containers will be further secured by storage in large, locked tool and equipment storage containers. Drums or other containers too large to be stored in containers will be stored raised off the ground on a liner and covered by plastic.

11.7.2 Reporting

All spills will be reported immediately to appropriate field and office management personnel. The sequence of reporting will be as follows:

- Notification by workers to the Site Superintendent or SSHO.
- The Site Superintendent or SSHO will immediately notify the Engineer regardless of the size of the spill.
- Sevenson and Arcadis will jointly determine the nature of the spill, its size, direction of travel, if anyone has been injured as a result of the spill and whether it requires immediate notification to regulatory agencies.
- Arcadis will have primary responsibility for notifying the regulatory agencies. Sevenson will have follow-up responsibility to verify that the notification is made in a timely manner. A full list of emergency contacts and telephone numbers is included this plan. This list includes Sevenson personnel, as well as federal, state and local authorities. This list will be posted in all trailers on-site.

Upon notification of a spill, all project activity will be immediately suspended and all necessary equipment and personnel will be diverted to spill control and containment. In the event of a spill, and regardless of the size, a Spill Incident Report will be submitted to with a copy to the Engineer within 48 hours of the incident.

11.7.3 Spill Response Equipment

Given the nature of this project, all the necessary equipment and personnel necessary to deal with a release of hazardous substances will be available on site. In addition to the heavy equipment and personal protective equipment, which is critical to spill control, Sevenson will have on hand an ample amount of sorbent materials, UN1A2 open top drums and overpacks.

11.7.4 Confinement and Containment

Prior to entering a spill area, all workers must be protected from any adverse effects of the spilled material. No one will enter any spill area alone. The SSHO will determine the level of protection required for response activities. To the extent practicable, the area will immediately be cordoned off and, if appropriate, exclusion, contamination reduction, and support zones will be established.

The decision to use confinement techniques such as diversion, diking and retention, are generally based on time, personnel, equipment, and supplies. As mentioned above, all necessary resources will be available on-site at all times. To the extent the nature of the material is known, the decision should be made based upon a review of the harmful effects of the material. In the event of a large migrating spill, an unlikely circumstance, diversion techniques, such as placing a soil wall or absorbent boom ahead of the spill, will be implemented first. Subsequently, diking techniques, such as using material such as sand covered with liner material (PVC, hypalon) should be implemented.

11.7.5 Cleanup

Once a spill has been contained and the source of the spill corrected and controlled, cleanup can begin. Spill cleanup can proceed at the same time as containment if feasible. Supervisory personnel will determine the appropriate cleanup methods. The SSHO will determine the appropriate level of protection depending upon the nature of the material.

- The first action will be to absorb free liquids with absorbent pads, booms, pillows, or clay. The absorbent material will be placed in drums and moved to an appropriate storage location. Subsequent to the removal of free liquids, soil believed to be contaminated will be excavated and containerized in drums or stockpiled on poly sheeting and covered for further testing.

- Dry spills, while posing less of a risk of migration, will still require appropriate and immediate action. The nature of the spilled material will be ascertained. The spilled material will be recovered for reuse if appropriate. Material, which cannot be recovered, and residual contaminated soil, will be shoveled into 55-gallon drums, placed in the drum storage area, and sampled and analyzed for waste characterization and disposal.

- Once containerized, Sevenson Environmental will provide for the appropriate sampling and analysis for waste characterization and disposal facility acceptance. Results of waste characterization analysis, waste profiles, and manifests will be provided to the Engineer for review.

- All spilled material and visually contaminated soil will be excavated and containerized in the initial spill response. If there appears to be a possibility that contaminants have migrated into the surrounding soil, post-construction sampling will be initiated. Soil samples will be taken from the areas of suspected contamination and analyzed for the compounds, which were released.

Personnel Decontamination - In general, all spill response operations will be performed in accordance with the provisions of the approved HSERP.

11.8 Report/Review

A written report will be made within 24 hours of incident resolution. The Engineer will be provided with a copy. In addition, all key personnel will have a meeting within 48 hours of the incident to discuss and critique all of the aspects of the Emergency Contingency Plan according to new site conditions and lessons learned.

12.0 WORKING ON OR NEAR WATER

While working on the Hudson River, Marine Safety procedures will be followed as directed by the boat captain and in accordance with the OSHA requirements at 1926.106. The following precautions will be taken:

- Work in a boat will be performed by at least a two-person team. Flotation devices, such as life vests, will be worn at all times. If work is performed at times when water temperatures are less than 38º F, it is recommended, but not necessary, that personnel wear float coats.
- If the work requires reaching, stretching, etc., from the boat, the worker will be equipped with a harness and lifeline. The lifeline will be attached to the boat.
- Footwear will have sufficient traction to reduce the risk of slipping.
- The deck of each boat must be rinsed to remove any visible river sediments.
- Any surface on the vessel that is visibly contaminated with soil or sediment will be rinsed off. Generation of airborne dust will be limited by adherence to this requirement.
- Vessels are required to have functioning navigational lights for any required dusk or night work.

In the event the National Weather Service issues a Small Craft Advisory, work onboard vessel(s) will be suspended and the vessel(s) will return to shore as soon as possible. If a Small Craft Advisory is issued before work commences, work will be rescheduled following the termination of the advisory. Work from a vessel will be conducted at the discretion of the vessel operator/captain.

12.1 Definitions

Barge — A manned or unmanned floating vessel that has a continuous, flat main deck. It is used to carry cargo. These vessels are not self-propelled.

Class A — A boat less than 16 feet long. Class A has the greatest numbers of boats. They can all be car topped or trailered. Due to their lightness and small size, many can become unstable if weight in them is excessive or carelessly loaded. Too much weight makes these boats sluggish, reduces their freeboard (the height of their sides above water) and can swamp (flood) them.

Class 1	A motorized boat from 16 feet to less than 26 feet in length. Though heavier and more powerful than Class A craft, most are still trailerable.
Class 2	A motorized boat from 26 feet to less than 40 feet in length.
Class 3	A motorized boat from 40 feet to less than 65 feet in length.
Type III Floatation Aid	Generally the most comfortable, have at least 15.5 lbs of buoyancy in the adult size. They do not turn the wearer face-up and can be jackets or vests.
Type IV Throwable Devices	These include the horseshoe, rung, and cushion. They have at least 16.5 lbs of buoyancy and must offer immediate access.

12.2. Small Boat Operation

When boarding be sure that the boat is secure. With one hand on the boat, quickly lower yourself straight down into the center of the boat. A life preserver should be worn. If others are boarding, have them step along the fore-and-aft centerline of the boat while you hold the boat in place along the pier. Avoid carrying anything aboard. Step down into the boat and load the items off the pier, or have someone had them to you one by one.

When loading a small boat, the amount and location of weight (persons and gear: the movable ballast) is critical for capsize protection. In a small utility boat, keep weight toward the middle, both fore-and-aft and side-to-side. If you see waves approaching, take them on the bow. Overloading a small boat inhibits its ability to rise to oncoming waves. Less freeboard means less clearance above the water's surface to prevent swamping. All craft must be operated within the boat manufacturer's weigh limits.

12.3. Class A and Class 1 Boats

- All persons on the boat will wear a US Coast Guard approved Type I, III, or V personal flotation vest. The type II vests (typically orange chest type) are not recommended because they are difficult to work in. In addition, throwable Type IV devices will be readily available for use.
- At least one B-1 Type US Coast Guard approved hand-held portable fire extinguisher (1A:10B:C) will be on the boat, readily available for use.
- Visual Distress Signal Flares and a battery operated light will be in good working order and readily available on the boat.
- A sound-producing distress signal; either a bell, whistle, or horn, will be in good working order and readily available on the boat.
- A first aid kit will be available on the boat.
- All boat fuel (gasoline) will be contained in engine manufacturer's approved containers that supply fuel to the engine via neoprene fuel lines. No fuel transfers between containers are to be conducted aboard the boat.

- A secondary means of propulsion will be available on the boat (oars or paddle).
- A boat hook, anchors, and proper mooring lines will be available on the boat.
- At least two extra sets of PPE for each person will be kept on the boats at all times or it shall be replaced immediately upon the next shore visit if PPE is utilized.

12.4. Boat Safety Equipment for Class 2, Class 3, Boats and Barges

- Wear safety shoes or boots with slip-resistant soles.
- Keep shoes / boots clean of mud, snow, ice, spilled liquids, and debris.
- All persons will wear a US Coast Guard Approved Type III personal flotation vest and at least one ring life buoy will be readily available for use.
- At least two type B-I (1A:10B:C) or one type B-II (4A:80B:C) fire extinguisher will be on board, readily available for use.
- Visual distress signal flares and a battery operated light will be on board, readily available for use.
- A sound-producing distress signal will be on board, readily available for use.
- A first aid kit will be available on board.
- At least two extra sets of PPE for each person will be kept on the boats at all times or it shall be replaced immediately upon the next shore visit if PPE is utilized.

12.5. Safe Boating Operations for Class A and Class 1 Boats

- All boats will be properly registered for use in waterways of local, state, and federal jurisdictions.
- All boat trailers and towing vehicles will be properly licensed and in good working order.
- The boat will only be operated by experienced personnel. The US Coast Guard Auxiliary and other organizations regularly sponsor boating safety courses. In addition to basic boating safety, the courses cover navigation regulations and emergency procedures. The training is recommended, even for experienced boat operators.
- The boat will be operated in a safe manner and all waterway regulations will be obeyed.
- No smoking or alcoholic beverages are permitted on the boat.
- No recreational equipment for fishing, hunting, water skiing, or self-contained underwater breathing apparatus (SCUBA) diving will be allowed on the boat unless specifically authorized as part of the work-related equipment.

12.6. Safe Boating Operations for Class 2 and Class 3 Boats and Barges

- Boats and barges will be operated in a safe manner and all waterway regulations will be obeyed.

- No smoking or alcoholic beverages are permitted on board.
- Keep all walking and working surfaces clean, dry, and unobstructed.
- Keep all areas free of debris.
- Clean up and report any spill immediately.
- Stack materials in a stable manner.
- Secure gear and equipment that is not in use.
- Repair leaks from hoses, pipelines and valves immediately.
- Have de-icing procedures in place when necessary.
- Walk at a normal rate. Do not run.
- Do not jump from one boat / barge to another.
- Avoid walking along an unguarded edge of a barge.
- Be cautious of working in reduced visibility due to poor lighting and weather conditions. Be sure there is adequate lighting (e.g., flashlights, headlights, light towers).
- All deck holes, openings and hatches should be covered or guarded.
- Stay clear when a hoist is being used. Never stand under a load or boom with a suspended load.
- Never stand in the bight of a line.

12.7. Boating Accidents

Coast Guard regulations, as well as state regulations, require accident reports if significant injuries or property damage occurs. It is normally best to stay with the boat in case of an accident and use signal flares or a distress horn to summon help. Hypothermia (loss of body heat) is a significant risk for those involved in boating accidents due to the rapid conduction of body heat by cold water.

13.0 INSPECTION AND REPORTING

13.1 Safety and Health Inspections

Safety and Health inspections will be conducted to discover, through specific, methodical auditing, checking, or inspection procedures, conditions and work practice that lead to job accidents and illnesses.

The Health and Safety Manager shall be responsible for ensuring that inspections are conducted at the frequency stated, reviewing the Daily Safety and Inspection Logs for completeness, thoroughness, and trends; performing monthly project inspections; and training site personnel on proper inspection techniques. The SSHO shall be responsible for ensuring that daily inspections are conducted,

reviewing the inspections findings and corrective actions for applicability and thoroughness, and providing the site management personnel with a summary of inspection findings each month.

13.2 Daily Safety and Inspections Log

The SSHO will insure that all aspects of the HSERP are complied with on a daily basis. Only one warning will be given to individuals not complying with the HSERP. The SSHO has the authority to shut the work down and ban any individual from the Site. If deficiencies are noted, they will be recorded on the Daily Safety and Inspection Log and will be corrected immediately. The Daily Safety and Inspection Log will be attached to the Daily Quality Control Report. The Daily Safety and Inspection Log will include the date, work area, employees present at the work area, PPE and work equipment in each area, specific safety and health issues, and notes and the signature of the preparer. Refer to ***Attachment 2 – Safety and Health Forms for the Daily Safety and Inspection Log.***

13.3 Certification of Worker/Visitor Acknowledgment

A Certification of Worker/Visitor Acknowledgment will be submitted to the Engineer prior to initial entry onto the Site. The certification/acknowledgment will include both formal, field and site-specific training received, personal protective equipment supplied and trained in use, and medical certification. Certificates and Medical certification will be kept on file at the site. Refer to ***Attachment 2 – Safety and Health Forms for the Certificate of Worker/Visitor Acknowledgement.***

13.4 Incident Reports

Incident reporting will ensure an immediate report on all incident/accidents and provide an effective follow-up for corrective action in order to eliminate unsafe practices and unsafe conditions. An **Incident/Accident Form** must be completed within 24 hours of the Incident/Accident. This report is utilized in the event of injuries, off-site releases, utility breaks, or accidents. Immediately following the incident/accident, the Site Superintendent and the SSHO will initiate an Incident/Accident Investigation. An Accident Report will be completed submitted to the Engineer within 2 days. ***Refer to Attachment 2 – Safety and Health Forms for the Incident/Accident Form.***

"Near misses" will be documented by the SSHO and discussed at the morning safety briefings to educate the work force to potentially hazardous operations or practices.

13.5 Weekly Safety Meeting/Daily Tool Box Talks

As part of Sevenson's Corporate Health and Safety Program, a Weekly Safety Meeting is conducted on Monday mornings in conjunction with Daily Toolbox Talks. This safety meeting outlines current industry safety issues and allows for discussion of job-specific issues. In addition, a daily site briefing will be held to discuss current work activities and hazards for the day. The SSHO/Superintendent will conduct Daily Tool Box Talks and Weekly Safety Meetings with ALL on-site personnel Refer to ***Attachment 2 – Safety and Health Forms for Daily Toolbox Talks and Weekly Safety Meetings.***

In addition to the daily toolbox talks and the weekly safety meeting, Sevenson will conduct monthly project management safety meetings. All site management, including sub-contractor personnel, is required to attend. Topics of discussion will include hazards identified and abated during the previous month, any outstanding action, new tasks to be performed, site concerns etc. The SSHO

will submit a synopsis of each meeting including topics covered, safety-related concerns, action items to be addressed, status of previous items, and a signed attendance list.

13.6 Monthly Exposure Report

A Monthly Exposure Report will be prepared by the Safety and Health Manager and submitted to the Engineer. This report will include a compilation of man-hours worked each month for the project (both Sevenson and subcontractors), the number of accidents, severity, class of accident, and lost time for each month.

13.7 Safety and Health Phase-Out Report

The Safety and Health Phase-Out Report will be completed at the end of the project. The following information will be included:

- A description of significant events, exposures, incidents, First Aid cases and actions taken to prevent their occurrence.
- A copy of the OSHA 300 log for site work.

Attachment 1
Activity Hazard Analysis

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Mobilization	Overall Risk Assessment Code (RAC) (Use highest code)	**H**
Project: General Motors Sediment Removal	**Risk Assessment Code (RAC) Matrix**	
Project Location Sleepy Hollow, New York	**Severity** / **Probability**	
Date Prepared September 4, 2012		
Prepared by (Name/Title): Paul Jung/Corporate Safety		
Reviewed by (Name/Title): Paul Hitcho/Director of Health and Safety		
Notes: (Field Notes, Review Comments, etc.)		

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Pre-job set up	1. Emergency Response	**1.** Rallying points. Notification of proper authorities in event of an emergency	**1. L**
	2. Heavy equipment inspection	**2.** Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment daily.	**2. L**
	3. Hand tool inspection	**3.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**3. L**
2. Mobilize equipment	1. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**1.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing for ticks periodically throughout the day. Use wasp/bee spray for nests. Protect bare skin from poison ivy by wearing long	**1. M**

		sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	
	2. Struck by/against heavy equipment	**2.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	**2. M**
	3. Chemical spill	**3.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**3. M**
	4. Contact with sharp objects/material	**4.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	**4. L**
	5. Excavation Cave In	**5.** Barricade open excavations. Be aware of cave in potential. Competent person on site during activity. Contact local mark out. Authority to identify and mark underground utilities. Keep vehicles/equipment at sufficient distance from edge of excavation. Maintain proper slope for soil classification. Maintain spoils two feet from edge of excavation. Perform daily excavation/trench inspection. Provide access/egress to excavation. When an unknown hazard has been encountered, work will stop until hazards and controls are identified and in place.	**5. M**

	6. Exposed to vehicle traffic	**6.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 5 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	**6. M**
	7. Exposure to high noise	**7.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**7. L**
	8. Exposure to high/low ambient temperatures	**8.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	**8. M**
	9. Flying Debris	**9.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**9. M**
	10. Hand/Power tools	**10.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**10. M**
	11. Walking/Working surface	**11.** Good housekeeping practices. Keep walkways and work	**11. L**

		areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots.	
	12. Hand injuries from pinch points	**12.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**12. M**
	13. Falls from elevation	**13.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**13. M**
	14. Fire/Explosion	**14.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**14. M**
	15. Severe Weather	**15.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado warnings/watches, Thunderstorm, Blizzard conditions, etc.)	**15. L**
	16. Fueling operation	**16.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	**16. M**

3. Site clearing and grubbing	1. Struck by/against heavy equipment	**1.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Follow EM 385 1-1 guidelines for power line requirements. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	**1. M**
	2. Chemical spill	**2.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**2. L**
	3. Exposed to vehicle traffic	**3.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 15 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	**3. M**
	4. Exposure to high noise	**4.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**4. M**
	5. Exposure to high/low ambient temperatures	**5.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes	**5. M**

		place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	
	6. Flying Debris	**6.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**6. H**
	7. Falls from elevation	**7.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**7. L**
	8. Walking/Working surface	**8.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots.	**8. M**
	9. Fire/Explosion	**9.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**9. M**
	10. Severe Weather	**10.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado warning/watch, Thunderstorm, Blizzard conditions, etc.)	**10. L**
	11. Hand/Power tools	**11.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**11. H**
	12. Fueling operation	**12.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas	**12. M**

		away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations	
	13. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**13.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing for ticks periodically throughout the day. Use wasp/bee spray for nests. Protect bare skin from poison ivy by wearing long sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	**13. M**
	14. Chainsaw operation	**14.** Workers operating the chainsaw will understand how the chainsaw works and will have experience using one. The chainsaw will be inspected prior to use and all guards will be attached and functioning properly. Dull blades will be replaced, as needed. Workers will be required to wear a hardhat, faceshield, safety glasses, hearing protection, gloves, and chaps while operating the chainsaw. The chainsaw will be turned off when fueling. Care will be taken to ensure fuel does not contact hot parts. Refer to the recommended controls for Fire/Explosion for more controls when working with flammable liquids.	**14. H**

4. Construction of support facility	1. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**1.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing for ticks periodically throughout the day. Use wasp/bee spray for nests. Protect bare skin from poison ivy by wearing long sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	**1. M**
	2. Struck by/against heavy equipment	**2.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	**2. M**
	3. Chemical spill	**3.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**3. M**
	4. Contact with sharp objects/material	**4.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report	**4. M**

		the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	
	5. Excavation Cave In	**5.** Barricade open excavations. Be aware of cave in potential. Competent person on site during activity. Contact local mark out. Authority to identify and mark underground utilities. Keep vehicles/equipment at sufficient distance from edge of excavation. Maintain proper slope for soil classification. Maintain spoils two feet from edge of excavation. Perform daily excavation/trench inspection. Provide access/egress to excavation. When an unknown hazard has been encountered, work will stop until hazards and controls are identified and in place.	**5. M**
	6. Exposed to vehicle traffic	**6.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 15 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	**6. M**
	7. Exposure to high noise	**7.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**7. M**
	8. Exposure to high/low ambient temperatures	**8.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early	**8. M**

		in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	
	9. Flying Debris	**9.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**9. M**
	10. Hand/Power tools	**10.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**10. M**
	11. Walking/Working surface	**11.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots.	**11. M**
	12. Hand injuries from pinch points	**12.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**12. M**
	13. Falls from elevation	**13.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**13. M**
	14. Fire/Explosion	**14.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**14. M**
	15. Severe Weather	**15.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado watch/warning, Thunderstorm, Blizzard conditions, etc.)	**15. L**
	16. Fueling operation	**16.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment,	**16. M**

		and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	
	17. Lockout/Tag-out	**17.** Equipment or circuits that are de-energized shall be rendered inoperative and have tags attached at all points where such equipment or circuits can be energized.	**17. H**
	18. Electrical work	**18.** Work done by licensed electricians. Work done in compliance with National Electric Code and the contract specifications	**18. H**
5. Construction of haul/ access road	1. Struck by/against heavy equipment	**1.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	**1. M**
	2. Chemical spill	**2.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**2. M**
	3. Exposed to vehicle traffic	**3.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use	**3. M**

		safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 15 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	
	4. Exposure to high noise	**4.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**4. L**
	5. Exposure to high/low ambient temperatures	**5.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	**5. M**
	6. Flying Debris	**6.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**6. M** **7. M**
	7. Falls from elevation	**7.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	
	8. Walking/Working surface	**8.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots.	**8. M**
	9. Fire/Explosion	**9.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot	**9. M**

		work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	
	10. Severe Weather	**10.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado watch/warning, Thunderstorm, Blizzard conditions, etc.)	**10. L**
	11. Hand/Power tools	**11.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**11. M**
	12. Fueling operation	**12.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	**12. M**
	13. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**13.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing	**13. M**

		for ticks periodically throughout the day. Use wasp/bee spray for nests. Protect bare skin from poison ivy by wearing long sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Level D PPE (Gloves, Safety Glasses, Work boots, Hardhat, Hi visibility clothing (Class II reflective apparel required when exposed to public vehicle traffic) Walkie Talkie Radios Tracked excavator Dump Trucks Bull dozer Mules/gators Misc. Hand tools (shovels, rakes, etc.) Chainsaw (Workers will be required to wear a hardhat, faceshield, safety glasses, hearing protection, gloves, and chaps while operating the chainsaw)	The SSHO shall be the Competent person for the following: □ Fall Protection Program □ Hazardous Communication Program □ Confined Space Program The Superintendent shall be the competent or qualified person for the following: □ Excavations □ General Operations Site Specific: 1. OSHA HAZWOPER 2. Lead awareness 3. Site specific 4. Daily tailgate safety meetings at which the affected employees can voice their concerns and/or recommendations of the site-specific training requirements. 5. Hazard communication Supervisory Personnel: 1. OSHA supervisor's training Motor Vehicle: 1. Operators shall hold a valid license for the type and class of vehicle they are operating. Heavy Equipment: 1. Trained and qualified operators.	Site Inspection: 1. Daily inspection by Health and Safety Officer Motor Vehicles: 1. Before initial use vehicles will be inspected by a mechanic and found to be in a safe operating condition. Equipment: 1. Before equipment is placed in use it will be inspected and tested by a competent person. 2. Inspections and tests will be done in accordance with manufacturer's instructions. 3. All equipment will be inspected daily when in use by the operator. 4. Inspections and tests will be documented and records will be maintained at the site.

	Equipment General: 1. Employees will be qualified and trained to operate or service mechanical equipment.	

Activity Hazard Analysis (AHA)

Activity/Work Task: Sheet Pile Installation	Overall Risk Assessment Code (RAC) (Use highest code)	**H**
Project: General Motors Sediment Removal	**Risk Assessment Code (RAC) Matrix**	
Project Location: Sleepy Hollow, New York		
Date Prepared: September 4, 2012		
Prepared by (Name/Title): Paul Jung/Corporate Safety		
Reviewed by (Name/Title): Paul Hitcho/Director of Health and Safety		
Notes: (Field Notes, Review Comments, etc.)		

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Job Steps	Hazards	Controls	RAC
1. Pre-job set up	1. Emergency Response 2. Crane mobilization 3. Crane inspection	**1.** Rallying points. Notification of proper authorities in event of an emergency **2.** Only licensed operator permitted to operate crane. Determine that the crane's annual inspection has been performed. **3.** Ensure personnel are trained on equipment. Inspect daily before each use. Make use of all safety devices and ensure they are functioning. Thoroughly inspect crane when it first arrives on site.	**1. L** **2. L** **3. L**
2. Sheet pile installation.	1. Slip/Trip/Fall 2. Struck by/against heavy equipment	**1.** Work Areas and means of access shall be maintained safe and orderly. Tripping and poor footing hazards will be repaired as they are discovered or clearly identified. Boats, barge & dredge will be properly secured before personnel attempt boarding). **2.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy	**1. M** **2. M**

		equipment at least 10 feet from power lines. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	
	3. Chemical spill	**3.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Chemical spills into the water required immediate notification to the SSHO.	**3.M**
	4. Contact with sharp objects/material	**4.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	**4. L**
	5. Exposure to high noise	**5.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**5. M**
	6. Exposure to high/low ambient temperatures	**6.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	**6. M**
	7. Flying Debris	**7.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**7. L**
	8. Hand/Power tools	**8.** Ensure personnel are trained on specific tools. Inspect	**8. M**

		tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	
	9. Walking/Working surface	**9.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots. During winter, maintain work areas clear of accumulating snow or ice.	**9. M**
	10. Hand injuries from pinch points	**10.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**10.M**
	11. Falls from elevation	**11.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**11. M**
	12. Fire/Explosion	**12.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**12. M**
	13. Severe Weather	**13.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado watch/warning, Thunderstorm, Blizzard conditions, etc.)	**13.M**
	14. Fueling operation	**14.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the	**14. L**

		SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	
	15. Inhalation/contact with hazardous material	**15.** Ensure site personnel have the appropriate HAZWOPER, medical clearance and Site Specific training. Follow decontamination procedures. Follow emergency contingency procedures. Implement site control areas. Perform real time air monitoring. Wear appropriate PPE for task/activity performed.	**15. M**
	16. Working on or near water	**16**. All persons on board will remain seated, except when working. All personnel on board, as well as personnel working on land within 6 feet of drowning hazard, shall wear United States Coast Guard (USCG) approved Personal Flotation Devices. All means of boat access shall be properly secured, guarded, and maintained free of slipping and tripping hazards. An adequate number of throw rings will be maintained on each watercraft and will be U.S. Coast Guard approved. Maximum weight capacity for watercraft will not be exceeded. Watercraft will not be used without shore support personnel. Personnel on board watercraft must be in radio contact with shore personnel. Throw rings shall be stationed on shore, a maximum distance of 200 feet apart with a minimum of 90 feet of line attached.	**16. M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Level D PPE (Gloves, Safety Glasses, Work boots, Hardhat, Hi visibility clothing (Class II reflective apparel required when exposed to public vehicle traffic) Walkie Talkie Radios Tracked excavator Misc. Hand tools (shovels, rakes, etc.) Monitoring Instruments (dust monitor) Barges 150 ton Crane Vibratory Hammer AZ-18 Sheets	The SSHO shall be the Competent person for the following: □ Fall Protection Program □ Hazardous Communication Program The Superintendent shall be the competent or qualified person for the following: □ Excavations □ General Operations Site Specific: 1. OSHA HAZWOPER 2. Lead awareness 3. Site specific 4. Daily tailgate safety meetings at which the affected employees can voice their concerns and/or recommendations of the site-specific training requirements.	Site Inspection: 1. Daily inspection by Health and Safety Officer Equipment: 1. Before equipment is placed in use it will be inspected and tested by a competent person. 2. Inspections and tests will be done in accordance with manufacturer's instructions. 3. All equipment will be inspected daily when in use by the operator. 4. Inspections and tests will be documented and records will be maintained at the site.

	5. Hazard communication Supervisory Personnel: 1. OSHA supervisor's training Heavy Equipment: 1. Trained and qualified operators. 2. Crane operator to be licensed Equipment General: 1. Employees will be qualified and trained to operate or service mechanical equipment.	

Activity Hazard Analysis (AHA)

Activity/Work Task: Mechanical Dredging and Loading Barges	Overall Risk Assessment Code (RAC) (Use highest code)	**H**
Project: General Motors Sediment Removal	**Risk Assessment Code (RAC) Matrix**	
Project Location: Sleepy Hollow, New York	**Severity** / **Probability**	
Date Prepared: September 4, 2012		
Prepared by (Name/Title): Paul Jung/Corporate Safety		
Reviewed by (Name/Title): Paul Hitcho/Director of Health and Safety		
Notes: (Field Notes, Review Comments, etc.)		

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Pre-job set up	1. Emergency Response	**1.** Rallying points. Notification of proper authorities in event of an emergency	**1. L**
	2. Heavy equipment inspection	**2.** Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment daily.	**2. L**
	3. Equipment inspection	**3.** Ensure personnel are trained on equipment. Inspect daily before each use. Make use of all safety devices and ensure they are functioning.	**3. L**
2. Mechanical Dredge barge	1. Slip/Trip/Fall	**1.** Work Areas and means of access shall be maintained safe and orderly. Tripping and poor footing hazards will be repaired as they are discovered or clearly identified. Boats, barge & dredge will be properly secured before personnel attempt boarding).	**1. M**
	2. Struck by/against heavy equipment	**2.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand	**2. M**

		signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	
	3. Chemical spill	**3.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Chemical spills into the water required immediate notification to the SSHO.	**3.M**
	4. Contact with sharp objects/material	**4.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	**4. L**
	5. Exposure to high noise	**5.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**5. M**
	6. Exposure to high/low ambient temperatures	**6.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	**6. M**
	7. Flying Debris	**7.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**7. L**

	8. Hand/Power tools	**8.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**8. M**
	9. Walking/Working surface	**9.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots. During winter, maintain work areas clear of accumulating snow or ice.	**9. M**
	10. Hand injuries from pinch points	**10.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**10.M**
	11. Falls from elevation	**11.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**11. M**
	12. Fire/Explosion	**12.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**12. M**
	13. Severe Weather	**13.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado watch/warning, Thunderstorm, Blizzard conditions, etc.)	**13.M**
	14. Fueling operation	**14.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and	**14. L**

		review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	
	15. Inhalation/contact with hazardous material	**15.** Ensure site personnel have the appropriate HAZWOPER, medical clearance and Site Specific training. Follow decontamination procedures. Follow emergency contingency procedures. Implement site control areas. Perform real time air monitoring. Wear appropriate PPE for task/activity performed.	**15. M**
	16. Working on or near water	**16**. All persons on board will remain seated, except when working. All personnel on board, as well as personnel working on land within 6 feet of drowning hazard, shall wear United States Coast Guard (USCG) approved Personal Flotation Devices. All means of boat access shall be properly secured, guarded, and maintained free of slipping and tripping hazards. An adequate number of throw rings will be maintained on each watercraft and will be U.S. Coast Guard approved. Maximum weight capacity for watercraft will not be exceeded. Watercraft will not be used without shore support personnel. Personnel on board watercraft must be in radio contact with shore personnel. Throw rings shall be stationed on shore, a maximum distance of 200 feet apart with a minimum of 90 feet of line attached.	**16. M**
3. Loading barges	1. Struck by heavy equipment	**1.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius	**1. M**
	2. Pinch points	**2.** Be aware of barge sections moving with water and wave action. Do not put your hand between the barge sections to align pin holes. Only use double headed barge pins. Do not stand between the barge and the work platform where the excavator is working. Do not put hands on rail of the boat when coming up to or secured to the work platform.	**2. M**
	3. Overhead hazards	**3.** Do not stand under a suspended load.	**3. M**
	4. Working over or near water	**4.** All persons on board will remain seated, except when working. All personnel on board, as well as personnel working on land within 6 feet of drowning hazard, shall wear United	**4. M**

	5. Inhalation or contact with hazardous materials	States Coast Guard (USCG) approved Personal Flotation Devices. All means of boat access shall be properly secured, guarded, and maintained free of slipping and tripping hazards. An adequate number of throw rings will be maintained on each watercraft and will be U.S. Coast Guard approved. Maximum weight capacity for watercraft will not be exceeded. Watercraft will not be used without shore support personnel. Personnel on board watercraft must be in radio contact with shore personnel. Throw rings shall be stationed on shore, a maximum distance of 200 feet apart with a minimum of 90 feet of line attached. **5.** Ensure site personnel have the appropriate HAZWOPER, medical clearance and Site Specific training. Follow decontamination procedures. Follow emergency contingency procedures. Implement site control areas. Perform real time air monitoring. Wear appropriate PPE for task/activity performed	**5. M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Level D PPE (Gloves, Safety Glasses, Work boots, Hardhat, Hi visibility clothing (Class II reflective apparel required when exposed to public vehicle traffic) Walkie Talkie Radios Tracked excavator Misc. Hand tools (shovels, rakes, etc.) Monitoring Instruments (dust monitor) Barges Crane	The SSHO shall be the Competent person for the following: □ Fall Protection Program □ Hazardous Communication Program The Superintendent shall be the competent or qualified person for the following: □ Excavations □ General Operations Site Specific: 1. OSHA HAZWOPER 2. Lead awareness 3. Site specific 4. Daily tailgate safety meetings at which the affected employees can voice their concerns and/or recommendations of the site-specific training requirements. 5. Hazard communication Supervisory Personnel: 1. OSHA supervisor's training	Site Inspection: 1. Daily inspection by Health and Safety Officer Equipment: 1. Before equipment is placed in use it will be inspected and tested by a competent person. 2. Inspections and tests will be done in accordance with manufacturer's instructions. 3. All equipment will be inspected daily when in use by the operator. 4. Inspections and tests will be documented and records will be maintained at the site.

	Heavy Equipment: 1. Trained and qualified operators. 2. Crane operator to be licensed Equipment General: 1. Employees will be qualified and trained to operate or service mechanical equipment.	

Activity Hazard Analysis (AHA)

Activity/Work Task Stabilization and Loading	Overall Risk Assessment Code (RAC) (Use highest code)	**H**
Project: General Motors Sediment Removal	**Risk Assessment Code (RAC) Matrix**	
Project Location: Sleepy Hollow, New York		
Date Prepared: September 4, 2012		
Prepared by (Name/Title): Paul Jung/Corporate Safety		
Reviewed by (Name/Title): Paul Hitcho/Director of Health and Safety		
Notes: (Field Notes, Review Comments, etc.)		

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Job Steps	Hazards	Controls	RAC
1. Pre-job set up	1. Emergency Response	**1.** Rallying points. Notification of proper authorities in event of an emergency	**1. L**
	2. Heavy equipment inspection	**2.** Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment daily.	**2. L**
	3. Hand tool inspection	**3.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**3. L**
2. Stabilization of material	1. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**1.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing for ticks periodically throughout the day. Use wasp/bee spray	**1. M**

		for nests. Protect bare skin from poison ivy by wearing long sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	
	2. Struck by/against heavy equipment	**2.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	**2. M**
	3. Chemical spill	**3.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**3.M**
	4. Contact with sharp objects/material	**4.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	**4. L**
	5. Exposed to vehicle traffic	**5.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and	**5. M**

		on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 5 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	
	6. Exposure to high noise	**6.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**6. M**
	7. Exposure to high/low ambient temperatures	**7.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	**7. L**
	8. Flying Debris	**8.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**8. M**
	9. Hand/Power tools	**9.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**9. M**
	10. Walking/Working surface	**10.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots. During winter, maintain work areas clear of accumulating snow or ice.	**10.M**
	11. Hand injuries from pinch points	**11.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**11. M**
	12. Falls from elevation	**12.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet.	**12. M**

		Workers shall use the proper sized ladders or stairs to climb to a different height.	
	13. Fire/Explosion	**13.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**13.M**
	14. Severe Weather	**14.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado warning/watch, Thunderstorm, Blizzard conditions, etc.)	**14. L**
	15. Fueling operation	**15.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	**15. M**
	16. Inhalation/contact with hazardous material	**16.** Ensure site personnel have the appropriate HAZWOPER, medical clearance and Site Specific training. Follow decontamination procedures. Follow emergency contingency procedures. Implement site control areas. Perform real time air monitoring. Wear appropriate PPE for task/activity performed.	**16. M**

3. Loading of truck	1. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**1.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing for ticks periodically throughout the day. Use wasp/bee spray for nests. Protect bare skin from poison ivy by wearing long sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	**1. M**
	2. Struck by/against heavy equipment	**2.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	**2. M**
	3. Chemical spill	**3.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**3. M**
	4. Contact with sharp objects/material	**4.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report	**4. L**

		the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	
	5. Truck loading	**5.** Truck to be turned off before entering the bed to place liner. A ladder is to be used to access the truck bed. A spotter shall be used in lieu of a tie off to hold the ladder while in use. Do not stretch away from the ladder to undo hold down straps. Tyvek is to be worn while lining the truck bed to reduce personal contamination. Once truck bed is loaded, signal excavator operator that truck bed is clear and to commence loading.	**5. H**
	6. Exposed to vehicle traffic	**6.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 15 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	**6. M**
	7. Exposure to high noise	**7.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**7. L**
	8. Exposure to high/low ambient temperatures	**8.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and	**8. M**

		review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	
	9. Flying Debris	**9.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**9. M**
	10. Hand/Power tools	**10.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**10. L**
	11. Walking/Working surface	**11.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots. During winter, maintain work areas clear of accumulating snow or ice.	**11. M**
	12. Hand injuries from pinch points	**12.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**12. L**
	13. Falls from elevation	**13.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**13. M**
	14. Fire/Explosion	**14.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**14. M**
	15. Severe Weather	**15.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado watch/warning, Thunderstorm, Blizzard conditions, etc.)	**15. L**
	16. Fueling operation	**16.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment,	**16. M**

	17. Inhalation/contact with hazardous material	and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials on hand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations. **17.** Ensure site personnel have the appropriate HAZWOPER, medical clearance and Site Specific training. Follow decontamination procedures. Follow emergency contingency procedures. Implement site control areas. Perform real time air monitoring. Wear appropriate PPE for task/activity performed.	**17. M**

Equipment to be Used	**Training Requirements/Competent or Qualified Personnel name(s)**	**Inspection Requirements**
Level D PPE (Gloves, Safety Glasses, Work boots, Hardhat, Hi visibility clothing (Class II reflective apparel required when exposed to public vehicle traffic) Modified Level D PPE to include: Hardhat, face shield, safety glasses (not store brand sunglasses), Hi visibility clothing (Class II reflective apparel required when exposed to public vehicle traffic, steel toe-work boots, (NO shorts, Tank Tops), Tyvek coveralls, and inner and outer nitrile gloves. Walkie Talkie Radios Tracked excavator Misc. Hand tools (shovels, rakes, etc.) Monitoring Instruments (dust monitor) Trucks	The SSHO shall be the Competent person for the following: □ Fall Protection Program □ Respiratory Protection Program □ Hazardous Communication Program □ Confined Space Program The Superintendent shall be the competent or qualified person for the following: □ General Operations Site Specific: 1. OSHA HAZWOPER 2. Lead awareness 3. Site specific 4. Daily tailgate safety meetings at which the affected employees can voice their concerns and/or recommendations of the site-specific	Site Inspection: 1. Daily inspection by Health and Safety Officer Motor Vehicles: 1. Before initial use vehicles will be inspected by a mechanic and found to be in a safe operating condition. Equipment: 1. Before equipment is placed in use it will be inspected and tested by a competent person. 2. Inspections and tests will be done in accordance with manufacturer's instructions. 3. All equipment will be inspected daily when in use by the

	training requirements. 5. Hazard communication Supervisory Personnel: 1. OSHA supervisor's training Motor Vehicle: 1. Operators shall hold a valid license for the type and class of vehicle they are operating. Heavy Equipment: 1. Trained and qualified operators. Equipment General: 1. Employees will be qualified and trained to operate or service mechanical equipment.	operator. 4. Inspections and tests will be documented and records will be maintained at the site. Personal Protective Equipment (PPE): 1. Disposal PPE shall be inspected before each use. 2. Reusable PPE shall be inspected before use. Any defective PPE shall be repaired or replaced before use. All reusable PPE shall be decontaminated and stored properly before reuse.

Activity Hazard Analysis (AHA)

Activity/Work Task Water Treatment	Overall Risk Assessment Code (RAC) (Use highest code)	**H**
Project: General Motors Sediment Removal	**Risk Assessment Code (RAC) Matrix**	
Project Location: Sleepy Hollow, New York	**Severity** / **Probability**	
Date Prepared: September 4, 2012		
Prepared by (Name/Title): Paul Jung/Corporate Safety		
Reviewed by (Name/Title): Paul Hitcho/Director of Health and Safety		
Notes: (Field Notes, Review Comments, etc.)		

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
2. Water treatment	1. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**1.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing for ticks periodically throughout the day. Use wasp/bee spray for nests. Protect bare skin from poison ivy by wearing long sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	**1. M**
	2. Chemical spill	**2.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**2. M**

	3. Contact with sharp objects/material	**3.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	**3.M**
	4. Exposure to high noise	**4.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**4. L**
	5. Exposure to high/low ambient temperatures	**5.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	**5. M**
	6. Hand/Power tools	**6.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**6. M**
	7. Walking/Working surface	**7.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots. During winter, maintain work areas clear of accumulating snow or ice.	**7. M**
	8. Hand injuries from pinch points	**8.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**8. M**
	9. Falls from elevation	**9.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**9. M**
	10. Fire/Explosion	**10.** Fire extinguisher inspected and in place. It may be	**10.L**

		necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	
	11. Severe Weather	**11.** Monitor weather for severe conditions. Discuss severe conditions with client rep and Superintendents when it poses a hazard to workers (i.e. Tornado warning/watch, Thunderstorm, Blizzard conditions, etc.)	**11. M**
	12. Inhalation/contact with hazardous material	**12.** Ensure site personnel have the appropriate HAZWOPER, medical clearance and Site Specific training. Follow decontamination procedures. Follow emergency contingency procedures. Implement site control areas. Perform real time air monitoring. Wear appropriate PPE for task/activity performed.	**12. M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Level D PPE (Gloves, Safety Glasses, Work boots, Hardhat, Hi visibility clothing (Class II reflective apparel required when exposed to public vehicle traffic) Walkie Talkie Radios Misc. Hand tools Monitoring Instruments (dust monitor) Pumps Filters	The SSHO shall be the Competent person for the following: □ Fall Protection Program □ Hazardous Communication Program The Water Treatment Operator shall be the competent or qualified person for the following: □ General Water Treatment Plant Operations Site Specific: 1. OSHA HAZWOPER 2. Lead awareness 3. Site specific 4. Daily tailgate safety meetings at which the affected employees can voice their concerns and/or recommendations of the site-specific training requirements. 5. Hazard communication Supervisory Personnel: 1. OSHA supervisor's training	Site Inspection: 1. Daily inspection by Health and Safety Officer Motor Vehicles: 1. Before initial use vehicles will be inspected by a mechanic and found to be in a safe operating condition. Equipment: 1. Before equipment is placed in use it will be inspected and tested by a competent person. 2. Inspections and tests will be done in accordance with manufacturer's instructions. 3. All equipment will be inspected daily when in use by the operator. 4. Inspections and tests will be documented and records will be maintained at the site.

	Equipment General: 1. Employees will be qualified and trained to operate or service mechanical equipment.	.

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Demobilization	Overall Risk Assessment Code (RAC) (Use highest code)	**H**
Project: General Motors Sediment Removal	**Risk Assessment Code (RAC) Matrix**	
Project Location: Sleepy Hollow, New York		
Date Prepared: September 4, 2012		
Prepared by (Name/Title): Paul Jung/Corporate Safety		
Reviewed by (Name/Title): Paul Hitcho/Director of Health and Safety		
Notes: (Field Notes, Review Comments, etc.)		

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Job Steps	Hazards	Controls	RAC
1. Pre-job set up	1. Emergency Response	**1.** Rallying points. Notification of proper authorities in event of an emergency	**1. L**
	2. Heavy equipment inspection	**2.** Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment daily.	**2. L**
	3. Hand tool inspection	**3.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**3. L**
2. Decontamination and removal of equipment	1. Struck by/against heavy equipment	**1.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Follow EM 385 1-1 guidelines for power line requirements. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment.	**1. M**

		For stationary equipment-rope off or guard swing radius.	
	2. Chemical spill	**2.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**2. M**
	3. Contact with sharp objects/material	**3.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	**3. M**
	4. Exposed to vehicle traffic	**4.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 5 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	**4. M**
	5. Exposure to high noise	**5.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**5. M**
	6. Exposure to high/low ambient temperatures	**6.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes	**6. M**

		place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	
	7. Hand/Power tools	**7.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**7. L**
	8. Walking/Working surface	**8.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots.	**8. M**
	9. Hand injuries from pinch points	**9.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**9. M**
	10. Falls from elevation	**10.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**10. M**
	11. Fire/Explosion	**11.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**11. L**
	12. Severe Weather	**12.** Monitor weather for severe conditions. Discuss severe conditions with USACE and Superintendents when it poses a hazard to workers (i.e. Hurricanes, Thunderstorm, Blizzard conditions, etc.)	**12. M**
	13. Fueling operation	**13.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas	**13. M**

		away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials onhand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	
3. Removal of support facility	1. Biological (i.e., Plants, Insects, Snake, and Infectious Material)	**1.** Avoid insect nest, spiders and spider webs, or likely habitats of snakes and use tick insect repellant. Check skin and clothing for tick periodically throughout the day. Use Wasp/Bee spray for nests. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash of any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils.). Use loud sounds to scare animals. Do NOT approach animals. Survey the area for biological hazards before commencing work. Avoid insect nests or likely habitats of snakes. Use appropriate insect repellants i.e., DEET for the insects. Check skin and clothing for ticks periodically throughout the day. Use wasp/bee spray for nests. Protect bare skin from poison ivy by wearing long sleeves. Use Poison Ivy Barrier cream in brush clearing activities. Use cool water and mild soap to wash off any oils. (Hot water opens skin pores, which allows increased contact with the irritating oils).	**1. M**
	2. Struck by/against heavy equipment	**2.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Follow EM 385 1-1 guidelines for power line requirements. Restrict pedestrian traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment.	**2. M**

		For stationary equipment-rope off or guard swing radius.	
	3. Chemical spill	**3.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**3. M**
	4. Contact with sharp objects/material	**4.** Ensure personnel are trained on specific tools. Use correct tool for the job. Make use of all safety devices and ensure they are functioning. Use care with utility knives, replace dull blades, store properly. Wear appropriate PPE (i.e., gloves, long-sleeved shirts and long pants) to avoid scratches. Be aware of body positioning, and ensure that tools are handled correctly. Take care to cut in a direction away from the body. Avoid placing hands in tight places while moving materials. Inspect tools before each use. If tool is not fit for use, report the condition to SSHO, so that it will be taken out of service. If unsure about use of any tool ask SSHO before attempting to utilize tool or equipment.	**4. M**
	5. Excavation Cave In	**5.** Barricade open excavations. Be aware of cave in potential. Competent person on site during activity. Contact local mark out. Authority to identify and mark underground utilities. Keep vehicles/equipment at sufficient distance from edge of excavation. Maintain proper slope for soil classification. Maintain spoils two feet from edge of excavation. Perform daily excavation/trench inspection. Provide access/egress to excavation. When an unknown hazard has been encountered, work will stop until hazards and controls are identified and in place.	**5. M**
	6. Exposed to vehicle traffic	**6.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 5 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control	**6. M**

		signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	
	7. Exposure to high noise	**7.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**7. L**
	8. Exposure to high/low ambient temperatures	**8.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	**8. M**
	9. Flying Debris	**9.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**9. M**
	10. Hand/Power tools	**10.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**10. M**
	11. Walking/Working surface	**11.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots.	**11. M**
	12. Hand injuries from pinch points	**12.** Ensure site personnel utilize appropriate hand protection. Avoid placing hands in tight spaces while moving materials.	**12. M**
	13. Falls from elevation	**13.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**13. M**
	14. Fire/Explosion	**14.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot	**14. M**

		work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	
	15. Severe Weather	**15.** Monitor weather for severe conditions. Discuss severe conditions with USACE and Superintendents when it poses a hazard to workers (i.e. Hurricanes, Thunderstorm, Blizzard conditions, etc.)	**15. L**
	16. Fueling operation	**16.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials onhand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations.	**16. M**
	17. Lockout/Tag-out	**17.** Equipment or circuits that are de-energized shall be rendered inoperative and have tags attached at all points where such equipment or circuits can be energized.	**17. H**
	18. Electrical work	**18.** Work done by licensed electricians. Work done in compliance with National Electric Code, EM-385-1-1 (2008), and the contract specifications	**18. H**
4. Removal of haul/ access road	1. Struck by/against heavy equipment	**1.** Approach equipment within the operators view. Only qualified employees will be authorized to operate heavy equipment. Equipment properly secured when not in use. Equipped with operable backup alarms and seat belts. ROPS are required on all heavy equipment. Inspect equipment regularly. Flaggers/spotters assigned where necessary. Use safety reflective vest when working around equipment. Hand signal by ONE (1) DESIGINATED worker. Keep heavy equipment at least 10 feet from power lines. Follow EM 385 1-1 guidelines for power line requirements. Restrict pedestrian	**1. M**

		traffic. Do not walk, work, or stand near equipment being loaded or unloaded. Stay out of swing radius of equipment. For stationary equipment-rope off or guard swing radius.	
	2. Chemical spill	**2.** Good housekeeping practices. Maintain spill response equipment onsite. Practice spill prevention at all times. Proper chemical storage. Spill control and countermeasures plan in place for spills encountered during work activities. Turn off equipment when fuelling. Report all spills to the SSHO. Subcontractors to supply MSDSs for chemicals to be used.	**2. M**
	3. Exposed to vehicle traffic	**3.** Traffic in and out of the site must be maintained and orderly throughout the workday as needed. Traffic control required for any work where work is performed on/adjacent to an active street. Pedestrian traffic must be controlled. Flaggers/spotters assigned where necessary, by the Superintendent, to specifically control the flow of traffic in and out of the site. Traffic control flaggers must be courteous, professional, and alert at all times. Ground crew and flagger/spotters shall use safety reflective vest when working around active traffic and on site equipment. Drivers are to follow the direction of flaggers/spotters. Drivers are required to wear safety reflective vests whenever they are outside their vehicle. Drivers shall obey all safe-driving regulations, including wearing seat belts. Observe speed limit of 5 miles per hour onsite or other posted speeds limits. Site vehicles and trucks will be equipped with backup alarms. Signal personnel to use standard traffic control signals. NOTE: When driver is concerned about a location or condition that may cause an incident, injury, or property damage based on their knowledge as a driver and their equipment, the driver is to stop and review the situation with the superintendent and safety officer.	**3. M**
	4. Exposure to high noise	**4.** Wear appropriate PPE (i.e., ear plugs/muffs). Instruct personnel on use of hearing protection. Employees on hearing conservation program.	**4. L**
	5. Exposure to high/low ambient temperatures	**5.** Discuss signs/symptoms of heat/cold stress. Conduct periodic safety briefs about heat/cold stress. If work takes place in cold weather: Dress properly and protect exposed skin when performing work outdoors. Workers should have extra clothing to change into if they get wet. Watch for symptoms of exposure. Drink warm liquids as needed. Monitor core temperatures of workers periodically throughout the workday. If work takes place in hot weather: Plan activity early in the day (if possible). Dress properly and protect exposed skin when performing work outdoors. Drink plenty of fluids and review the signs and symptoms of heat related illness. Rest as needed. Wear sunscreen and tinted safety glasses. Drink cool	**5. M**

		liquids as appropriate. Monitor core temperatures of workers periodically throughout the workday.	
	6. Flying Debris	**6.** Ensure guards are installed and working on tools/equipment. Initiate dust control measures. Wear appropriate PPE (i.e., Safety glasses/goggles/faceshield).	**6. M**
	7. Falls from elevation	**7.** Personnel/workers shall not ride on moving equipment unless a seat with seatbelt is provided. Maintain three points of contact when climbing on or off equipment. Fall protection required when working from heights greater than 6 feet. Workers shall use the proper sized ladders or stairs to climb to a different height.	**7. M**
	8. Walking/Working surface	**8.** Good housekeeping practices. Keep walkways and work areas clear of hoses, cords, and clutter. Restrict site to essential personnel. Wear steal toe/composite boots.	**8. M**
	9. Fire/Explosion	**9.** Fire extinguisher inspected and in place. It may be necessary to wet down work area when combustible materiel cannot be moved. Fire watch during and 30 minutes after hot work procedures. Obtain Hot Work Permit (Open Flame Permit) from SSHO for any activity that involves welding radiation, flashes, sparks, molten metal, and slag. Follow hot work permit procedures. No such activity will be permitted in the presence of explosive atmospheres. Use good housekeeping practices. All ignition sources shall be eliminated or protected.	**9. M**
	10. Severe Weather	**10.** Monitor weather for severe conditions. Discuss severe conditions with USACE and Superintendents when it poses a hazard to workers (i.e. Hurricanes, Thunderstorm, Blizzard conditions, etc.)	**10. M**
	11. Hand/Power tools	**11.** Ensure personnel are trained on specific tools. Inspect tools before each use. Use correct tool for the job. Make use of all safety devices and ensure they are functioning.	**11. L**
	12. Fueling operation	**12.** All equipment will be shut down prior to fueling. Do not stage equipment in areas of high vegetation. Observe site smoking policies. Do not smoke during fueling operations. NOTE: Smoking is never permitted while in the Exclusion Zone! Fueling will be accomplished in well-ventilated areas away from ignition sources. Equipment and fuel tank do not need to be bonded or grounded if the metal nozzle is in contact with the metal of the equipment's fuel tank. Practice good housekeeping habits. Maintain spill response equipment, and ensure that the spill cleanup materials are compatible with materials to be cleaned up. Practice spill prevention at all times. Keep only enough materials onhand for use (to minimize potential amount to spill/leak). Perform proper chemical use and storage. Refer to MSDS for proper handling	**12. M**

		procedures, disposal, cleanup and PPE requirements. Keep a Spill Control and Countermeasures Plan in place, and review/update it periodically. Report all spills/leaks to the SSHO. If any spills/leaks occur, they will be contained, identified, and disposed of in accordance with Federal, State, and Local regulations	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Level D PPE (Gloves, Safety Glasses, Work boots, Hardhat, Hi visibility clothing (Class II reflective apparel required when exposed to public vehicle traffic) Walkie Talkie Radios Tracked excavator End dumps (Moxy) Bull dozer Mules/gators Misc. Hand tools (shovels, rakes, etc.) Cranes	The SSHO shall be the Competent person for the following: □ Fall Protection Program □ Hazardous Communication Program □ Confined Space Program The Superintendent shall be the competent or qualified person for the following: □ Excavations □ General Operations Site Specific: 1. OSHA HAZWOPER 2. Lead awareness 3. Site specific 4. Daily tailgate safety meetings at which the affected employees can voice their concerns and/or recommendations of the site-specific training requirements. 5. Hazard communication Supervisory Personnel: 1. OSHA supervisor's training Motor Vehicle: 1. Operators shall hold a valid license for the type and class of vehicle they are operating. Heavy Equipment: 1. Trained and qualified operators. Equipment General: 1. Employees will be qualified and trained to operate or service mechanical equipment.	Site Inspection: 1. Daily inspection by Health and Safety Officer Motor Vehicles: 1. Before initial use vehicles will be inspected by a mechanic and found to be in a safe operating condition. Equipment: 1. Before equipment is placed in use it will be inspected and tested by a competent person. 2. Inspections and tests will be done in accordance with manufacturer's instructions. 3. All equipment will be inspected daily when in use by the operator. 4. Inspections and tests will be documented and records will be maintained at the site. Personal Protective Equipment (PPE): 1. Disposal PPE shall be inspected before each use. 2. Reusable PPE shall be inspected before use. Any defective PPE shall be repaired or replaced before use. All reusable PPE shall be decontaminated and stored properly before reuse.

Attachment 2
Safety and Health Forms

Job No. _____

Job Address _____

_____

Sevenson Environmental Services, Inc.

Report of Accident, Injury, or Illness

Instructions: Please print. Fill in all blanks. When completed, return this form to Sharon Lee at the main office.

Name _____ Sex:_____ Age: _____

Social Security Number _____ Birth Date: _____

Address _____ Phone Number _____

Marital Status: ☐ Single; ☐ Married; ☐ Separated; ☐ Divorced; ☐ Widowed

# of Dependents _____ Date of Accident _____ Time _____ AM/PM

Date Employee notified employer: _____ Who was notified: _____

Employment Start Date:	Wage Rate:
Occupation:	Average Hours Worked:
Date Last Worked:	Average Days Per Week:
Time Shift Began:	Was worker paid for day of injury?
Name of Witness:	Did salary continue?
Describe how the accident happened:	
What was employee doing when injured?	
Describe the injury in detail and indicate part of body affected:	
Name of object or substance that directly injured the employee:	
Date & Time medical attention was sought:	

Name, address and phone number of hospital or doctor:
Was employee involved in any other incidents/accidents? If yes, describe:
Any history of work accidents, absenteeism, and/or disciplinary problems:
Substance abuse test administered:___ Yes, ___ No – if no, why not?
Medical release obtained:
Corrective Action Taken:

Supervisor _____ Date _____

Safety Officer _____ Date _____

Comments:_____

_____

_____

_____

Report of Accident, Injury, or Illness

Safe Plan Of Action

Project No. _____
Job/Task _____ **Work Area** _____ **Date** _____

Steps of Task	Hazard/Reaction to Change	Safe Plan	Resources

Team Members' Signatures

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

The signature of the supervisor confirms the completion of the hazard assessment and Safe Plan of Action by the crew.

Supervisors Signature: _____ Date_____

Instructions: 1. Write name of job or task in space provided. 2. Conduct walk-through survey of work area. 3. Write the steps of the task in a safe sequence. 4. List all possible hazards involved in each step and reaction to change. 5. In the Safe Plan column, state actions that will be taken to prevent the hazards or injury from reaction to change. 6. In Resources column, list equipment, tools, etc. needed to do the job. 8. Ask each team member, who helped develop and will use this SPA, to sign in spaces provided. 9. Review the SPA at the end of the task for improvements.

Work shall stop when conditions change, the job changes, or a deficiency in the plan is discovered, and the current SPA will be modified or a new SPA created.

Project No. _____

Job/Task _____ **Work Area** _____ **Date:** _____

Team Member Signature Sheet Continuation

Review checklist while completing front page of SPA. Check all that apply.

A new SPA is required if the job scope or work conditions change.

Required Permits	Hazards	Safe Plan
☐ Confined Space	☐ Overhead Utilities	☐ Power de-energization required ☐ Insulation blankets required ☐ Wire watcher required
☐ Critical Lift		☐ Required clearance distance = _____Ft. ☐ Safe work zone marked
☐ Hot Work	☐ Crane or other	☐ Signalman assigned ☐ Tag lines in use ☐ Area around crane barricaded
☐ Lock Out/Tag Out	Lifting Equipment	☐ Lifting equipment inspected ☐ Personnel protected from overhead load
☐ Soil Disturbance (Over 12")	☐ Underground Utilities	☐ Reviewed as-builts ☐ Subsurface surveys ☐ Received dig permit
☐ Utility Clearance		☐ Required clearance distance = _____ Ft. ☐ Safe work zone Marked
Required PPE	☐ Electrical	☐ Lock Out/Tag Out/Try Out ☐ Permit required? ☐ Confirm that equipment is de-energized
☐ Hard Hat, Class C		☐ Reviewed electrical safety procedures
☐ Hard Hat, Class E *(Elect. Protect)*	☐ Excavations	☐ Permits ☐ Inspected prior to entering ☐ Proper sloping/shoring
☐ Ear Plugs/Ear Muffs		☐ Barricades provided ☐ Access/egress provided ☐ Protection from accumulated water
Eye Protection:	☐ Fire Hazard	☐ Hot Work Permit ☐Fire Extinguishers ☐ Fire watch
☐ Safety Glasses		☐ Adjacent area protected ☐ Unnecessary flammable material removed
☐ Face Shield	☐ Vehicular Traffic or	☐ Traffic Barricades ☐ Cones ☐ Signs ☐ Flagmen ☐ Lane closure
☐ Chemical Goggles	Heavy Equipment	☐ Communication with equipment operator
☐ Welding Hood	☐ Noise >85 dB	Hearing protection is required: ☐ Ear plugs ☐ Ear Muffs ☐ Both
Hand Protection:	☐ Hand & Power Tools:	☐ Inspect general cond. ☐ GFCI in use ☐ Identified PPE required for each tool
☐ Cut Resistant Gloves		☐ Reviewed safety requirements in operators manual(s) ☐ Guarding OK
☐ Welders Gloves	☐ Hand Hazards	List sharp tools, material, equipment: _____
☐ Nitrile Gloves		☐ PPE gloves, etc. ☐ Protected sharp edges as necessary
☐ Surgical Gloves	☐ Manual Lifting	☐ Reviewed proper lifting tech. ☐ Identified material requiring lifting equipment
☐ Rubber Gloves		☐ Hand protection required ☐ Back support belts
☐ Elect. Insulated Gloves	☐ Ladders	☐ Inspect general cond. before use ☐ Ladder inspected with in last quarter
☐ Arm Sleeves		☐ Ladder tied off or held ☐ Proper angle and placement ☐ Reviewed ladder safety
Foot Protection:	☐ Scaffolds	☐ Inspect general condition before use ☐ Tags in place ☐ Properly secured
☐ Sturdy Work Boots		☐ Toe boards used ☐ Footings adequate ☐ Materials properly stored on scaffold
☐ Safety Toe Boots	☐ Slips, Trips Falls	☐ Inspect for trip hazards ☐ Hazards marked ☐ Tools & material properly stored
☐ Rubber Boots		☐ Extension cords properly secured ☐ Work zone free of debris
☐ Rubber Boot Covers	☐ Pinch Points	List potential pinch points: _____
☐ Dielectric Footwear		☐ Working near operating equipment ☐ Hand/Body positioning
Respiratory. Protection:	☐ Working w/ Chemicals	☐ List specific chemicals involved and list hazards and precaution on front side.
☐ Dust Mask		☐ Reviewed MSDS ☐ Exposure Monitoring required ☐ Have proper containers and labels.
☐ Air Purifying Respirator	☐ Asbestos or Lead Paint	☐ Identified proper PPE (respirators, clothing, gloves, etc.)
☐ Supplied Air Respirator	Potential	☐ Areas to be worked may contain asbestos or lead paint ☐ Asbestos controls incorporated
☐ SCBA	☐ Heat Stress Potential	☐ Lead based point controls in place ☐ Exposure monitoring conducted.
☐ Emergency Escape Respirator		☐ Heat stress monitoring (>85°) ☐ Liquids available ☐ Cool down periods
Special Clothing:	☐ Cold Stress Potential	☐ Sun Screen ☐ Reviewed Heat Stress symptoms
☐ Tyvek ®	☐ Environmental	☐ Proper clothing (i.e.. gloves, coat, coveralls) ☐ Wind chill <32°
☐ Poly Coated Tyvek ®		☐ Reviewed Cold Stress symptoms ☐ Warm up periods
☐ Fire Resistant Coveralls	☐ Natural or Site Hazards	☐ Air emissions ☐ Water discharge ☐ Hazardous wastes ☐ Other wastes
☐ Rain Suit		☐ Pollution prevention ☐ Waste minimization
☐ Safety Vest	☐ Adjacent Work/Processes	☐ Weather ☐ Terrain ☐ Adjacent operations or processes ☐ Biological hazards
Fall Protection:		☐ Animals/reptiles/insects hazards
☐ Harness	☐ Barricades/covers	☐ Notified them of our presents ☐ Other workers adjacent, above, or below.
☐ Double Lanyard Required		☐ Coordinated with adjacent supervisor/customer/operator ☐ Need barriers between.
☐ Anchorage Point Available		☐ Caution barricade tape required ☐ Danger barricade tape required ☐ Rigid railing required
☐ Additional Anchorage Connector Needed e.g. Cross Arm Strap, etc.		☐ Covers over opening ☐ Warning signs required
☐ Retractable Device Needed	**Additional Information:**	
☐ Horizontal Life Line System Req'd.		
☐ Fall Clearance Distance Adequate		
☐ Fall Rescue/Retrieval Plan Set Up		

Sevenson Environmental Services, Inc.

CONFINED SPACE PERMIT

Date_____ Time of Issue_____ Length of Permit_____
Location _____ Equipment ID_____
Purpose of Entry & Description of Work _____
_____
_____
Authorized Entrant(s)_____
Will "HOT" Work be authorized for this Entry? ☐ No; ☐ Yes (describe)_____
_____

HAZARDOUS IDENTIFICATION

Indicate ALL potential Hazards of this Permit Space:	YES	N/A
a. Contains or may contain a hazardous atmosphere	☐	☐
b. Contains a material for potential engulfment	☐	☐
c. Has an internal configuration for potential entrapment	☐	☐

If "Yes", describe _____
_____

d. Contains the following serious safety or health Hazards:_____

PRE-ENTRY PREPARATION

		YES	N/A	Done			Removed		
				Date	Time	By	Date	Time	By
1. Lines broken and/or blanked:									
Line Contents	Location								
a.									
b.									
c.									
2. Drain or at a workable level									
3. Purge - flush and vent									
4. Force air to bottom & vent									
5. Lock out power feeds:									
Equip/Location of Lock out									
a.									
b.									
6. Shut-off heating systems									
7. Other:									

TEST TO BE TAKEN

	P.E.L.	Time Tester Yes	Time Tester N/A	Time Tester Results	Time Tester Results	Time Tester Results
% of Oxygen	19.5% to 23%					
% of LEL	Any % over 10					
Carbon Monoxide	25 ppm					
Hydrogen Sulfide	10 ppm					
VOC						
Temperature	< 110ºF/43ºC					

PREVENTION OF UNAUTHORIZED ENTRY

	YES
1. Have Worker(s) to enter been trained for this specific entry?	☐
2. Have Attendants been trained for this specific space?	☐
3. Post "WORKER IN CONFINED SPACE" Sign	☐

4. Set-up the following additional barriers:

_____

_____

MANDATORY SAFETY EQUIPMENT REQUIRED

	YES	N/A
1. Fire Extinguisher	☐	☐
2. Retrieval Lines	☐	☐
3. Respirator	☐	☐
4. Goggles	☐	☐
5. Hearing Protection	☐	☐
6. Protective Clothing	☐	☐
7. Special Boots or Shoes	☐	☐
8. Gloves	☐	☐
9. Other Safety Equipment Required	☐	☐

_____ _____

_____ _____

_____ _____

_____ _____

COMMUNICATION PROCEDURES AND EQUIPMENT TO BE USED FOR THIS ENTRY

(Verify that chosen equipment is in place and operation.)

Verified by:

1._____ _____

2._____ _____

RESCUE EQUIPMENT TO BE PROVIDED ON-SITE

		YES	N/A
a.	Two chest harnesses or two wristlets	☐	☐
b.	Two five minute supplied air escape respirators	☐	☐
c.	One 30 minute S.C.B.A.	☐	☐
d.	One emergency siren	☐	☐
e.	Man basket	☐	☐
f.	Retrieval wench	☐	☐
g.	Other necessary Rescue Equipment	☐	☐

_____

_____

_____

IN CASE OF EMERGENCY

Rescue Service	Phone Number or Ext.
1._____	_____
2._____	_____
3._____	_____

Confined Space Entry Supervisor or designee must sign below AFTER all the above actions are fully understood and conditions necessary for SAFE entry have been met.

Authorization of Entry

Signature (if not CSE Supervisor, add title)	Date	Time

Termination of Entry

Signature	Date	Time

Sevenson Environmental Services, Inc.
Daily Safety Meeting

DATE: **DAY:**	**JOB NAME:** **& NUMBER:**

TOPIC:

PRINT	SIGNATURE:

Sevenson Environmental Services, Inc.
DAILY SAFETY REPORT

DATE:

WORK PERIOD COVERED:

WEATHER CONDITIONS:

SUMMARY OF DAY'S WORK ACTIVITY:

EQUIPMENT UTILIZED BY SAFETY MONITORS:

PROTECTIVE CLOTHING AND EQUIPMENT BEING USED BY TASK:

PHYSICAL CONDITION OF WORKERS (any heat or cold stress or other medical problems):

ACCIDENTS OR BREACH OF PROCEDURES:

DESCRIPTION OF MONITORING AND AIR SAMPLES TAKEN:

TYPE AND NUMBER OF PERMITS ISSUED:

SUMMARY OF TRAINING AND SAFETY MEETING:

NAME:	TITLE: Site Health and Safety Officer
SIGNATURE:	

Sevenson Environmental Services, Inc.

EMPLOYEE & VISITOR LOG

DATE:

PRINT NAME	SIGNATURE	COMPANY	Time In	Time Out

Sevenson Environmental Services, Inc.

TRAINING ACKNOWLEDGMENT FORM

NAME:

ADDRESS:

SOCIAL SECURITY NO.: XXX-XX-

EMPLOYER:

I have completed and understand the training program for work to be carried out during work at the Site, including the following topics:

a. Work Rules and Safety Requirements
b. Personal Protection Equipment
c. Potentially Hazardous Chemicals
d. Emergency Equipment and Plan
e. Reporting Injuries and Illnesses
f. Emergency Procedures
g. Job Assignment
h. Personal Hygiene
i. Medical Tests
j. Standard Operating Procedures
k. Applicable Rules and Regulations

Site Personnel Signature: _____	Date:_____

I certify that this Site Person has received adequate safety training and instruction and that this person is proficient in the use of protective clothing and equipment and knowledgeable in all aspects of the Accident Prevention Plan.

Safety Officer Signature: _____	Date: _____

Sevenson Environmental Services, Inc.

HOT WORK PERMIT

Job Description: ☐ **Welding;** ☐**Torch/oxy/acetylene;** ☐ **Grinding/Cut saw;** ☐**Maintenance;**
☐ **Heating Operation;** ☐ **Other:**_____

Permit Duration: ☐ **4 hrs;** ☐ **8 hrs;** ☐ **10 hrs;** ☐ **12 hrs**

Person(s) Performing Hot Work: _____

Fire Watch Required? ☐ **Yes;** ☐ **No**

If yes, Fire Watch Attendant:_____

Air Monitoring Required? ☐ **Yes;** ☐ **No** **Respiratory Protection Required?** ☐ **Yes;** ☐ **No**

MONITORING
(Acceptable Levels)

DATE	TIME	O_2 (19.5-22.0%)	LEL (0-10%)	ORGANIC VAPOR* (0-25ppm)

FIRE PROTECTION

Fire extinguisher present: YES ☐; **Area cleared of combustibles: YES** ☐; **Are operations in compliance with OSHA Regulations: YES** ☐;

Activity Hazard Analysis attached and reviewed by affected personnel: YES ☐

Requirements for Performing Hot Work

- **Flame retardant gloves, coat, and proper eye protection (glasses or shield with welding/cutting rated glass lens)**
- **Respirators will be required when welding/cutting/heating areas that cannot be decontaminated or when welding on stainless steel (Cr-VI) or galvanized metal (metal fume fever).**
- **Use fire blankets when necessary to protect material or areas where removing combustibles is not practical.**
- **Inspect welder, lead lines, and ensure unit is properly grounded.**
- **Maintain a 50 ft diameter clearance for flammables (i.e., fuel cans, vapors) an/or 25 ft diameter clearance for combustibles (i.e., wood, rags, debris)**
- **Oxygen & Acetylene bottles are secure with regulators removed and caps installed prior to moving or unattended during breaks**
- **Inspect all hoses, torch, tips and regulators for defects and ensure flash suppressors are installed**
- **Properly store all empty and full cylinders from vicinity and protect from hot work activities**
- **Barricade walkway under any overhead work**
- **If welding shields are not available, barricade and delineate all work areas when using a torch or welder with a minimum distance of 75 feet.**
- **When normal fire prevention precautions are not sufficient, a qualified fire watch is required. The fire watch shall be instructed in anticipated fire hazards and shall perform assigned duties to 30 minutes after hot work was stopped.**
- **At completion of work activity, disassemble all hoses and regulators and properly store**
- **Toxic surface coatings must be removed prior to welding, cutting or heating. A minimum of 4-inches must be cleared from each side of the weld, cut, or heated area.**
- ***If working with fuel oil the PID for organic vapors will be used to determine the LEL due to the poor LEL sensor response to heavy hydrocarbons. Acceptable PID readings for ensuring vapors are less than 10% LEL will be less than 250 ppm VOCs.**

Health and Safety Officer:_____ **DATE:**_____

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Attachment 3
Chemical Information Sheets

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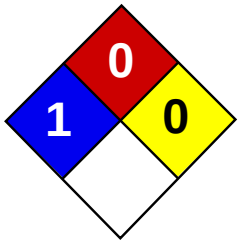

Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m3) from OSHA (PEL) [United States] TWA: 0.03 (mg/m3) from NIOSH [United States] TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

pH (1% soln/water): Not applicable.

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:21 PM

Last Updated: 11/01/2010 12:00 PM

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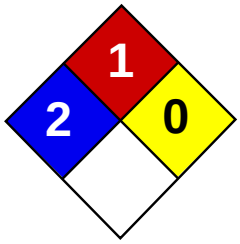

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Chromium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chromium

Catalog Codes: SLC4711, SLC3709

CAS#: 7440-47-3

RTECS: GB4200000

TSCA: TSCA 8(b) inventory: Chromium

CI#: Not applicable.

Synonym: Chromium metal; Chrome; Chromium Metal Chips 2" and finer

Chemical Name: Chromium

Chemical Formula: Cr

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Chromium	7440-47-3	100

Toxicological Data on Ingredients: Chromium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 580°C (1076°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame. Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence. Pyrophoric chromium unites with nitric oxide with incandescence. Incandescent reaction with nitrogen oxide or sulfur dioxide.

Special Remarks on Explosion Hazards:
Powdered Chromium metal +fused ammonium nitrate may react violently or explosively. Powdered Chromium will explode spontaneously in air.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 (mg/m3) from ACGIH (TLV) [United States] TWA: 1 (mg/m3) from OSHA (PEL) [United States] TWA: 0.5 (mg/m3) from NIOSH [United States] TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 0.5 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 52 g/mole

Color: Silver-white to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 2642°C (4787.6°F)

Melting Point: 1900°C (3452°F) +/- !0 deg. C

Critical Temperature: Not available.

Specific Gravity: 7.14 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Soluble in acids (except Nitric), and strong alkalies.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:
Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalies and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride. It may react violently or ignite with bromine pentafluoride. Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate. Potentially hazardous incompatibility with strong oxidizers.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: May cause skin irritation. Eyes: May cause mechanical eye irritation. Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea. Chronic Potential Health Effects: Inhalation: The effects of chronic exposure include irritation , sneezing, reddness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconoisis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur. Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Chromium Illinois toxic substances disclosure to employee act: Chromium Illinois chemical safety act: Chromium New York release reporting list: Chromium Rhode Island RTK hazardous substances: Chromium Pennsylvania RTK: Chromium Minnesota: Chromium Michigan critical material: Chromium Massachusetts RTK: Chromium Massachusetts spill list: Chromium New Jersey: Chromium New Jersey spill list: Chromium Louisiana spill reporting: Chromium California Director's List of Hazardous Substances: Chromium TSCA 8(b) inventory: Chromium SARA 313 toxic chemical notification and release reporting: Chromium CERCLA: Hazardous substances.: Chromium: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R40- Limited evidence of carcinogenic effect S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:16 PM

Last Updated: 11/01/2010 12:00 PM

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MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT IDENTIFICATION

Date: 01/01/10
Code: Type I/II

	Distributor	Telephone
Product Name	Mintek Resources, Inc.	937-431-0218 Office
Portland Cement Type I/II	PO Box 340187	937-431-1305 Fax
	Beavercreek, OH 45434	800-424-9300 CHEMTREC

Chemical Name	**Chemical Family**
Cement	Cement

SECTION 2. TYPICAL COMPOSITION

Component	**Formula**	**% Wt.**	**CAS No.**
Trialcium Silicate	$3CaO.SiO_2$	45-60 %	12168-85-3
Dicalcium Silicate	$2CaO.SiO_2$	10-30 %	10034-77-2
Tricalcium Aluminate	$3CaO.Al_2O_3$	04-13 %	12042-78-3
Tetracalcium Alumino Ferrite	$4CaO.A\ l_2O_3.Fe_2O_3$	08-16 %	12068-35-8
Calcium Sulfate-Dihydrate	$CaSO_4.2H_2O$	04-07 %	13397-24-5

SECTION 3. HAZARD CLASSIFICATIONS

THRESHHOLD LIMIT VALUE

Respirable Dus – $5mg/m_3$
Total Dust - mg/m_3

EFFECTS OF OVEREXPOSURE

Acute: Cement, especially as an ingredient in plastic (unhardened) concrete can dry the skin and cause alkali burns. Cement dust can irritate the eyes and upper respiratory system.

EMERGENCY & FIRST AID PROCEDURES

Irrigate eyes with water.
Wash exposed skin areas with soap and water. If irritation persists, consult physician.

Chronic: Cement dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the eyes. Hypersensitive individuals may develop an allergic dermatitis (skin rash).

SECTION 4. PERSONAL PROTECTION INFORMATION

Respiratory Protection: NIOSH approved respirator or mask in dusty conditions
Eye Protection: Approved, tight-fitting safety goggles.
Ventilation: In enclosed, dusty environments use exhaust fans to control airborne dust levels.

Skin Protection: Use barrier creams, gloves, boots and clothing to protect the skin from prolonged contact with cement, especially in plastic (unhardened) concrete. Immediately after working with cement, workers should wash exposed areas with soap and water. Precautions must be observed because wet cement burns with little warning – little is sensed.

SECTION 5. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid/powder.
Odor & Appearance:	Odorless gray powder.
Boiling Point:	N/A
Explosion Risk:	None.
Vapor Pressure:	None.
Vapor Density:	None.
Solubility in Water:	Slight (0.1 – 1.0%)
Specific Gravity:	3.00 – 3.20
Evaporation Rate:	N/A

SECTION 6. FIRE AND EXPLOSION HAZARD DATS

FLASH POINT: Portland Cement is noncombustible and nonexplosive.
SPECIAL FIREFIGHTING PROCEDURES: Not applicable.
FLAMMABLE OR EXPLOSIVE LIMTS: Not applicable.
UNUSUAL FIRE & EXPLOSION HAZARDS: None.
EXTINGUISHING MEDIA: Not applicable.

SECTION 7. REACTIVITY DATA

STABILITY: Product is stable. Keep dry until used.
HAZARDOUS DECOMPOSITION PRODUCTS: None.
INCOMPATABILITY: None.
HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 8. SPILL PROCEDURES

SPILL CLEANUP METHOD: Use dry cleanup methods that do not disperse the dust into the air.

SECTION 9. DISPOSAL CONSIDERATIONS

Material can be returned to container for later use, or it can be disposed of as a common waste.

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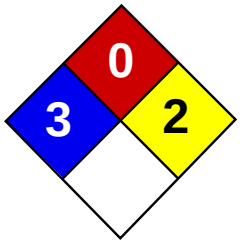
P.O. Box 340187
Beavercreek, OH 45434
Dispatch (937) 431-0218
Fax (937) 431-0254



Material Safety Data Sheet
Sulfuric acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sulfuric acid

Catalog Codes: SLS2539, SLS1741, SLS3166, SLS2371, SLS3793

CAS#: 7664-93-9

RTECS: WS5600000

TSCA: TSCA 8(b) inventory: Sulfuric acid

CI#: Not applicable.

Synonym: Oil of Vitriol; Sulfuric Acid

Chemical Name: Hydrogen sulfate

Chemical Formula: H2-SO4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sulfuric acid	7664-93-9	95 - 98

Toxicological Data on Ingredients: Sulfuric acid: ORAL (LD50): Acute: 2140 mg/kg [Rat.]. VAPOR (LC50): Acute: 510 mg/m 2 hours [Rat]. 320 mg/m 2 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged

contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion:
Products of combustion are not available since material is non-flammable. However, products of decompostion include fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas. Reacts with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Fire Hazards in Presence of Various Substances: Combustible materials

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of oxidizing materials.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Metal acetylides (Monocesium and Monorubidium), and carbides ignite with concentrated sulfuric acid. White Phosphorous + boiling Sulfuric acid or its vapor ignites on contact. May ignite other combustible materials. May cause fire when sulfuric acid is mixed with Cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phorphorous (III) oxide, and oxidizing agents such as chlorates, halogens, permanganates.

Special Remarks on Explosion Hazards:
Mixturesofsulfuricacidandanyofthefollowingcanexplode:p-nitrotoluene,pentasilver trihydroxydiaminophosphate, perchlorates, alcohols with strong hydrogen peroxide, ammonium tetraperoxychromate, mercuric nitrite, potassium chlorate, potassium permanganate with potassium chloride, carbides, nitro compounds, nitrates, carbides, phosphorous, iodides, picratres, fulminats, dienes, alcohols (when heated) Nitramide decomposes explosively on contact with concentrated sulfuric acid. 1,3,5-Trinitrosohexahydro-1,3,5-triazine + sulfuric acid causes explosive decompositon.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage:
Hygroscopic. Reacts. violently with water. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 STEL: 3 (mg/m3) [Australia] Inhalation TWA: 1 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 1 STEL: 3 (mg/m3) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 1 (mg/m3) from NIOSH [United States] Inhalation TWA: 1 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Thick oily liquid.)

Odor: Odorless, but has a choking odor when hot.

Taste: Marked acid taste. (Strong.)

Molecular Weight: 98.08 g/mole

Color: Colorless.

pH (1% soln/water): Acidic.

Boiling Point:
270°C (518°F) - 340 deg. C Decomposes at 340 deg. C

Melting Point: -35°C (-31°F) to 10.36 deg. C (93% to 100% purity)

Critical Temperature: Not available.

Specific Gravity: 1.84 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 3.4 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:
Easily soluble in cold water. Sulfuric is soluble in water with liberation of much heat. Soluble in ethyl alcohol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability:
Conditions to Avoid: Incompatible materials, excess heat, combustible material materials, organic materials, exposure to moist air or water, oxidizers, amines, bases. Always add the acid to water, never the reverse.

Incompatibility with various substances:
Reactive with oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture.

Corrosivity:
Extremely corrosive in presence of aluminum, of copper, of stainless steel(316). Highly corrosive in presence of stainless steel(304). Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Hygroscopic. Strong oxidizer. Reacts violently with water and alcohol especially when water is added to the product. Incompatible (can react explosively or dangerously) with the following: ACETIC ACID, ACRYLIC ACID, AMMONIUM HYDROXIDE, CRESOL, CUMENE, DICHLOROETHYL ETHER, ETHYLENE CYANOHYDRIN, ETHYLENEIMINE, NITRIC ACID, 2-NITROPROPANE, PROPYLENE OXIDE, SULFOLANE, VINYLIDENE CHLORIDE, DIETHYLENE GLYCOL MONOMETHYL ETHER, ETHYL ACETATE, ETHYLENE CYANOHYDRIN, ETHYLENE GLYCOL MONOETHYL ETHER ACETATE, GLYOXAL, METHYL ETHYL KETONE, dehydrating agents, organic materials, moisture (water), Acetic anhydride, Acetone, cyanohydrin, Acetone+nitric acid, Acetone + potassium dichromate, Acetonitrile, Acrolein, Acrylonitrile, Acrylonitrile +water, Alcohols + hydrogen peroxide, ally compounds such as Allyl alcohol, and Allyl Chloride, 2-Aminoethanol, Ammonium hydroxide, Ammonium triperchromate, Aniline, Bromate + metals, Bromine pentafluoride, n-Butyraldehyde, Carbides, Cesium acetylene carbide, Chlorates, Cyclopentanone oxime, chlorinates, Chlorates + metals, Chlorine trifluoride, Chlorosulfonic acid, 2-cyano-4-nitrobenzenediazonium hydrogen sulfate, Cuprous nitride, p-chloronitrobenzene, 1,5-Dinitronaphthlene +

sulfur, Diisobutylene, p-dimethylaminobenzaldehyde, 1,3-Diazidobenzene, Dimethylbenzylcarbinol + hydrogen peroxide, Epichlorohydrin, Ethyl alcohol + hydrogen peroxide, Ethylene diamine, Ethylene glycol and other glycols, , Ethylenimine, Fulminates, hydrogen peroxide, Hydrochloric acid, Hydrofluoric acid, Iodine heptafluoride, Indane + nitric acid, Iron, Isoprene, Lithium silicide, Mercuric nitride, Mesityl oxide, Mercury nitride, Metals (powdered), Nitromethane, Nitric acid + glycerides, p-Nitrotoluene, Pentasilver trihydroxydiaminophosphate, Perchlorates, Perchloric acid, Permanganates + benzene, 1-Phenyl-2-methylpropyl alcohol + hydrogen peroxide, Phosphorus, Phosphorus isocyanate, Picrates, Potassium tert-butoxide, Potassium chlorate, Potassium Permanganate and other permanganates, halogens, amines, Potassium Permanganate + Potassium chloride, Potassium Permanganate + water, Propiolactone (beta)-, Pyridine, Rubidium aceteylene carbide, Silver permanganate, Sodium, Sodium carbonate, sodium hydroxide, Steel, styrene monomer, toluene + nitric acid, Vinyl acetate, Thalium (I) azidodithiocarbonate, Zinc chlorate, Zinc Iodide, azides, carbonates, cyanides, sulfides, sulfites, alkali hydrides, carboxylic acid anhydrides, nitriles, olefinic organics, aqueous acids, cyclopentadiene, cyano-alcohols, metal acetylides, Hydrogen gas is generated by the action of the acid on most metals (i.e. lead, copper, tin, zinc, aluminum, etc.). Concentrated sulfuric acid oxidizes, dehydrates, or sulfonates most organic compounds.

Special Remarks on Corrosivity:
Non-corrosive to lead and mild steel, but dillute acid attacks most metals. Attacks many metals releasing hydrogen. Minor corrosive effect on bronze. No corrosion data on brass or zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2140 mg/kg [Rat.]. Acute toxicity of the vapor (LC50): 320 mg/m3 2 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. May cause damage to the following organs: kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
Mutagenicity: Cytogenetic Analysis: Hamster, ovary = 4mmol/L Reproductive effects: May cause adverse reproductive effects based on animal data. Developmental abnormalities (musculoskeletal) in rabbits at a dose of 20 mg/m3 for 7 hrs.(RTECS) Teratogenecity: neither embryotoxic, fetoxic, nor teratogenetic in mice or rabbits at inhaled doses producing some maternal toxicity

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes severe skin irritation and burns. Continued contact can cause tissue necrosis. Eye: Causes severe eye irritation and burns. May cause irreversible eye injury. Ingestion: Harmful if swallowed. May cause permanent damage to the digestive tract. Causes gastrointestial tract burns. May cause perforation of the stomach, GI bleeding, edema of the glottis, necrosis and scarring, and sudden circulatory collapse(similar to acute inhalation). It may also cause systemic toxicity with acidosis. Inhalation: May cause severe irritation of the respiratory tract and mucous membranes with sore throat, coughing, shortness of breath, and delayed lung edema. Causes chemical burns to the repiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Cause corrosive action on mucous membranes. May affect cardiovascular system (hypotension, depressed cardiac output, bradycardia). Circulatory collapse with clammy skin, weak and rapid pulse, shallow respiration, and scanty urine may follow. Circulatory shock is often the immediate cause of death. May also affect teeth(changes in teeth and supporting structures - erosion, discoloration). Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect behavior (muscle contraction or spasticity), urinary system (kidney damage), and cardiovascular system, heart (ischemic heart leisons), and respiratory system/lungs(pulmonary edema, lung damage), teeth (dental discoloration, erosion). Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic skin reaction.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 49 mg/l 48 hours [bluegill/sunfish].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Sulfuric acid may be placed in sealed container or absorbed in vermiculite, dry sand, earth, or a similar material. It may also be diluted and neutralized. Be sure to consult with local or regional authorities (waste regulators) prior to any disposal. Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sulfuric acid UNNA: 1830 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Sulfuric acid New York release reporting list: Sulfuric acid Rhode Island RTK hazardous substances: Sulfuric acid Pennsylvania RTK: Sulfuric acid Minnesota: Sulfuric acid Massachusetts RTK: Sulfuric acid New Jersey: Sulfuric acid California Director's List of Hazardous Substances (8 CCR 339): Sulfuric acid Tennessee RTK: Sulfuric acid TSCA 8(b) inventory: Sulfuric acid SARA 302/304/311/312 extremely hazardous substances: Sulfuric acid SARA 313 toxic chemical notification and release reporting: Sulfuric acid CERCLA: Hazardous substances.: Sulfuric acid: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R35- Causes severe burns. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30- Never add water to this product. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.

Other Special Considerations: Not available.

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Last Updated: 06/09/2012 12:00 PM

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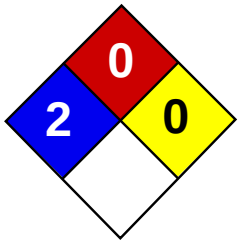

Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Ferrous sulfate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ferrous sulfate

Catalog Codes: SLF1516

CAS#: 13463-43-9

RTECS: Not available.

TSCA: TSCA 8(b) inventory: No products were found.

CI#: Not available.

Synonym: Ferrous Sulfate Hydrate; Ferrous Sulfate Dried Powder

Chemical Name: Ferrous Sulfate

Chemical Formula: FeSO4.xH2O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ferrous sulfate	13463-43-9	100

Toxicological Data on Ingredients: Ferrous sulfate LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, cardiovascular system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes.

Storage:
Hygroscopic. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 151.9 g/mole + H20

Color: Grayish -white to yellowish. (Light.)

pH (1% soln/water): Not available.

Boiling Point: Not available.

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: Not available.

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatibles

Incompatibility with various substances: Not available.

Corrosivity: Not available.

Special Remarks on Reactivity:
Hygroscopic. Loses water at about 300 C. No other information found.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: May cause damage to the following organs: kidneys, liver, cardiovascular system, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract irritation. Ingestion: Harmful if swallowed. May cause gastrointestinal tract distrubances and irritation with nausea, vomiting, colic, constipation, diarrhea, black stool. May also affect behavior/Central Nervous System (somnolence -general depressed activity), respiration, cardiovascular system, liver, kidneys (pink urine discoloration). Chronic Potential Health Effects: Repeated exposure via ingestion may increase iron levels in the liver, and spleen. Damage may occur to spleen and liver.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: No products were found.

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 06/09/2012 12:00 PM

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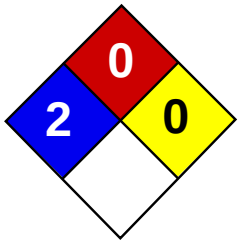

Material Safety Data Sheet
Sodium Hydroxide, 25% MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium Hydroxide, 25%

Catalog Codes: SLS4210

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Sodium hydroxide; Water

CI#: Not applicable.

Synonym:

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	25
Water	7732-18-5	75

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant), of eye contact (irritant), of ingestion. Hazardous in case of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Non-corrosive for skin. Non-irritant for skin. Non-sensitizer for skin. Non-permeator by skin. Non-irritating to the eyes. Non-hazardous in case of ingestion. Non-hazardous in case of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe

skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Finish by rinsing thoroughly with running water to avoid a possible infection. Cold water may be used.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:
Corrosive liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Do not breathe gas/fumes/ vapour/spray. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as acids.

Storage:
Alkalis may be stored in heavy duty gauge steel containers. Corrosive materials should be stored in a separate safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
Sodium hydroxide CEIL: 2 (mg/m3) from ACGIH [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Odorless.

Taste: Alkaline. Bitter. (Strong.)

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Basic.

Boiling Point: The lowest known value is 100°C (212°F) (Water).

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.15 (Water = 1)

Vapor Pressure: The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Extremely reactive or incompatible with acids.

Corrosivity:
Highly corrosive in presence of aluminum. Slightly corrosive to corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (corrosive, irritant), of ingestion. Hazardous in case of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 8: Corrosive liquid.

Identification: : Sodium hydroxide, solution (Sodium hydroxide) : UN1824 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Sodium hydroxide Massachusetts RTK: Sodium hydroxide TSCA 8(b) inventory: Sodium hydroxide; Water

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC): R35- Causes severe burns.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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ARCADIS

Sevenson Environmental Services
Sampling and Analysis Plan

Sampling and Analysis Plan

General Motors Sleepy Hollow Site

Sleepy Hollow, NY

October 2012

Sevenson Environmental Services, Inc.

TABLE OF CONTENTS

Section I

SOIL SAMPLING AND ANALYSIS PLAN 1

1. Sampling Objective(s): Sampling Frequency Requirements 1
2. Analytical Sources (off-site laboratory) 2
3. Sampling Procedures 2
4. Sampling Equipment and Containers 2
5. Analytical Data Turn Around Time 2
6. Record Keeping and Reporting Procedures 2
7. Sample Handling, Storage and Shipment 3
8. Offsite Laboratories 3

Section II

WATER SAMPLING AND ANALYSIS PLAN 4

1. General 4
2. Flow Routing 5
3. Monitoring Program 5

SECTION 1

SOIL SAMPLING AND ANALYSIS PLAN

1. Sampling Objective(s): Sampling Frequency Requirements

The Generator's Engineer, ARCADIS, shall obtain samples of the stabilized dredge sediments per their Sampling and Analysis Plan (SAP), which has been submitted and reviewed separately from this SAP. ARCADIS' samples shall be analyzed to determine whether the stockpiled dredge sediments meet the requirements of the BUD determination for the Site. If the dredge soils' meet these requirements, they may remain onsite.

If they do not meet BUD requirements, Sevenson shall perform sampling and analysis of the dewatered sediments for offsite landfill disposal waste approval characterization purposes. The sediment sample(s) will be analyzed to confirm that they do not exceed criteria for management as a US EPA TCLP characteristically hazardous waste as defined in 40 CFR 261.21 through 261.24.

All analytical data shall be of known quality and formally reported to ARCADIS after review by Sevenson's in-house chemist.

Sevenson shall notify ARCADIS not less than five business days in advance of any sample collection activity.

Sampling frequency, sample matrices and analytical parameters are presented in Table 1.

TABLE 1

SAMPLE MATRIX	PARAMETERS	FREQUENCY
Dewatered Sediments	Disposal Analysis Parameters	Every 500-1000 yd3 of processed output

Sevenson's offsite laboratory shall analyze the representative samples for the TCLP characteristics of Ignitability, Corrosivity, Reactivity and Toxicity. Sevenson shall supply split samples to ARCADIS for independent verification of the analytical results upon request. Analytical Sources (off-site laboratory)

Sevenson shall make sure that the offsite laboratory maintains a documented Quality Assurance Program. All sampling and testing procedures shall follow the documented EPA Guidelines.

The offsite laboratory will be required to operate at DQO Level 2 for confirmational testing of treated waste for disposal analysis.

2. Sampling Procedures

In order to obtain a representative sample of the stabilized final product, 5 random grab samples from a 500 to 1000 cubic yard stockpile of dewatered material will be taken. The random grab samples will be homogenized (with the exception of the sample for VOCs) into a composite sample representative of the stockpile. The grab samples will be taken from random depths and locations within the stockpile.

3. Sampling Equipment and Containers

Samples will be collected with disposable hand trowels. Samples will be placed in sealed glass jars equipped with Teflon-lined lids. No decontamination procedures will be necessary as all sampling equipment is designed as one-use.

Each sample container will be labeled with the Site name, sample type and a unique sample ID.

4. Analytical Data Turn Around Time

All samples of stockpiled sediments will be analyzed with a 5-day turnaround time.

5. Record Keeping and Reporting Procedures

Field personnel will be responsible for entering all daily field activities, measurements and observations in a bound field log book. All data will be recorded legibly in the log book with each day's entries signed and dated. Upon completion of all field work, the field log book will be placed in the project file

After proper labeling, numbering and identification of each sample, appropriate

chain-of-custody forms are completed. Sampling conditions and major visible or self-evident characteristics are noted, such as color, physical state, odor, specific appearance, etc., will be noted in the field logbook. Paperwork may include preparation of sample logs, shipping papers and special instructions, if any, to the sample receiving entity.

The offsite laboratory shall communicate analytical data along with QA/QC reports to the site as well as to Sevenson's Project Chemist. The analytical data will be checked for accuracy, precision, comparability and completeness as it is received. Any QA/QC problems identified will be subject to corrective action. The implementation of corrective action, if necessary, and its impact will be documented in the report.

The reports will be made available to the ARCADIS as required.

6. Sample Handling, Storage and Shipment

All samples will be handled separately to prevent any cross contamination, labeled appropriately and logged to identify sampling point, objective and specific parameter of interest. The soil samples are stored and packed appropriately to prevent any accidents or breakage of glass jars. Sample handling, storage and shipping guidelines under strict chain of custody protocols will be observed as required in SW-846 methodology.

All samples are shipped on time, and usually on the same day as sampled, to the receiving entity such as the offsite laboratory. Shipments follow guideline of the carrier(s) and the Department of Transportation (DOT).

7. Offsite Laboratories

Sediment samples collected during field operations will be analyzed by:

Mitkem Labs
175 Metro Center Blvd.
Warwick, RI 02886

Section II

WASTE WATER SAMPLING AND ANALYSIS PLAN

It is Sevenson's intent to initially collect water in a series of 20,000 gallon storage tanks located on GM's west parcel. It is anticipated that Sevenson will have 6 storage tanks on site at the start of the project. All collected water will be sampled and analyzed for the following parameters:

RCRA Characteristics (ignitability/reactive cyanide and sulfide/pH)
Total Metals
Total VOCs
Total SVOCs
Total PCB
Total Organic Carbon

Once a batch has been reviewed and approved, the water will be pumped to tanker trucks for off-site disposal at a permitted wastewater treatment facility.

Sevenson will also obtain a permit for potential discharge to the municipal sewer system.

Sevenson will also provide a portable wastewater treatment facility as site needs dictate. The following sections describe the protocol to be followed for onsite treatment.

1. General

This Sampling and Analysis Plan covers the wastewater treatment plant and its discharge of effluent from the General Motors Sleepy Hollow Site. The wastewater treatment plant is designed to process 100 gpm of wastewater from the remediation activities and groundwater from the GM site.

The treatment facility has been designed to remove oil and grease, suspended solids, lead, hexavalent chromium, volatile organic compounds (VOCs), primarily trichloroethylene or TCE, and semi-volatile organic compounds (SVOCs).

The plant is designed with the following processes:

- Solids/Oil & Grease Removal—Gravity separation in Oil-Water Separator
- Chromium Reduction—Chemical reduction of hexavalent chromium
- Neutralization/Precipitation for Metals Removal—Chemical addition/Sedimentation

2. Flow Routing

All flow from the wastewater treatment plant will be discharged to the local POTW. The effluent flow rate will be instantaneously measured and totalized. The effluent may also be diverted to the 21,000-gallon Backwash Storage Tank as required for backwash requirements.

3. Monitoring Program

Table 1 is a summary of pretreatment requirements for Westchester County.

SES will obtain grab samples from the effluent line from the treatment process as follows:

- First five days of operation—daily sample for regulated pollutants in Table 1
- Following three weeks of operation—weekly sample for expected pollutants
- After three-week period of operation—monthly sample for expected pollutants

After the first week, each effluent sample will be analyzed for the following constituents:

- pH
- Total suspended solids
- Oil and grease
- Total toxic organics
- Volatile organic compounds
- Semi-volatile organic compounds
- Lead
- Total and Hexavalent Chromium

Table 1: Required Westchester County Pretreatment Requirements

REGULATED POLLUTANT	AVERAGE DAILY CONCENTRATION (mg/L)
pH – Low	5.5
pH – High	9.5
Arsenic	0.2
Barium	2.0
Cadmium	0.7
Chromium (Total)	3.0
Chromium (Hex)	2.0
Copper	2.8
Cyanide (Total)	0.8
Lead	0.4
Mercury	0.2
Nickel	2.8
Oil & Grease	100.0
Phenols	4.0
Selenium	0.2
Silver	0.8
Total Toxic Organics	2.1
Zinc	1.8

Besides the required permit tests, Sevenson will perform other tests on influent and process flows as required to control and monitor process performance. Sevenson will perform the following tests as required:

- Daily turbidity testing of the Sedimentation Tank influent and effluent;
- Visual observation of Separate-Phase Hydrocarbons (SPH) in the Influent Equalization Tank influent and effluent;

The wastewater treatment plant effluent control and monitoring program discussed in this section are required for compliance with the pretreatment standards, and for day-to-day control of the treatment plant.

Sevenson will collect samples and conduct the analyses for the following reasons:

- To form a rational basis for controlling the treatment processes.
- To define the operational efficiency of the plant.

- To develop a historical record of the conditions under which the plant has been operated, as an aid to the design of any necessary plant modifications.
- To satisfy the discharge reporting requirements of the regulatory agency.

Table 2 shows Sevenson's control and monitoring schedule for the wastewater treatment plant.

All samples will be properly preserved and sent to Mitkem Labs, Warwick, RI. Sevenson will also provide split samples to the County representative, should it be required.

Table 2: Influent/Effluent Monitoring Plan (All samples grab samples)

Parameter	Reason For Analysis	Influent	Process	Effluent
Flow	P/O	D	--	D
pH	P/O	D	--	D
Total Suspended Solids	P/O	M	--	M
Volatile Organic Compounds	P	--	M—GAC Effluent	M
Semi-Volatile Organic Compounds	P	--	M—GAC Effluent	M
Total Toxic Organics	P	--	--	M
Lead	P	--	--	M
Total and Hexavalent Chromium	P	--	--	M
Sludge Blanket Level (in Sedimentation Tank)	O	1GD	--	--

Reason for Analysis
P—for Pretreatment Permit Compliance
O—Operation and Control

Frequency of Analysis
D—Daily before discharging
M—Monthly after process established

ARCADIS

Sevenson Environmental Services
Spill and Contamination
Prevention Plan

Spill and Contamination Prevention Plan

I. PURPOSE

This Spill and Contamination Prevention Plan (SCPP) has been prepared by Sevenson Environmental Services, Inc. to satisfy General Motors contract requirements for the Former GM Assembly Plant Site in Sleepy Hollow, N.Y. This is a site-specific SCPP that establishes Sevenson's policy to prevent, respond to, and report spills or releases to the environment. This plan, as presented herein, will provide contingency measures for potential spills of bulked liquids, contaminated soils, and other solids handled on site. Sevenson's goal is to generate, transport, store, handle, and dispose of oil and hazardous substances in a manner that protects the environment and public health. The SCPP will be updated as project work progresses or site activities change. An updated copy of this SCPP plan will be maintained and implemented at the project site.

Sevenson personnel will respond to all on-site spill emergencies. It will be the waste haulers responsibility to respond to all off-site emergencies.

II. SITE INFORMATION

The project site is located in the Village of Sleepy Hollow, Town of Mount Pleasant, Westchester County, New York and is identified in The BCAs as follows:

- East Parcel, Village Tax Section 15, Block 15, Lot 1 and Section 15, Block 7, Lot 11
- South Parcel, Village Section 16, Block 2, Lot 27
- West Parcel, Village Tax Section 15, Block 1, Lot 1

The East Parcel (approximately 28.3 acres) is bordered by DeVries Park to the north, Philipsburg Manor on the northeast corner, and Barnhart Park and residential properties to the south-east.

The south Parcel (approximately 1.7 acres) I a corner Lot, situated on a natural Hillside and surrounded on three sides by village streets. The east side of the South Parcel abuts a residential property and lands owned by the Village for Department of Public Works operations.

The West Parcel (approximately 66.2 acres) is bordered by the Hudson River to the West, Kingsland Point Park of Westchester County to the north/northwest, and Ichabod's Landing to the southwest. The waterfront along the frontage of Ichabod's Landing is a walkway/park owned by the Village of Sleepy Hollow. See attached Drawing G201 for further information.

Remedial activities will include sediment removal in the Hudson River near outfall OF-1 and within the former process sewer/combined storm sewer system discharging to OF-1. Sevenson will conduct an environmental investigation during the mobilization phase of the project. Investigation work will consist of documenting existing site conditions and noting any potential sources that may require a spill response (i.e., wet wells, pits, etc.).

SITE TOPOGRAPHY

The overall topography of the West Parcel is relatively flat, with significant portions occupied by the remaining building floor slabs of the former Chassis and Body Plants. Ground surface elevations over much of the West Parcel are within 5 to 20 feet (ft) above mean sea level (MSL), with building slabs at an approximate elevation of 13 ft above MSL. The surrounding area rises steeply to the east, away from the Hudson River. Stormwater is conveyed to the Hudson river via a storm drain system with two active outfalls (OF-1 and OF-2). Approximately 2,300 linear feet (LF) of the existing Hudson River Shoreline is lined with rip-rap shoreline protection from the water's edge to the top of slope. The top of slope is at approximate elevation of 7.5 ft for much of the property's waterfront.

GROUNDWATER FLOW

Groundwater flow is also toward the Hudson River.

POTENTIAL SPILL SOURCES

Potential spill sources at the site include materials and equipment brought on-site, pre-existing site contamination, and potential unknown site conditions.

Equipment and Materials Brought On-site

- Equipment staging and maintenance areas (fuel, lubricating oil, and hydraulic oil from drill rigs, backhoes, bulldozers, piling drivers, water trucks, pickup trucks, support truck equipment, lighting units, pumps, and generators);
- Fuel staging areas (bulk storage of gasoline and diesel);
- Hazardous material staging (containers of lubricants, fuels, and hydraulic oil); and
- Hazardous waste storage (drums of used oil filter, material used to clean and maintain equipment).

Pre-existing Site Conditions

The site is primarily covered with asphalt, concrete slabs, or concrete millings. The underlying historic fill contains metals and PAHs. The sediments to be dredged from the river and removed from the storm sewer contain the mass of metals targeted for removal (chromium, copper, lead, mercury and zinc).

Unknown Conditions that may be encountered

- Blocked or collapsed storm sewer pipes.
- Obstructions buried within the sediment removal zone.

CONTRACTOR PERSONNEL

The Sevenson Environmental Services, Inc. designated person responsible for managing, implementing, and maintaining this SCR plan is Jim Pazderski. His designated alternative is Jeff Shirley. Project phone numbers are as follows:

- Sevenson Environmental Services, Inc. corporate office (716) 284-0431
- Project site office – Land Line Not Available (refer to cell numbers below)
- Jim Pazderski, cellular (716) 308-8406
- Brad Weiser, cellular (716) 510-3664

III. GENERAL

All response actions will comply with the site Safety and Health Plan. Temporary fuel (oil) storage tanks will be placed in a lined containment area of sufficient size and strength to contain the contents of the tank in the event of leakage.

Emergency Contacts in the event of a spill:

- National Response Center (800) 424-8802
- NYSDEC Spill Response (800) 457-7362

IV. PROJECT SITE DESCRIPTION

ITEMS BROUGHT ON SITE

Equipment staging and maintenance, fuel staging, hazardous material staging, waste storage areas, and waste water treatment facilities are located within a 40 ml high density polyethylene lined area of the site. Any spills within these areas will be collected in sump(s).

V. MATERIAL HANDLING

BULKED LIQUIDS AND SOLIDS

Sevenson will ensure that all vehicles provided for the remedial work are in a good state of repair. The equipment will be operated in a safe manner to prevent spills during the handling of all bulked liquids and solids. Equipment (i.e., tankers, frac tanks, etc.) storing bulked liquids must be certified for that purpose and must be inspected to ensure that all valves and other access ports are secured to prevent leaks. All hoses, pumps, valves, and connections will also be inspected to ensure the unit is free of leaks. Haulage units (trucks, intermodals, etc.) used for bulked-solid-handling will be inspected to ensure that their tailgates are secured and the loads are covered (tarped) to avoid spillage or spread of the solids or excavated material.

DRUMMED WASTE

The handling and transport of drummed waste will be, at all times, conducted in a controlled and safe manner which will minimize damage to drums, repacks, or overpacks. If during transport or handling, leakage or spillage of waste occurs, the drums will immediately be placed within an overpack unit (overpack units will be provided on site). The spill will be cleaned up immediately and the incident will be logged.

EQUIPMENT

Sevenson will have the following equipment on-site to be used for any unexpected spills:

- Sand, clean fill, or other non-combustible absorbent;
- Several empty overpack drums (85 gallons), a dump truck or a 20-cubic yard (cy) roll-off container;
- Shovels;
- Front end loader;

- High volume water pump;
- Water transfer hoses; and
- Wash water for decontaminating tools and equipment.
- Spill Response Kit (including sorbent pads, speedy dry, gloves, shovels, plastic, brooms)

Hand tools used for spill response will generally be discarded with the waste material unless it is determined appropriate to decontaminate the tools. All contaminated materials, including solvents, cloth, soil and wood that cannot be decontaminated will be properly containerized, labeled, and disposed of as soon as possible.

VI. SPILL RESPONSE

Sevenson personnel will respond to all on-site spill emergencies. It will be the waste haulers responsibility to respond to all off-site emergencies.

If a spill occurs, Sevenson will notify General Motors and the NYSDEC Project Manager to the notification immediately and take immediate measures to control and contain the spill within site boundaries.

Measures to be implemented are as follows:

ASSESS HAZARD

Sevenson will stop operations and Jim Pazderski will determine if the spill is *incidental*, which is defined as (1) spilled material that is known and definable and (2) Sevenson has the resources (trained personnel, equipment, and supplies) onsite to safely and effectively respond to the spill. If one or more of the criteria are not met, the spill is not *incidental* and direction will be given for evacuation of the area and the fire department (911) and emergency response contractor/team will be notified.

If the spill is incidental, Sevenson will assess the quantity of substance spilled and the extent of the affected area, and implement the following:

- Isolate hazardous areas and keep unnecessary people away;
- Prevent people from touching spilled materials;
- Stay upwind, keep out of low areas;
- Keep combustibles away from the spilled materials;
- Secure the area and obtain the appropriate spill response equipment and PPE;
- Use water sprays or foam suppressant to reduce vapors, as needed;
- Contain the spill area;
- Seal or stop the source of the spill by closing valves, providing containment, or deactivating pumps, as applicable; and
- Take samples for analysis to determine that the clean-up is adequate.

MITIGATING, REMOVING, AND DISPOSING OF SPILLED MATERIAL

Only OSHA-trained personnel will perform spill cleanup activities. The spill response contractor/team will be responsible for cleanup activities as a result of spills or leaks when Sevenson does not have the training, equipment, or materials to cleanup this particular spill.

SPILLS ONTO THE GROUND (SOIL):

- Clean up the spill immediately.
- Absorb liquid spills with sand, clean fill, or non-combustible absorbent materials.
- Employ control measures to prevent the diversion of extraneous water onto adjacent properties. This water will be diverted to existing storm water collection systems.
- Collect spilled material and place into drums labeled to identify contents.

- Collect absorbent and other material used to clean up the spill, label the container, and properly dispose of waste at an approved disposal facility.
- Decontaminate the affected area, equipment, and surfaces that have contacted the spilled material.
- Restore habitat, if necessary.

SPILLS INTO WATERWAYS:

- Notify the National Response Center and the State of New York Department of Environmental Conservation.
- Notify a spill response contractor, if necessary.
- Stop the source of the spill immediately.
- Shut down all equipment and ignition sources in the area.
- Deploy boom and absorbent to contain the spill.
- Clean up absorbent and waste materials and dispose of at an approved waste disposal facility.
- Decontaminate the affected area, equipment and surfaces that have contacted the spilled material.

CONTAMINATED SOIL SPILLS

In the event that contaminated soil is spilled on-site, Sevenson will implement the following:

- The spill area will be secured.
- The contaminated material will be cleaned up and placed in a container/box.
- The surface area where the spill occurred will be surveyed for contamination.
- Once the area is deemed decontaminated, the area will be restored to its original condition.

DECONTAMINATION PROCEDURES:

Decontamination procedures may be required after cleanup to eliminate traces of the substance spilled or reduce it to an acceptable level as determined by the General Motors. Complete cleanup may require removal of contaminated soils. Personnel decontamination will include hand wash/boot wash stations, portable emergency shower station and cleaning or disposing of protective clothing and equipment. All contaminated materials including solvents, cloth, soil, and wood that cannot be decontaminated will be removed and disposed of properly.

REPORT/NOTIFICATION

Sevenson will submit a spill report/notification to General Motors, which will include the following:

- Type of Release;
- Source of Release;
- Contents of Release;
- Quantity of Release;
- Time of Release;
- Contact list, in order;
- Injury Report;
- List of personnel involved; and
- Final disposal location.

VII. STORMWATER RUN-OFF RELEASES

Requirements for control of sediment in stormwater run-off will be performed in accordance with Sevenson's Soil Erosion and Sediment Control Plan. These requirements will include, but are not limited to, the following:

- Installation of a decontamination pad in accordance with the contract drawings, including collection of contaminated water;
- Curtailing work to reduce the exposed surface in heavy rains; and,
- Controlling sediment that may be entrained by rainwater running off the site.

ARCADIS

Sevenson Environmental Services
Quality Control Plan

Site-Specific Contractor's Quality Control Plan (CQCP)

This CQCP will be implemented in order to ensure compliance with the Remedial Work Plan for the Sediment Remediation Project at the former GM Assembly Plant in Sleepy Hollow, NY. Prior to the initiation of work, the Sevenson's Project Manager, Jim Pazderski, and their Quality Control Manager, Brad Weiser, will meet with General Motors and their designated representatives to discuss Sevenson's quality control system. During this meeting, a mutual understanding of the system's details will be developed, including forms for recording, control activities, testing, and administration of the system for both on-site and off-site work.

Quality control measures will extend to field sampling procedures; staffing; types of material and equipment to be used; and methods of performing, documenting, and enforcing quality control operations of both the prime contractor and subcontractors (including inspection and testing).

As previously stated, maintenance of the QCP will be the responsibility of the QCM. The QCM will be responsible for ensuring that all materials and work comply with the contract specifications. Testing firms will also be at the disposal of the QCM in order to ensure contract compliance in all aspects of work. All testing firms' qualifications will be submitted to the engineer for approval. All reports from testing firms will be forwarded to the QCM for his review and approval. Testing firms hired to perform chemical analysis will be required to comply with the requirements listed in the specifications and must be validated and approved by General Motors and their designated representatives prior to conducting work.

i. Implementation

The QCM will be responsible for implementing the QCP by ensuring that quality materials and supplies are provided for the proposed project, and that good workmanship is provided in all aspects of this contract. Sevenson's QCM, Brad Weiser, will report directly to the Project Manager (PM) Jim Pazderski, and will complete daily site inspections to ensure compliance with the quality control specifications. Daily reports will be completed listing all field-testing and sampling activities. These reports will be submitted to General Motors and their designated representatives on a daily basis. The QCM will be responsible for ensuring that all materials and work comply with the contract plans and specifications and that all performance standards are met.

As additional features of work are added, addenda to the QCP will be submitted detailing updated lists of Definable Features of Work, updated lists of quality control testing, and other additional quality control information specific to the additional phases of work.

ii. Reporting

The QCM will record control activities in a daily quality control (QC) report maintained on site at all times. All site activities, site inspections, and field testing of materials will be recorded on a daily basis, along with any unacceptable site occurrences or deficiencies and their associated

corrective actions. Each daily entry into the report will be signed by the QCM. Quality Control Reports will be submitted on a daily basis during all field construction activities.

iii. Inspections

To ensure that all construction and remedial activities comply with the project specifications, the QCM will complete, in conjunction with the subcontractors, three phases of site inspections for each feature of work. These inspections will include the following:

PHASE I - PREPARATORY INSPECTION

- Preparatory inspections will be performed prior to beginning work on any definable feature of the project and will include:
- Reviews of contract requirements.
- Reviews of applicable Activity Hazard Analyses and associated administrative and engineering controls to be employed.
- A check to ensure that all materials and/or equipment have been tested, submitted, and approved.
- A check to ensure that provisions have been made to provide required control testing.

- Examination of the work area to ascertain that all preliminary work has been completed.

A physical examination of materials, equipment, and sample work will be performed to ensure that they conform to approved shop drawings or submittal data and that all materials and/or equipment are on hand.

Subsequent to the preparatory inspection and prior to commencement of work, Sevenson will instruct each applicable worker on the level of workmanship required to meet contract specifications.

Phase II - Initial Inspections

Initial phase inspections will be performed as soon as a representative portion of the particular feature of work has been accomplished. Initial inspections include, but are not limited to, examination of the quality of workmanship; review of control testing for compliance with contract requirements; and identification of defective or damaged materials, omissions, and dimensional requirements.

The initial phase inspection is the time to discuss and agree on the required level of quality associated with a given work activity. Any discrepancies relative to work quality should be addressed at this time.

Phase III - Follow-Up Inspections

Follow-up inspections will be performed daily as work progresses to ensure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. Final follow-up inspections will be conducted and deficiencies corrected prior to beginning new work.

The QCM will notify General Motors and their designated representatives at least 24 hours in advance of any inspections. Notification and meeting minutes of all inspections will be recorded in the Daily Quality Control Report.

Final Follow-Up Inspections

At the completion of all work, or any increment thereof established by a completion time stated in the specifications, the QCM will conduct a final follow-up inspection of the work. General Motors and their designated representatives will be given at least 24 hours-notice of all inspections. The QCM will develop a "punch list" of items that do not conform to the approved

plans and specifications. This list will include the estimated date by which the deficiencies will be corrected. The QCM or his staff will perform a second completion inspection to ascertain that all deficiencies have been corrected.

Following completion of all inspections at the end of the construction, a series of pre-final and final inspections will be conducted by the QCM. General Motors and their designated representative's will be advised of all pre-final and final inspections at least 2 days in advance.

Final Completion Inspections

Pre-final and final inspections will take place after all individual final follow-up inspections are completed, and all punch list items corrected.

The QCM will conduct pre-final inspections to identify deficient areas of work, and develop a punch list of items requiring correction. Once all punch list items have been corrected, Sevenson and General Motors and their designated representatives will conduct a final inspection, noting any deficient areas of work. After correcting any deficiencies, General Motors and their designated representatives and Sevenson will conduct a final inspection, leading to acceptance of the work as complete.

The completion inspection(s) and any required deficiency corrections will be accomplished within the time stated for completion of the entire scope of work or any particular increment thereof if the project is divided into increments by separate completion dates.

iv. Field Testing Procedures

Sevenson will conduct field-testing to verify that control measures are adequate to provide a product that conforms to contract requirements.

Field-testing shall be conducted under the auspices of the QCM and he or his designee shall:

- Arrange for, or conduct, field testing in accordance with applicable test parameters (ASTM, etc.).
- Verify that facilities and testing equipment are available and comply with testing standards and ensure that testing facilities are validated.
- Check test equipment calibration data against certified standards.
- Verify that all tests are documented and submitted as part of quality control system reporting.
- Review all test documentation prior to submittal.

vi. Deficiency Tracking System

Throughout the course of the project, deficiencies will be recorded by use of a deficiency tracking system in which a master list of outstanding deficiencies will be maintained by the QCM.

The QCM will list any deficiencies noted during the course of project work and both Sevenson and General Motors and their designated representatives will sign-off when each deficiency is corrected. During the quality control portion of the weekly progress meeting, a review will be held to ensure that the master list of outstanding deficiencies is kept up to date. During these meetings, discussions will be held on the inspection, addition, corrective actions, re-inspection, and ultimate removal of items from the deficiency list. Minutes will be recorded and copies given to General Motors and their designated representatives. Both Sevenson and General Motors designated representatives will sign-off on the master list of outstanding deficiencies once appropriate corrective actions have been implemented.

vii. Submittals

The QCM will be responsible for the review and approval of submittals prior to their submittal to General Motors and their designated representatives. This includes reviews of materials and

suppliers' catalog cuts, as well as subcontractor submittals. The QCM will review the submittal for completeness and compliance with the contract specifications.

viii. DOCUMENTATION

All testing results will be recorded on the daily quality control report. Any concerns or deviations from the required material specifications and the actions taken to correct the problems will be noted on the report. Information recorded on the daily quality control report will include:

- Description of trades working on the project.
- Number of personnel.
- Equipment types used.
- Weather conditions.
- Types and numbers of tests performed.
- Results of testing.
- Delays encountered.
- Directions received from the QCM and actions taken.
- Health and safety issues or deficiencies and how they were resolved.

x. REVISIONS TO WORK

Sevenson will be responsible for ensuring total compliance of fieldwork to the project specifications. Should modifications or revisions to the specifications appear necessary, Sevenson will suggest these changes, in writing, to General Motors and their designated representatives. Approval from General Motors and their designated representatives must be received prior to allowing the suggested modifications or revisions to be made in the field. The QCM will be informed of and record all such requests in his daily log and on the daily quality control report.

xi. DEFINABLE FEATURES OF WORK

Listed below are the general categories and types of work that will be performed under this Remedial Action Work Plan. These items, known as Definable Features of Work, have been grouped into the various categories in which work will be performed. Suitable quality control methods and procedures will be utilized in order to ensure that all work is performed to the standards and quality required by the specifications.

- Work Task 1 – Preparation and Review of Contractor Submittals
- Work Task 2A – Project Meetings and Mobilization
- Work Task 2B – Site Preparation and Survey

- Work Task 3A – Excavation Support
- Work Task 3B – West Parcel Storm Sewer Pipe Cleaning
- Work Task 3C – Sediment Excavation and Stabilization
- Work Task 3D - Backfill
- Work Task 4 – Onsite Handling and Disposal
- Work Task 5 – Handling, Transportation, and Offsite Disposition of Waste Materials
- Work Task 6 – Temporary Water Treatment System (Water Management)
- Work Task 7 – Concrete Millings Cover over On-Site Disposal Area
- Work Task 8 – Site Controls – Turbidity Curtains and Booms
- Work Task 9 – Site Restoration/Demobilization

ARCADIS

Sevenson Environmental Services
Storm Sewer Cleanup Plan

SEWER CLEANING

It is Sevenson's intention to subcontract the sewer cleaning portion of the work to National Water Main Cleaning Company, which is a Carylon Company.

In 1949, National Power Rodding Corp. (the first of the Carylon companies) saw a need for better sewer cleaning equipment than was available at that time. As a result, they developed and patented the world's first heavy-duty "continuous rod" power rodder; an exceptional piece of machinery that proved to be far superior to anything on the market.

More than 60 years later, with its network of companies located throughout the U.S.A., the Carylon Corporation has grown to become the largest and most experienced industrial & municipal specialized maintenance contractor in the country.

SCOPE OF WORK

To conduct all field activities associated with the Cleaning and Closed Circuit Color Video Inspection of 4 inch through 48 inch sewers located at the former General Motors Facility in Sleepy Hollow, New York. There are approximately 10,000 Linear Feet of storm sewers to be inspected.

PERSONNEL

A Project Manager and an additional equipment operator will be mobilized to conduct the proposed site activities. All personnel have received OSHA 1910.120 HAZWOPER training in addition to other specialized training germane to the technical and specialized services we provide. This training includes

but is not limited to Confined Space Entry, Lock Out/Tag Out, Hazardous Communication/MSDS Safety, and Respirator Training. The Project Manager is also certified by the Board of Certified Safety Professionals (BCSP) and American Board of Industrial Hygienist (ABIH) Joint Committee as an Occupational Health and Safety Technologist (OHST) and has received the 8 hour Supervisor of Hazardous Waste Operations training.

All employees will hold current refresher certifications as well. If required, a complete list of equipment and safety training provided by National Water Main Cleaning Company for its employees can be supplied.

The Project Manager will have a minimum of 15 years experience in the coordination of activities on Hazardous Waste sites for the sewer cleaning and television inspection of underground piping, as well as extensive equipment and operations training. In addition these men attend weekly toolbox sessions regarding equipment operations and maintenance, work techniques, and health and safety. The Project Manager has also coordinated three previous projects in Puerto Rico which included the removal of metallic mercury from underground piping. (For additional information on Puerto Rico, see ERM - Northeast, Juncos, Puerto Rico Reference)

EQUIPMENT

Based on the available information given about the piping and customer requirements, the following equipment will be mobilized for completion of the scope of work.

Closed Circuit Color Television Equipment: This equipment will be capable of inspecting underground piping from 6 inch through 24 inch with access ranging from catch basins, headwalls, and manholes.

Main Line Multi-Angle Closed Circuit Color Camera (MAC): This unit is designed for six inch and larger diameter sewer mains with limited access through excavations, manholes, etc. (minimum 36 inch opening). The unit can function on the self-propelled crawler tractor.

The MAC camera shall have a high-resolution lens capable of spanning 360 degrees circumferentially and 270 degrees on the horizontal axis. Focal distance is adjustable through a range of one inch to infinity. The purpose of the rotating head camera is to view all service connections, and to locate all defects, as well as any questionable problem areas. The MAC lets you look directly at each observation to assist in making better assessments.

All camera equipment is specifically designed and constructed for the purpose of televising sewers.

Additional camera lighting will be supplied where feasible to ensure a clear, continuously in-focus picture of the entire periphery of the sewer pipe for all conditions encountered during the work. The camera is able to operate in 100 % humidity conditions.

The camera, television monitor and all other necessary components of the video system shall be capable of producing minimum 350 lines of resolution color video picture.

The findings of the sewer inspection shall be recorded on narrated videotape using VHS format and CD/DVD Digital Format simultaneously. Videotapes shall be high quality color and recorded in the SP mode and the Digital Recordings will be captured in MPEG 2 or MPEG 4 depending on Customer Storage capabilities.

At the end of the job, additional tapes and reports will be generated up to 4 copies at no additional charge. Copies beyond that will be negotiated.

Combination Vactor Jet Rodder: Water Pump: (2500 PSI@ 125 GPM), Industrial Vacuum Pump: (4000-5000 CFM)

This unit will be equipped with a variety of nozzles of various sizes and orifice configurations for sewer cleaning. The unit comes equipped with a one inch hose approximately 500 linear feet long. In addition, three-quarter inch and half inch hoses will be supplied for small diameter pipes. Dyes for tracing the sewers of unknown destination will be supplied to assist in mapping the systems. This truck will also come equipped with approximately 20 feet of 8 inch aluminum vacuum tubes.

WORK PROCEDURE

A crew, consisting of a Job Foreman/Operator and additional Operators and laborers, with a Combination Vactor Jet Rodder (Jet-Vac), Industrial Vactor, CCTV Television Inspection Truck equipped with a closed circuit color mini camera and Multi-Angle Camera (MAC) will be mobilized to perform the work.

Prior to the start of the Cleaning and CCTV Operation, Sevenson Environmental will construct a coffer dam or other method to isolate the outfall system. National Water Main Cleaning Company will provide pumping systems to divert the flow from one sub-system to an adjacent system in an effort to dewater the piping for proper cleaning and inspection. Note: No work will be conducted during rain events and all plugging provided by NWMCC will be removed at the conclusion of each day restoring the drainage system to normal operation.

Once the crew is mobilized, a local fire hydrant (city water or fire suppression system) will be accessed and fresh water will be fed to the 1500 gallon reservoir. Upon filling with water, the Combination Vactor Jet Rodder (Jet Vac) and Industrial Vactors will be moved into position on a manhole to perform work on the sewers.

Once the Jet Vac is in position, our jet nozzle will be inserted into the downstream manhole in the upstream sewer line. The water pressure will be turned on and the hose will propel itself toward the upstream manhole. The hose will then be retracted using a hydraulic motor attached to our hose reel. As the combination of liquid and solid waste flow into the downstream manhole, it will be removed by the Jet Vac and collected in a 7 – 12 cubic yard watertight debris box mounted on the truck. Continuous cleaning passes will be made on each individual sewer reach until such time as the line is clean.

Once the Jet Vac reaches capacity of liquid and solids, the liquid waste will be decanted off the Jet Vac back into the sewer through a rubber return line, leaving moist sediment on the truck.

The process of vacuum loading the Jet Vac and decanting will be repeated until such time as the truck is nearly 100 percent full of moist sediment. At this time the truck will be moved to a staging area and the solids will be deposited at a customer/owner designated location.

A variety of cleaning tools, from rotating nozzles to forward penetrating nozzles, will be used to flush materials through the interior sewers to at least the first manhole outside of a building. At this point, vacuum removal of solids can be done if necessary.

At the conclusion of the cleaning operation, a Closed Circuit Color Camera will be utilized to verify the effectiveness of the cleaning operation and to determine the structural integrity of the sewer system.

The video inspection equipment will be set in place on the upstream manhole or cleanout. If the upstream access point is not feasible, then we will use the downstream access point and the camera will be passed between the two manholes or cleanouts. If conditions are ideal, a straight pipe from a manhole to a manhole or a manhole to a clean-out, then it is our intention to use our Multi-Angle Camera (MAC) main line system to conduct the inspection. In lines with deflections or elbows, where the MAC camera cannot pass, we will use the alternative closed circuit color mini camera system to conduct the inspection. The mini cameras do not have the pan and tilt head capability.

The multi-angle cameras will pass between manholes on self-propelled tractors controlled within the TV studio. The mini cameras also have the capability of using a self-propelled tractor if access permits. Generally, because of restricted access, these cameras are pushed with fiberglass rods or the sewer is threaded and the camera is pulled. Access conditions will determine which technique is used.

There will be onscreen information, such as date, job and location name, upstream and downstream manhole or cleanout numbers, continuous footage readout to track location or any other data you feel is important to the job. In addition, a sensor can be attached to the camera which will transmit a signal above ground to trace the camera route if desired.

All observations will be recorded on color video tapes with an audio commentary and also in an MPEG-1 Digital Video format. Computer-generated television Inspection Reports and MH Inspection Reports will be produced at the conclusion of each reach of sewer inspected. Two copies of the tape and reports will be submitted upon completion of the work.

Should the CCTV inspection prove that the sewer lines under inspection are blocked by sediment or debris and with authorization from the client, cleaning activities will begin at the farthest upstream

manhole or cleanout and work in a downstream direction from there. This procedure will prevent passing any debris from a dirty sewer into one already cleaned.

For the work required, National Water Main Cleaning Company will furnish:

1. All necessary personnel, supervision, and equipment to perform the work
2. Confined Space Equipment (as required)
3. Transportation of men and equipment to and from the job site;
4. Four computer generated type written inspection reports and Four digital video (CD/DVD) copies with our findings upon completion of the work. Additional Videotapes and CD/DVD copies will incur an additional fee; and
5. All Confined Space Entries will be made in accordance with OSHA Regulations (29CFR1910.146) and in full compliance with the On Site GM Health and Safety requirements as provided by Sevenson Environmental.

Once all of the sewer cleaning work has been confirmed clean by GM or its on-site representative, the sewer cleaning equipment will be thoroughly decontaminated at the primary material staging pad and will be inspected by the on-site Health and Safety Officer, who will verify that the equipment is clean and ready for removal from the site.

SEWER CLEANING CONTAINMENT STRUCTURE

As noted in the work procedure above, it is National's intent to start with the up gradient pipes and work downstream, cleaning sections as they go.

Some of the downstream sections, particularly the 48" section that discharges at the outfall structure, will be cleaned into a containment structure that will be installed prior to the sewer cleaning work.

Please see figure 4 for the layout and details associated with this containment structure.

The containment system will consist of steel sheet piling that will be installed in addition to the temporary excavation support sheeting that will be installed along the bulkhead and the GM property in which dredging will be performed.

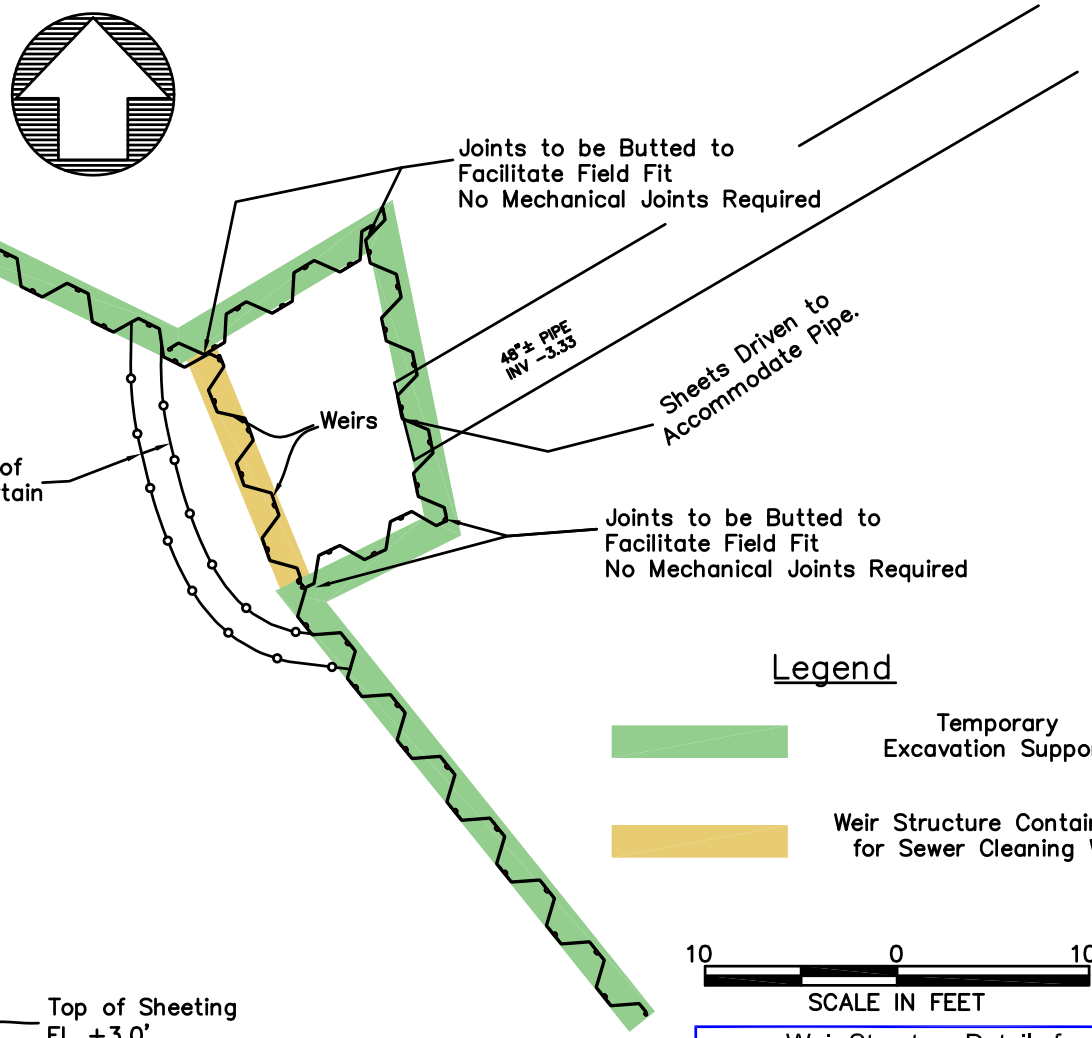
The temporary excavation support sheeting at the outfall will be driven to an elevation just below the invert elevation of the outfall pipe. Sevenson will then install additional sheeting to essentially "close off" an area directly in front of the outfall to contain any water and sediments that are discharged from the sewer cleaning work and any bypass waters as necessary.

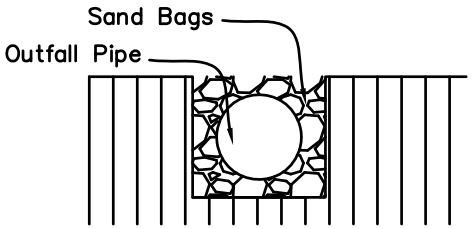
As you can see from the detail, the sheeting will be installed with two weirs installed at an elevation to promote settling within the contained area. An additional two rows of silt curtain will be installed as further protection against any turbid water that may flow over the weir structure.

It is important to note that all sewer cleaning work will be completed prior to dredging activities. Therefore, the settled sediments will be removed from an area that requires dredging anyway. These sediments, as they accumulate, will be removed with a long stick excavator and placed on the lined staging area located on GM property for proper handing and testing.

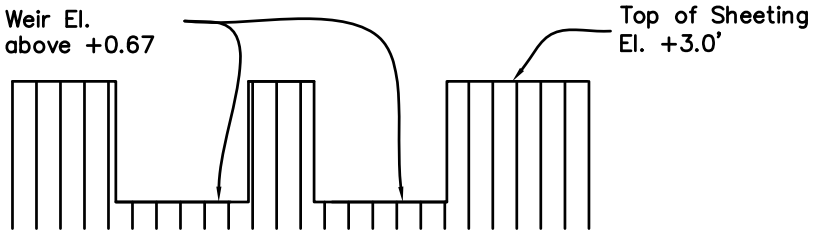
It is also important to note that the double row of silt curtain just outside the weir structure will be installed in addition to the turbidity containment structure fully encompassing the dredge area.

Top of Sheeting	3.00
MHHW	2.08
Top of Pipe	0.67
Weir Elev.	0.67
Pipe Invert	-3.33





Profile of Outfall Sheeting
Not to Scale



Profile of Sheeting Weir
Not to Scale

Legend

Temporary
Excavation Support

Weir Structure Containment
for Sewer Cleaning Work

10 0 10

SCALE IN FEET

Weir Structure Details for
Sewer Cleaning Containment

General Motors, LLC
Sediment Remediation
Sleepy Hollow, New York
LOCATION

SEVENSON
ENVIRONMENTAL
SERVICES, INC.

Figure
4

DATE:	10/4/12
DRAWN BY:	C. Bigelow
CHECKED BY:	J. Pazderski
CAD FILE:	Sump
SCALE:	As Shown

ARCADIS

Sevenson Environmental Services
Glynn Geotechnical Engineering

Excavation Support Plan

Civil • Structural • Geotechnical • Materials Testing • Consulting

Former General Motors Assembly Plant
Sediment Remediation
Sleepy Hollow, NY

Temporary Excavation Support & Turbidity Barrier Kingpile Design

prepared for:
Sevenson Environmental Services, Inc.
2749 Lockport Rd.
Niagara Falls, New York 14305

prepared by:
Glynn Geotechnical Engineering
415 South Transit Street
Lockport, New York 14094

GGE 10-1043B

October 15, 2012

Former GM Plant, Sediment Remediation ,
Sleepy Hollow, NY
Temporary Excavation Support / Barrier Curtain Kingpiles
GGE No. 10-1043-B

October 15, 2012
Design Submittal

Civil • Structural • Geotechnical • Materials Testing • Consulting

Project Description

This submittal provides design analyses and calculations for (1) a temporary excavation support wall along the shore side of the sediment removal area, and (2) kingpiles to support a turbidity curtain along the river side of the sediment removal area at the Former GM Assembly Plant site in Sleepy Hollow, NY. The design provided herein is based project drawings dated July 2012, prepared by Arcadis of New York, and additional project information also provided by Arcadis. The additional project information provided by Arcadis included historical information for this site, including boring logs, and previous engineering evaluations by others. The historical subsurface information and soil conditions were used as the basis for the design analyses relative to the temporary shoring.

Temporary Excavation Support

The design for the temporary excavation support uses cantilevered steel sheet piling installed along the alignment shown on Arcadis drawing G-200. The design analyses referenced cross-sections A-A' and C-C' shown on drawings G-300 and G-301, resp. The design included development of a design section geometry, estimation of design soil parameters, and an analysis of a cantilevered sheet pile support system using "SupportIT" computer software.

Based on historical soil investigation and design evaluation data, soil conditions at the proposed sheet piling driveline are generally estimated to consist of loose to med. dense, sand/silty-sand overlying med. dense to dense, sand and gravel to the underlying Schist bedrock at a depth of approximately twenty-feet below the existing surface of the sediment. The design analyses model considered a uniform, loose, fine sand for analysis of the cantilevered support system using Rankine earth pressure coefficients. Design results and notes follow:

1. Cantilevered sheet piling shall be driven to a tip el. of -24, or deeper, which provides toe depths of fourteen feet (14') and eleven feet (11') referencing cross-sections A-A' and C-C', respectively.
2. Based on a top of sheet (TOS) el. at +3.0 (0.92' above MHW), twenty-seven foot long sheets are required.
3. The design analyses considered AZ18, A328 which exceeded the evaluated flexural strength and stiffness criteria of the design. Acceptable sheet piling sections shall provide a minimum section modulus, Z, of 24.2 in^3/ft, a min. moment if inertia, I, of 144 in^4/ft and comply with, or exceed, ASTM A328 material specifications. SES will use AZ-18, AZ-19, and AZ-26 Sheet pile sections for the excavation support. Each of these sections meet the structural requirements for the temporary shoring system as designed.
4. Weirs or "windows" should be provided in the sheet piling above the MLW el. (-1.87) to maintain equivalent water levels on both sides of the shore wall.

5. The design analyses used a reduction factor of 1.3 applied to the passive earth resistance coefficients.
6. Referenced borings indicate rock at approximate el. -27 which is three feet (3') below the target tip el.

Additional notes and specification relative to the temporary excavation support system are provided on design submittal drawing S2.

Barrier Curtain Kingpiles

The design for barrier curtain support at the riverside of the dredge area uses driven, cantilevered HP kingpiles. The cantilevered kingpile design is based on a water depth of 11.08' and a flow velocity of 3 fps referencing stream velocity data from the USGSS website. The kingpile design analysis includes both hand calculations as well as "SupportIT computer analyses. SES will use 51.5' long, ASTM A500, Gr 42 16" dia. x 0.844" wall monopiles for the kingpiles. These far exceed the structural capacity and minimum toe embedment requirements of the design. Minimum toe embedment depths are provided for various pile spacing's for barrier curtain segments oriented both parallel, and at a 45°, to the direction of flow. The required embedment vs. spacing is provided in the following table.

Barrier Curtain Segments Oriented at not more 45° to the Direction of Flow

Kingpile Spacing	Min. Toe Embedment
30'	13'
40'	15'
80'	20'

Barrier Curtain Segments Parallel to the Direction of Flow

Kingpile Spacing	Min. Toe Embedment
50'	8'
80'	10'

Attachments included within, and comprising the entirety of, this report are listed following:

Attachment A - Reference Subsurface Soil Information (8 shts.)
Attachment B - Temporary Shoring Design Analyses (14 shts.)
Attachment C - Turbidity Barrier Kingpile Design Analyses (20 shts.)
Shoring Design Drawings S1 and S2

Civil • Structural • Geotechnical • Materials Testing • Consulting

Attachment A

Former General Motors Assembly Plant
Sediment Remediation
Sleepy Hollow, NY

Temporary Excavation Support &
Turbidity Barrier Kingpile Design

Referenced Subsurface Soil Information (8 shts.)

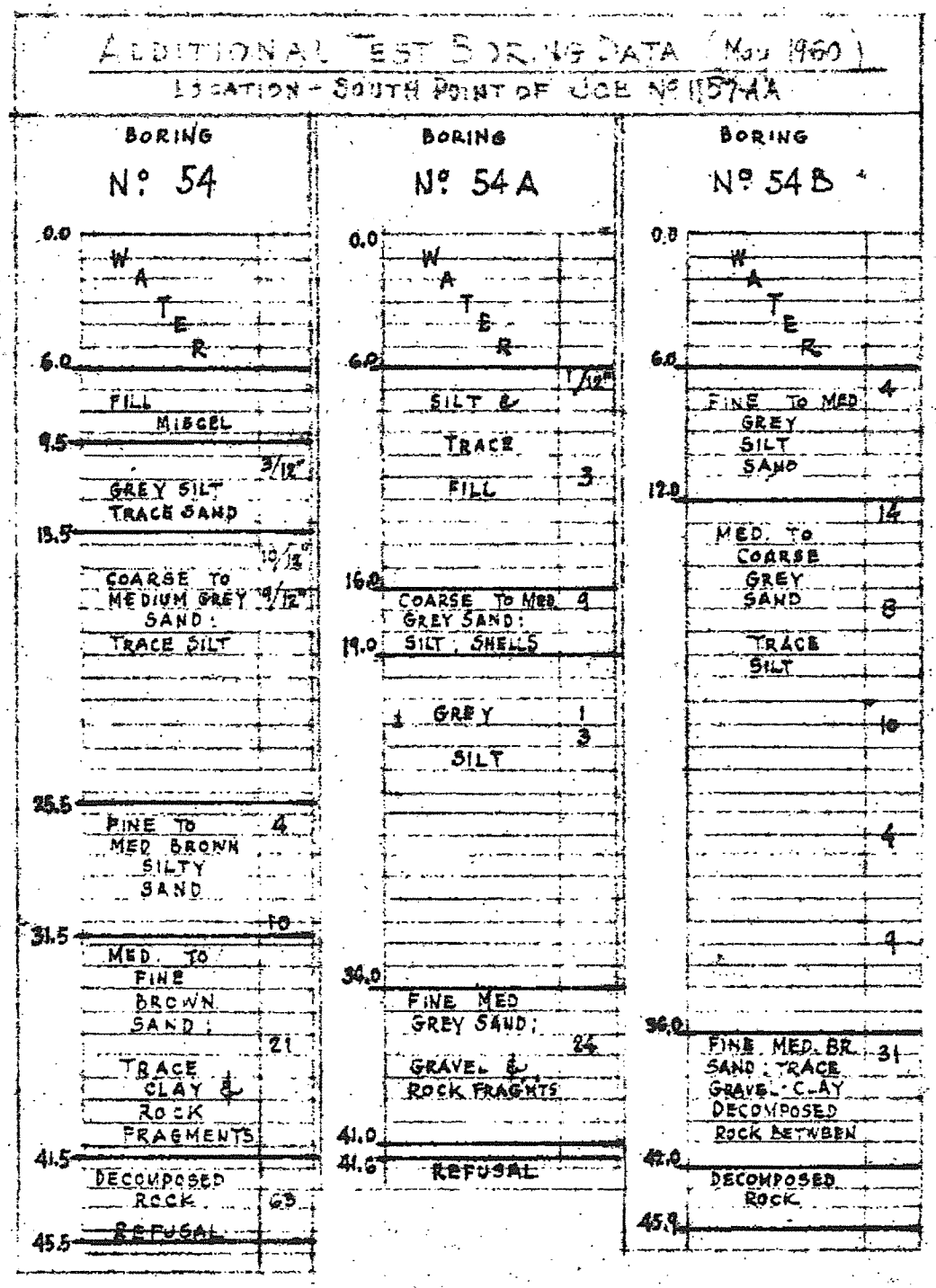
GGE 06-1103-B

October 15, 2012

GGE
a member of the GLYNN GROUP

ADDITIONAL TEST BORING DATA (May 1960)

LOCATION - SOUTH POINT OF JOB No. 1157-AA

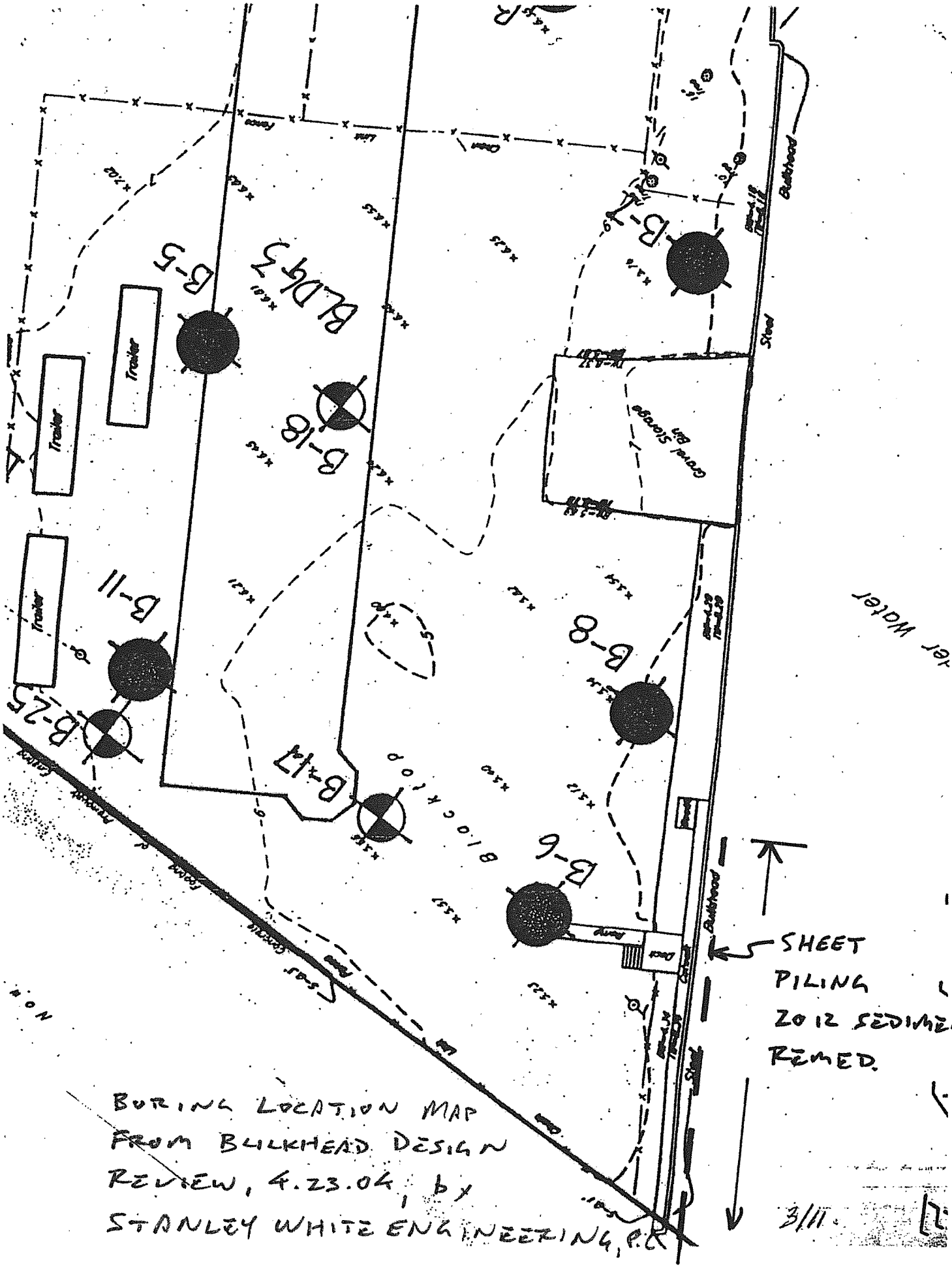


GENERAL NOTES:

1. All borings are plotted to a scale of 1 inch = 8'-0" using Mean Low Water (M.L.W.) as datum 3' 0.0"
2. Soil classifications are made by visual inspection.
3. Figures in right hand column indicate number of blows required to drive 2" O.D. casing pipe one foot using 140 pound weight falling 30 inches.
4. All Boring Data taken from Raymond Concrete File No. Report dated: May 1960.
5. Borings are indicated by symbol thus ⊙ as shown on plan.

TEST BORING LOGS FROM DWG. 1-S FOR NEW 48" STORM SEWER EXTENSION by GEO. H. MIENLE P.E.

side lines

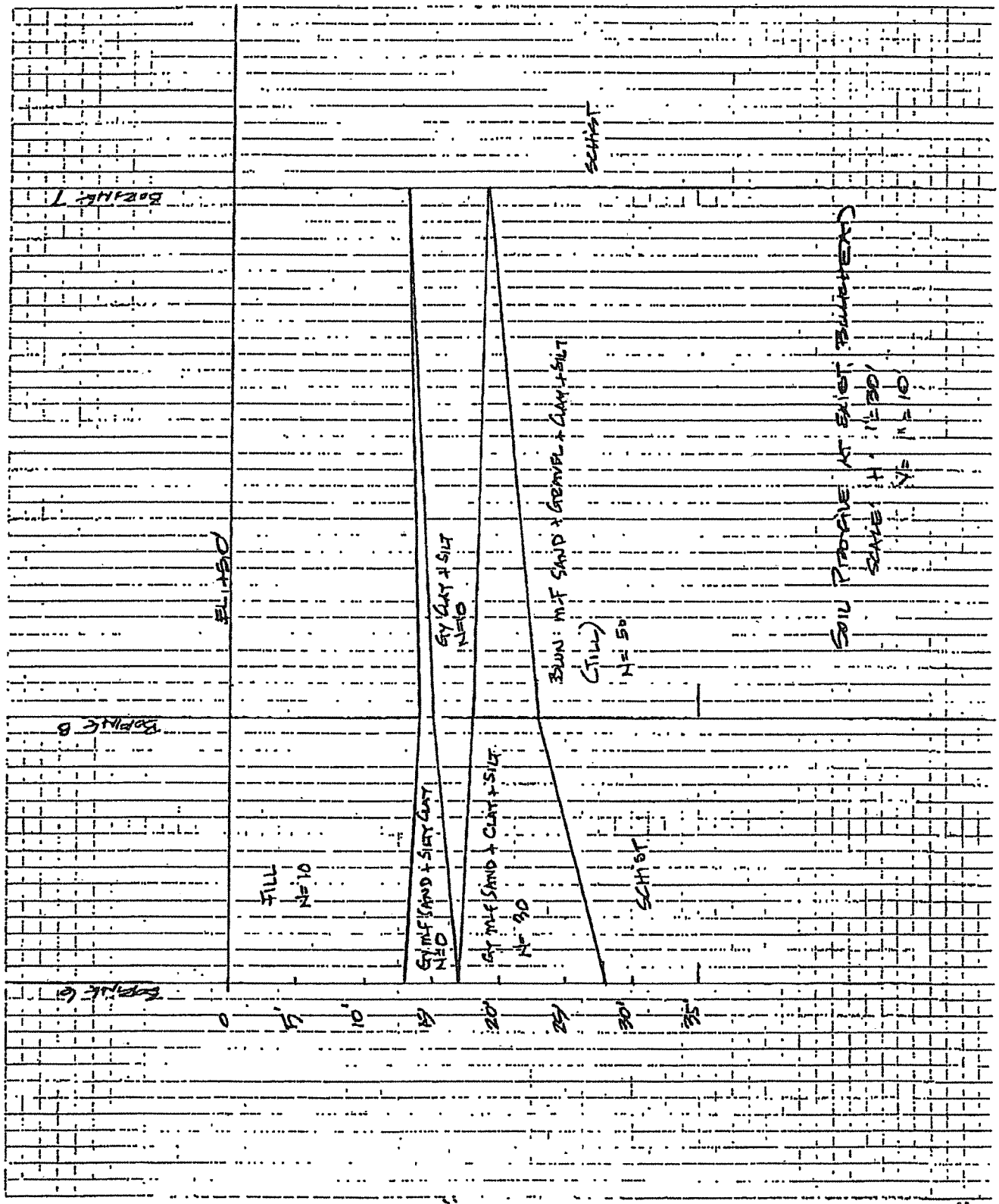


BORING LOCATION MAP FROM BULKHEAD DESIGN REVIEW, 4.23.04, by STANLEY WHITE ENGINEERING, P.C.

OCEAN AND COASTAL CONSULTANTS INC.

PROJECT ICHABOD'S LANDING
SUBJECT

SHEET NO. 12 OF 20
JOB NO. 99024 TASK NO. 7
MADE BY AM DATE 3-22-04
CHKD. BY DATE



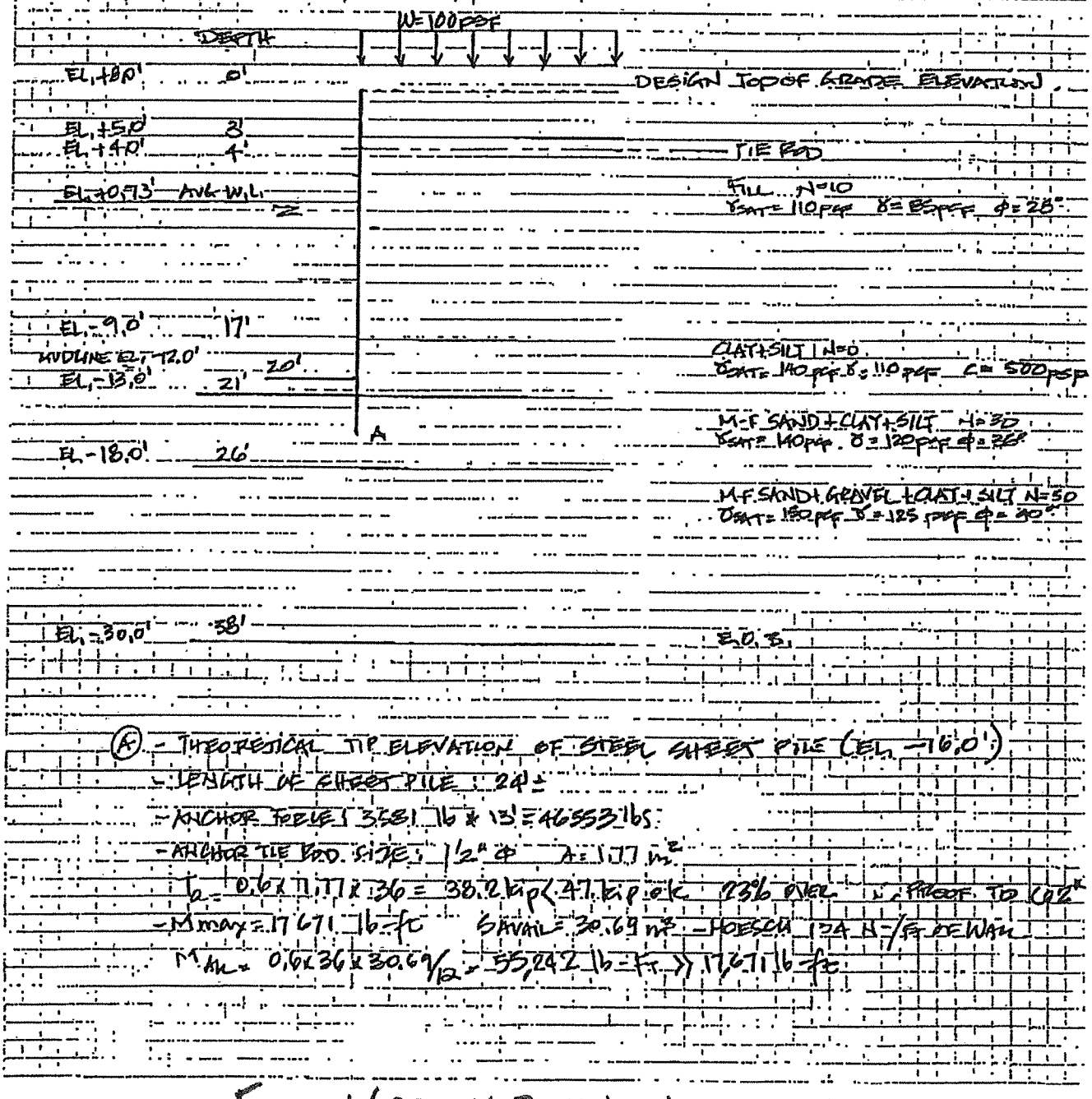
FROM 4.23.04 BULKHEAD DESIGN REVIEW by STANLEY WHITE ENGINEERING, P.C.

OCEAN AND COASTAL CONSULTANTS INC

PROJECT Ichabod's Landing
SUBJECT

SHEET NO. 3 OF 20
JOB NO. 99024 TASK NO. 7
MADE BY AM DATE 3-22-04
CHKD. BY TD DATE 4.20.04

INPUT PARAMETERS FOR ANALYSIS OF EXISTING BULKHEAD



(A) - THEORETICAL TIP ELEVATION OF STEEL SHEET PILE (EL.-16.0')
- LENGTH OF SHEET PILE : 24±
- ANCHOR FORCE : 3581 lb * 13' = 46553 lbs
- ANCHOR TIE ROD SIZE : 1 1/2" φ A = 1.77 in²
T_a = 0.6 x 1.77 x 36 = 38.2 kip < 47 kip o.k. 23% over ; PROOF TO 60%
- Mmax = 17671 lb-ft S AVAIL = 30.69 in³ - HOESCH 12A H-/ft SHEETPILE WALL
M_{AL} = 0.6 x 36 x 30.69 / 12 = 55,242 lb-ft >> 17,671 lb-ft

From 4.23.04 Bulkhead Design Review
by Stanley Whitman Engineering PC

TECTONIC ENGINEERING CONSULTANTS P.C.

PROJECT No. 2422.02
PROJECT: Cooney Property
LOCATION: Sleepy Hollow, New York

BORING No. B-6

13/20

SHEET No. 1 of 2

CLIENT: Ginsburg Development
CONTRACTOR: Craig Test Borings, Inc.
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | 3 7/8" | 14' TO 35'
CASING: | 4" | 0 TO 14'
DIAMOND CORE: | | TO

GROUND WATER: DATE 7/20/99 | TIME 9:00 am | DEPTH 5"

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: TO
WEATHER: Clear TEMP: 75 F
DEPTH TO ROCK: 28.5'
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: Myron Chaplin
DRILLER: Dave Cooke
SURFACE ELEVATION: 5.3
DATUM: See Remarks
DATE START: 7/20/99
DATE FINISH: 7/20/99

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ⊖ 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊖ | LIQUID LIMIT % Δ
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. ROD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY	ELEVATION (FT.)
1								Asphalt		
2	38	25 21 17 28	S-1	17		M	SM	Gy bwn c-f SAND, some c-f Gravel, little Silt,includes brick & asphalt (FILL)		
3										
4	22	20 14 8 8	S-2	12		M	SM	Same		
5										0.3
6	4	5 3 1 7	S-3	8		W	SM	Same		
7										
8	5	8 2 3 5	S-4	20		W	SM	Same Bwn m-f SAND, little c-f Gavel, little Silt (possible FILL)		
9										
10	8	2 3 5 9	S-5	24		W	SM	Same		
11										
12										
13										
14										
15										-9.7
16	1	1 1 0 1	S-6	24		W	SC	Gy f SAND and Silty Clay, little shells		
17										
18										
19										
20										-14.7
21	1	WOH WOH 1 47	S-7	18		W	SM	Gy m-f SAND, some Clay & Silt, trace c-f Gravel, trace Organics, occasional thin layers of Silt		
22										
23										
24										
25										-19.7

REMARKS: *from split spoon sample

From 4.23.04 Bulkhead Design Review by Stanley White Engineering P.C.

TECTONIC ENGINEERING CONSULTANTS P.C.

PROJECT No. 2422.02
PROJECT: Cooney Property
LOCATION: Sleepy Hollow, New York

BORING No. B-6

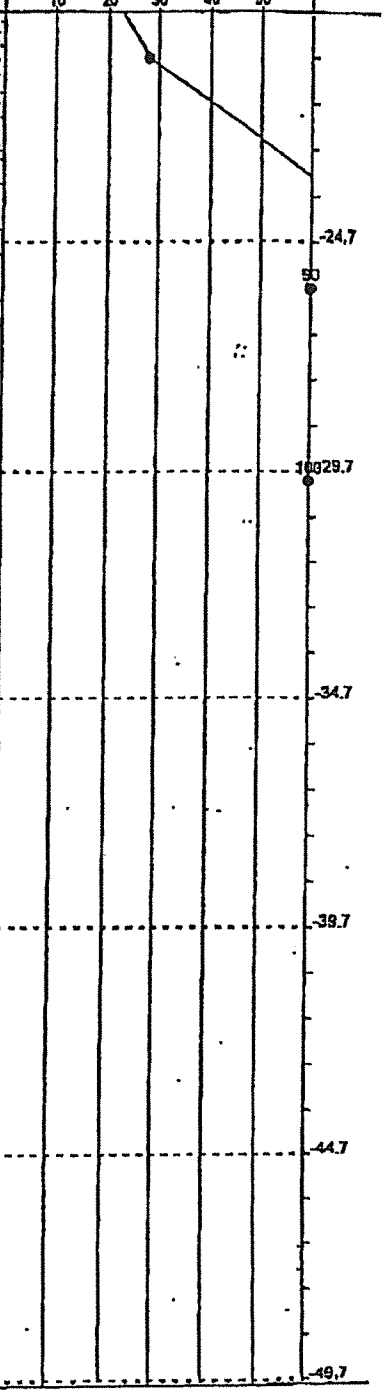
14/20

SHEET No. 2 of 2

CLIENT: Ginsburg Development
CONTRACTOR: Craig Test Borings, Inc.

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BLS IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: ROD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	28	19 16 12 9	S-8	8		W	SM	Brwn c-f SAND and c-f Gravel, little Silt (micaceous)		
27										
28										
29										
30										-24.7
31	90	19 38 52 24	S-9	8		W		Gy & Or c-m grained highly westhered, soft to very soft GRANITE and SCHIST		
32										
33										
34										
35	100+	100/5"	S-10	5		W	SP	Same		-29.7
36								End of Boring at 35.4'		
37										
38										
39										
40										-34.7
41										
42										
43										
44										
45										-39.7
46										
47										
48										
49										
50										-44.7
51										
52										
53										
54										
55										-49.7

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ⊕ — 1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % — × — ⊙ — △ — 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● — 10 20 30 40 50



REMARKS: *from split spoon sample

From 4.23.04 Bulkhead Design Review by Stanley White Engineering, P.C.

TECTONIC ENGINEERING CONSULTANTS P.C.

PROJECT No. 2422.02
PROJECT: Cooney Property
LOCATION: Sleepy Hollow, New York

BORING No. B-8

15/20

SHEET No. 1 of 2

CLIENT: Ginsburg Development
CONTRACTOR: General Borings, Inc.

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 30'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

GROUND WATER	DATE	TIME	DEPTH
	11/19/01	12:00 pm	6'
			▼

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: TO
WEATHER: Overcast TEMP: 40 F
DEPTH TO ROCK: 30' (completely weathered)
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: Mustafa Mengel
DRILLER: Ed Palkay
SURFACE ELEVATION: 8.0
DATUM: See Remarks
DATE START: 11/19/01
DATE FINISH: 11/19/01

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % X — WATER CONTENT % B — LIQUID LIMIT % Δ
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BLS/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								8" Asphalt pavement		
2	50	15 21 29 47	S-1	8		M	SP-SM	Dk Brwn c-f SAND, some c-f Gravel, trace Silt (FILL)		8.0
3	100+	100/2"	S-2	NR				No recovery, refusal on apparent cobble or boulder		
4										
5										0.0
6	3	4 1 2 2	S-3	3		W	SP-SM	Brwn c-f SAND, little c-f Gravel, trace Silt, with shells (FILL)		
7										
8	14	11 10 4 1	S-4	5		W	SP-SM	Same with trace wood (FILL)		
9										
10	4	1 3 1 2	S-5	8		W	ML	Dk Gy SILT, and f Sand with wood & organics (FILL)		-5.0
11										
12	15	5 7 8 8	S-6	14		W	SM	Dk gy m-f SAND and Silt with trace wood & glass and organics (FILL)		
13										
14	5	2 3 2 3	S-7	18		W	SM	Top 12", same (FILL)		
15								Dk gy f SAND, some Silt, trace f Gravel, trace decomposed organics		-10.0
16			U-1	22		W	CL	Undisturbed sample from 15'-17' - Gy CLAY & SILT, trace f Sand with shell fragments		
17										
18	11	5 6 5 4	S-8	20		W	CL SC	Top 12", Same		
19								Gy m-f SAND, some Clay and Silt, trace f Gravel		
20	19	5 7 12 7	S-9	20		W	SC	Same		-15.0
21										
22										
23										
24										
25										-20.0

REMARKS: Surface elevation estimated from untitled plan provided by the client.

From 4.23.04 Bulkhead Design Review by Stanley White Engineering, P.C.

TECTONIC ENGINEERING CONSULTANTS P.C.

PROJECT No. 2422.02
PROJECT: Cooney Property
LOCATION: Sleepy Hollow, New York

BORING No. B-8

10/20

SHEET No. 2 of 2

CLIENT: Ginsburg Development

CONTRACTOR: General Borings, Inc.

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BLS IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: ROD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY
26	79	23 29 50 78	S-10	19		W	SM	Brwn m-f SAND, little f Gravel, little Clayey Silt (TILL)	
27									
28									
29									
30									
31	112	27 55 57 60	S-11	17		W	SP	Same, with trace Silt (micaceous) (apparent completely weathered schist bedrock)	
32								End of Boring at 32'	
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊙ — LIQUID LIMIT % △ 10 20 30 40 50

● STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

ELEVATION (FT.)

79

112

-25.0

-30.0

-35.0

-40.0

-45.0

-50.0

REMARKS: Surface elevation estimated from unfilled plan provided by the client.

From 4.23.04 Bulkhead Design Review by Stanley White Engineering, P.C.

Civil • Structural • Geotechnical • Materials Testing • Consulting

Attachment B

Former General Motors Assembly Plant
Sediment Remediation
Sleepy Hollow, NY

Temporary Excavation Support &
Turbidity Barrier Kingpile Design

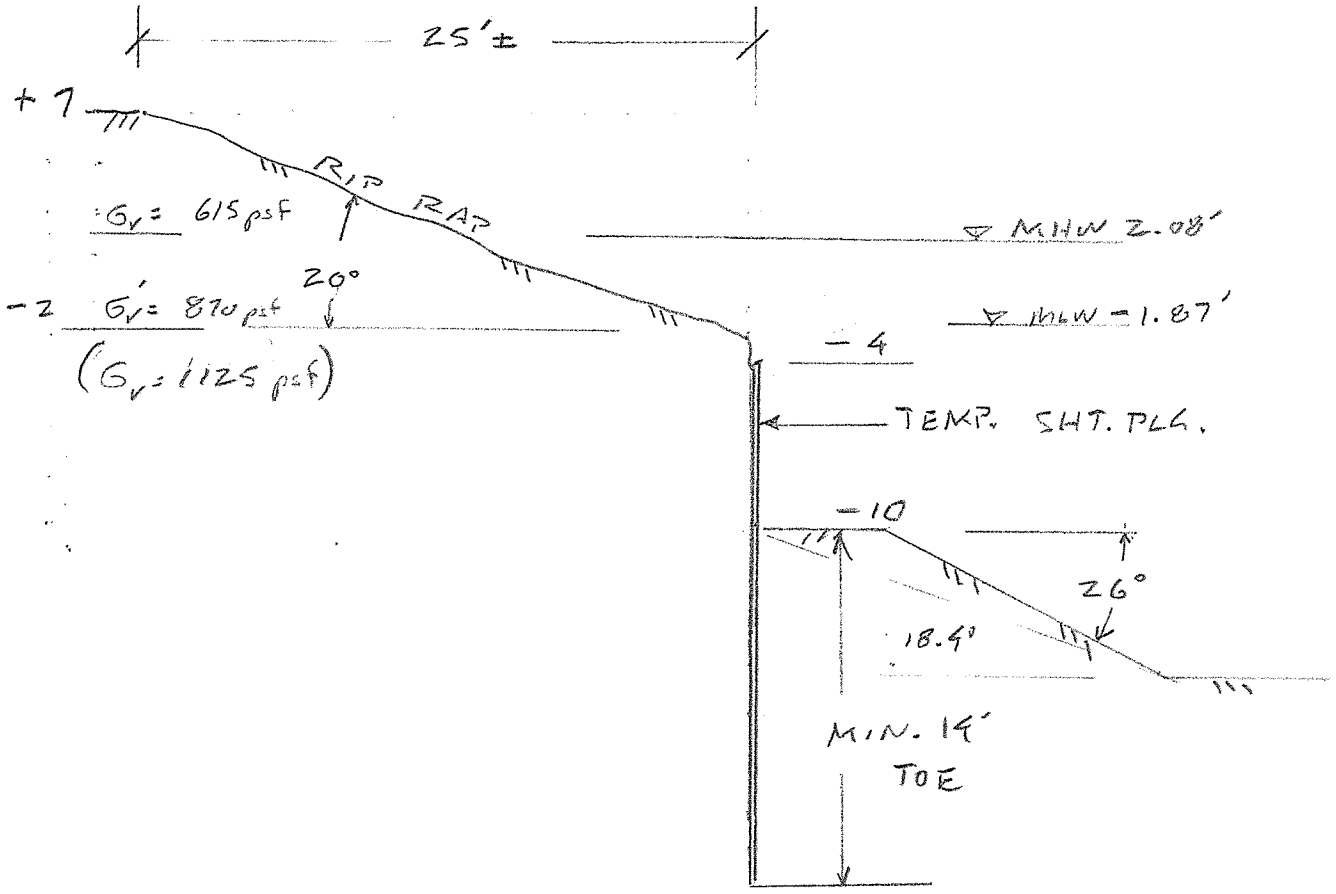
Temporary Shoring Design Analyses
(14 shts.)

GGE 06-1103-B

October 15, 2012

a member of the GLYNN GROUP

DESIGN @ SECTION A-A



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ENGINEERING · DESIGN
GLYNN GEOTECHNICAL ENGINEERING
415 South Transit Street
Lockport, New York 14094
voice 716.625.6933 / fax 716.625.6983
www.glynngroup.com

PROJECT: SLEEPY HOLLOW GAS PLANT			SHEET NO: 1 / 14
SUBJECT: SEDIMENT REMOVAL SHORING			
CLIENT: SEVENSON			
PROJECT NO: 06-1103-B	SCALE: -	DATE: 4.31.12	BY: LG

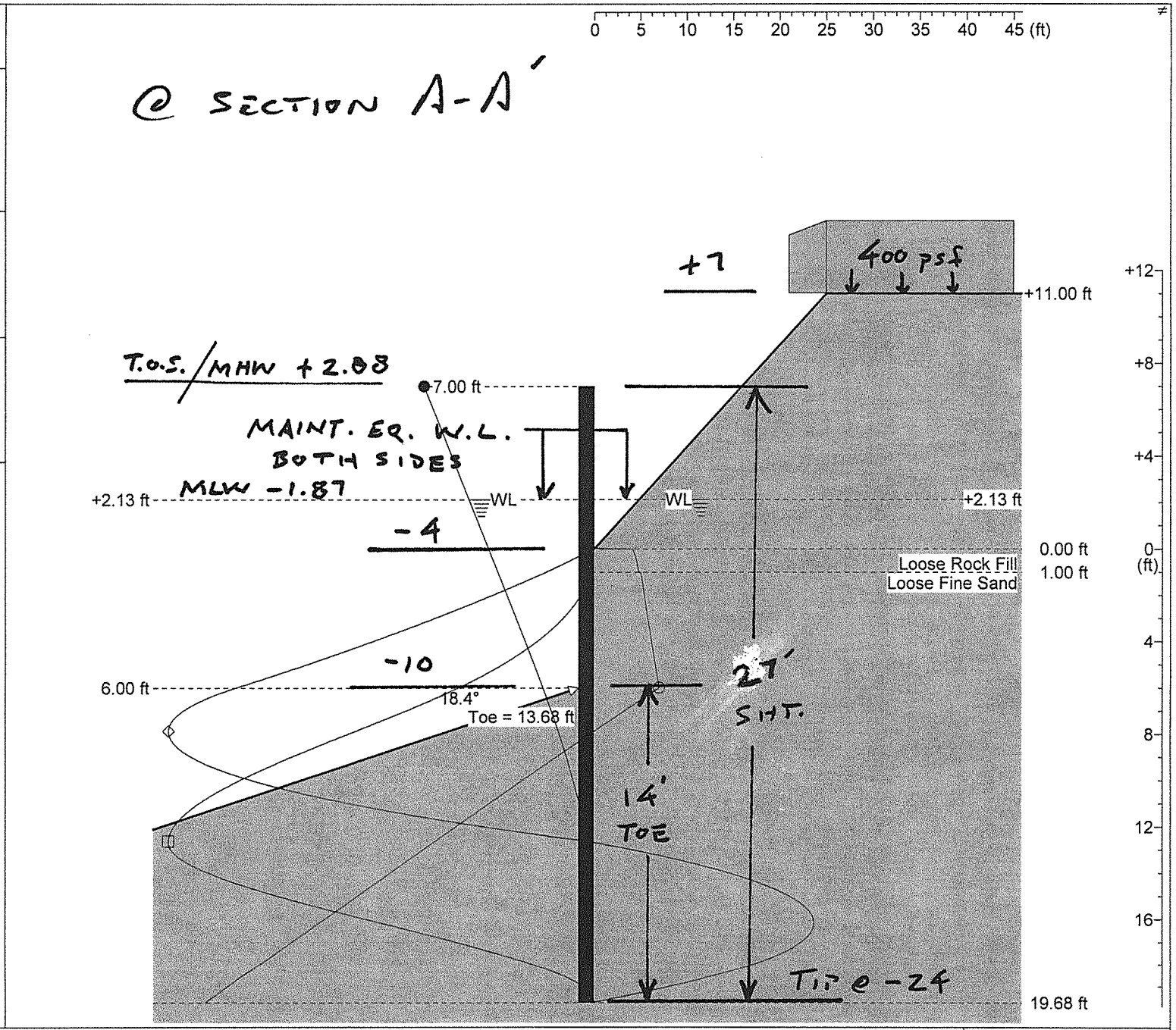
Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section A-A'
Designer: jeg
Ref: 06-1103-B
Page: 1
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 ($K_p \div 1.3$; $C_{pas} \div 1.3$)
Toe: Cantilever

Maximum	d (ft)
○ 208.8 psf	6.00
□ 8946.3 ftlb/ft	12.63
◇ 1226.9 lb/ft	7.88
● 0.3 in	-7.00

Excavation Support at Section A-A
T.O.S. at +3.0
MLW El. -1.87



Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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21

Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section A-A'
Designer: jeg
Ref: 06-1103-B
Page: 3
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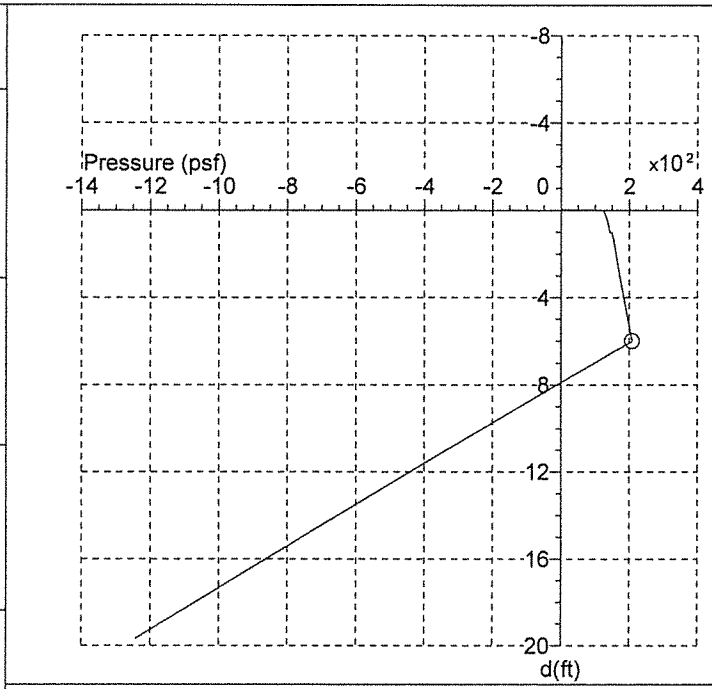
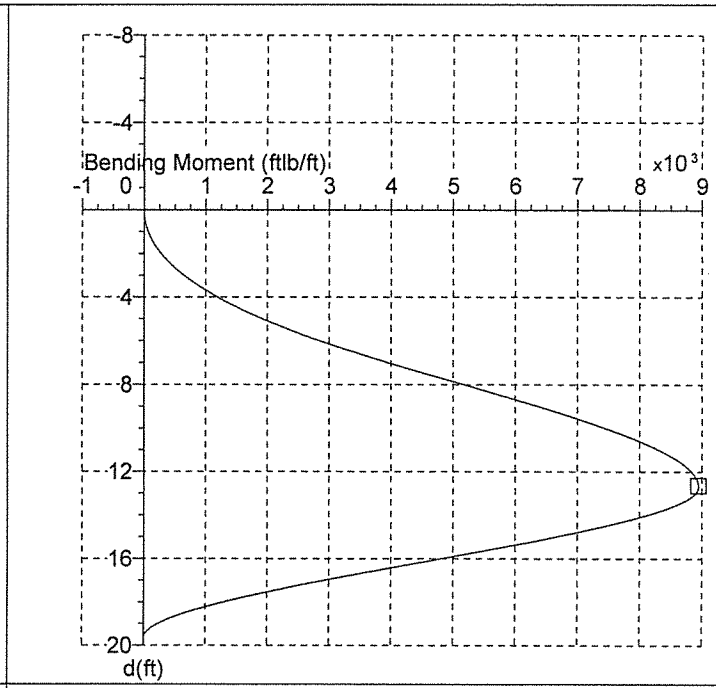
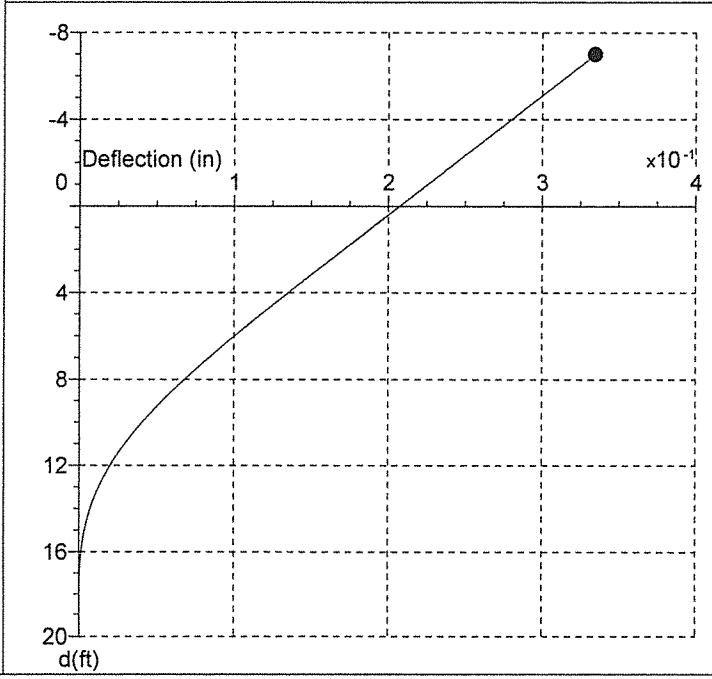
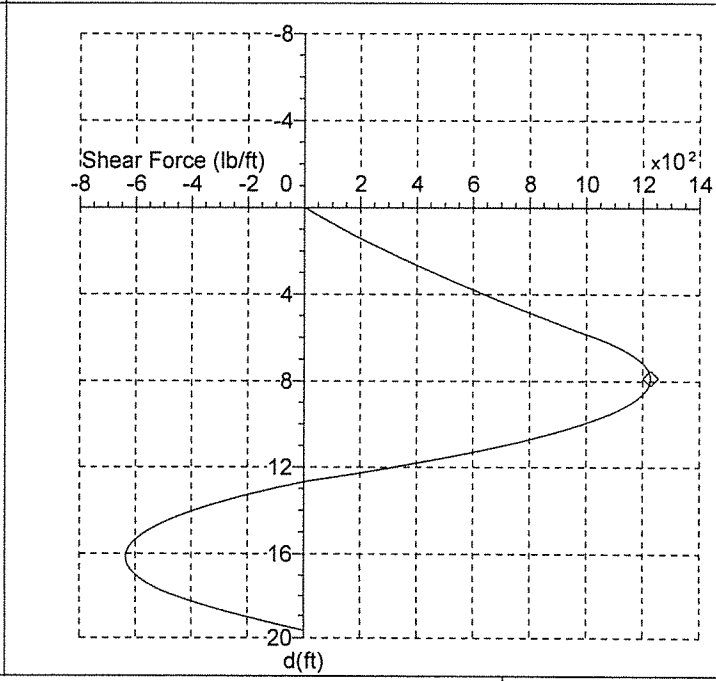
○	208.8 psf	6.00
□	8946.3 ftlb/ft	12.63
◇	1226.9 lb/ft	7.88
●	0.3 in	-7.00

Excavation Support at Section A-A
T.O.S. at +3.0
MLW El. -1.87









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Fax: 716.625.6983
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4-1

Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section A-A'
Designer: jeg
Ref: 06-1103-B
Page: 2
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 (K_p÷1.3; C_{pas}÷1.3)
Toe: Cantilever

Excavation Support at Section A-A
T.O.S. at +3.0
MLW El. -1.87

Input Data

Depth Of Excavation = 6.00ft
Surcharge = 0.0psf
Depth Of Active Water = +2.13ft
Depth Of Passive Water = +2.13ft
Slope (passive) = 18.4degrees
Water Density = 62.43pcf
Minimum Fluid Density = 31.80pcf

Soil Profile — Active Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	φ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Loose Rock Fill	120.00	62.37	0.0	0.0	40.0	0.0	0.22	0.00	4.60	0.00
1.00	Loose Fine Sand	109.20	65.55	0.0	0.0	30.0	0.0	0.33	0.00	3.00	0.00

Soil Profile — Passive Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	φ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Loose Rock Fill	120.00	62.37	0.0	0.0	40.0	0.0	0.22	0.00	4.60 (3.54)	0.00 (0.00)
1.00	Loose Fine Sand	109.20	65.55	0.0	0.0	30.0	0.0	0.33	0.00	3.00 (2.31)	0.00 (0.00)

( ) indicates factored value used in all calculations. Factor(s): K_p÷1.3; C_{pas}÷1.3

Surcharges

Position (ft)	Width (ft)	Length (ft)	Depth (ft)	Magnitude	Type
25.00	20.00	20.00	+11.00	160000.0lb	Area

Solution

Sheet

Sheet Name	E (psi)	I (in⁴/ft)	f (psi)	Z (in³/ft)	Allowed M_{max} (ftlb/ft)	b (in)	A (in²/ft)	W (lb/ft)	Upstand (ft)	Toe (ft)	Length (ft)
Arbed AZ18	3.04E+07	250.40	24966.8	33.50	69698.9	24.80	7.09	50.0	7.00	13.68	26.68

Maxima

	Maximum	Depth (ft)
Pressure	208.8 psf	6.00
Bending Moment	8946.3 ftlb/ft	12.63
Deflection	0.3 in	-7.00
Shear Force	1226.9 lb/ft	7.88

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Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section A-A'
Designer: jeg
Ref: 06-1103-B
Page: 4
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 ($K_p \div 1.3$; $C_{pas} \div 1.3$)
Toe: Cantilever

Excavation Support at Section A-A
T.O.S. at +3.0
MLW El. -1.87

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	123.8	0.0	0.2	2.8	6.61	141.5	3507.4	0.1	1137.7	13.22	-572.7	8790.8	0.0	-186.6
0.14	128.4	1.7	0.2	22.4	6.75	124.3	3685.4	0.1	1158.2	13.36	-586.8	8708.6	0.0	-226.5
0.28	131.7	5.7	0.2	39.8	6.89	109.6	3840.3	0.1	1173.6	13.50	-600.8	8610.5	0.0	-264.5
0.42	134.6	12.0	0.2	57.6	7.03	94.8	3997.2	0.1	1187.1	13.64	-617.2	8477.2	0.0	-306.6
0.56	137.3	22.3	0.2	78.8	7.17	77.7	4182.4	0.1	1200.4	13.78	-631.2	8347.4	0.0	-340.6
0.70	139.3	33.8	0.2	97.3	7.31	63.0	4342.6	0.1	1209.6	13.92	-645.2	8204.3	0.0	-372.7
0.84	140.8	47.8	0.2	116.0	7.45	48.3	4503.9	0.1	1216.8	14.06	-661.5	8021.3	0.0	-407.9
0.98	142.2	67.3	0.2	138.1	7.59	31.2	4693.2	0.1	1222.8	14.20	-675.5	7851.6	0.0	-436.0
1.12	151.2	86.7	0.2	158.1	7.73	16.6	4856.0	0.1	1225.9	14.34	-689.5	7670.9	0.0	-462.2
1.27	153.0	108.9	0.2	178.4	7.87	1.9	5019.1	0.1	1226.9	14.48	-705.8	7447.1	0.0	-490.4
1.41	155.0	138.2	0.2	202.4	8.01	-15.1	5209.5	0.1	1226.0	14.62	-719.7	7245.1	0.0	-512.6
1.55	156.6	166.2	0.2	223.2	8.15	-29.7	5372.5	0.1	1223.2	14.76	-733.7	7034.4	0.0	-532.9
1.69	158.1	197.1	0.2	244.2	8.29	-44.3	5534.9	0.1	1218.4	14.90	-749.9	6778.6	0.0	-554.3
1.83	159.7	236.6	0.2	269.0	8.44	-61.3	5723.5	0.1	1210.4	15.04	-763.9	6551.7	0.0	-570.6
1.97	161.2	273.6	0.2	290.4	8.58	-75.8	5884.0	0.1	1201.4	15.18	-777.8	6318.6	0.0	-585.0
2.11	162.6	313.4	0.2	312.0	8.72	-90.3	6043.3	0.1	1190.5	15.32	-791.7	6079.9	0.0	-597.6
2.25	164.0	356.2	0.2	333.8	8.86	-107.3	6227.1	0.1	1175.3	15.47	-807.9	5795.4	0.0	-610.0
2.39	165.7	409.7	0.2	359.5	9.00	-121.7	6382.6	0.1	1160.2	15.61	-821.9	5547.3	0.0	-618.5
2.53	167.2	458.7	0.2	381.7	9.14	-136.2	6536.0	0.1	1143.2	15.75	-835.8	5296.1	0.0	-625.2
2.67	168.7	510.7	0.2	404.1	9.28	-153.1	6711.9	0.0	1120.8	15.89	-852.0	5000.0	0.0	-630.7
2.81	170.4	575.2	0.2	430.6	9.42	-167.5	6859.9	0.0	1099.6	16.03	-865.8	4744.6	0.0	-633.4
2.95	171.9	633.7	0.2	453.4	9.56	-181.9	7004.9	0.0	1076.5	16.17	-879.7	4488.3	0.0	-634.2
3.09	173.5	695.3	0.2	476.5	9.70	-198.7	7170.0	0.0	1047.0	16.31	-895.9	4189.4	0.0	-632.9
3.23	175.3	771.1	0.1	503.6	9.84	-213.1	7307.8	0.0	1019.7	16.45	-909.8	3934.0	0.0	-629.7
3.37	176.9	839.4	0.1	527.1	9.98	-227.5	7441.8	0.0	990.5	16.59	-923.6	3680.2	0.0	-624.7
3.51	178.5	910.8	0.1	550.9	10.12	-244.2	7593.1	0.0	954.0	16.73	-939.8	3387.2	0.0	-616.5
3.66	180.4	998.1	0.1	578.8	10.26	-258.5	7718.2	0.0	920.6	16.87	-953.7	3139.4	0.0	-607.5
3.80	182.0	1076.5	0.1	603.0	10.40	-272.9	7838.7	0.0	885.3	17.01	-967.5	2895.6	0.0	-596.6
3.94	183.6	1158.0	0.1	627.4	10.54	-289.5	7973.2	0.0	841.7	17.15	-983.7	2617.2	0.0	-581.6
4.08	185.5	1257.3	0.1	656.2	10.69	-303.8	8083.0	0.0	802.3	17.29	-997.5	2384.6	0.0	-566.7
4.22	187.1	1346.0	0.1	681.0	10.83	-318.1	8187.5	0.0	761.0	17.43	-1011.3	2158.2	0.0	-550.0
4.36	188.7	1437.9	0.1	706.1	10.97	-332.3	8286.3	0.0	717.7	17.57	-1027.5	1903.2	0.0	-528.1
4.50	190.6	1549.5	0.1	735.7	11.11	-349.0	8394.2	0.0	664.9	17.71	-1041.3	1693.1	0.0	-507.4
4.64	192.3	1648.8	0.1	761.2	11.25	-363.2	8480.1	0.0	617.5	17.86	-1055.1	1491.7	0.0	-484.8
4.78	193.9	1751.5	0.1	787.0	11.39	-377.4	8559.5	0.0	568.3	18.00	-1071.2	1268.8	0.0	-456.2
4.92	195.8	1875.6	0.1	817.4	11.53	-394.0	8643.8	0.0	508.4	18.14	-1085.0	1088.8	0.0	-429.6
5.06	197.4	1985.8	0.1	843.6	11.67	-408.1	8708.5	0.0	455.1	18.28	-1098.8	919.8	0.0	-401.2
5.20	199.1	2099.5	0.1	870.1	11.81	-422.3	8765.9	0.0	399.9	18.42	-1114.9	737.7	0.0	-365.8
5.34	201.0	2236.6	0.1	901.2	11.95	-438.8	8823.6	0.0	333.0	18.56	-1128.7	595.2	0.0	-333.4
5.48	202.6	2357.9	0.1	928.2	12.09	-453.0	8864.6	0.0	273.7	18.70	-1142.5	466.2	0.0	-299.1
5.62	204.3	2482.9	0.1	955.4	12.23	-467.1	8897.7	0.0	212.5	18.84	-1158.6	333.5	0.0	-256.9
5.76	206.2	2633.3	0.1	987.3	12.37	-483.6	8925.8	0.0	138.7	18.98	-1172.4	236.1	0.0	-218.7
5.90	207.9	2766.1	0.1	1015.0	12.51	-497.7	8940.6	0.0	73.4	19.12	-1186.2	154.4	0.0	-178.6
6.05	205.3	2902.7	0.1	1042.6	12.65	-511.8	8946.0	0.0	6.2	19.26	-1202.3	80.0	0.0	-129.5
6.19	185.8	3066.5	0.1	1072.7	12.79	-528.2	8938.1	0.0	-47.7	19.40	-1216.1	34.9	0.0	-85.5
6.33	171.0	3210.6	0.1	1096.4	12.93	-542.3	8911.0	0.0	-93.6	19.54	-1229.8	8.0	0.0	-39.6
6.47	156.3	3357.6	0.1	1118.0	13.08	-556.3	8865.7	0.0	-137.6	19.68	-1241.3	0.0	0.0	0.0

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Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section A-A'
Designer: jeg
Ref: 06-1103-B
Page: 5
Date: 9.19.12

Sheet: Arbed AZ18
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Excavation Support at Section A-A
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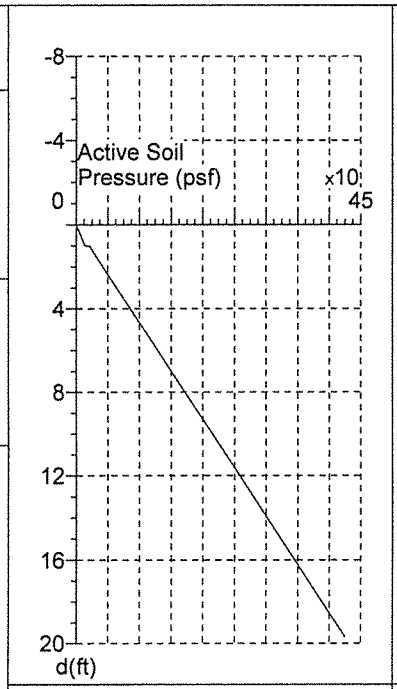

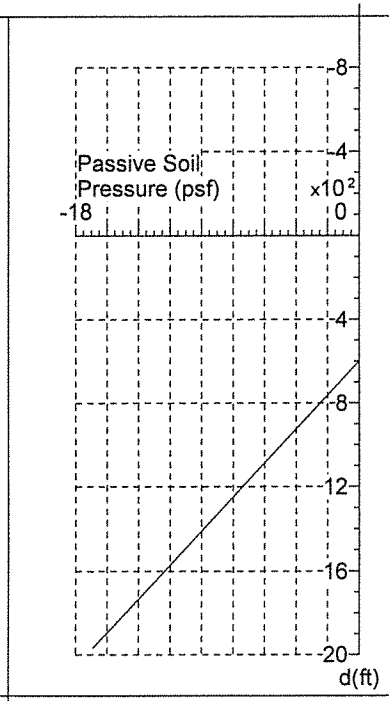

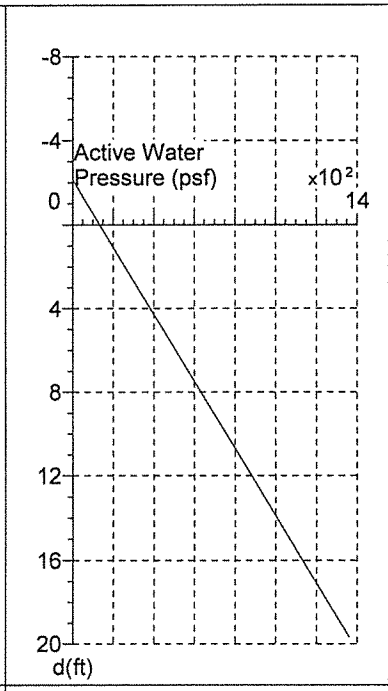

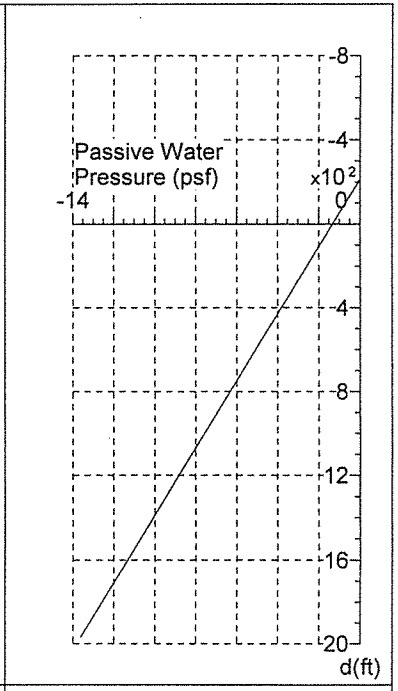

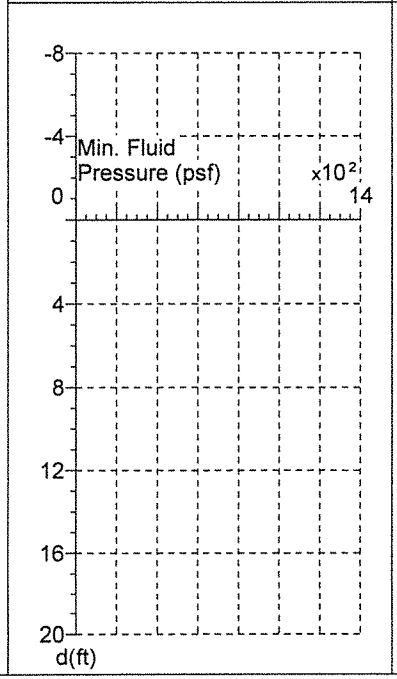

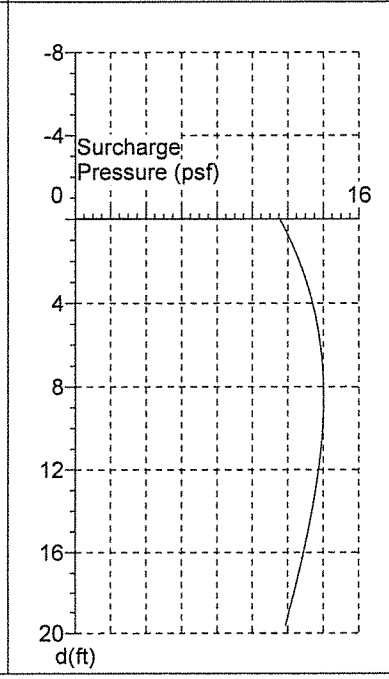

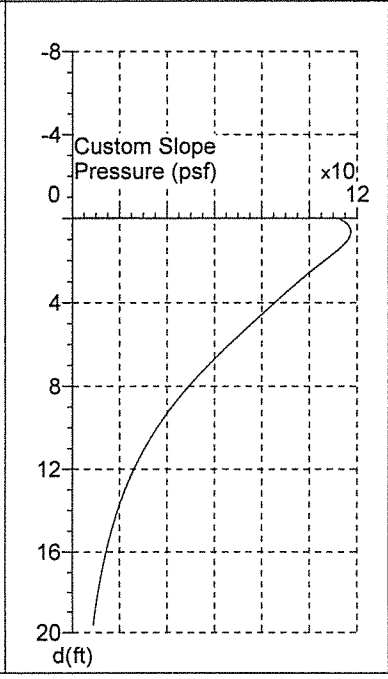

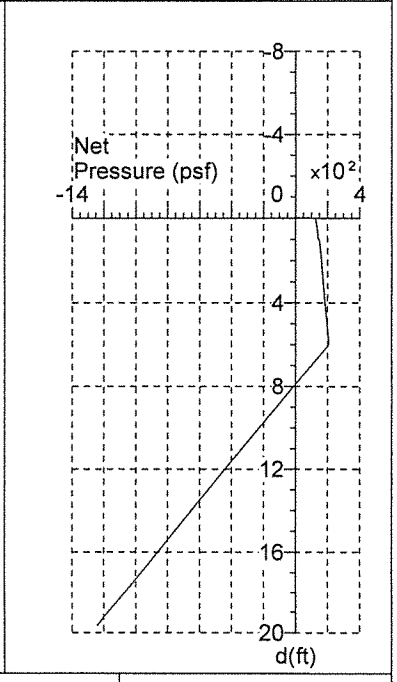

Glynn Geotechnical Engineering

415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Web: www.GTSoft.org

16

Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section A-A'
Designer: jeg
Ref: 06-1103-B
Page: 7
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 (K_p÷1.3; C_{pas}÷1.3)
Toe: Cantilever

Excavation Support at Section A-A
T.O.S. at +3.0
MLW El. -1.87

Design Report

1. The standard surcharge is 0.0psf. The Piling Handbook recommends a minimum surcharge of 200.0psf. Other surcharges have been defined, but ensure that this is sufficient.

2. Minimum fluid density is 31.8pcf. The Piling Handbook recommends 31.8pcf.

3. BSPH approximation used for slope calculation. i.e. Pressure modified by 5% for each 5° of slope.

4. Factor(s) applied to soil parameter(s) in the 'Wall' page, and used in all calculations.
   Factor(s) used: Kp ÷1.3; C (passive) ÷1.3

5. Maximum bending moment = 8946.3ftlb/ft and f = 24966.8psi. MINIMUM required sheet section modulus is: Z = 4.30in³/ft (= M/f). Sheet section modulus in this design is Z = 33.50in³/ft, and is satisfactory.

6. FOS = 0.99 (Net Pressure)
   This is the factor of safety against rotation about the toe. It is calculated using the factored soil parameters (see above).
   The FOS can be changed using 'Defined FOS' or 'Manual' in the 'Wall' page.

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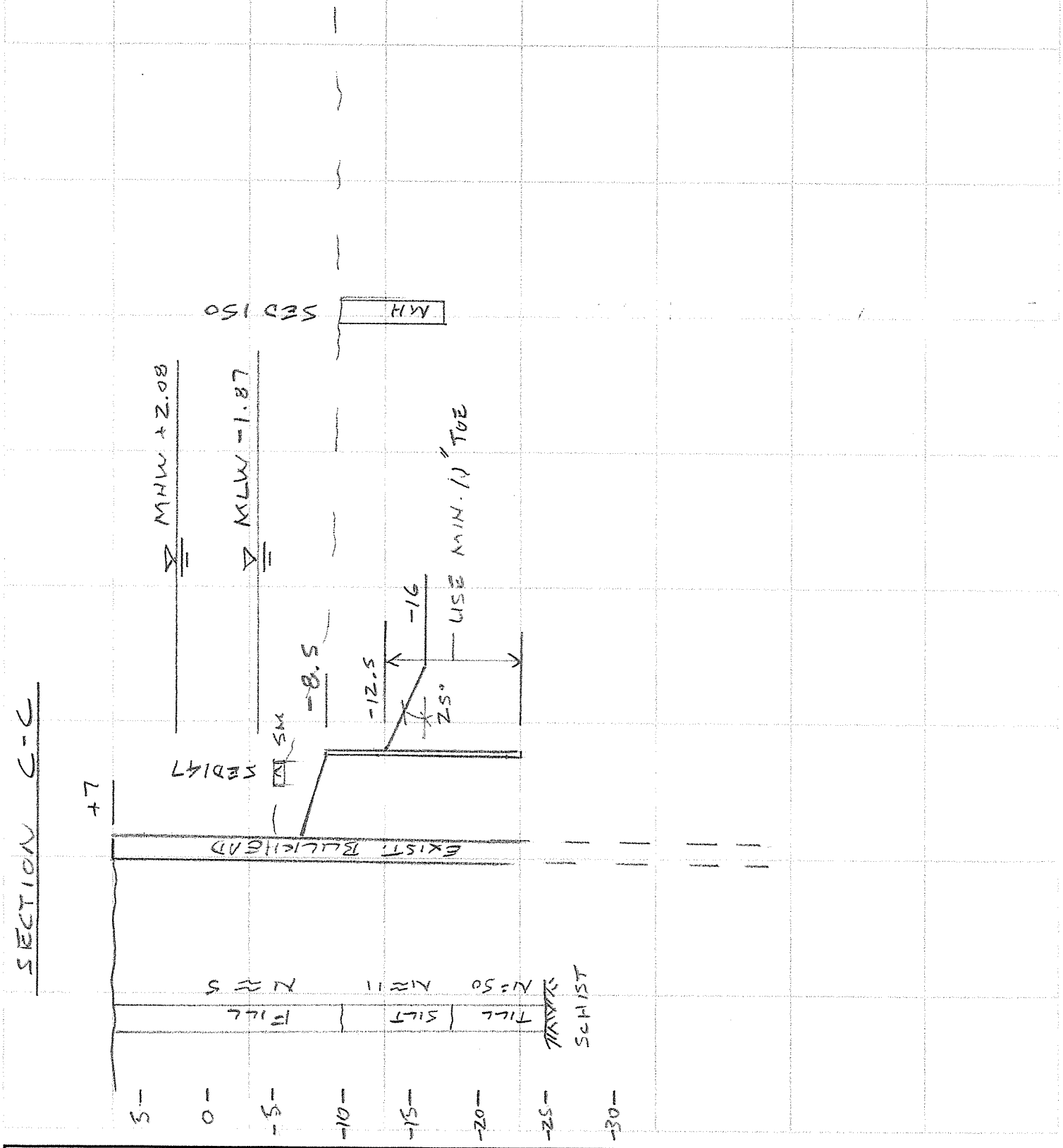

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415 South Transit Street
Lockport, New York 14094
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www.glynngroup.com

PROJECT: GM SLEEPY HOLLOW			SHEET NO: 8 / 14
SUBJECT: SEDIMENT REMOVAL SHORING			
CLIENT: EVENSON			
PROJECT NO: 06-1103-13	SCALE: —	DATE: 9.12.12	BY:

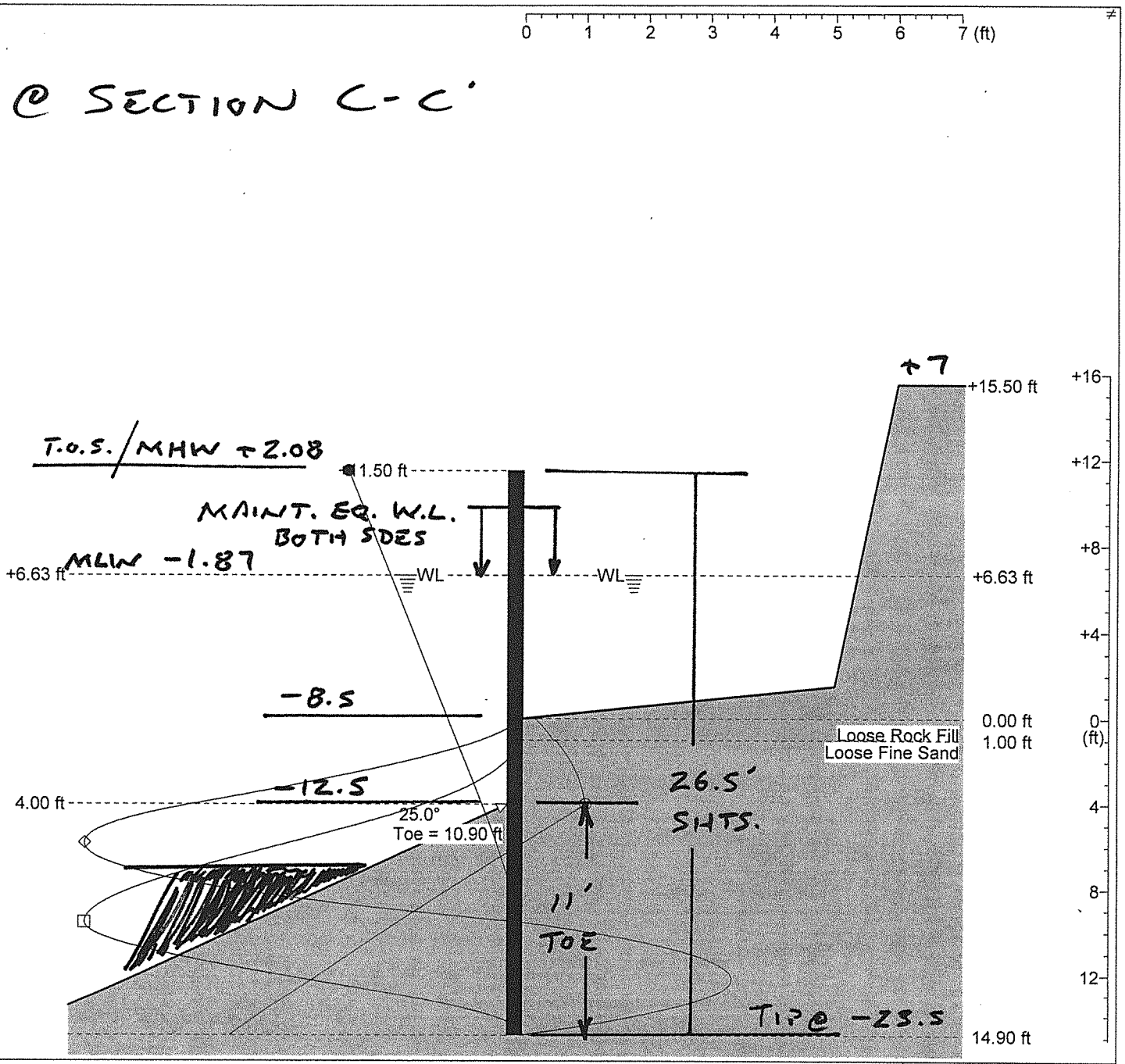
Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section C-C'
Designer: jeg
Ref: 06-1103-B
Page: 1
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 (K_p÷1.3; C_{pas}÷1.3)
Toe: Cantilever

Maximum	d (ft)
○ 192.2 psf	4.00
□ 3840.1 ftlb/ft	9.55
◇ 716.5 lb/ft	5.81
● 0.1 in	-11.50

Excavation Support at Section C-C
T.O.S. at +3.0
MLW El. -1.87



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Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section C-C'
Designer: jeg
Ref: 06-1103-B
Page: 2
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 ($K_p \div 1.3$; $C_{pas} \div 1.3$)
Toe: Cantilever

Excavation Support at Section C-C
T.O.S. at +3.0
MLW El. -1.87

Input Data

Depth Of Excavation = 4.00ft
Surcharge = 0.0psf
Depth Of Active Water = +6.63ft
Depth Of Passive Water = +6.63ft
Slope (passive) = 25.0degrees
Water Density = 62.43pcf
Minimum Fluid Density = 31.80pcf

Soil Profile — Active Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Loose Rock Fill	120.00	62.37	0.0	0.0	40.0	0.0	0.22	0.00	4.60	0.00
1.00	Loose Fine Sand	109.20	65.55	0.0	0.0	30.0	0.0	0.33	0.00	3.00	0.00

Soil Profile — Passive Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Loose Rock Fill	120.00	62.37	0.0	0.0	40.0	0.0	0.22	0.00	4.60 (3.54)	0.00 (0.00)
1.00	Loose Fine Sand	109.20	65.55	0.0	0.0	30.0	0.0	0.33	0.00	3.00 (2.31)	0.00 (0.00)

( ) indicates factored value used in all calculations. Factor(s): $K_p \div 1.3$; $C_{pas} \div 1.3$

Solution

Sheet

Sheet Name	E (psi)	I (in⁴/ft)	f (psi)	Z (in³/ft)	Allowed M_{max} (ftlb/ft)	b (in)	A (in²/ft)	W (lb/ft)	Upstand (ft)	Toe (ft)	Length (ft)
Arbed AZ18	3.04E+07	250.40	24966.8	33.50	69698.9	24.80	7.09	50.0	11.50	10.90	26.40

Maxima

	Maximum	Depth (ft)
Pressure	192.2 psf	4.00
Bending Moment	3840.1 ftlb/ft	9.55
Deflection	0.1 in	-11.50
Shear Force	716.5 lb/ft	5.81

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Lockport, NY 14094
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Fax: 716.625.6983
EMail: www.glynngroup.com

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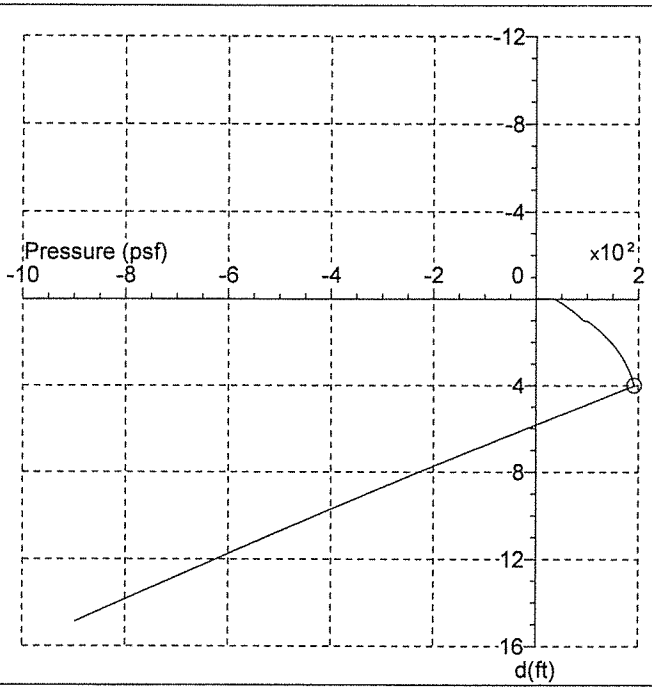
Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

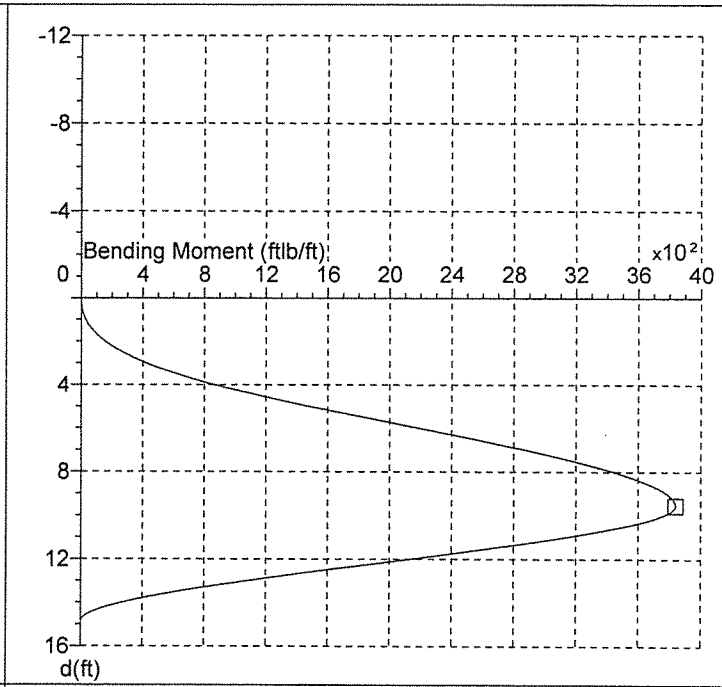
Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section C-C'
Designer: jeg
Ref: 06-1103-B
Page: 3
Date: 9.19.12

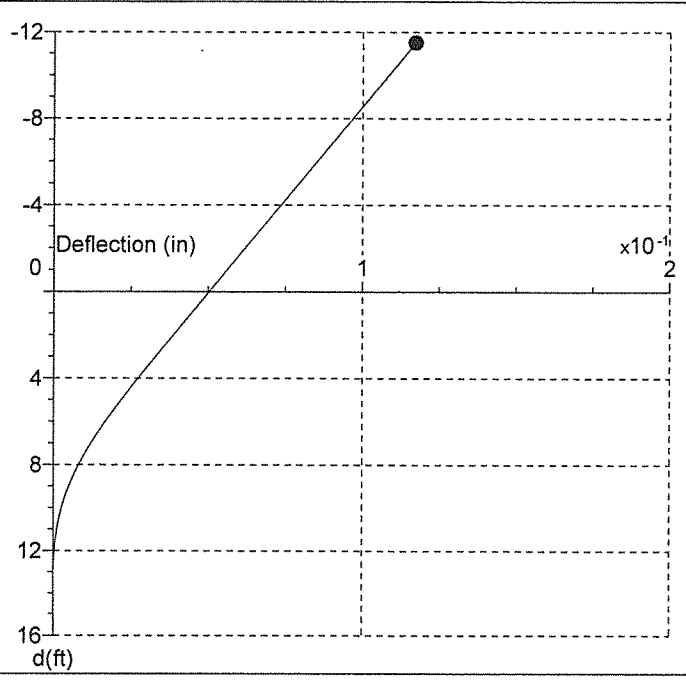
Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 ($K_p \div 1.3$; $C_{pas} \div 1.3$)
Toe: Cantilever

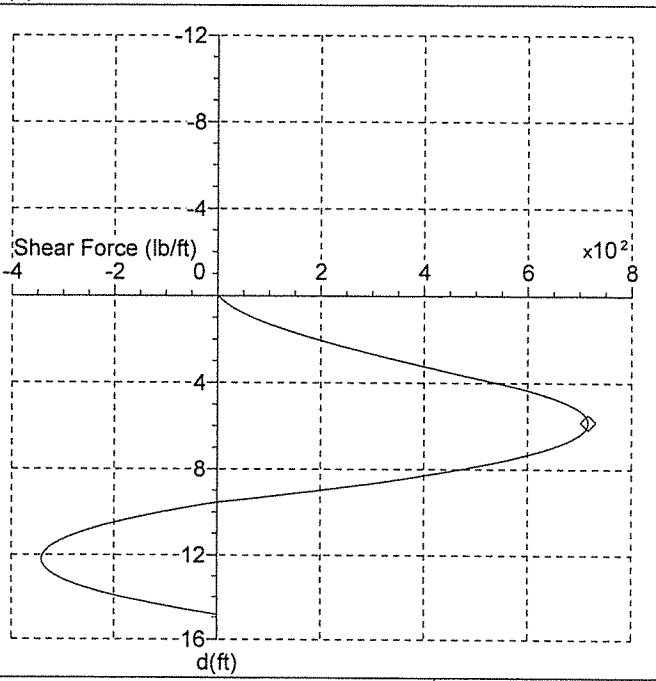
	Maximum	d (ft)
○	192.2 psf	4.00
□	3840.1 ftlb/ft	9.55
◇	716.5 lb/ft	5.81
●	0.1 in	-11.50

Excavation Support at Section C-C
T.O.S. at +3.0
MLW El. -1.87









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Fax: 716.625.6983
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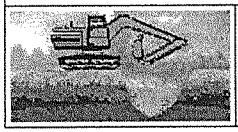
Page: 4
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 ($K_p \div 1.3$; $C_{pas} \div 1.3$)
Toe: Cantilever

Excavation Support at Section C-C
T.O.S. at +3.0
MLW El. -1.87

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	36.8	0.0	0.1	0.8	5.00	86.3	1495.0	0.0	682.3	10.00	-429.5	3753.8	0.0	-109.1
0.11	44.6	0.3	0.0	5.4	5.11	76.9	1555.0	0.0	689.4	10.11	-440.4	3711.0	0.0	-132.0
0.21	51.9	1.1	0.0	10.8	5.21	65.3	1630.9	0.0	697.1	10.21	-451.2	3660.4	0.0	-153.7
0.32	58.6	2.5	0.0	16.9	5.32	53.7	1707.5	0.0	703.5	10.32	-462.1	3602.5	0.0	-174.2
0.43	65.0	4.7	0.0	23.8	5.43	42.0	1784.8	0.0	708.6	10.43	-470.7	3551.3	0.0	-189.7
0.53	69.8	7.0	0.0	29.8	5.53	30.3	1862.6	0.0	712.5	10.53	-481.6	3481.3	0.0	-208.0
0.64	75.6	10.6	0.0	37.8	5.64	18.6	1940.8	0.0	715.0	10.64	-492.4	3405.2	0.0	-225.2
0.74	81.2	15.1	0.0	46.5	5.75	7.0	2019.2	0.0	716.3	10.75	-503.1	3323.3	0.0	-241.1
0.85	86.5	20.6	0.0	55.8	5.85	-2.4	2082.0	0.0	716.5	10.85	-513.9	3236.2	0.0	-255.9
0.96	91.7	27.1	0.0	65.7	5.96	-14.0	2160.4	0.0	715.7	10.96	-524.6	3144.1	0.0	-269.5
1.06	104.2	34.8	0.0	76.6	6.06	-25.7	2238.7	0.0	713.6	11.07	-533.2	3067.2	0.0	-279.5
1.17	109.9	43.7	0.0	88.4	6.17	-37.3	2316.8	0.0	710.3	11.17	-543.9	2967.4	0.0	-291.0
1.28	114.4	51.8	0.0	98.3	6.28	-48.9	2394.4	0.0	705.7	11.28	-554.6	2863.8	0.0	-301.3
1.38	119.8	63.1	0.0	111.3	6.38	-60.6	2471.5	0.0	699.8	11.38	-565.3	2756.9	0.0	-310.4
1.49	125.1	75.9	0.0	124.8	6.49	-69.8	2532.6	0.0	694.2	11.49	-576.0	2647.0	0.0	-318.3
1.60	130.1	90.2	0.0	138.9	6.60	-81.4	2608.3	0.0	686.0	11.60	-586.7	2534.6	0.0	-325.1
1.70	134.9	106.0	0.0	153.5	6.70	-93.0	2683.0	0.0	676.5	11.70	-595.2	2443.2	0.0	-329.7
1.81	139.6	123.5	0.0	168.6	6.81	-104.5	2756.7	0.0	665.8	11.81	-605.8	2327.3	0.0	-334.3
1.92	143.1	138.7	0.0	181.1	6.92	-116.1	2829.1	0.0	653.8	11.92	-616.5	2210.0	0.0	-337.8
2.02	147.4	159.2	0.0	197.2	7.02	-127.6	2900.1	0.0	640.5	12.02	-627.1	2091.8	0.0	-340.1
2.13	151.4	181.5	0.0	213.6	7.13	-136.8	2955.9	0.0	629.0	12.13	-637.7	1973.0	0.0	-341.3
2.23	155.3	205.6	0.0	230.5	7.24	-148.2	3024.1	0.0	613.4	12.24	-648.3	1854.0	0.0	-341.3
2.34	158.9	231.7	0.0	247.9	7.34	-159.7	3090.6	0.0	596.6	12.34	-656.7	1759.0	0.0	-340.4
2.45	162.3	259.6	0.0	265.6	7.45	-171.1	3155.1	0.0	578.5	12.45	-667.3	1640.8	0.0	-338.3
2.55	164.9	283.3	0.0	280.0	7.55	-182.5	3217.7	0.0	559.2	12.56	-677.9	1523.5	0.0	-335.0
2.66	167.9	314.8	0.0	298.3	7.66	-193.9	3278.1	0.0	538.7	12.66	-688.4	1407.7	0.0	-330.6
2.77	170.7	348.3	0.0	317.0	7.77	-202.9	3324.7	0.0	521.3	12.77	-698.9	1293.6	0.0	-325.0
2.87	173.4	383.8	0.0	335.9	7.87	-214.3	3380.8	0.0	498.5	12.87	-709.5	1181.7	0.0	-318.3
2.98	175.9	421.5	0.0	355.2	7.98	-225.6	3434.4	0.0	474.4	12.98	-717.9	1094.0	0.0	-312.1
3.09	178.2	461.2	0.0	374.7	8.09	-236.9	3485.2	0.0	449.1	13.09	-728.4	987.1	0.0	-303.2
3.19	180.0	494.6	0.0	390.4	8.19	-248.1	3533.3	0.0	422.6	13.19	-738.9	883.5	0.0	-293.3
3.30	182.1	538.2	0.0	410.4	8.30	-259.3	3578.4	0.0	394.8	13.30	-749.4	783.6	0.0	-282.1
3.40	184.0	584.1	0.0	430.5	8.41	-268.3	3612.2	0.0	371.7	13.41	-759.8	687.8	0.0	-269.8
3.51	185.8	632.1	0.0	450.9	8.51	-279.5	3651.6	0.0	341.7	13.51	-770.3	596.5	0.0	-256.4
3.62	187.5	682.4	0.0	471.4	8.62	-290.7	3687.7	0.0	310.4	13.62	-778.7	527.0	0.0	-244.8
3.72	189.0	734.9	0.0	492.2	8.72	-301.8	3720.3	0.0	278.0	13.73	-789.1	444.9	0.0	-229.3
3.83	190.2	778.6	0.0	508.8	8.83	-312.9	3749.3	0.0	244.3	13.83	-799.6	368.5	0.0	-212.6
3.94	191.6	835.3	0.0	529.9	8.94	-324.0	3774.5	0.0	209.4	13.94	-810.0	298.1	0.0	-194.8
4.04	189.1	894.2	0.0	550.9	9.04	-332.9	3791.9	0.0	180.6	14.04	-820.5	234.1	0.0	-175.9
4.15	175.8	955.5	0.0	570.7	9.15	-344.0	3810.1	0.0	143.5	14.15	-830.9	177.0	0.0	-155.8
4.26	164.5	1018.8	0.0	589.3	9.26	-355.0	3824.1	0.0	105.2	14.26	-839.2	136.5	0.0	-138.9
4.36	153.1	1084.1	0.0	606.6	9.36	-366.0	3833.9	0.0	65.6	14.36	-849.6	92.7	0.0	-116.7
4.47	144.0	1137.7	0.0	619.6	9.47	-377.0	3839.3	0.0	24.9	14.47	-860.0	56.9	0.0	-93.4
4.58	132.5	1206.3	0.0	634.7	9.58	-388.0	3838.9	0.0	-11.3	14.58	-870.4	29.4	0.0	-68.9
4.68	121.0	1276.4	0.0	648.5	9.68	-396.7	3831.9	0.0	-33.3	14.68	-880.8	10.7	0.0	-43.3
4.79	109.4	1348.0	0.0	661.0	9.79	-407.7	3814.7	0.0	-59.8	14.79	-891.2	1.2	0.0	-16.6
4.89	97.9	1420.9	0.0	672.3	9.90	-418.6	3788.5	0.0	-85.1	14.90	-897.4	0.0	0.0	0.0



Glynn Geotechnical Engineering
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12

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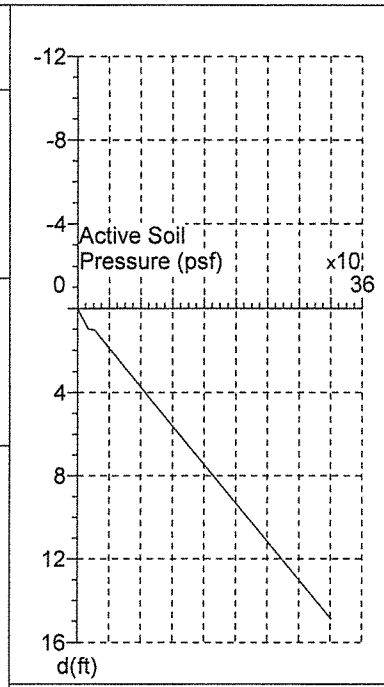
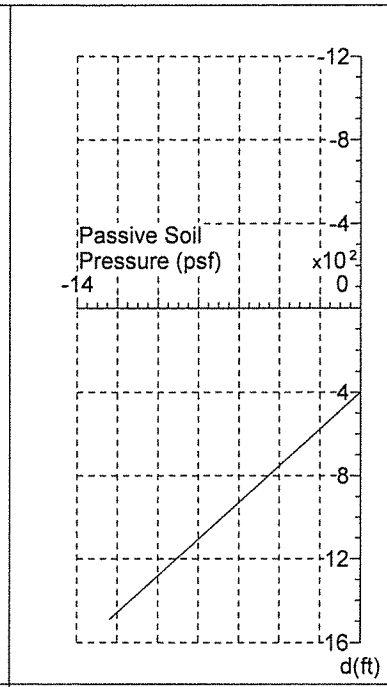
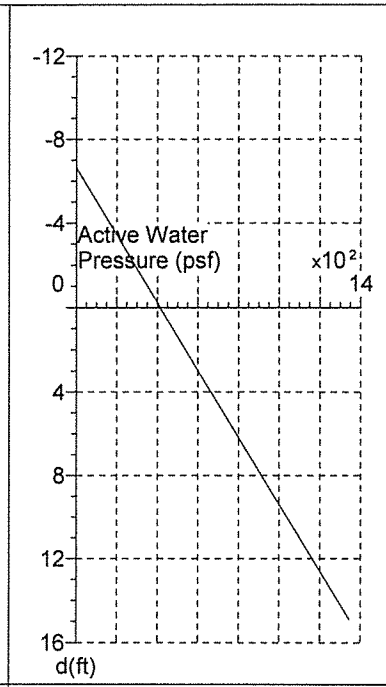
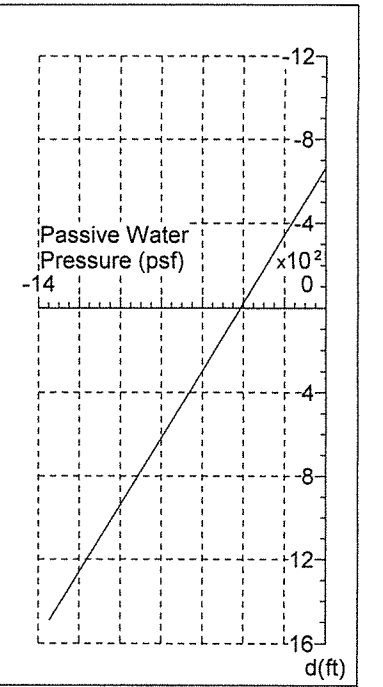
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 ($K_p \div 1.3$; $C_{pas} \div 1.3$)
Toe: Cantilever

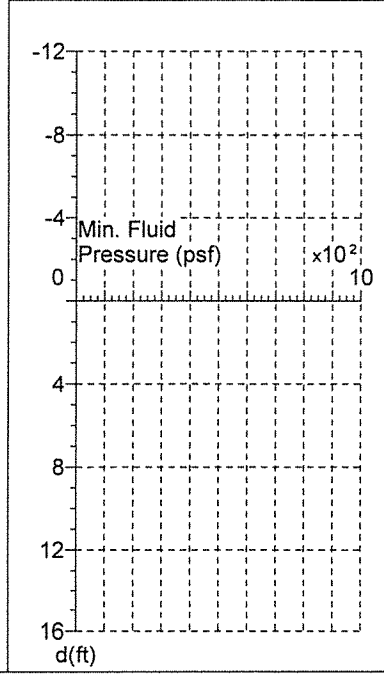
Excavation Support at Section C-C
T.O.S. at +3.0
MLW El. -1.87

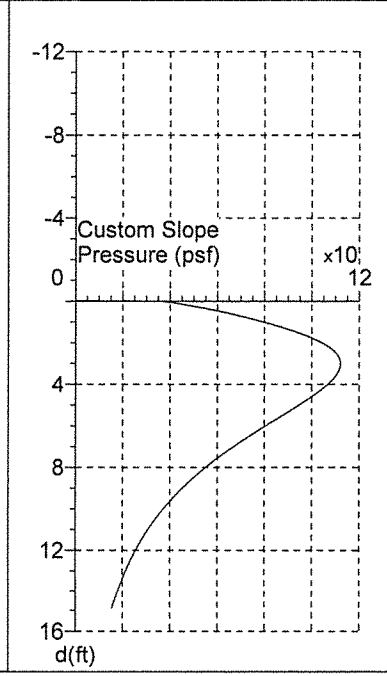


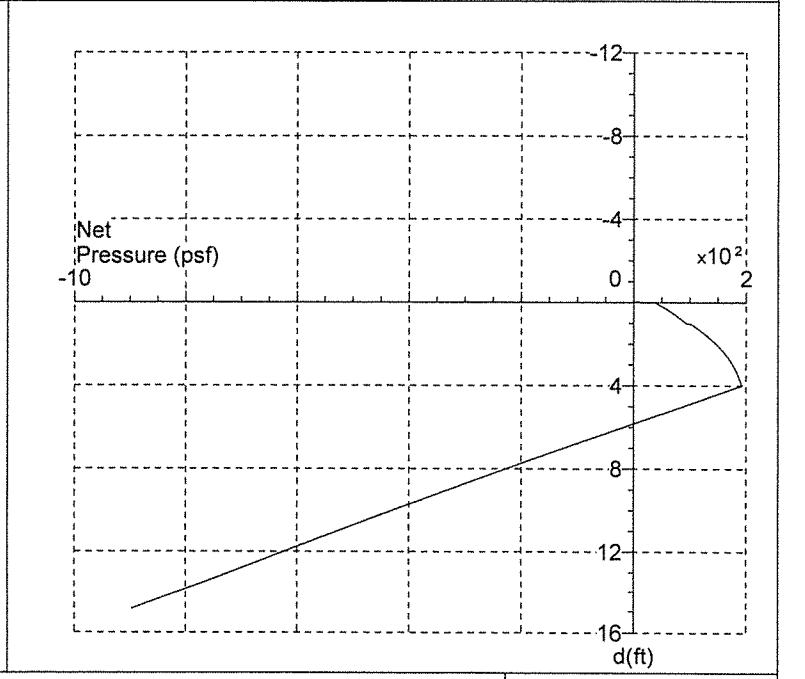












Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

Client: Sevenson Environmental Services, Inc.
Site: GM Sleepy Hollow

Title: GM Plant Sediment Removal Sleepy Hollow, NY Excavation Section C-C'
Designer: jeg
Ref: 06-1103-B
Page: 7
Date: 9.19.12

Sheet: Arbed AZ18
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 0.99 (K_p÷1.3; C_{pas}÷1.3)
Toe: Cantilever

Excavation Support at Section C-C
T.O.S. at +3.0
MLW El. -1.87

Design Report

1. The standard surcharge is 0.0psf. The Piling Handbook recommends a minimum surcharge of 200.0psf.

2. Minimum fluid density is 31.8pcf. The Piling Handbook recommends 31.8pcf.

3. BSPH approximation used for slope calculation. i.e. Pressure modified by 5% for each 5° of slope.

4. Factor(s) applied to soil parameter(s) in the 'Wall' page, and used in all calculations.
   Factor(s) used: Kp ÷1.3; C (passive) ÷1.3

5. Maximum bending moment = 3840.1ftlb/ft and f = 24966.8psi. MINIMUM required sheet section modulus is: Z = 1.85in³/ft (= M/f). Sheet section modulus in this design is Z = 33.50in³/ft, and is satisfactory.

6. Toe (10.90ft) is less than minimum calculated toe for Cantilever support (10.92ft).

7. FOS = 0.99 (Net Pressure)
   This is the factor of safety against rotation about the toe. It is calculated using the factored soil parameters (see above).
   The FOS can be changed using 'Defined FOS' or 'Manual' in the 'Wall' page.

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Attachment C

Former General Motors Assembly Plant
Sediment Remediation
Sleepy Hollow, NY

Temporary Excavation Support &
Turbidity Barrier Kingpile Design

Turbidity Barrier Kingpile Design Analyses (20 shts.)

GGE 06-1103-B

October 15, 2012

Civil • Structural • Geotechnical • Materials Testing • Consulting

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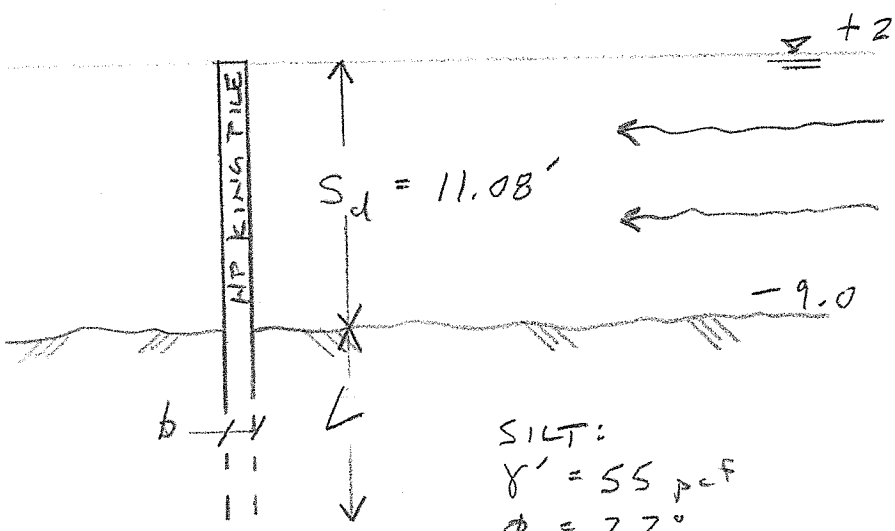
TURBIDITY BARRIER



CURRENT LOAD, W_c (plf)

$W_c = 1.92\, L^2\, S_d\, f_c$

CURRENT DIRECTION FACTOR, f_c = 0.57 (@45°)

= 0.1 (@ ≈ 0°)

$W_{c\,(\text{ANGLED SEGMENTS})} = 1.92(3)^2(11.08)(0.57) = \underline{109\ plf}$

$W_{c\,(\text{SEGMENT // TO FLOW})} = 1.92(3)^2(11.08)(0.1) = \underline{19\ plf}$

(1) FROM: http://waterdata.usgs.gov

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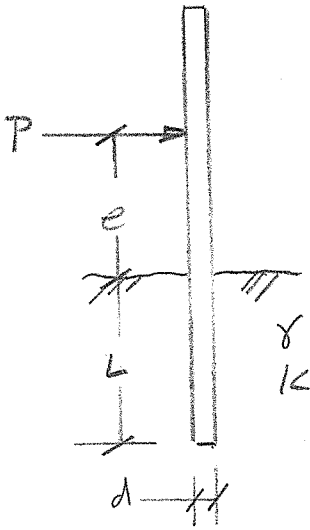
www.glynngroup.com

PROJECT: GM Sleepy Hollow Sediment			SHEET NO: 1 / 20
SUBJECT: Turbidity Barrier Piles			
CLIENT: SES			
PROJECT NO: 06-1178-B	SCALE: —	DATE: 9.4.12	BY: TS

EVALUATE REQUIRED TOE @ VAR. SPACING

USING BROMS METHOD



$e = 11.08'/2 = 5.54'$

USE: $d = 1'$, F.S. = 1.5

$\gamma' = 55$ pcf

$K_p = 2.2$

USING FIG. 6, (ANGLED SEGMENT)

$F.S. \times P / K_p d^3 \gamma'$

$= 1.5 \times S \times 109_{plf} / 2.2(1)^3(55)$

$= 1.35\ S$

SPACING, S	$P/K_p d^3 \gamma$	L
= 30'	40.5	11'
= 60'	81	15'
= 80'	108	17'

CHECK AGAINST SUPPORTIT ANALYSIS & FOR MOMENT & OTHER CASES.

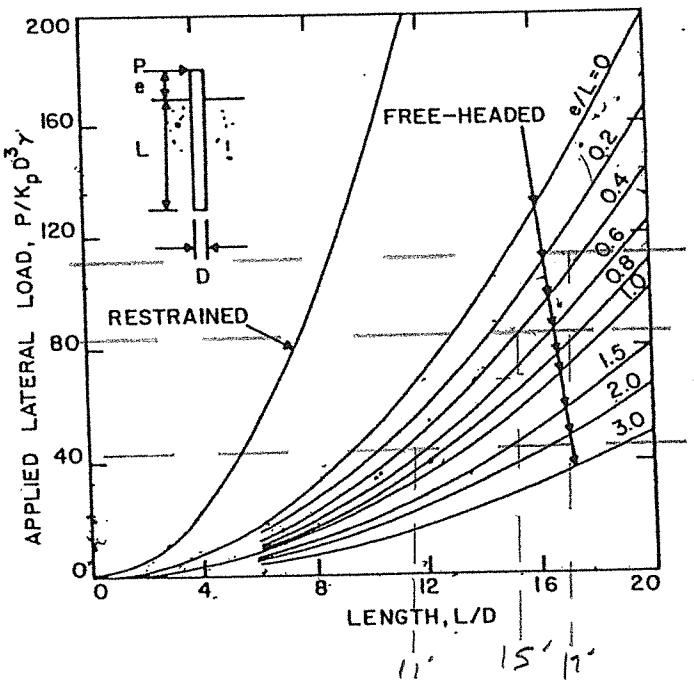


FIG. 6.—ULTIMATE LATERAL RESISTANCE FOR COHESIONLESS SOILS RELATED TO EMBEDMENT LENGTH

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PROJECT:	GM Sleepy Hollow Sediment
SUBJECT:	Turbidity Barrier Piles
CLIENT:	SEC
PROJECT NO:	06-1107-B
SCALE:	-
DATE:	9.4.12
BY:	
SHEET NO:	2 / 20

TURBIDITY BARRIER DESIGN SUMMARY

STREAM VELOCITY, V = 3 fps

FLOW DEPTH, S_1 = 11.08'

I) AT ANGLES BARRIER SEGMENTS (45° ∠, MAX)

PILE SPACING	TOE	MOM	$Z_{REQ'D}$	USE
30'	13'	28.6 k-ft	12 in³	HP12x53
40'	15'	40.3 k-ft	17 in³	HP12x53
80'	20'	94.5 k-ft	38 in³	HP12x53

II AT SEGMENTS PARALLEL TO FLOW

SPACING	TOE	MOM.	$Z_{REQ'D}$	USE
50'	8'	6.9 k-ft	3 in³	HP12x53
80'	10'	11.6 k-ft	5 in³	HP12x53

10.15.12 SES WILL USE 16"ϕ x 0.849" WALL, GR. B (F_y = 42 ksi) MONOPILES x 51'-6" LONG

Z = 138 in³ >> 38 in³ O.K., ALL CASES

TOE = 51.5' - 11.1' = 40' O.K., ALL CASES

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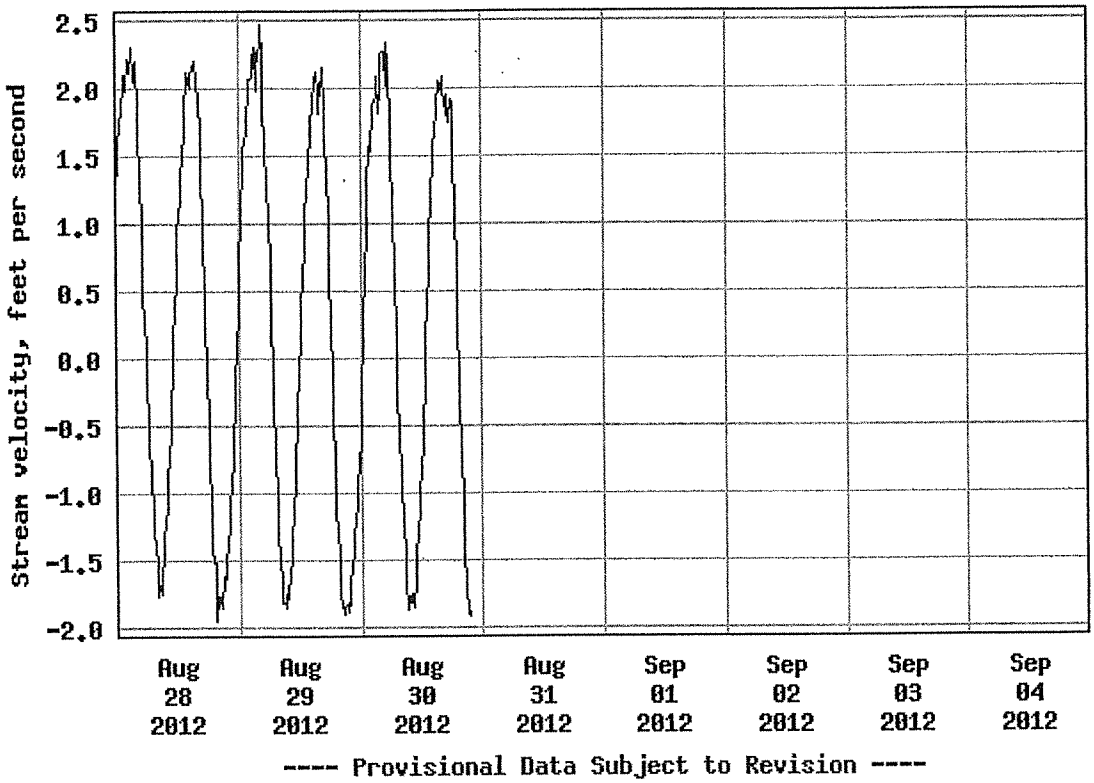
PROJECT: GM SLEEPY HOLLOW SEDIMENT			SHEET NO: 3 / 20
SUBJECT: TURBIDITY BARRIER PILES			
CLIENT: SES			
PROJECT NO: 06-1103-B	SCALE: —	DATE: 9.4.12	BY: JS

USGS

USGS 01372058 HUDSON RIVER BELOW POUGHKEEPSIE NY



USGS STREAM FLOW DATA

http://waterdata.usgs.gov

GGE ENGINEERING · DESIGN GLYNN GEOTECHNICAL ENGINEERING 415 South Transit Street Lockport, New York 14094 voice 716.625.6933 / fax 716.625.6983 www.glynngroup.com	PROJECT: GM SLEEPY HOLLOW SEDIMENT			SHEET NO: 4
	SUBJECT: TURBIDITY BARRIER PILES			
	CLIENT: SES			
	PROJECT NO: 06-1103-E	SCALE: ~	DATE: 9.4.12	BY: JG

1/20

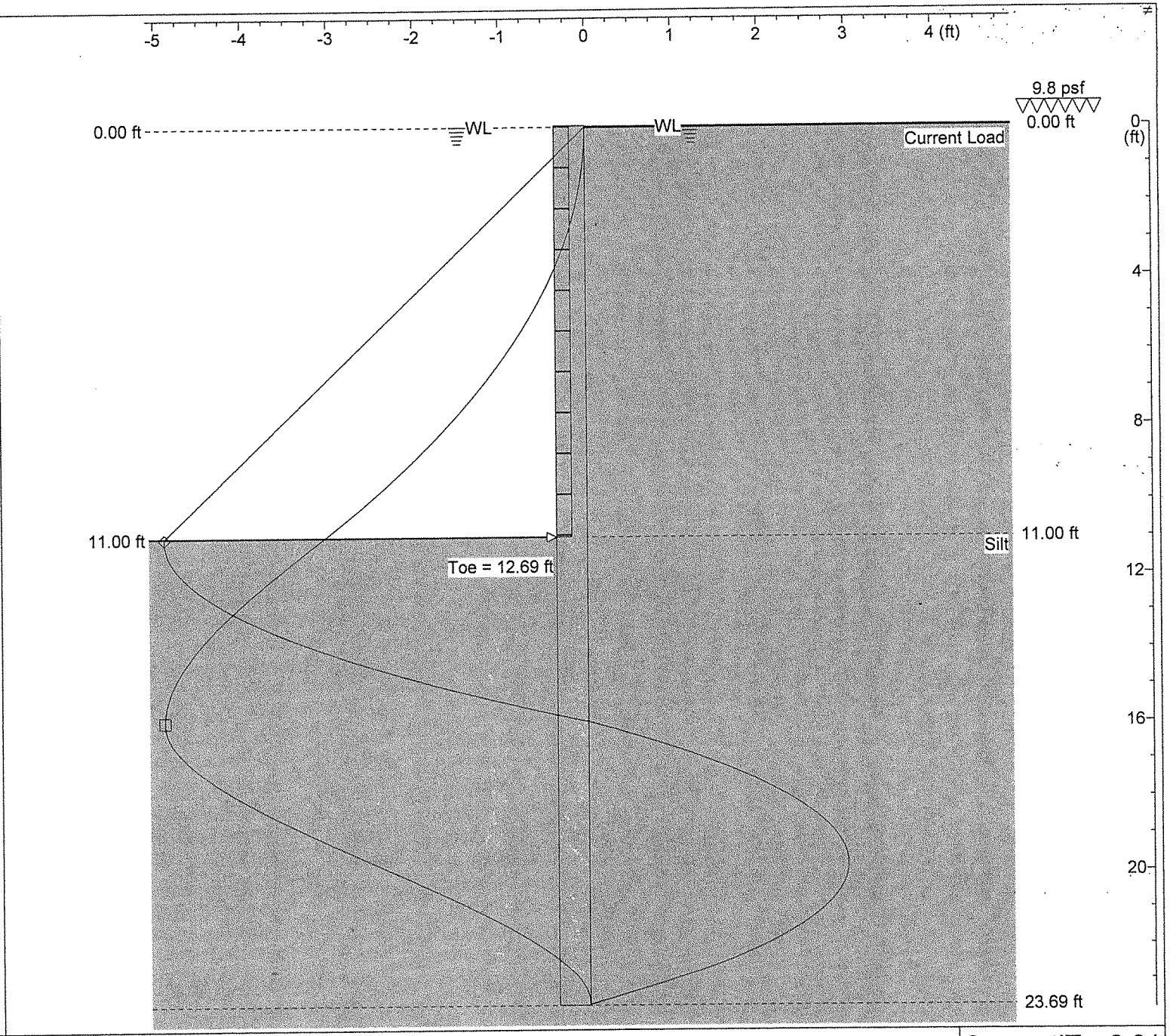
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 1
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

Maximum	d (ft)
□ 28584.2 ftlb	15.97
◇ 3245.3 lb	11.03

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 30'



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415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
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5

Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 2
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 (K_p÷1.5; C_{pas}÷1.5)
Toe: Cantilever

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 30'

Input Data

Depth Of Excavation = 11.00ft
Surcharge = 9.8psf

Depth Of Active Water = 0.00ft
Depth Of Passive Water = 0.00ft

Water Density = 62.43pcf
Minimum Fluid Density = 31.80pcf

Soil Profile — Active Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	φ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Current Load	0.00	0.00	0.0	0.0	0.0	0.0	1.00	0.00	1.00	0.00
11.00	Silt	112.64	55.00	0.0	0.0	22.0	12.0	0.41	0.00	3.05	0.00

Soil Profile — Passive Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	φ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Current Load	0.00	0.00	0.0	0.0	0.0	0.0	1.00	0.00	1.00	0.00
11.00	Silt	112.64	55.00	0.0	0.0	22.0	12.0	0.41	0.00	3.05 (2.03)	0.00 (0.00)

( ) indicates factored value used in all calculations. Factor(s): K_p÷1.5; C_{pas}÷1.5

Solution

Wall

Description	E (psi)	I (in^4)	f (psi)	Z (in^3)	Allowed M_{max} (ftlb)	b (ft)	t (ft)	w (ft)	s (ft)	Arching	Upstand (ft)	Toe (ft)	Length (ft)
	3.04E+07					3.000	1.000		30.00	1.00	0.00	12.69	23.69
	3.04E+07					1.000	0.333	----	----	----	----	----	----

Maxima

	Maximum	Depth (ft)
Pressure	9.8 psf	5.23
Bending Moment	28584.2 ftlb	15.97
Shear Force	3245.3 lb	11.03

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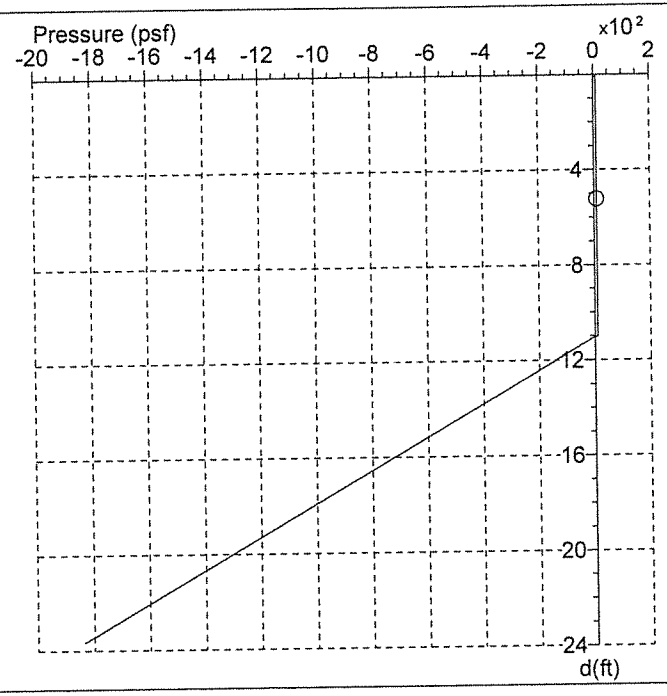
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

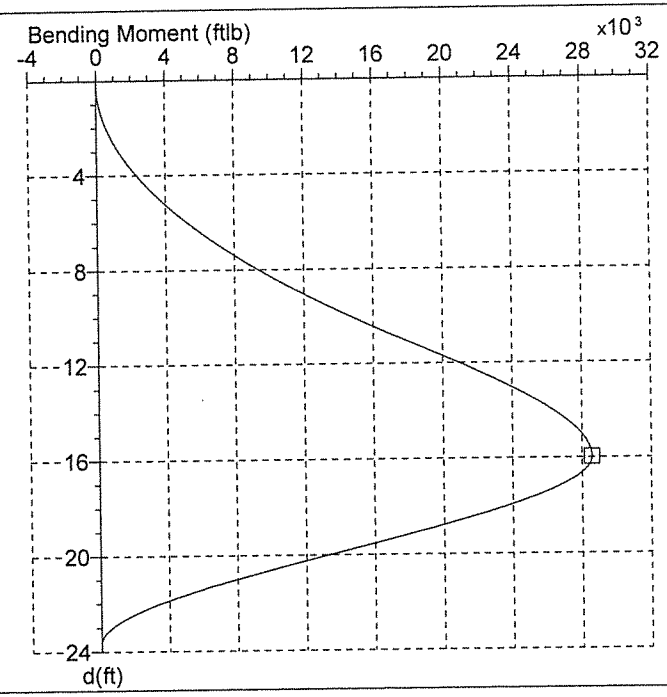
Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 3
Date: 9.4.12

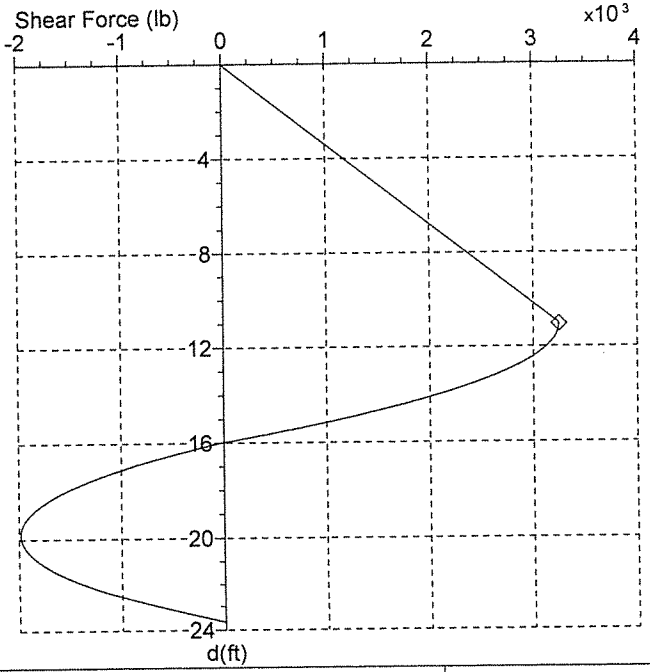
Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 (K_p÷1.5; C_{pas}÷1.5)
Toe: Cantilever

Maximum	d (ft)
○ 9.8 psf	5.23
□ 28584.2 ftlb	15.97
◇ 3245.3 lb	11.03

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 30'







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415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
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Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 4
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 30'

depth (ft)	P (psf)	M (ftlb)	D (in)	F (lb)
0.00	9.8	0.0		0.0
0.17	9.8	3.8		48.8
0.34	9.8	14.7		95.5
0.51	9.8	35.8		148.0
0.68	9.8	62.3		194.6
0.85	9.8	100.9		247.1
1.02	9.8	143.1		293.8
1.18	9.8	199.2		346.2
1.35	9.8	264.7		398.7
1.52	9.8	330.7		445.4
1.69	9.8	413.8		497.9
1.86	9.8	495.4		544.5
2.03	9.8	596.0		597.0
2.20	9.8	693.3		643.7
2.37	9.8	811.4		696.1
2.54	9.8	938.9		748.6
2.71	9.8	1060.0		795.3
2.88	9.8	1205.1		847.8
3.05	9.8	1341.8		894.4
3.21	9.8	1504.4		946.9
3.38	9.8	1656.7		993.6
3.55	9.8	1836.9		1046.0
3.72	9.8	2026.4		1098.5
3.89	9.8	2202.6		1145.2
4.06	9.8	2409.6		1197.7
4.23	9.8	2601.5		1244.3
4.40	9.8	2826.1		1296.8
4.57	9.8	3033.5		1343.5
4.74	9.8	3275.7		1395.9
4.91	9.8	3527.2		1448.4
5.08	9.8	3758.5		1495.1
5.25	9.8	4027.5		1547.6
5.41	9.8	4274.5		1594.2
5.58	9.8	4561.1		1646.7
5.75	9.8	4823.6		1693.4
5.92	9.8	5127.8		1745.8
6.09	9.8	5441.2		1798.3
6.26	9.8	5727.7		1845.0
6.43	9.8	6058.7		1897.5
6.60	9.8	6360.7		1944.1
6.77	9.8	6709.3		1996.6
6.94	9.8	7027.0		2043.3
7.11	9.8	7393.1		2095.7
7.28	9.8	7768.6		2148.2
7.44	9.8	8110.1		2194.9
7.61	9.8	8503.2		2247.4
7.78	9.8	8860.3		2294.0
7.95	9.8	9270.9		2346.5
8.12	9.8	9643.7		2393.2
8.29	9.8	10071.8		2445.6
8.46	9.8	10509.3		2498.1
8.63	9.8	10905.9		2544.8
8.80	9.8	11360.9		2597.3
8.97	9.8	11773.2		2643.9
9.14	9.8	12245.7		2696.4
9.31	9.8	12673.6		2743.1
9.48	9.8	13163.8		2795.5
9.64	9.8	13663.2		2848.0
9.81	9.8	14115.0		2894.7
9.98	9.8	14632.0		2947.2
10.15	9.8	15099.3		2993.8
10.32	9.8	15633.9		3046.3
10.49	9.8	16116.9		3092.9
10.66	9.8	16669.0		3145.4
10.83	9.8	17230.4		3197.9
11.00	9.8	17737.3		3244.6
11.17	-21.0	18312.2		3243.4
11.34	-44.0	18822.5		3235.1
11.51	-69.8	19394.5		3217.8
11.67	-92.7	19899.8		3195.3
11.84	-118.5	20463.4		3161.9
12.01	-144.3	21020.5		3120.2
12.18	-167.2	21508.9		3076.0
12.35	-193.0	22049.5		3018.2
12.52	-215.9	22520.9		2959.8
12.69	-241.7	23039.6		2886.1
12.86	-264.7	23489.3		2813.5
13.03	-290.5	23980.8		2723.9
13.20	-316.2	24455.8		2625.8
13.37	-339.2	24862.9		2531.4
13.54	-365.0	25302.6		2417.4
13.70	-387.9	25675.9		2308.8
13.87	-413.7	26074.9		2178.8
14.04	-436.6	26409.7		2056.1
14.21	-462.4	26762.6		1910.1
14.38	-488.2	27088.9		1755.6
14.55	-511.1	27355.6		1611.2
14.72	-536.9	27627.7		1440.7
14.89	-559.9	27843.8		1282.1
15.06	-585.7	28056.4		1095.7
15.23	-608.6	28217.2		922.9
15.40	-634.4	28364.9		720.5
15.57	-660.2	28476.0		509.7
15.74	-683.1	28543.0		315.2
15.90	-708.9	28581.1		88.4
16.07	-731.8	28573.1		-100.5
16.24	-757.6	28484.0		-274.7
16.41	-780.6	28333.3		-422.5
16.58	-806.4	28087.2		-580.8
16.75	-832.2	27764.1		-730.6
16.92	-855.1	27415.6		-856.6
17.09	-880.9	26958.4		-990.5
17.26	-903.8	26497.5		-1102.4
17.43	-929.6	25921.3		-1220.3
17.60	-952.5	25361.2		-1318.0
17.77	-978.3	24681.1		-1419.9
17.93	-1004.1	23952.0		-1513.3
18.10	-1027.1	23266.3		-1589.3
18.27	-1052.9	22456.2		-1666.8
18.44	-1075.8	21705.2		-1728.6
18.61	-1101.6	20829.3		-1790.1
18.78	-1124.5	20026.4		-1837.7
18.95	-1150.3	19099.5		-1883.3
19.12	-1176.1	18151.9		-1920.4
19.29	-1199.0	17295.4		-1946.3
19.46	-1224.8	16319.9		-1967.4
19.63	-1247.8	15445.4		-1979.1
19.80	-1273.6	14457.0		-1984.2
19.97	-1296.5	13577.8		-1981.7
20.13	-1322.3	12591.6		-1970.9
20.30	-1348.1	11612.8		-1951.7
20.47	-1371.0	10752.1		-1927.5
20.64	-1396.8	9798.5		-1892.2
20.81	-1419.7	8967.0		-1853.8
20.98	-1445.5	8053.6		-1802.6
21.15	-1468.5	7264.5		-1750.0
21.32	-1494.2	6406.4		-1682.9
21.49	-1520.0	5583.6		-1607.3
21.66	-1543.0	4885.4		-1533.0
21.83	-1568.8	4141.0		-1441.4
22.00	-1591.7	3519.0		-1352.9
22.16	-1617.5	2867.9		-1245.3
22.33	-1640.4	2335.6		-1142.6
22.50	-1666.2	1792.8		-1019.1
22.67	-1692.0	1313.6		-887.1
22.84	-1714.9	944.2		-762.7
23.01	-1740.7	596.4		-614.8
23.18	-1763.7	350.5		-476.2
23.35	-1789.5	149.0		-312.3
23.52	-1812.4	40.0		-159.5
23.69	-1835.3	0.0		0.0

Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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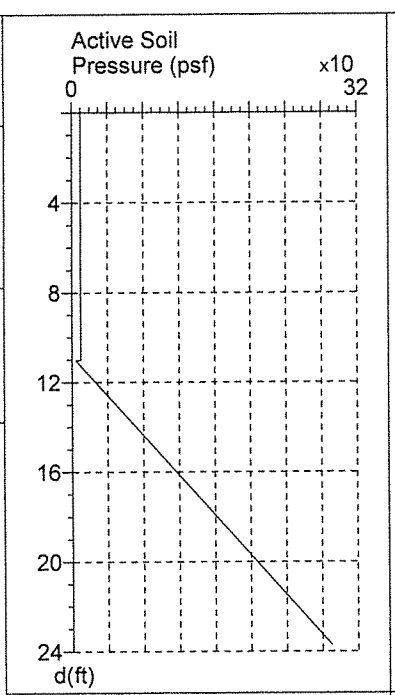
© 1997 - 2011, GTSoft Ltd.
Tel/Fax: +44 (0)1292 477754
Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

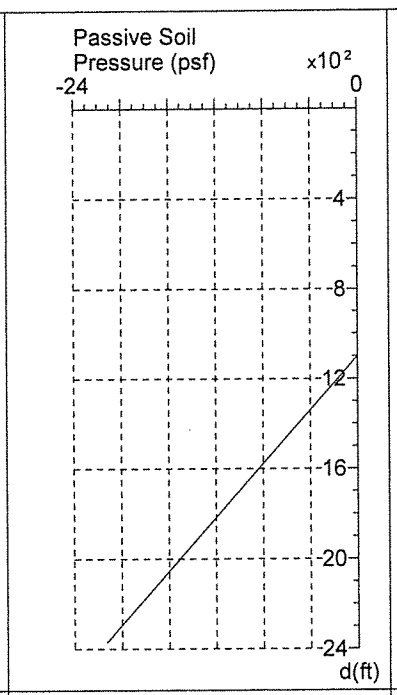
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

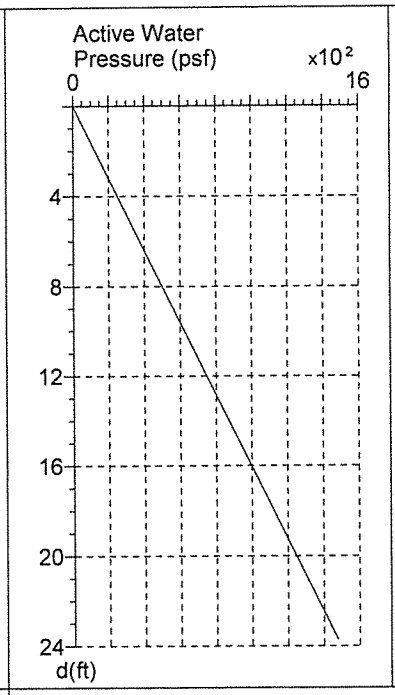
Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 5
Date: 9.4.12

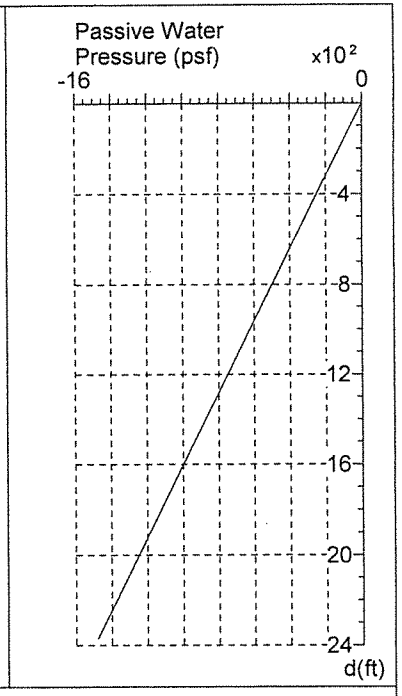
Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

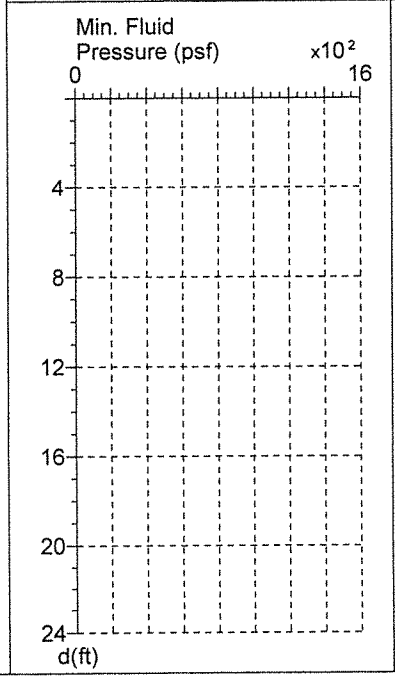
Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 30'

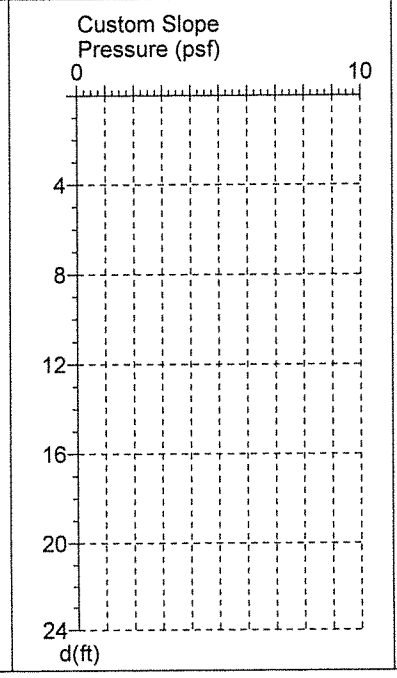


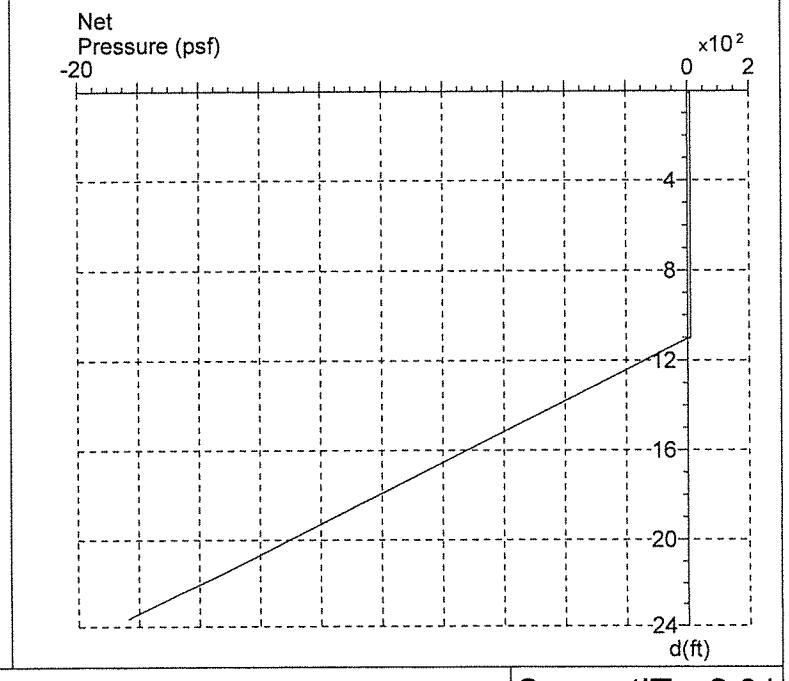












Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Tel/Fax: +44 (0)1292 477754
Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

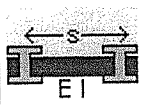
16

Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 6
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
Toe: Cantilever

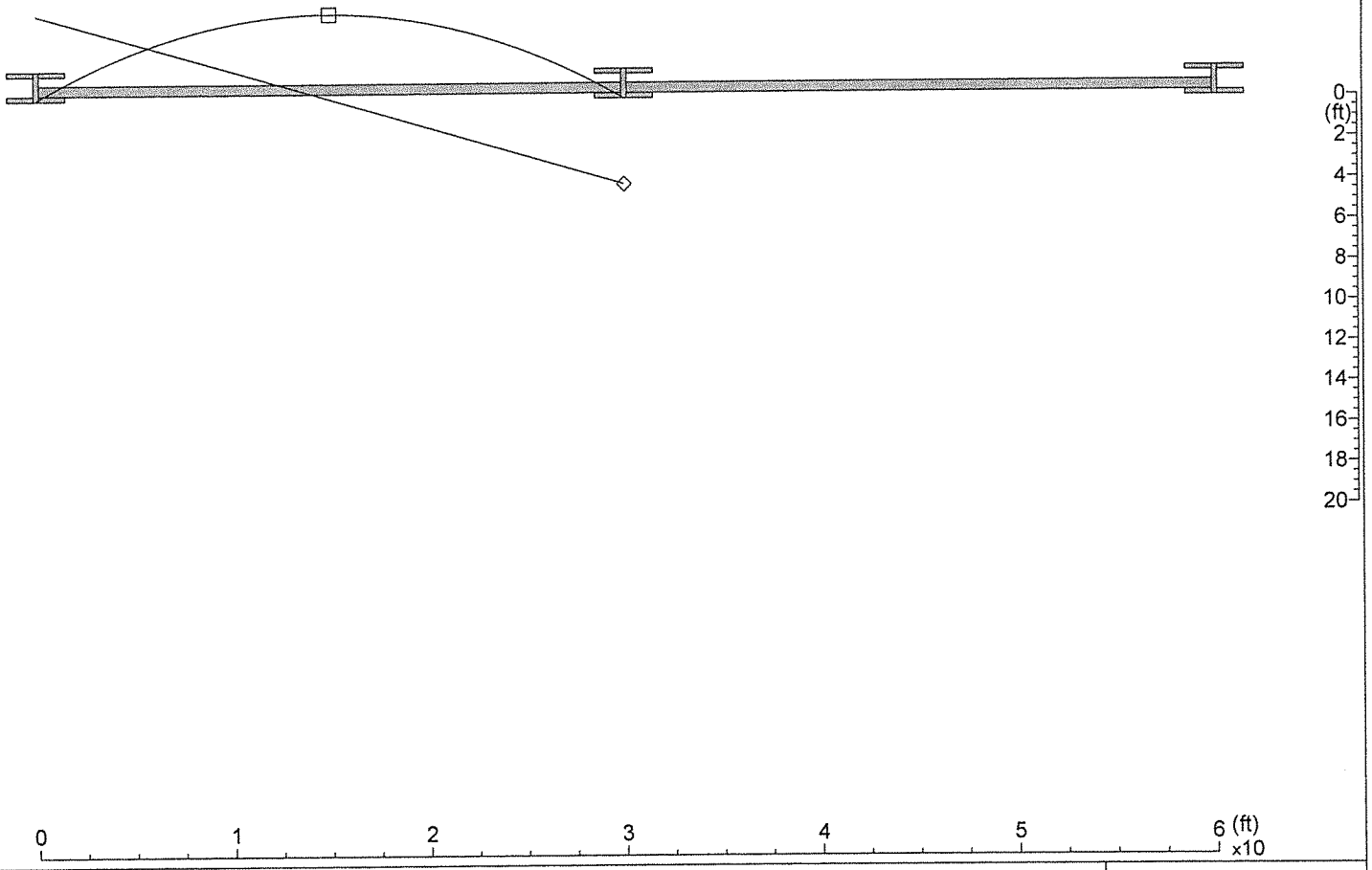
Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 30'



s = 30.00 ft
E = 3.04E+07 psi

		Maximum	x (ft)
Pressure (psf)		9.8	5.23
Bending Moment (ftlb)	□	1105.9	14.97
Shear Force (lb)	◇	147.5	29.97

Specify lagging stress, f, for minimum section modulus



Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 7
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 (K_p÷1.5; C_{pas}÷1.5)
Toe: Cantilever

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 30'

Design Report

1.

d(ft)	Bulk D(pcf)	Sub. D(pcf)
0.00	0.00	0.00

Are these density values correct? Note that SupportIT uses Submerged Density, NOT Saturated Density.

2. The standard surcharge is 9.8psf. The Piling Handbook recommends a minimum surcharge of 200.0psf.

3. Minimum fluid density is 31.8pcf. The Piling Handbook recommends 31.8pcf.

4. Factor(s) applied to soil parameter(s) in the 'Wall' page, and used in all calculations.
Factor(s) used: Kp ÷1.5; C (passive) ÷1.5

5. Soldier pile allowed bending moment undefined.

6. Soldier pile section modulus is undefined.

7. FOS = 1.00 (Net Pressure)
This is the factor of safety against rotation about the toe. It is calculated using the factored soil parameters (see above).
The FOS can be changed using 'Defined FOS' or 'Manual' in the 'Wall' page.

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Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

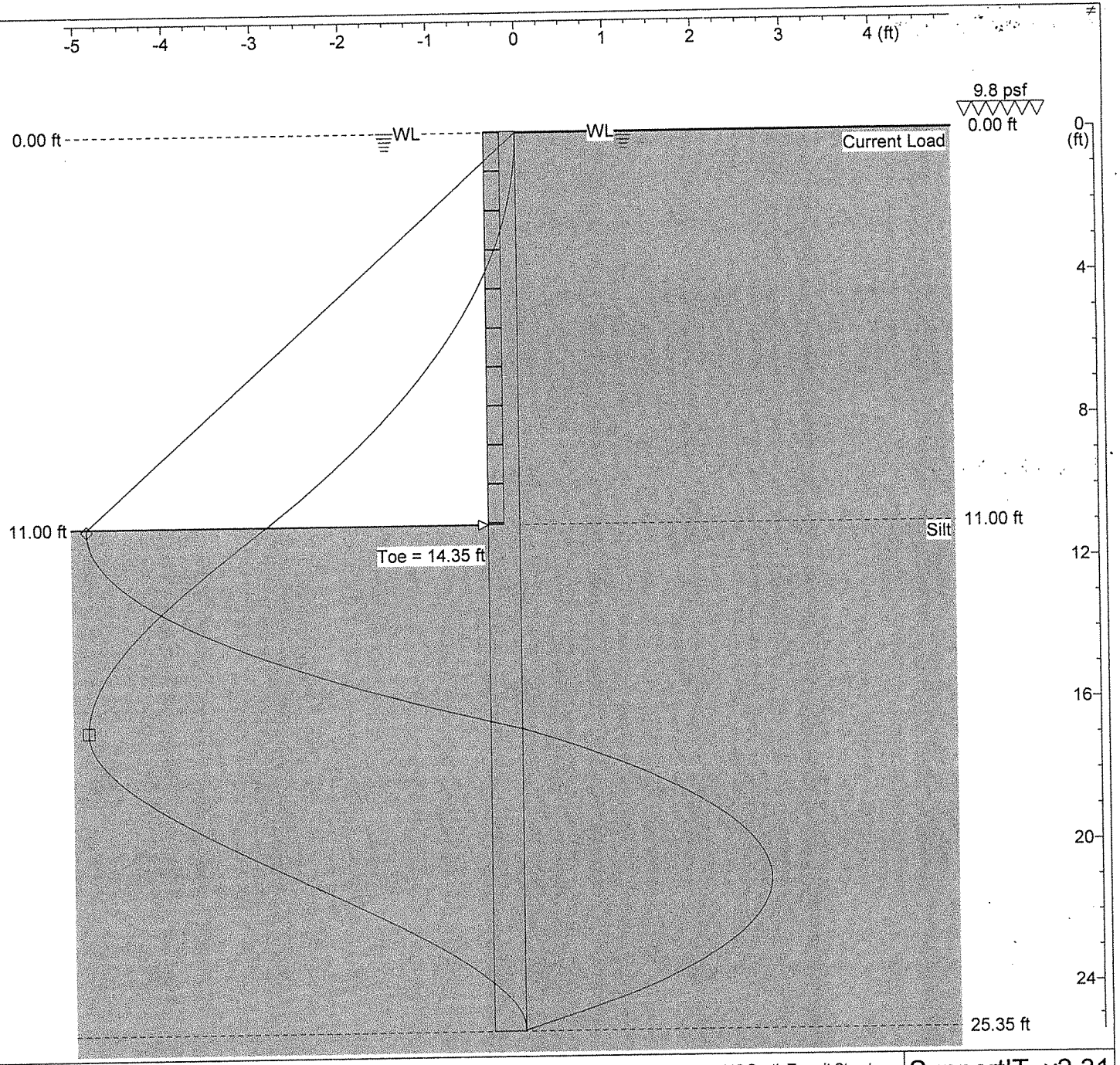
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 1
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

	Maximum	d (ft)
□	40266.3 ftlb	16.75
◇	4317.3 lb	11.07

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segment)
S = 40'



Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Tel/Fax: +44 (0)1292 477754
Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

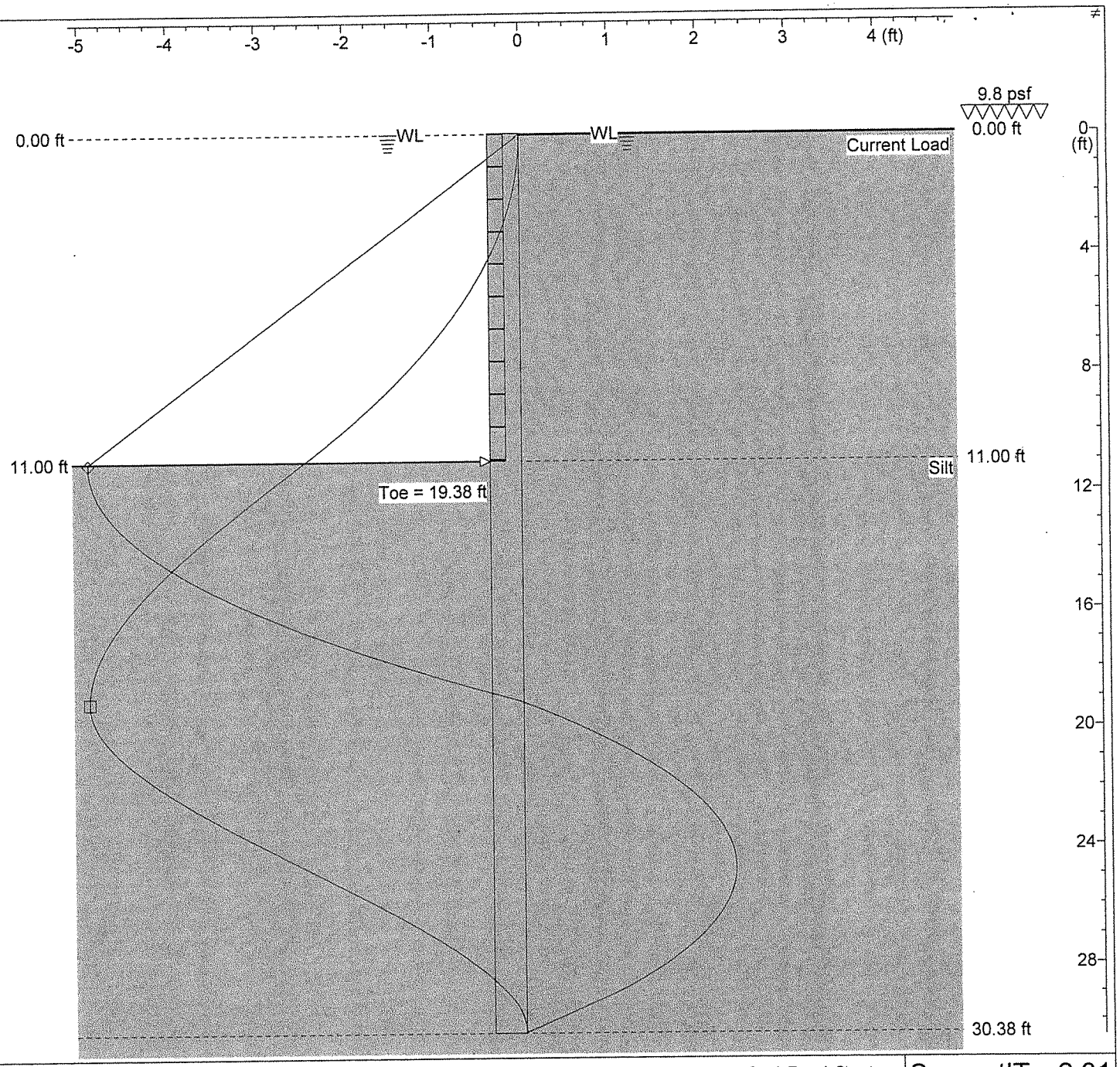
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 1
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 0.99 (K_p÷1.5; C_{pas}÷1.5)
Toe: Cantilever

Maximum	d (ft)
□ 94458.6 ftlb	19.14
◇ 8664.7 lb	11.06

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.57 (angled segments)
S = 80'



Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Email: GTSoftLtd@aol.com
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13

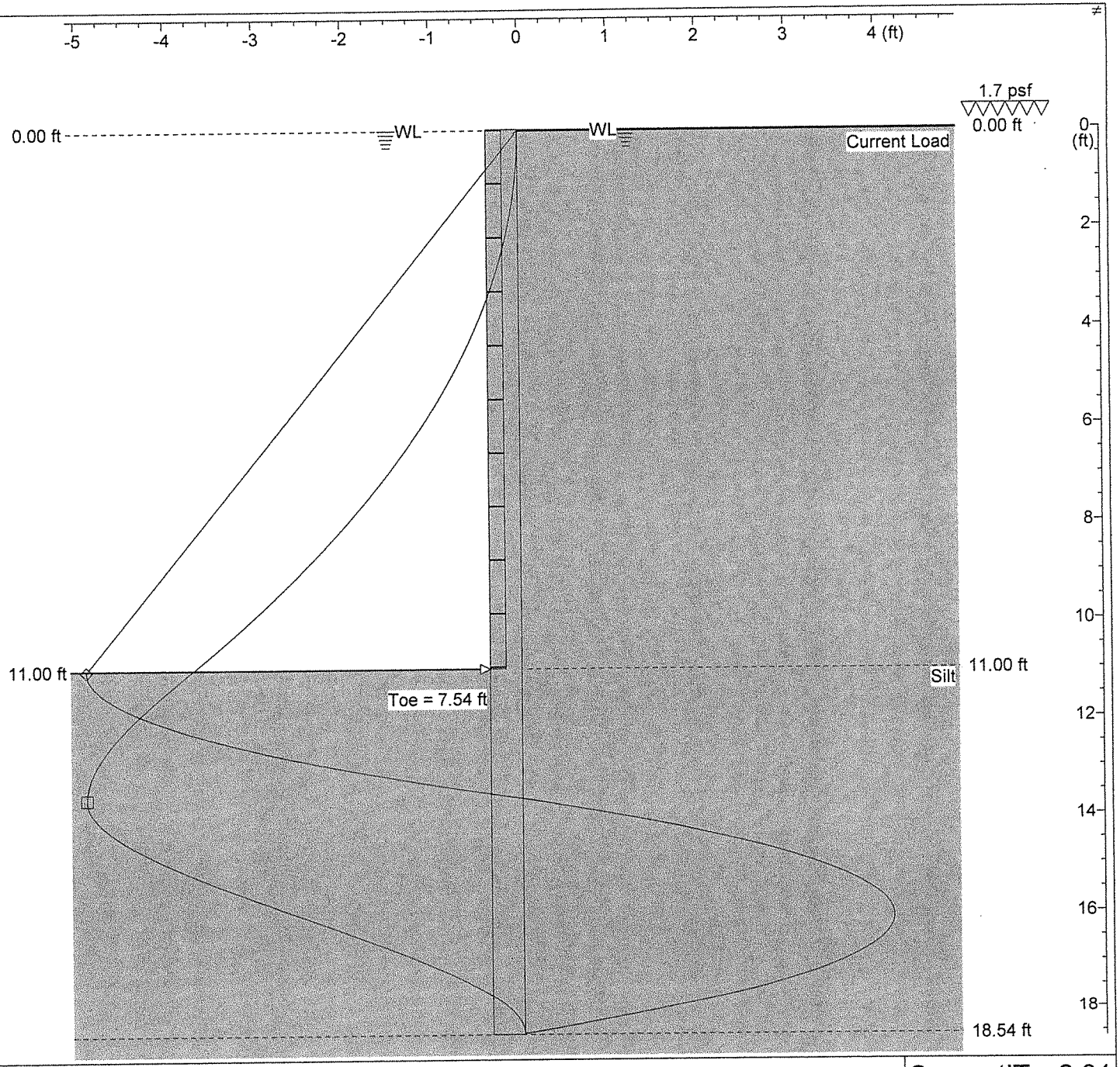
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 1
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.01 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

Maximum	d (ft)
□ 6781.0 ftlb	13.66
◇ 935.0 lb	11.03

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.1 (parallel segment)
S = 50'



Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Email: GTSoftLtd@aol.com
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14

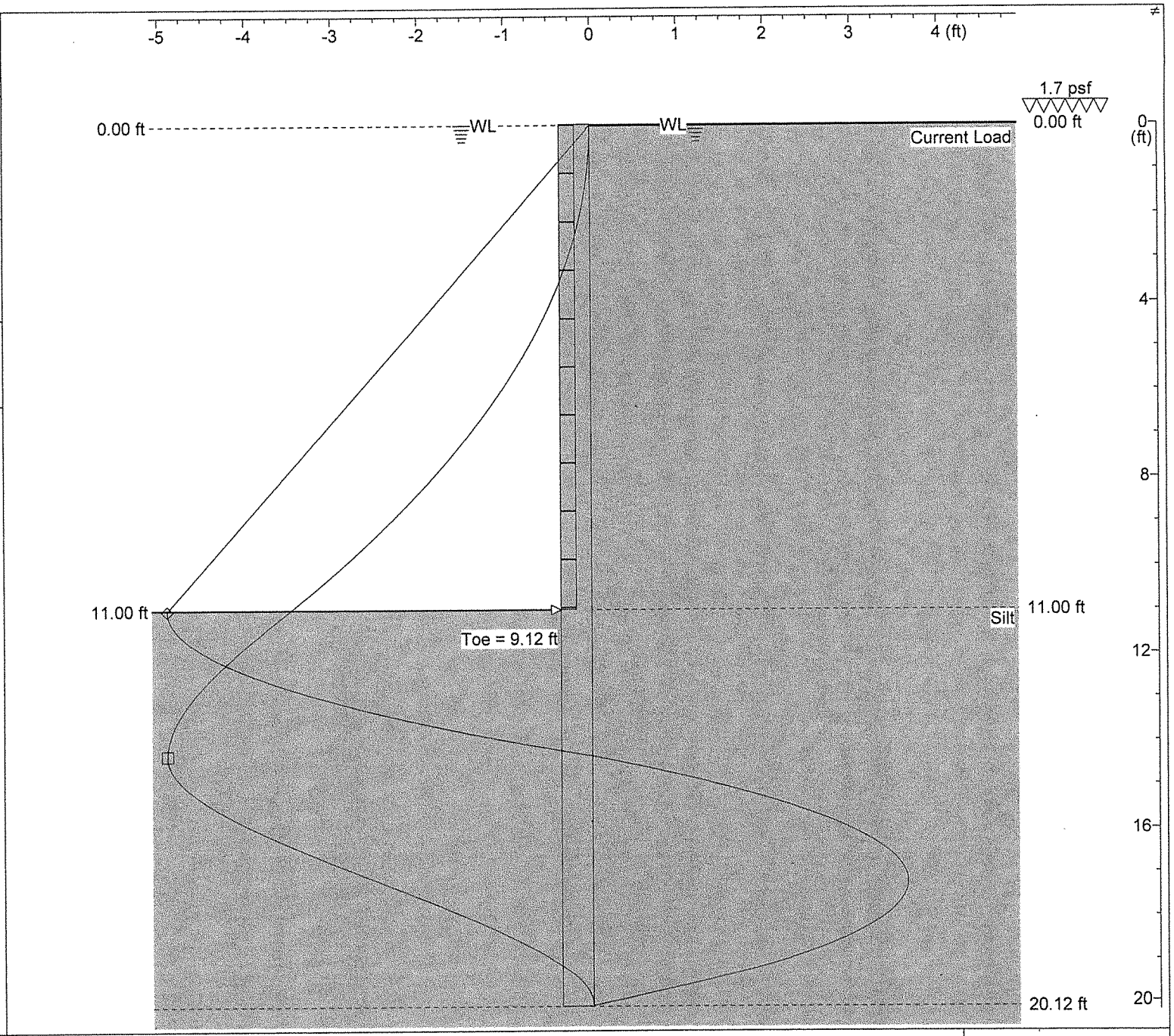
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 1
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 (K_p÷1.5; C_{pas}÷1.5)
Toe: Cantilever

Maximum	d (ft)
□ 11543.9 ftlb	14.35
◇ 1495.8 lb	11.03

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.1 (parallel segment)
S = 80'



Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 2
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 (K_p÷1.5; C_{pas}÷1.5)
Toe: Cantilever

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.1 (parallel segment)
S = 80'

Input Data

Depth Of Excavation = 11.00ft
Surcharge = 1.7psf

Depth Of Active Water = 0.00ft
Depth Of Passive Water = 0.00ft

Water Density = 62.43pcf
Minimum Fluid Density = 31.80pcf

Soil Profile — Active Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	φ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Current Load	0.00	0.00	0.0	0.0	0.0	0.0	1.00	0.00	1.00	0.00
11.00	Silt	112.64	55.00	0.0	0.0	22.0	12.0	0.41	0.00	3.05	0.00

Soil Profile — Passive Side

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	φ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Current Load	0.00	0.00	0.0	0.0	0.0	0.0	1.00	0.00	1.00	0.00
11.00	Silt	112.64	55.00	0.0	0.0	22.0	12.0	0.41	0.00	3.05 (2.03)	0.00 (0.00)

( ) indicates factored value used in all calculations. Factor(s): K_p÷1.5; C_{pas}÷1.5

Solution

Wall

Description	E (psi)	I (in^4)	f (psi)	Z (in^3)	Allowed M_{max} (ftlb)	b (ft)	t (ft)	w (ft)	s (ft)	Arching	Upstand (ft)	Toe (ft)	Length (ft)
	3.04E+07					1.000	1.000	3.000	80.00	1.00	0.00	9.12	20.12
	3.04E+07					1.000	0.333	----	----	----	----	----	----

Maxima

	Maximum	Depth (ft)
Pressure	1.7 psf	10.70
Bending Moment	11543.9 ftlb	14.35
Shear Force	1495.8 lb	11.03

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Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

1/91

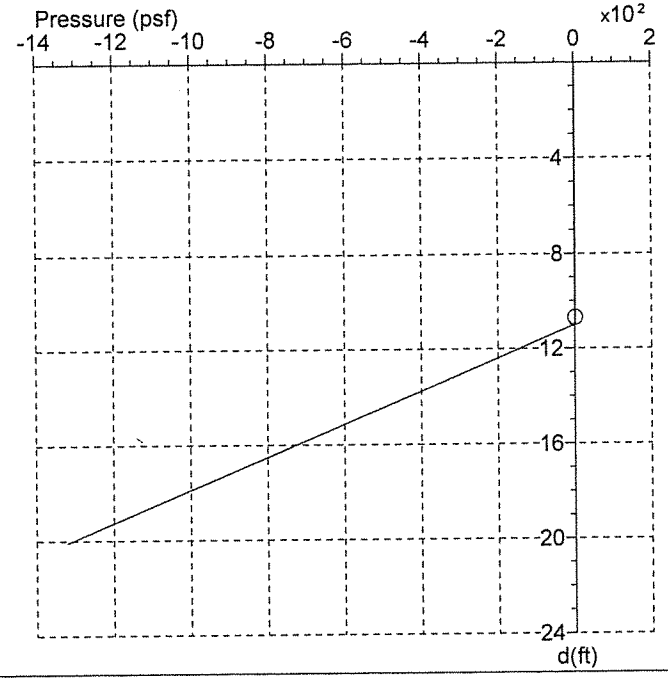
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

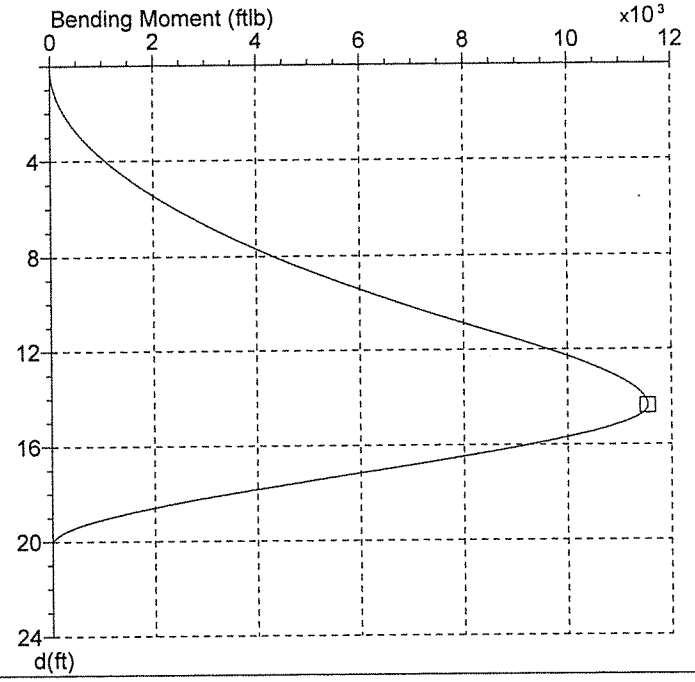
Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 3
Date: 9.4.12

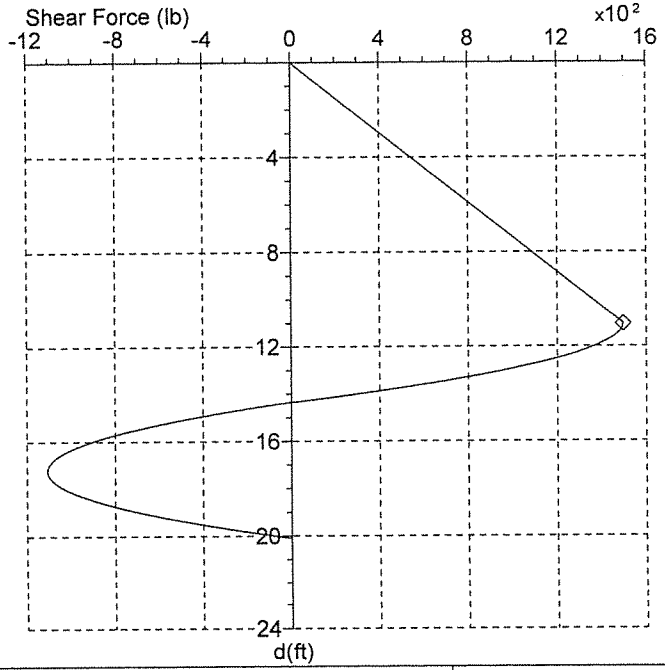
Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

Maximum		d (ft)
○	1.7 psf	10.70
□	11543.9 ftlb	14.35
◇	1495.8 lb	11.03

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.1 (parallel segment)
S = 80'







Glynn Geotechnical Engineering

415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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Tel/Fax: +44 (0)1292 477754
Email: GTSoftLtd@aol.com
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Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 4
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.1 (parallel segment)
S = 80'

depth (ft)	P (psf)	M (ftlb)	D (in)	F (lb)
0.00	1.7	0.0		0.0
0.14	1.7	1.4		18.2
0.29	1.7	4.9		36.5
0.43	1.7	11.7		57.0
0.57	1.7	20.4		75.2
0.72	1.7	33.2		95.8
0.86	1.7	47.0		114.0
1.01	1.7	65.6		134.5
1.15	1.7	87.2		155.0
1.29	1.7	109.1		173.3
1.44	1.7	136.6		193.8
1.58	1.7	163.6		212.0
1.72	1.7	196.9		232.6
1.87	1.7	229.1		250.8
2.01	1.7	268.3		271.3
2.16	1.7	310.5		291.8
2.30	1.7	350.7		310.1
2.44	1.7	398.8		330.6
2.59	1.7	444.1		348.8
2.73	1.7	498.1		369.4
2.87	1.7	548.6		387.6
3.02	1.7	608.4		408.1
3.16	1.7	671.2		428.6
3.31	1.7	729.7		446.9
3.45	1.7	798.4		467.4
3.59	1.7	862.1		485.6
3.74	1.7	936.6		506.2
3.88	1.7	1005.5		524.4
4.02	1.7	1085.9		544.9
4.17	1.7	1169.4		565.4
4.31	1.7	1246.2		583.7
4.45	1.7	1335.5		604.2
4.60	1.7	1417.5		622.4
4.74	1.7	1512.6		643.0
4.89	1.7	1599.8		661.2
5.03	1.7	1700.8		681.7
5.17	1.7	1804.9		702.2
5.32	1.7	1900.0		720.5
5.46	1.7	2010.0		741.0
5.60	1.7	2110.3		759.2
5.75	1.7	2226.0		779.8
5.89	1.7	2331.5		798.0
6.04	1.7	2453.1		818.5
6.18	1.7	2577.9		839.0
6.32	1.7	2691.3		857.3
6.47	1.7	2821.8		877.8
6.61	1.7	2940.5		896.0
6.75	1.7	3076.8		916.6
6.90	1.7	3200.7		934.8
7.04	1.7	3342.9		955.3
7.18	1.7	3488.2		975.8
7.33	1.7	3620.0		994.1
7.47	1.7	3771.1		1014.6
7.62	1.7	3908.1		1032.8
7.76	1.7	4065.1		1053.4
7.90	1.7	4207.2		1071.6
8.05	1.7	4370.1		1092.1
8.19	1.7	4536.0		1112.6
8.33	1.7	4686.1		1130.9
8.48	1.7	4857.8		1151.4
8.62	1.7	5013.1		1169.6
8.77	1.7	5190.7		1190.2
8.91	1.7	5351.2		1208.4
9.05	1.7	5534.6		1228.9
9.20	1.7	5721.2		1249.4
9.34	1.7	5889.6		1267.7
9.48	1.7	6082.0		1288.2
9.63	1.7	6255.6		1306.4
9.77	1.7	6453.8		1327.0
9.92	1.7	6632.6		1345.2
10.06	1.7	6836.6		1365.7
10.20	1.7	7043.8		1386.2
10.35	1.7	7230.5		1404.5
10.49	1.7	7443.5		1425.0
10.63	1.7	7635.4		1443.2
10.78	1.7	7854.3		1463.8
10.92	1.7	8051.4		1482.0
11.06	-8.7	8275.9		1495.6
11.21	-30.6	8501.0		1490.6
11.35	-50.1	8700.1		1481.0
11.50	-72.0	8922.2		1464.5
11.64	-91.5	9117.3		1444.6
11.78	-113.4	9333.1		1416.6
11.93	-132.8	9521.2		1386.6
12.07	-154.7	9727.5		1347.0
12.21	-176.7	9927.5		1301.3
12.36	-196.1	10099.1		1255.6
12.50	-218.0	10284.6		1198.4
12.65	-237.5	10441.8		1142.5
12.79	-259.4	10609.5		1073.8
12.93	-278.9	10749.5		1007.6
13.08	-300.8	10896.0		927.4
13.22	-322.7	11030.0		841.1
13.36	-342.2	11137.9		759.3
13.51	-364.1	11245.8		661.4
13.65	-383.6	11329.1		569.3
13.79	-405.5	11407.6		460.0
13.94	-424.9	11463.3		357.7
14.08	-446.9	11509.2		236.8
14.23	-468.8	11536.4		109.9
14.37	-488.2	11543.9		-12.9
14.51	-510.1	11517.9		-125.3
14.66	-529.6	11456.9		-220.2
14.80	-551.5	11347.9		-321.1
14.94	-571.0	11217.1		-405.8
15.09	-592.9	11034.0		-495.2
15.23	-614.8	10815.4		-578.5
15.38	-634.3	10593.2		-647.5
15.52	-656.2	10314.2		-719.3
15.66	-675.7	10042.2		-778.0
15.81	-697.6	9711.7		-838.3
15.95	-717.1	9398.0		-886.8
16.09	-739.0	9025.0		-935.6
16.24	-760.9	8633.0		-978.3
16.38	-780.3	8270.7		-1011.1
16.53	-802.3	7849.9		-1042.3
16.67	-821.7	7465.9		-1064.8
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17.10	-885.0	6175.5		-1105.0
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17.39	-926.4	5318.0		-1103.7
17.53	-948.3	4866.6		-1094.2
17.67	-967.8	4469.4		-1080.6
17.82	-989.7	4029.5		-1059.6
17.96	-1009.2	3646.6		-1035.9
18.11	-1031.1	3227.2		-1003.3
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18.54	-1094.4	2105.7		-875.1
18.68	-1113.8	1794.2		-825.4
18.82	-1135.7	1466.5		-763.8
18.97	-1155.2	1197.3		-703.9
19.11	-1177.1	921.5		-630.7
19.26	-1199.0	677.0		-551.4
19.40	-1218.5	487.7		-475.8
19.54	-1240.4	308.8		-385.1
19.69	-1259.9	181.9		-299.2
19.83	-1281.8	77.5		-196.9
19.97	-1301.3	20.8		-100.9
20.12	-1320.7	0.0		0.0

Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

SupportIT, v2.31
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Tel/Fax: +44 (0)1292 477754
Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

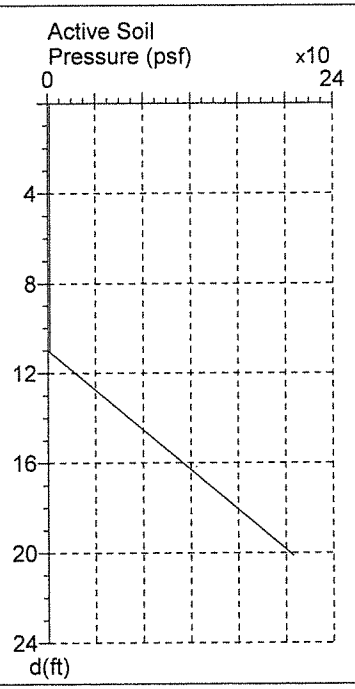
5/8

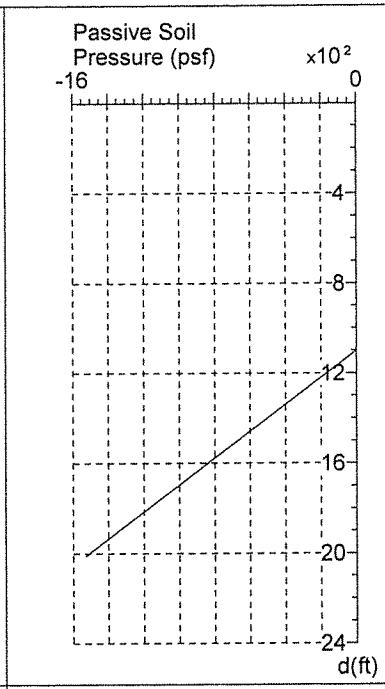
Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

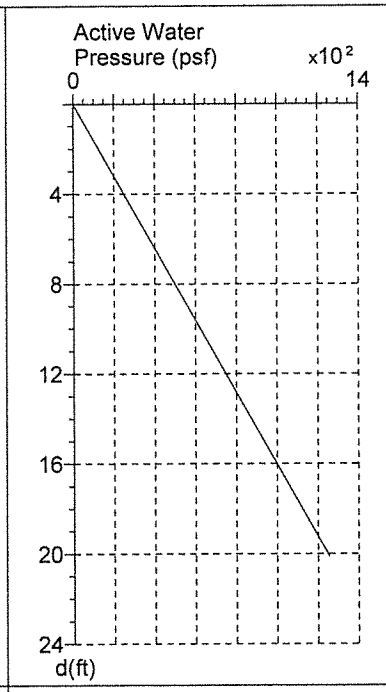
Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 5
Date: 9.4.12

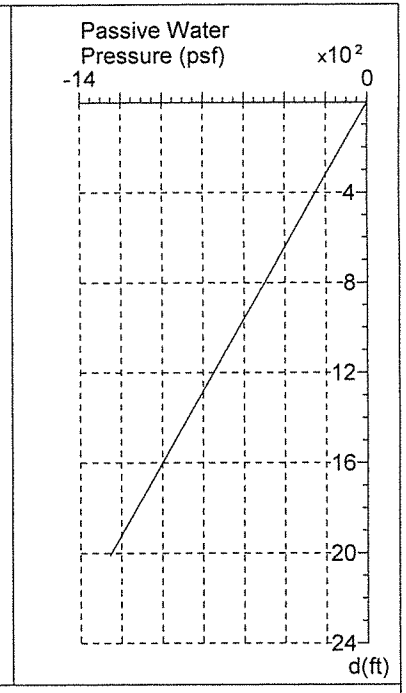
Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 ($K_p \div 1.5$; $C_{pas} \div 1.5$)
Toe: Cantilever

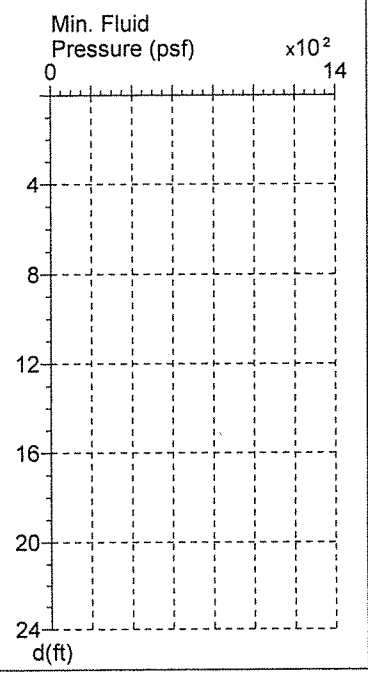
Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.1 (parallel segment)
S = 80'

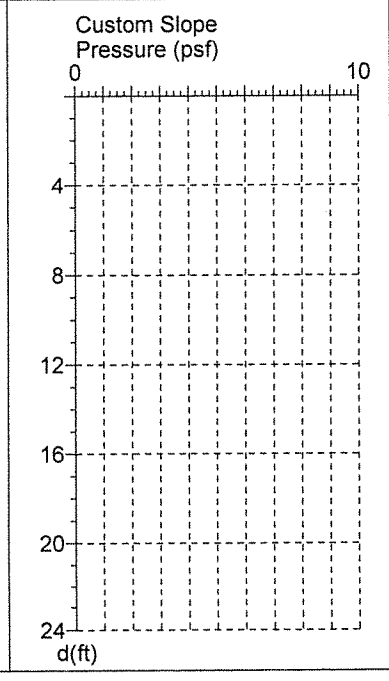


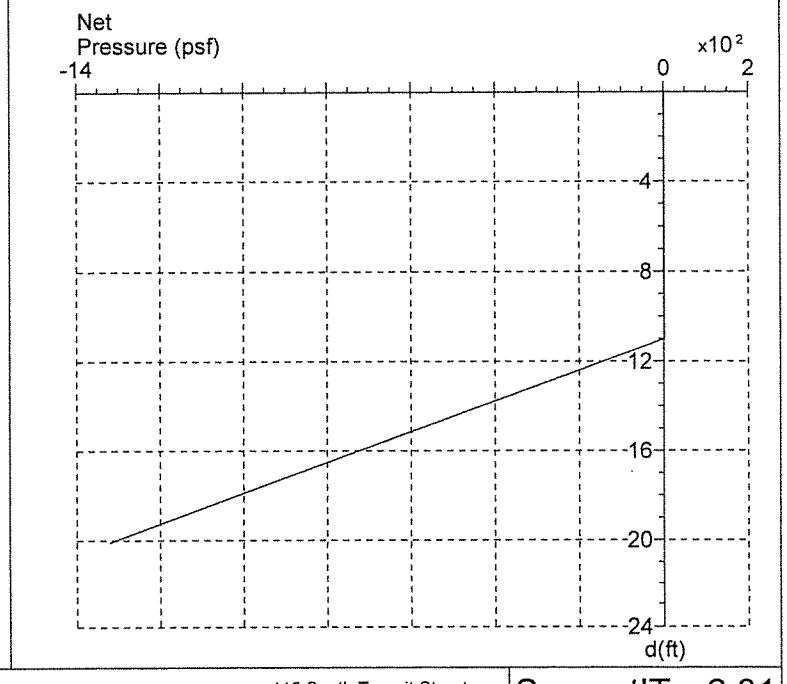












Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094
Tel: 716.625.6933
Fax: 716.625.6983
EMail: www.glynngroup.com

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© 1997 - 2011, GTSoft Ltd.
Tel/Fax: +44 (0)1292 477754
Email: GTSoftLtd@aol.com
Web: www.GTSoft.org

Client: Sevenson Environmental Services, Inc.
Site: Niagara Falls, NY
Tel: 284-0431

Title: 06-1103-B GM Plant Sediment Removal, Sleepy Hollow, NY
Designer: jeg
Ref: SES
Page: 7
Date: 9.4.12

Works: Temporary
Pressure: Coulomb
Analysis: Net Pressure
FOS: 1.00 (K_p÷1.5; C_{pas}÷1.5)
Toe: Cantilever

Turbidity Barrier Kingpiles
H = 11.08'
U = 3 fps
fc = 0.1 (parallel segment)
S = 80'

Design Report

1.

d(ft)	Bulk D(pcf)	Sub. D(pcf)
0.00	0.00	0.00

Are these density values correct? Note that SupportIT uses Submerged Density, NOT Saturated Density.

2. The standard surcharge is 1.7psf. The Piling Handbook recommends a minimum surcharge of 200.0psf.

3. Minimum fluid density is 31.8pcf. The Piling Handbook recommends 31.8pcf.

4. Factor(s) applied to soil parameter(s) in the 'Wall' page, and used in all calculations.
Factor(s) used: Kp ÷1.5; C (passive) ÷1.5

5. Soldier pile allowed bending moment undefined.

6. Soldier pile section modulus is undefined.

7. FOS = 1.00 (Net Pressure)
This is the factor of safety against rotation about the toe. It is calculated using the factored soil parameters (see above).
The FOS can be changed using 'Defined FOS' or 'Manual' in the 'Wall' page.

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Tel/Fax: +44 (0)1292 477754
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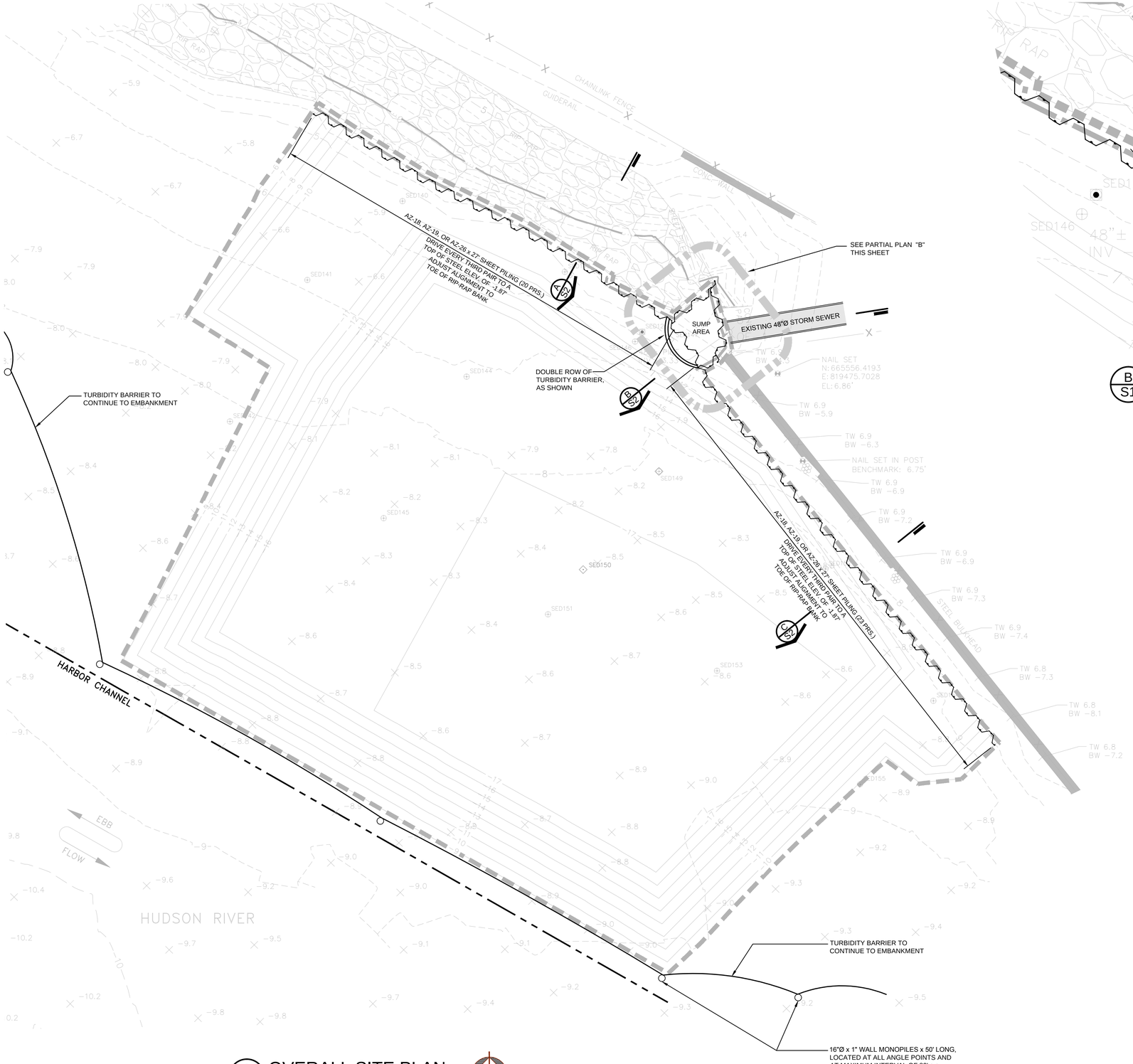
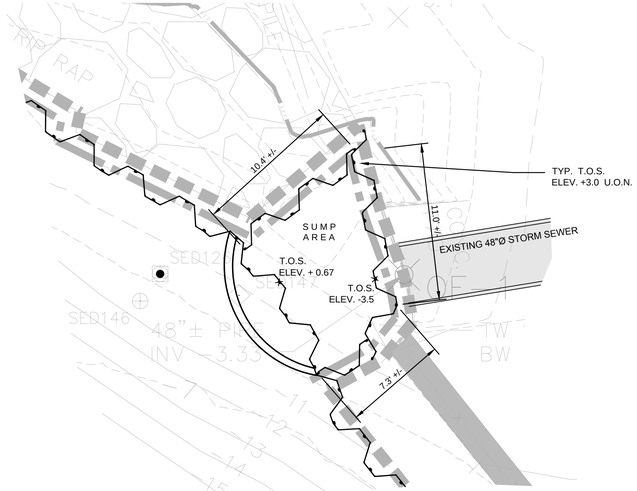
Web: www.GTSoft.org



A/S1 OVERALL SITE PLAN
SCALE: 1" = 10'
5' 0' 10' 20'



B/S1 PARTIAL PLAN "B"
SCALE: 1" = 5'
2.5' 0' 5' 10'
NORTH

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MATERIALS TESTING • CONSULTING

GLYNN GEOTECHNICAL ENGINEERING
1645 FRANKLIN STREET
LOCKPORT, NEW YORK 14094
www.glynngroup.com
VOICE (716) 625 - 6983 / FAX (716) 625 - 6983

STATE OF NEW YORK
JESSE GROSSMAN
070885
LICENSED PROFESSIONAL ENGINEER
10/15/12

ITEM:	DATE:	REVISION:
0	10/15/12	ISSUED FOR REVIEW

CLIENT:
Sevenson Environmental Services, Inc.

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PROJECT:
GENERAL MOTORS, LLC. SITE
SLEEPY HOLLOW, WESTCHESTER CO., N. Y.
SEDIMENT REMEDIATION - SHORING DESIGN

TITLE:
EXCAVATION AREA LOCATION PLAN

GGE PROJ #:
06-1103-B
GGE FILE:
SP1.DWG
DRAWN BY:
jg/EMP
CHECKED BY:
MWG

DWG:
S1

THIS DRAWING USES BASE SITE PLAN PREPARED AND PROVIDED BY ARCADIS OF NEW YORK, INC., AS A REFERENCE PLAN FOR THE EXCAVATION SHORING DESIGN PREPARED BY GLYNN GEOTECHNICAL ENGINEERING.

DESIGN NOTES:

1. EXCAVATION SHORING DESIGN IS BASED ON TEMPORARY EXCAVATION SUPPORT CONDITIONS USING RANKINE EARTH PRESSURE COEFFICIENTS AND IS BASED ON PROJECT INFORMATION PROVIDED ON DRAWINGS DATED JULY 2012, PREPARED BY ARCADIS OF NEW YORK, AND ADDITIONAL PROJECT INFORMATION WHICH WAS ALSO PROVIDED BY ARCADIS, INCLUDING HISTORICAL INFORMATION FOR THIS SITE (PREVIOUSLY ADVANCED BORING LOGS AND PREVIOUS ENGINEERING EVALUATIONS BY OTHERS). THE HISTORICAL SUBSURFACE INFORMATION AND INDICATED SOIL CONDITIONS WERE USED AS THE BASIS FOR THE DESIGN ANALYSES RELATIVE TO THE TEMPORARY SHORING.

2. DESIGN DRAWINGS INDICATE THE LATERAL EXTENTS OF THE SEDIMENT REMOVAL LIMITS AS INDICATED ON THE ARCADIS CONTRACT DRAWINGS.

MATERIALS:

1. STEEL SHEETPILE MATERIAL SHALL COMPLY WITH ASTM A328 (Fy = 39 KSI, MIN.), AND SHALL BE PRODUCED BY "HOT ROLLING" WITH BALL AND SOCKET INTERLOCKS.

2. SHEETPILING SHALL PROVIDE A MIN. SECTION MODULUS OF 24in³/ft. ACCEPTABLE SHEET PILING SECTIONS INCLUDE: AZ-18, AZ-19, AND AZ-26 SECTIONS BY ARCELORMITTAL.

 2.1. USED SHEET PILING SHALL BE VISUALLY INSPECTED AND ACCEPTED FOR USE PRIOR TO INSTALLATION. USED SHEET PILING SHALL BE INSPECTED FOR DAMAGES AND REJECTED IF THE USED SHEETS: (1) ARE DISTORTED TO A DEGREE THAT PRECLUDES DRIVING, (2) HAVE DAMAGED INTERLOCKS THAT WILL PREVENT CONTINUITY WITH ADJACENT SHEETS AND HINDER DRIVEABILITY, AND/OR (3) ARE TORN OR HAVE PENETRATIONS THROUGH THE SHEET.

3. PROVIDE LACED INTERLOCKS TO THE GREATEST EXTENT POSSIBLE. AS APPROVED BY THE ENGINEER, CORNERS AND CHANGES IN ALIGNMENT MADE BE ACCOMPLISHED BY OVERLAPPING ADJACENT SHEETS. TEMPORARY SHEET PILING IS NOT INTENDED TO SERVE AS A WATER BARRIER.

4. IF REQUIRED, SUPPLEMENTAL STRUCTURAL STEEL SHALL COMPLY WITH:

 4.1. WIDE-FLANGE "W" SHAPES - ASTM A992, Fy = 50 ksi,
 4.2. "HP" SHAPES - ASTM A572, Fy = 50 ksi,
 4.3. PIPE SECTIONS - ASTM A53, Gr. B, Fy = 35 ksi,
 4.4. HSS SECTIONS - ASTM A500, Gr. B, Fy = 42 ksi,
 4.5. MISC. PLATES AND CHANNELS - ASTM A36, Fy = 36 ksi

5. ANY ALTERNATE BRACED OR ANCHORED EXCAVATION SUPPORT SYSTEM PROPOSED BY THE CONTRACTOR OR AS IS REQUIRED BASED ON UNANTICIPATED OR CHANGED PROJECT CONDITIONS SHALL BE DESIGNED BY A NEW YORK STATE REGISTERED PROFESSIONAL ENGINEER AND THE DESIGN SHALL BE SUBMITTED TO THE OWNER FOR REVIEW BY THE OWNER'S ENGINEER.

6. ADDITIONAL CONSTRUCTION SURCHARGE LOADS ARE NOT CONSIDERED IN THE SHORING DESIGN AND SHALL BE AVOIDED.

EXCAVATION SHORING SYSTEM GENERAL CONSTRUCTION PROCEDURES

1. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS OF OSHA CFR 29, PART 1926.

2. COMPLETE SURFICIAL EXCAVATION ALONG THE ALIGNMENT OF THE SHEET PILING TO CLEAR THE DRIVELINE OF OBSTRUCTIONS AND ALLOW FOR OVERDRIVING IF REQUIRED.

3. DRIVE SHEET PILING ALONG THE ALIGNMENT OF THE SEDIMENT REMOVAL LIMITS TO THE TOE DEPTHS SPECIFIED FOR THE MAXIMUM ANTICIPATED EXCAVATION DEPTH.

4. PROVIDE WEIRS OR "WINDOWS" ALONG THE SHEET PILE SHORING ALIGNMENT WITH INTERMITTENT SHEET PAIRS DRIVEN TO A T.O.S. ELEVATION AT -1.87' OR BELOW TO PROVIDE BALANCED WATER LEVELS ON BOTH SIDES OF THE SHEET PILING.

 4.1. SHEET PILING DRIVEN TO REFUSAL AND ACHIEVING AT LEAST 50% OF THE DESIGN TOE EMBEDMENT IS ACCEPTABLE IF NOT MORE THAN TWO (2) CONSECUTIVE PAIRED SHEETS ARE LEFT "SHORT" AND THE ADJACENT SHEETS ARE DRIVEN TO THE DESIGN TOE EMBEDMENT. IF MULTIPLE, CONSECUTIVE SHEETS ENCOUNTER REFUSAL ABOVE THE DESIGN TOE DEPTH, THE SHEET PILING SHALL BE RE-EVALUATED BY THE ENGINEER PRIOR TO ADVANCING THE EXCAVATION AND SUPPLEMENTAL BRACING OR ANCHORS MAY BE REQUIRED.

5. COMPLETE SEDIMENT REMOVAL TO THE SPECIFIED LIMITS.

6. IF BRACED SHORING IS USED, THE SOIL LEVEL ON THE PASSIVE SIDE OF ACTIVE EXCAVATION AREA BRACE WALLS SHALL REMAIN AT LEAST 2' ABOVE THE UPPER BRACE LEVEL IN THE ACTIVE EXCAVATION AREA BEFORE ADVANCING THE EXCAVATION BELOW, OR UNTIL THE EXCAVATION IS BACKFILLED TO, THE STAGE ONE EXCAVATION LEVEL.

7. ALL EXCAVATIONS SHALL BE MONITORED FOR INDICATION OF EXCESSIVE MOVEMENT, DEFLECTION, OR OVERSTRESSING OF THE SHORING BY A COMPETENT AND EXPERIENCED PERSON WITH THE AUTHORITY TO SUSPEND EXCAVATION ACTIVITIES AND TAKE IMMEDIATE CORRECTIVE ACTIONS. THE DESIGN OF THE CANTILEVERED SHEETPILING EXCAVATION SUPPORT SYSTEM INDICATES THAT THE MAXIMUM ANTICIPATED LATERAL DEFLECTION MEASURED AT THE TOP OF THE SHEET PILING WILL BE 1" OR LESS.

8. GLYNN GEOTECHNICAL ENGINEERING SHALL BE NOTIFIED IMMEDIATELY IF CONDITIONS ENCOUNTERED IN THE FIELD VARY TO ANY SIGNIFICANT DEGREE, FROM THOSE CONSIDERED AND REPRESENTED IN THIS DESIGN AND/OR IF UNEXPECTED MOVEMENT OF THE SHORING SYSTEM IS NOTED DURING CONSTRUCTION.

PROTECTION OF ADJACENT FACILITIES

1. CONDUCT A PRE-CONSTRUCTION SURVEY OF EXISTING FACILITIES PRIOR TO DRIVING SHEET PILING.

2. CONDUCT GROUND VIBRATION MONITORING THROUGHOUT SHEET PILING DRIVING AND EXTRACTION. CONSTRUCTION ACITIVITIES, INCLUDING SHEET PILING DRIVING AND EXTRACTION, SHALL BE CONTROLLED TO LIMIT THE MEASURED PEAK PARTICLE VELOCITY TO NO MORE THAN 0.2 fps AS MEASURED WITHIN THREE FEET (3') OF EXISTING STRUCTURE FOUNDATIONS.

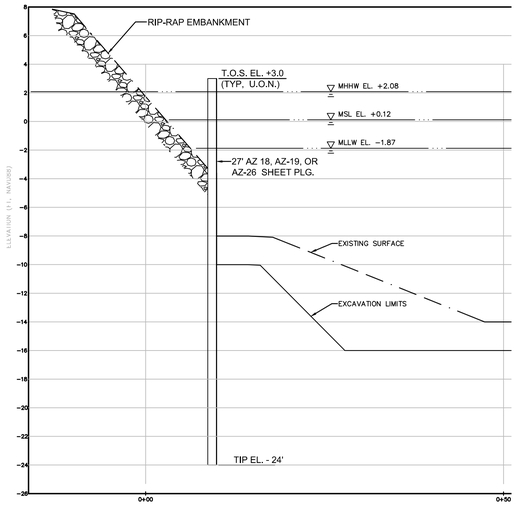
3. CONTRACTOR SHALL CONSIDER APPROPRIATE MEANS AND METHODS FOR SHEET PILING DRIVING AND EXTRACTION NEAR TO EXISTING FACILITIES IN ORDER TO LIMIT GROUND VIBRATIONS AND PROTECT ADJACENT STRUCTURES. SUCH MEANS AND METHODS MAY INCLUDE ANY, OR ANY COMBINATION, OF THE FOLLOWING:

 3.1. USING OF A HIGH FREQUENCY, VARIABLE MOMENT VIBRATORY HAMMER,
 3.2. USING A RESONANT PILE DRIVER (RPD) (by RESONANCE TECHNOLOGY INTERNATIONAL, 604.395.6845).
 3.3. PRE-DRILLING ALONG THE DRIVELINE,
 3.4. USE OF OTHER, PROPRIETARY PILING INSTALLATION METHODS

TURBIDITY BARRIER KINGPILES

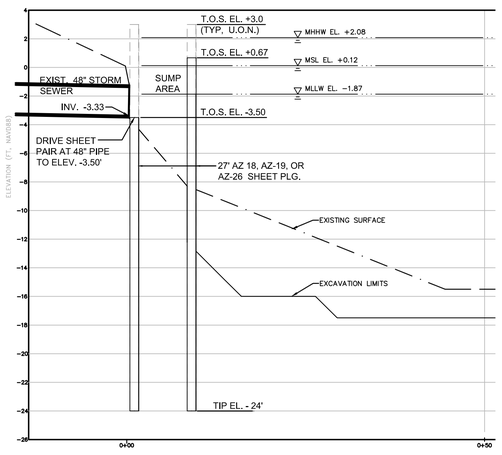
1. TEMPORARY KINGPILES SHALL BE INSTALLED AT A MAXIMUM SPACING OF EIGHTY-FEET (80'), AS WELL AS AT EACH ANGLE, POINT ALONG THE ALIGNMENT OF THE TURBIDITY BARRIER CURTAIN TO PROVIDE SUPPORT FOR TEH CURTAIN.

2. KINGPILES SHALL BE 16" dia. x 0.84" WALL MONOPILES DRIVEN TO A MINIMUM TOE DEPTH OF TWENTY-FEET (20'). MONOPILES SHALL COMPLY WITH THE MATERIAL REQUIREMENTS OF ASTM A500, GR. B (42 ksi).



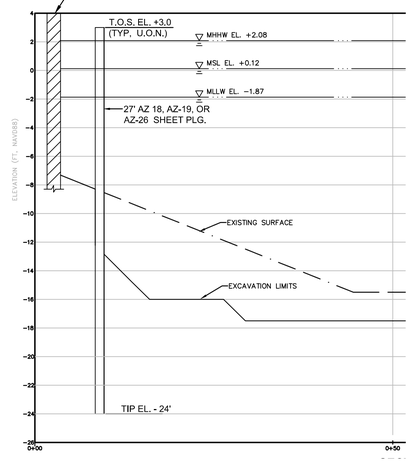
A / S2 SECTION A

SCALE: HORIZ. 1" = 10'
VERT. 1" = 5'



B / S2 SECTION B - SUMP AREA

SCALE: HORIZ. 1" = 10'
VERT. 1" = 5'



C / S2 SECTION C

SCALE: HORIZ. 1" = 10'
VERT. 1" = 5'

THIS DRAWING USES BASE SITE PLAN PREPARED BY ARCADIS OF NEW YORK, INC. AND IS INCLUDED AS A REFERENCE PLAN WITH THE EXCAVATION SHORING DESIGN PREPARED BY GLYNN GEOTECHNICAL ENGINEERING.

THIS DRAWING USES BASE SITE PLAN PREPARED AND PROVIDED BY ARCADIS OF NEW YORK, INC., AS A REFERENCE PLAN FOR THE EXCAVATION SHORING DESIGN PREPARED BY GLYNN GEOTECHNICAL ENGINEERING.

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CIVIL • STRUCTURAL • GEOTECHNICAL
MATERIALS TESTING • CONSULTING

GLYNN GEOTECHNICAL ENGINEERING
615 FRANKLIN STREET
LOCKPORT, NEW YORK 14094
www.glynngroup.com
VOICE (716) 625 - 6933 / FAX (716) 625 - 6983

STATE OF NEW YORK ☆ STEVEN E. GROSSMAN ☆ 075888 ☆ LICENSED PROFESSIONAL ENGINEER ☆ 12/5/12

ITEM	DATE	REVISION
0	10/15/12	ISSUED FOR REVIEW

CLIENT: Sevenson Environmental Services, Inc.

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PROJECT: GENERAL MOTORS, LLC. SITE
SLEEPY HOLLOW, WESTCHESTER CO., N. Y.
SEDIMENT REMEDIATION - SHORING DESIGN

TITLE: EXCAVATION SECTIONS AND GENERAL NOTES

GGE PROJ #: 06-1103-B
GGE FILE: SP1.DWG
DRAWN BY: JJ/EMP
CHECKED BY: MWG

DWG: S2

ARCADIS

Appendix B

Community Air Monitoring Plan

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

General Motors LLC

Community Air Monitoring Plan for Sediment Remediation

Former General Motors Assembly Plant Site
Sleepy Hollow, New York

November 2012

Community Air Monitoring Plan

Appendix B to the Sediment Remediation Work Plan

Former General Motors Assembly Plant Site
Sleepy Hollow, New York

Prepared for:
General Motors LLC

Prepared by:
ARCADIS of New York, Inc.
6723 Towpath Road
P O Box 66
Syracuse
New York 13214-0066
Tel 315 446 9120
Fax 315 449 0017

Our Ref.:
B00644.64462 #10

Date:
November 2012

ARCADIS

Table of Contents

1. Introduction **1**

1.1 Site Description 1

1.2 Summary of Remedial Activities 1

1.3 Potential Air Emissions Related to Remedial Activities 2

2. Air Monitoring Activities **3**

2.1 Monitoring Locations 3

2.2 Monitoring Methods 3

2.3 Action Levels 4

2.3.1 Total VOC Action Levels 4

2.3.2 PM_{10} Action Levels 5

2.4 Emission Control Measures 6

2.5 Meteorological Monitoring 7

2.6 Instrument Calibration 7

3. Reporting and Notification **8**

4. Acronyms and Abbreviations **9**

5. References **10**

Figures

Figure 1 Site Location

Figure 2 Potential Air Monitoring Locations

Attachments

A New York State Department of Health Generic Community Air Monitoring Plan (Appendix 1A of DER-10)

B Fugitive Dust Suppression and Particulate Monitoring (Appendix 1B of DER-10)

C Community Air Monitoring Log

D Exceedance Notification Report

1. Introduction

This Community Air Monitoring Plan (CAMP) describes the air monitoring that will be conducted for particulates (i.e. dust) and volatile organic compounds (VOCs) at the perimeter of the work area during implementation of the Sediment Remedial Work Plan (Sediment RWP) at the former General Motors Assembly Plant site located in Sleepy Hollow, New York (site). This CAMP does not establish action levels for worker respiratory protection: the Contractor will be required to implement air monitoring in the worker breathing zone for the purposes of worker protection in accordance with the Contractor's Health and Safety Plan (HASP). Rather, the intent of this CAMP is to provide a measure of protection for potential downwind community receptors, including residences, businesses, and people not directly involved with the remedial activities. If action levels specified in this CAMP are exceeded, then increased monitoring, corrective actions to abate emissions, and/or work shutdown will be required. This CAMP provides mechanisms to monitor air quality at the work area perimeter and includes criteria for implementing dust/vapor controls in order to meet specific action levels.

This CAMP draws upon the New York State Department of Health (NYSDOH) Generic *Community Air Monitoring Plan* (provided as Attachment A), and the New York State Department of Environmental Conservation (NYSDEC)'s program for *Fugitive Dust Suppression and Particulate Monitoring (*provided as Attachment B). These documents provide guidance for developing and implementing an air monitoring program for community protection.

1.1 Site Description

The site is situated on the eastern shore of the Hudson River and occupies an area of approximately 96.2 acres within the Village of Sleepy Hollow (Figure 1). It comprises three, noncontiguous parcels: 1) main assembly plant area referred to as the West Parcel (approximately 66.2 acres); 2) eastern parking lot referred to as the East Parcel (approximately 28.3 acres); and 3) former salaried employee parking lot referred to as the South Parcel (approximately 1.7 acres). Sediment remediation and associated work will be confined to the West Parcel.

1.2 Summary of Remedial Activities

The remedial activities to be performed at the site include, but are not limited to, dredging of sediments from the Hudson River and removal of sediments from west

parcel storm sewers, processing of sediments onsite for draining and stabilization, onsite water management, relocation of processed sediments within the site, and movement and grading of concrete millings within the site.

The sediments to be removed from the Hudson River contain elevated concentrations of chromium, copper, lead, mercury, and zinc. These same metals may be present in the sediments within the West Parcel storm sewer system due to particulate deposition from historic industrial wastewater and tidal influx from the river. Sediment removal from the river will be performed under wet conditions using mechanical dredging methods. Sediments within the storm sewer systems will be flushed to catch basins and removed using vacuum pumps and other specialized equipment. Dredged areas will be backfilled with clean material from an offsite source, as described in the Sediment RWP. During this work, the existing stockpile of concrete millings will be used to construct temporary berms and an interim cover over processed sediments that will be placed in open slab crawl space areas. The millings pile may also be reshaped with some millings redistributed to other areas of the site.

1.3 Potential Air Emissions Related to Remedial Activities

Dredging and sewer cleaning will be performed using wet methods, resulting in little to no dust generation. Activities with the potential to impact air quality include, but may not be limited to, the following:

- Pre-remedial construction activities, including site preparation that may temporarily expose historic fill
- Installation and removal of steel sheeting and other waterfront structures
- Staging, handling, and dewatering of excavated/dredged material
- Relocation and grading of stabilized sediments
- Relocation and grading of concrete millings
- Loading trucks or containers for onsite relocation or offsite disposal
- Site restoration activities

2. Air Monitoring Activities

Ambient air monitoring will be implemented at the site by the Engineer for total VOCs and particulate matter less than 10 microns in diameter (PM_{10}) during the intrusive activities listed in Section 1.3. Ambient air monitoring will also be conducted whenever sediment piles are exposed to wind, and will continue until such material is under temporary (polyethylene tarps) or interim (concrete millings) cover. In the event that sediment piles cannot be covered at the end of the work shift, ambient air monitoring will be performed continuously until covering is completed during a subsequent work shift. Additional ambient air monitoring may be conducted at other times and locations at the discretion of the Engineer.

Total VOCs and PM_{10} levels in ambient air will be continuously measured in real-time using portable instruments. The sample location rationale, sampling methods, action levels, and abatement procedures are discussed below.

2.1 Monitoring Locations

A minimum of three work area perimeter monitoring locations will be selected (one upwind and two downwind) based on the established work areas (e.g., sediment handling and processing areas), proximity to potential community receptors, prevailing wind direction and as directed by the Engineer. This pattern will facilitate upwind and downwind monitoring, and will be adaptable to potential changes in wind direction. The upwind and down wind air monitoring locations will be designated daily, based on changes in prevailing wind direction. Additional monitoring stations may be utilized to monitor the downwind work areas at the discretion of the Engineer based on the extent of work activities. Potential air monitoring locations are shown in Figure 2, and will include more than three possible locations as the work expands.

2.2 Monitoring Methods

Total VOCs in ambient air will be monitored and recorded using a portable photoionization detector (PID) with data-logging capabilities (MiniRae 2000 or equivalent). The PID will be housed in a watertight shelter attached to a tripod and set at a height of approximately five feet above the ground. Total VOC levels will be measured continuously and recorded at 15-minute average intervals.

Particulate monitoring will involve daily real-time monitoring performed using a MIE dataRAM Model DR-2000 or 4000 (DR), MIE dataRAM Model pDR-1000 (pDR), Met

One E-BAM, or equivalent with data logging capabilities for measuring airborne particulates. Each monitor will be equipped to monitor and record concentrations of particulate matter with a diameter less than 10 micrometers. PM_{10} levels will be measured continuously and recorded at 15-minute average intervals.

The Engineer is responsible for periodically checking VOC and PM_{10} levels at the community air monitoring stations and responding to notifications from the monitoring levels when action levels are exceeded. Initial and maximum action levels, as well as the required response actions, are Specified in Section 2.3. If the action levels are exceeded, the Engineer will notify the Contractor to take the appropriate actions to reach allowable VOC and/or PM_{10} levels. When it is determined that vapor or dust control measures are adequate and allowable airborne contaminant levels have been obtained, the Engineer will give the Contractor authorization to resume the work activities. The Engineer will be responsible for notification and reporting to NYSDEC and NYSDOH, as described in Section 3.0. As a result of their sensitivity to moisture, the monitors will be carefully observed during humid or rainy weather. During sustained steady rain events, community air monitoring stations will not be operable, due to sensitivity to moisture. During these sustained rain events the precipitation will act as a control measure for offsite migration of contaminants and community air monitoring will not be conducted.

In addition, monitoring for airborne particulates provides a qualitative assessment regarding the potential for other airborne contaminants, such as metals in the sediments. Metals in sediments are relatively non-volatile, so that the most likely route of migration for these constituents during the performance of the work is via wind-blown airborne particulates. Therefore, daily monitoring for airborne particulates is generally sufficient to assess potential off-site migration.

2.3 Action Levels

The site perimeter action levels provided below for VOCs and particulates are based on the values provided in the NYSDOH generic CAMP (NYSDOH, 2002; also provided as Attachment A) and will be used to initiate response actions, if necessary, based on real-time monitoring.

2.3.1 Total VOC Action Levels

The following total VOC action levels and responses will be implemented at the site during remedial activities that may generate emissions:

- If the ambient air concentration of total VOCs at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background (upwind location) for the 15-minute average, intrusive site activities will be temporarily halted while monitoring continues. If the total VOC concentration readily decreases (through observation of instantaneous readings) below 5 ppm above background, then intrusive site activities will resume with continuous monitoring.

- If the ambient air concentrations of total VOCs at the downwind perimeter of the work area persist at levels in excess of 5 ppm above background, but less than 25 ppm above background, intrusive site work activities will be halted, the source of the elevated VOC concentrations identified, corrective actions to reduce or abate the emissions undertaken, and air monitoring will continue. Once these actions have been implemented, intrusive site work activities will resume provided the following two conditions are met.

  - The VOC concentration at half the distance to the nearest residential or occupied commercial building or parkland (in no case less than 20 feet) is below 5 ppm above background for the 15-minute average.

  - The VOC level 200 feet downwind of the work area or half the distance to the nearest occupied parkland or residential/commercial structure (whichever is less, but in no case less than 20 feet) is below 5 ppm over background for the 15-minute average.

- If the ambient air concentrations of total VOCs are above 25 ppm above background at the perimeter of the work area, intrusive site activities will stop and emission control measures will be implemented.

2.3.2 PM_{10} Action Levels

The following PM_{10} action levels and responses will be implemented at the perimeter of the work area during remedial activities that may generate emissions and are designed to be protective of off-site receptors for metals:

- If the ambient air concentration of PM_{10} at one (or more) of the sampling locations is noted at levels in excess of 100 micrograms per cubic meter ($\mu g/m^3$) above background (upwind location) for the 15-minute average, or if airborne dust is observed leaving the work area, intrusive site activities will be temporarily halted. The source of the elevated PM_{10} concentration is to be identified, corrective actions

to reduce or abate the emissions will be undertaken, and air monitoring will continue. Work may continue following the implementation of dust suppression techniques provided the PM_{10} levels do not exceed 150 µg/m^3 above background for the15-minute average and provided that no visible dust is migrating from the work area.

- If after implementation of dust suppression techniques, PM_{10} levels are greater than 150 µg/m^3 above background, work will stop and site activities will be re-evaluated. Work will resume after dust suppression measures and other controls are implemented and PM_{10} levels are less than 150 µg/m^3 above background and no visible dust is migrating from the work area.

2.4 Emission Control Measures

The following emission control measures may be used if action levels are exceeded during remedial activities:

- Applying water to exposed sediment/material piles
- Covering excavated sediment/material piles with poly sheeting or other appropriate material
- Reducing surface area of exposed material/sediment areas
- Excavating, loading, handling, and backfilling materials in a manner that minimizes dust generation
- Periodically removing dirt/debris from access roads and active vehicle transportation routes
- Spraying water on access roads and active vehicle transportation routes
- Hauling excavated materials and clean backfill materials in properly tarped/covered vehicles
- Restricting vehicle speeds on access roads and active vehicle transportation routes

2.5 Meteorological Monitoring

Meteorological monitoring of wind direction and temperature will be conducted at an established onsite station located in accordance with industry practice. A wind sock or anemometer will be used to measure wind direction, and a thermometer will be used for temperature readings. Meteorological readings will be recorded by the Engineer at a minimum of once per hour. Alternatively, an electronic weather station will be established to measure and record onsite wind direction and temperature. Regional weather conditions will be obtained from online weather sources.

2.6 Instrument Calibration

The Engineer will calibrate the VOC and PM_{10} instruments in accordance with each of the equipment manufacturer's calibration and quality assurance requirements. Equipment calibrations will be recorded in the field activity logbook by the Engineer.

3. Reporting and Notification

Air monitoring data will be collected continuously from VOC and PM_{10} monitors during intrusive site activities via real-time monitoring devices. The daily recorded ranges will be summarized in a daily Community Air Monitoring Log (Attachment C) and included in the Engineer's daily construction observation report.

The Engineer will notify the NYSDEC's onsite observer (if present) if a maximum VOC or PM_{10} action level is exceeded during the remedial construction activities. The Engineer will include with the daily construction observation report which summarizes: 1) the community air monitoring data; 2) the suspected cause of exceedances; and 3) corrective actions implemented or to be implemented as a result of the exceedance. An Exceedance Notification Report (Attachment D) will be completed to document the notification.

Air monitoring data and reports will be filed electronically and made available for NYSDOH and NYSDEC personnel for review. A summary of the air monitoring activities conducted during the sediment remedial action will be included in the Sediment Remedial Action Report submitted to NYSDEC following completion of the remedial activities.

4. Acronyms and Abbreviations

CAMP	Community Air Monitoring Plan
GM	General Motors Corporation
HASP	Health and Safety Plan
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OVA	organic vapor analyzer
PID	photoionization detector
PM_{10}	particulate matter less than 10 microns in diameter
ppm	part per million
$\mu g/m^3$	micrograms per cubic meter
VOC	Volatile Organic Compound

5. References

NYSDEC. 1989. Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites. Technical and Administrative Guidance Memorandum (TAGM 4031). New York State Department of Environmental Conservation. October 1989.

NYSDOH. 2002. Generic Community Air Monitoring Plan. New York State Department of Health. December 2002.

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Figures

REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., WHITE PLAINS, NY, 1967, PHOTOREVISED 1979.

2000' 0 2000'

Approximate Scale: 1" = 2000'

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

COMMUNITY AIR MONITORING PLAN

SITE LOCATION MAP

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FIGURE
1

09/25/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00060/CDR/64460N01.CDR

EAST PARCEL
(APPROX. 28.3 ACRES)

METRO-NORTH RAILROAD

CONSTRUCTION OFFICE AREA

BEEKMAN AVENUE

HUDSON STREET

SOUTH PARCEL
(APPROX. 1.7 ACRES)

RIVER STREET

EXISTING CONCRETE SLAB

RAIL LOADING ZONE

TRAIN WELL

SITE ENTRANCE/ SECURITY GATE

WEST PARCEL
(APPROX. 66.2 ACRES)

C-3

ICHABOD'S LANDING

C-2

C-1

C-4

PROPOSED SEDIMENT STABILIZATION AREA

200'

OF-1

SEDIMENT REMOVAL AREA

SEDIMENT PROCESSING & STAGING FOR RAIL, IF NEEDED

TRUCK MARSHALLING AREA

SEDIMENT INTERIM STAGING

EXISTING CONCRETE SLAB WITH CRAWL SPACE

GATE

EXISTING OPENING IN SLAB

TEMPORARY ENCLOSED WASTE WATER TANKS

KINGSLAND POINT COUNTY PARK

C-5

C-6

HARBOR CHANNEL

EBB FLOW

CONCRETE MILLINGS PILE

HUDSON RIVER

0 100' 200'
GRAPHIC SCALE

LEGEND:

- PROPERTY BOUNDARIES
- HARBOR CHANNEL
- TURBIDITY CURTAIN
- REMOVAL BOUNDARY
- AIR MONITORING STATION
- METEOROLOGICAL STATION

NOTES:

1. SITE PREPARATION AREAS WERE PROVIDED TO THE ENGINEER BY SEVENSON ENVIRONMENTAL SERVICES SEPTEMBER 17, 2012.
2. SEDIMENT PROCESSING SHALL NOT OCCUR WITHIN 200 FEET OF ICHABOD'S LANDING.

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NY

COMMUNITY AIR MONITORING PLAN

AIR MONITORING STATION LOCATIONS

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FIGURE
2

CITY: SYRACUSE, NY DIV/GROUP: ENV/IM-DV DB: B. DECLERCQ, P. LISTER PM/TM: J. MESSINGER TR: J. MELWIKI LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIB\064462\0001\100060\DWG\064462B01.dwg LAYOUT: 2 SAVED: 10/17/2012 11:04 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 10/17/2012 11:04 AM BY: DECLERCQ, BRIAN
XREFS: IMAGES: PROJECTNAME: ----
064462X03

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Attachments

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Attachment A

New York State Department of Health
Generic Community Air Monitoring
Plan (Appendix 1A of DER-10)

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

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Attachment B

Fugitive Dust Suppression and Particulate Monitoring (Appendix 1B of DER-10)

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

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Attachment C

Community Air Monitoring Log

Daily Air Monitoring Report

Project: General Motors LLC Former GM Assembly Plant Site 199 Beekman Ave, Sleepy Hollow, NY 10591 **Contractor Company:** Sevenson Environmental Services **Contractor's Supervisor:** Jim Pazderski **Engineer Company:** ARCADIS **Engineer's Project Manager:** Raymond Kapp	**Project Number:** **Task Number:** **Date:** **Day of Week:** S M T W T F S **CAMP Daily Report Number:** **Report By:**

Weather Conditions	Temperature	Humidity	Wind	Precipitation[1]
	Low: °F High: °F	Low: % High: %	Direction: Degrees: Speed: mph	inches

Work Day Morning (0700 to1200) Perimeter Air Monitoring Data Summary

Station ID	Upwind/Downwind	TVOC Min Avg* [2]	TVOC Max Avg* [2]	PM-10 Min Avg* [2]	PM-10 Max Avg* [2]
C-1					
C-2					
C-3					
C-4					
C-5					
C-6					

Work Day Afternoon (1200 to 1700) Perimeter Air Monitoring Data Summary

Station ID	Upwind/Downwind	TVOC Min Avg* [2]	TVOC Max Avg* [2]	PM-10 Min Avg* [2]	PM-10 Max Avg* [2]
C-1					
C-2					
C-3					
C-4					
C-5					
C-6					

Post-Work Day (If Required) Perimeter Air Monitoring Data Summary

Station ID	Upwind/Downwind	TVOC Min Avg* [2]	TVOC Max Avg* [2]	PM-10 Min Avg* [2]	PM-10 Max Avg* [2]
C-1					
C-2					
C-3					
C-4					
C-5					
C-6					

* - Volatile Organics reported in parts per million (ppm)

** - Particulates reported in micrograms per cubic meter (µg/m□)

[1] - Daily precipitation information obtained from www.weather.com

[2] - Averages are based on a rolling 15-minute time weighted average

CAMP Action Level Alerts :

Number of Alerts Exceeding Maximum Action Levels:

Actions Taken in Response to Alerts:

Attachments:
Daily CAMP Stations Map
Exceedance Notification Report

Certification:
Representative completing report: _____ Date: _____

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Attachment D

Exceedance Notification Report

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EXCEEDANCE NOTIFICATION REPORT

COMMUNITY AIR MONITORING PROGRAM
FORMER GM ASSEMBLY PLANT SITE – SLEEPY HOLLOW, NY

EXCEEDANCE DATE: _____

I. Maximum Action Levels Exceeded

Time/Time Range	*TVOC> 25 ppm 15-min average*	*PM10 >150 µg/m^3 15-min average*	*Total Duration Minutes*

What was the cause (nature) and location of the exceedance(s)?

_____
_____
_____
_____
_____

Sevenson Representative(s) Notified: _____Time:_____

NYSDEC Representative(s) Notified: _____Time:_____

II. Corrective Action(s)

Action Taken:

_____
_____
_____
_____

Time of Action:_____

III. Verification of Corrective Action(s)

Monitoring Data Confirming Corrective Action: Time: _____

_____
_____

Representative completing report: _____Date: _____

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Appendix C

Health and Safety Plan

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Infrastructure · Water · Environment · Buildings

Imagine the result

General Motors LLC

Site-Specific Health & Safety Plan

Former General Motors Assembly Plant Site
Sleepy Hollow, New York

November 2012

ARCADIS

Erika Denkenberger
Designated H&S Plan Writer

Sarah Fisher
Designated H&S Plan Reviewer

Raymond Kapp
Project Manager

Site-Specific Health & Safety Plan

Former General Motors Assembly Plant Site
Sleepy Hollow, New York

Prepared for:
General Motors LLC

Prepared by:
ARCADIS of New York, Inc.
6723 Towpath Road
Syracuse
New York 13214-0066
Tel 315.446.9120
Fax 315.449.0017

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ARCADIS

Table of Contents

Directions to Hospital: **1**

1. Emergency Procedures **3**

1.1 Emergency Contacts 3

1.2 Emergency Equipment / First Aid 4

1.3 ARCADIS Project Personnel Responsibilities During Emergencies 4

1.3.1 Site Safety Officer (SSO) 4

1.4 Emergency Procedures for Contaminated Personnel 5

1.5 Site Evacuation and Rescue Plan 6

1.6 Spill and Release Contingencies 6

1.7 Accidents, Incidents, and Injury, Reporting and Investigation 8

1.7.1 Summary Listing of Work-Related Injuries and Illnesses 9

2. Introduction **10**

3. Project Site History and Requirements **11**

3.1 Site Background 11

3.2 Site Description 12

3.3 List of Project Tasks and Scope of Work 13

4. ARCADIS Organization and Responsibilities **14**

4.1 All Personnel 14

4.2 Project Manager/Task Manager 15

4.3 Site Safety Officer (SSO) 15

5. Project Hazards and Control Measures **17**

5.1 Hazard Analysis 17

5.2 Job Safety Analyses (JSAs), H&S Standards and PPE 20

5.3 Field Health & Safety Handbooks 20

6. Hazard Communication (HazCom) **23**

6.1 Chemical Hazards 24

7. Tailgate Meetings **25**

8. Medical Surveillance **26**

9. General Site Access and Control **27**

9.1 Sanitation at Temporary Workplaces 27

9.1.1 Potable Water 27

9.1.2 Toilet Facilities 27

10. Decontamination Control Zones and Procedures **28**

11. Record Keeping and Audit Program **29**

11.1 Safety Book and Other Health and Safety Records 29

11.2 Audit Program 30

12. Client-Specific Health and Safety Requirements **32**

13. Ground or Air Shipments of Hazardous Materials (HazMat) **34**

14. H&S Orientation and Task Improvement Process (TIPs) **35**

15. Subcontractors **36**

16. Project Personnel HASP Certification **37**

17. Roadway Work Zone Safety **38**

Tables

Table 1. Risk Assessment Matrix 8

Appendices

A HASP Addendum Pages and Log Table

B JSAs/ARCADIS Standards

C HASP Forms

D PPE Equipment List

E MSDSs

F STAR Plan Template

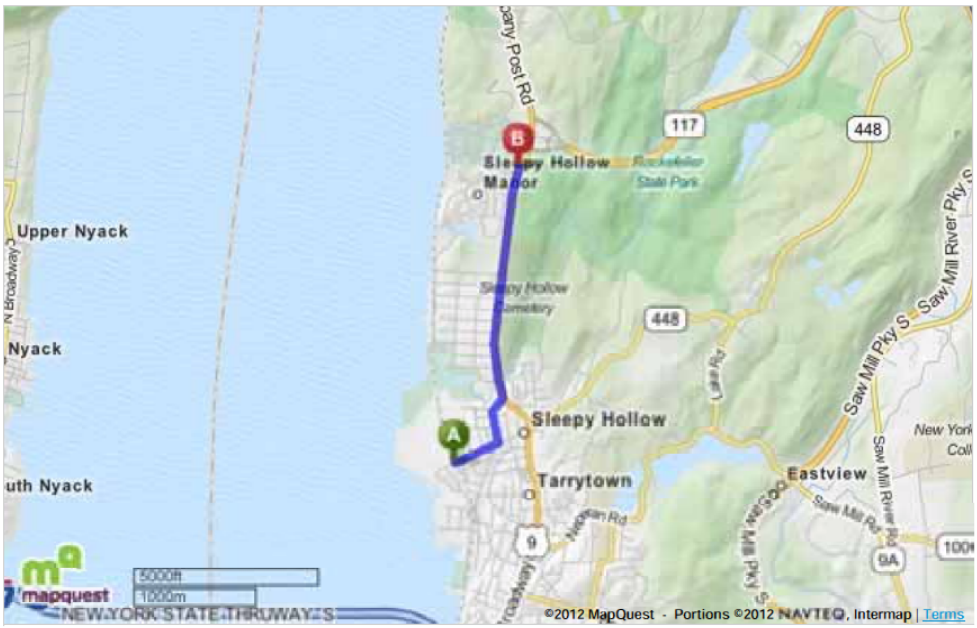
G Shipping Determination Form Template

Directions to Hospital:

Medical Facility: Phelps Memorial Hospital
Address: 701 N. Broadway, Sleepy Hollow, NY 10591

Phone Number: 914.366.3000 (main); 914.366.3570(emergency)

Total Travel Estimate: **1.93 miles - about 5 minutes**



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Trip to:
Phelps Memorial Medical Center
701 N Broadway
Sleepy Hollow, NY 10591
9143663000Emergency9143663590
1.93 miles / 5 minutes

Notes

A	**199 Beekman Ave**, Sleepy Hollow, NY 10591-2403	
	1. Start out going **northeast** on **Beekman Ave** toward **Clinton St**. Map	**0.3 Mi** *0.3 Mi Total*
	2. Turn **left** onto **Pocantico St**. Map	**0.3 Mi** *0.6 Mi Total*
9	3. Turn **left** onto **US-9 / N Broadway**. Map	**1.4 Mi** *1.9 Mi Total*
	4. **701 N BROADWAY** is on the **left**. Map	
B	**Phelps Memorial Medical Center** 701 N Broadway, Sleepy Hollow, NY 10591 9143663000Emergency9143663590	

Emergency Notification Procedure for the project:

Step 1: Dial 911 (if necessary) and/or Work Care 800-455-6155 (mandatory for ARCADIS staff)

Step 2: Contact ARCADIS Project Manager

Step 3: Contact ARCADIS H&S Manager

Step 4: Contact Client

1. Emergency Procedures

1.1 Emergency Contacts

Local Police -Sleepy Hollow –	911 and 914.631.0800
Local Ambulance/EMS –	911 and 914.631.1962
Local Fire Department – Sleepy Hollow	911 and 914.366.5119
Local Hospital – Phelps Memorial Hospital (Emergency Room)	914.366.3570
Local Weather Data	weather.com
Poison Control (New York Regional)	800.222.1222
NYS Spill Hotline (all reportable spills in New York)	800.457.7362
National Response Center (all spills in reportable quantities, including spills to surface waters)	800.424.8802
ARCADIS Project Manager – Raymond Kapp	Cell: 845.346.6454 Tel: 201.797.7400, Ext 4388
ARCADIS H&S Manager – Sarah Fisher	Tel: 317.236.2813 Ext. 62813 Cell: 317.691.4011
ARCADIS Site Supervisor/SSO – David Foster	Tel: 914.641.2777
Client Contact/Project Manager – Jim Hartnett	Tel: 315.463.2391 Cell: 315-856-0211
NYSDEC Project Manager – Jason Pelton	518.402.9818
WorkCare (mandatory for all ARCADIS staff)	1-800-455-6155
Underground Utilities Notification Service	811 or 800-962-7962
Contractor (Sevenson) Project Manager – James Pazderski	Cell: 716.308.8406
Contractor (Sevenson) Health and Safety Manager – Paul Hitcho	Work: 716.284.0431 Cell: 716.998.9797
Contractor (Sevenson) Site Superintendent – Dan Dragonette	Cell: 716.609.0571
Contractor (Sevenson) On-Site SSO – Wyatt Beougher	Cell: 724.977.6037

1.2 Emergency Equipment / First Aid

Emergency Supplies and Equipment (check all that apply)	Location on Project Site
☒ OSHA Approved First Aid Kit: sized for a minimum of 20 people	Field office trailer(s)
☒ 10-pound ABC Type Dry Chemical Fire Extinguisher	Field office trailer(s)
☒ Mobile Phone ☐ Satellite Phone	Carried by individual field personnel
☒ Traffic Cones	
☒ Walkie Talkies	Carried by individual field personnel
☒ Water or Other Fluid Replenishment	Field office trailer(s)
☒ Eye Wash/Quick Drench Station	Field office trailer(s)
☒ Eye Wash Bottle	Field office trailer(s)
☒ Wash and Dry Towelettes	Field office trailer(s)
☒ Sunscreen (SPF 15 or higher)	Field office trailer(s)
☒ Insect Repellant	Field office trailer(s)
☒ Chemical Spill Kit	Field office trailer(s)
☒ *Other (specify): Personal Flotation Device(PFD) for all boat work, two Self-Contained Breathing Apparatus (SCBAs)*	*Readily accessible to staff*

This equipment should be accessible and usable on the project.

1.3 ARCADIS Project Personnel Responsibilities During Emergencies

1.3.1 Site Safety Officer (SSO)

As the administrator of the Project HASP, the SSO has primary responsibility for responding to and correcting emergency situations. The SSO will, when applicable:

i) Take appropriate measures to protect personnel including: withdrawal from the exclusion zone (EZ), total evacuation and securing of the site or upgrading or downgrading the level of protective clothing and respiratory protection.

ii) Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing runoff to surface waters and ending or controlling the emergency to the extent possible.

iii) Ensure that appropriate federal, state, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.

iv) Ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained.

v) Lead the investigation to determine the cause of the incident and make recommendations to prevent the recurrence.

vi) Ensure that all required reports have been prepared.

1.4 Emergency Procedures for Contaminated Personnel

Whenever possible, personnel should be decontaminated in the contamination reduction zone before administering first aid, without causing further harm to the patient.

- **Skin Contact:** Remove contaminated clothing, wash immediately with water, and use soap, if available.

- **Inhalation:** Remove victim from contaminated atmosphere. Remove any respiratory protection equipment. Initiate artificial respiration, if necessary. Transport to the hospital.

- **Ingestion:** Remove from contaminated atmosphere. Do not induce vomiting if victim is unconscious. Never induce vomiting when acids, alkalis, or petroleum products are suspected. Transport to the hospital, if necessary.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a listing of the contaminants of concern to which they may have been exposed.

Any vehicle used to transport contaminated personnel will be cleaned or decontaminated, as necessary.

1.5 Site Evacuation and Rescue Plan

In the event of an emergency situation such as fire, explosion, or significant release of toxic gases, project personnel in the field will be notified through established communications (mobile phones and/or radio communications) to evacuate the area. In the event of an emergency, personnel will gather at their primary mustering point for a head count. The SSO will determine a primary and secondary muster point to be used as an assembly area in the event of an emergency. The secondary muster point will be located at least 90 degrees from the primary. These locations will be communicated to the work crew(s) during the Site-specific training prior to commencement of work activities, weekly thereafter, and prior to the advent of potentially threatening weather. Muster points will be identified in the Emergency Information Sheet and may be indicated on the map.

1.6 Spill and Release Contingencies

Attempt to identify the spilled material, and then contain the spill. After the spill is contained, contact the Contractor Project Manager and the GM Project Manager to report the spill and determine the follow up and additional reporting requirements.

Immediately contact local and regional spill coordinators (state and national hotlines, local emergency services) if required (i.e., reportable release). Be prepared to tell them:

- Who you are
- What was spilled
- Estimate of the amount spilled
- When the spill occurred

- What media did the release occur into (i.e., air, water, land)
- The address and location of the release
- Was anyone injured and how badly
- Environmentally sensitive areas likely to be affected by the release (i.e., wetlands, lakes, rivers)
- Whether evacuation is necessary
- What you will be doing after you hang up and where they can find you or reach you.

In the event of a reportable spill event, contact the National Response Center (800/424-8802) and the NYS Spill Hotline (800-457-7362) after medical needs are met. Be prepared to tell them:

- Who you are
- What was spilled
- Estimate of the amount spilled
- When the spill occurred
- What media did the release occur into (i.e., air, water, land)
- The address, city, county, and state in which the release occurred
- Was anyone injured and how badly
- Environmentally sensitive areas likely to be affected by the release (i.e., wetlands, lakes, rivers)
- Whether evacuation is necessary
- What you will be doing after you hang up the phone and where they can find you or reach you.

If injuries have occurred as a result of a spill, contact emergency medical personnel first. After that, the local agency responsible for spills should be contacted (dial 911) and spill hotlines listed above. Inform them of the same information as above. Finally, contact the Contractor Project Manager or, in the Contractor Project Manager's absence, the GM Project Manager and inform them of the same information as above.

1.7 Accidents, Incidents, and Injury, Reporting and Investigation

All accidents/incidents (including, but not limited to: near miss, serious miss, critical injury, recordable case, lost work day case, pedestrian industrial vehicle incident, fatalities) that occur on-Site during field activity will be promptly reported in accordance with ARC HSMS010 – Incident Reporting and Investigation Standard (Appendix B). In general, the emergency notification procedure (already identified in Section 1 cover pages) is as follows:

Step 1: Dial 911 (if necessary) and/or Work Care 800-455-6155 (mandatory for ARCADIS staff)

Step 2: Contact ARCADIS Project Manager

Step 3: Contact ARCADIS H&S Manager

Step 4: Contact Client (The Contractor or Engineer's Project Manager must immediately notify the GM Project Manager upon the occasion of any incident or accident involving Contractor's or Engineer's personnel or their subcontractors).

Per GM LLC requirements, e-mail initial reports, notifications, and completed reports to: Service_Provider_Safety@gm.com. A copy of the e-mail must be sent the GM Project Manager and Mr. Steve Biechele (steven.biechele@gm.com). In addition, the final incident report will be sent to the same e-mail addresses listed above, although the GM Project Manager will establish the process for reviewing the Accident/Incident report prior to submission. The attached Incident Investigation Form may be used to document any incidents that may occur at the Site; however, all incident reports will be uploaded and maintained in the ARCADIS H&S database (4-Sight).

1.7.1 Summary Listing of Work-Related Injuries and Illnesses

ARCADIS will generate a report that provides a summary listing of all work-related injuries and illnesses experienced by ARCADIS employees and any subcontractor's employees through the use of the ARCADIS H&S Database (4-Sight). ARCADIS will submit a copy of the summary report to GM for the previous calendar month.

2. Introduction

This Site-Specific Health & Safety Plan (HASP) for Construction Observation supports the remedial activities, at the Former General Motors Corporation (GMC) North Tarrytown Assembly Plant, that are outlined in the Sediment Remedial Work Plan (RWP) prepared by ARCADIS on behalf of General Motors LLC (GM LLC). The Site is located at 199 Beekman Avenue, Village of Sleepy Hollow, New York (Site).

All work on this project will be carried out in compliance with ARCADIS' Health and Safety Standards, and the Occupational Safety and Health Administration's Hazardous Waste Operations and Emergency Response regulation. The design of this health and safety plan (HASP) conforms to the requirements of the ARC HSFS010-H&S Plan Standard and the GM LLC Template for Site-Specific Health and Safety Plan (HASP) Development Guide. Specific health and safety information for the project is contained in this HASP. All personnel working on hazardous operations or in the area of hazardous operations will read and be familiar with this HASP before doing any work. All project personnel will sign the certification page acknowledging that they have read and understand this HASP.

Changes in the scope of the project or introduction of new hazards to the project will require revision of the HASP by the HASP writer and reviewer, and approval by the Project Manager. The HASP Addendum Form and log table are included as Appendix A.

3. Project Site History and Requirements

3.1 Site Background

This Health and Safety Plan (HASP) has been prepared by ARCADIS for observation monitoring, and sampling activities associated with remedial activities conducted for General Motors LLC (GM LLC), in accordance with Brownfield Cleanup Agreements (BCAs) with the New York State Department of Environmental Conservation (NYSDEC) for the investigation and remediation of the Former General Motors Assembly Plant Site located at 199 Beekman Avenue, Village of Sleepy Hollow, New York (Site). The contemplated use of the Site is restricted (by deed restrictions/environmental easement) mixed commercial and restricted residential development, with public open space, including public access to the waterfront and municipal public works operations.

GMC and their former development partner Roseland/Sleepy Hollow, LLC (Roseland) initiated formal NYSDEC review of Site environmental conditions in a Voluntary Cleanup Agreement (VCA) signed in November 2002. The VCA applied to the entire Site and included investigation of the Hudson River adjacent to the West Parcel. In June 2004, the project transitioned from the Voluntary Cleanup Program to the Brownfield Cleanup Program (BCP). During the transition, two separate Brownfield Cleanup Agreements (BCAs) were signed in May 2005, one for the East Parcel and the other for the West Parcel. The BCA for the West Parcel also includes the South Parcel and the Hudson River as an identified offsite area of interest to the West Parcel. On April 1, 2009, Roseland terminated its participation in the BCAs and the Site redevelopment. On June 1, 2009, GMC filed for bankruptcy. On July 10, 2009 in accordance with an order from the Bankruptcy court, GMC changed its name to Motors Liquidation Corporation (MLC) and sold its interest in the Sleepy Hollow site to a newly formed company, General Motors LLC (GM LLC). GM LLC was added to the BCAs in 2010 and intends to complete the actions required by the BCAs and select a new partner to implement the redevelopment project.

The cleanup action includes the removal of sediments from the river bottom adjacent to the site in the vicinity of former industrial outfall (Outfall 01). As part of the cleanup, the stormwater sewer system that currently discharges through Outfall 01, and a second outfall to the Hudson River, will be inspected and accumulated sediment will be removed.

3.2 Site Description

The Site is situated on the eastern shore of the Hudson River and occupies an area of approximately 96.2 acres within the Village of Sleepy Hollow. The Site is comprised of three, non-contiguous parcels: 1) the former main assembly plant area referred to as the West Parcel (approximately 66.2 acres); 2) the eastern parking lot referred to as the East Parcel (approximately 28.3 acres); and 3) the former salaried employee parking lot referred to as the South Parcel (approximately 1.7 acres).

Remedial work included in this HASP will be performed on the West Parcel and the Hudson River along the West Parcel shoreline.

Site Type: (Check as many as applicable}

	Active	X	Secure	X	Industrial		Landfill		Service station
X	Inactive		Unsecured		Commercial		Well field	X	Water work
			Uncontrolled	X	Residential	X	Railroad		Undeveloped
Other specify: The Hudson River borders the West parcel of the Site. Easements exist for sewer pipelines that cross the Site. A portion of the work will be offshore of residential property (less than 100 ft). Access to the waterfront will be closed to the residents and general public during the river work. Rail siding on the GM site may be used by the contractor to ship/receive materials, but only as a contingency. ARCADIS will not work on the active rail corridor.									

The constituents of potential concern (COPCs) on this project are:

Known Compounds	Source (soil/water/drum, etc.)	Known Concentration Range (mg/kg)	
		Lowest	Highest
Zinc	Sediment	31	14,500
Lead	Sediment	5	8,420
Mercury	Sediment	0.04	3.5
Copper	Sediment	5	177
Chromium	sediment	11	1,960

3.3 List of Project Tasks and Scope of Work

1. Mobilization

2. Construction Observation for sheet pile installation, storm sewer pipe cleaning, mechanical dredging, stabilization of dredged material, loading and transport of stabilized material by truck (or rail as a contingency), water treatment, on-site redistribution of recycled concrete

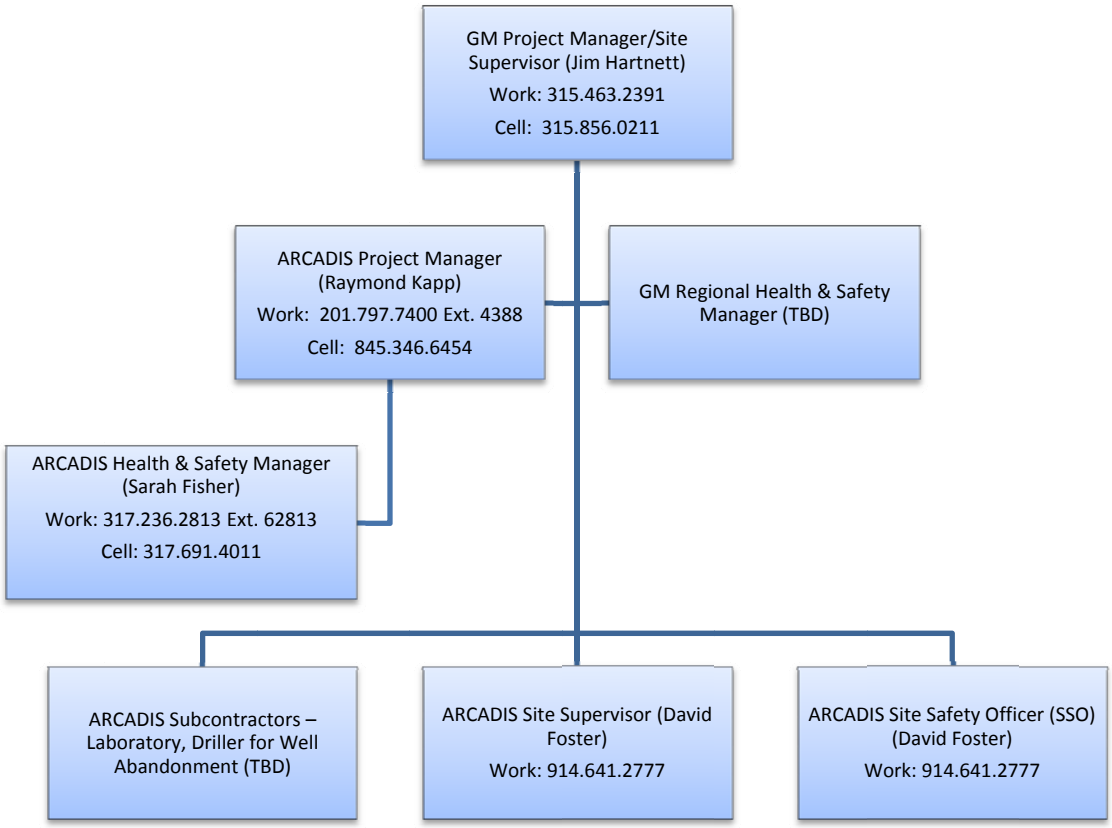
3. Community Air Monitoring

4. Real-time water quality monitoring and sediment sampling by boat during Construction Observation

5. Decommissioning of 1-inch piezometers and 2-inch ID monitoring wells and injection wells

6. Demobilization

4. ARCADIS Organization and Responsibilities



4.1 All Personnel

Each person is responsible for completing tasks safely, and reporting any unsafe acts or conditions to their supervisor. No person may work in a manner that conflicts with these procedures. Prior to initiating site activities, all ARCADIS and subcontractor personnel will receive training in accordance with applicable regulations, and be familiar with the requirements and standards referenced in this HASP. In addition, all personnel will attend daily safety meetings (tailgate meetings) to discuss site-specific hazards prior to beginning each day's work. ***Every ARCADIS employee, subcontractor, and client representative at the Site has the responsibility to stop the work of a coworker or subcontractor if the working conditions or behaviors are considered unsafe.***

4.2 Project Manager/Task Manager

The Project Manager is responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The Project Manager is responsible for confirming that the project has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or that subcontractors assigned to this project, meet the requirements established by ARCADIS. It is also the responsibility of the Project Manager to:

- Review all applicable H&S Standards, and ensure that project activities conform to all requirements.
- Obtain client-specific health and safety information and communicate with the client on health and safety issues.
- Communicate with the Site Safety Officer (SSO) on health and safety issues.
- Allocate resources for correction of identified unsafe work conditions.
- Ensure ARCADIS site workers have all training necessary for the project.
- Report all injuries, illnesses and near-misses to the client representative, lead incident investigations, and ensure that any recommendations made are implemented.

4.3 Site Safety Officer (SSO)

The SSO has overall responsibility for the technical health and safety aspects of the project. Inquiries regarding ARCADIS health and safety standards, project procedures, and other technical or regulatory issues should be addressed to this individual. It is also the responsibility of the SSO to:

- Develop and update pre-task plans (or Job Safety Analyses, JSAs), which should cover all safety critical activities for the project.
- Review, modify (as more information becomes available) and work in accordance with the components of this HASP.

- Ensure that this HASP is available to and reviewed by all site personnel including subcontractors.
- Ensure that necessary site-specific training is performed (both initial and "tailgate" safety briefings).
- Ensure site visitors have been informed of the hazards related to ARCADIS work.
- Ensure that work is performed in a safe manner and has authority to stop work when necessary to protect workers and/or the public.
- Ensure that proper monitoring is conducted to protect workers and/or the public (i.e., air monitoring).
- Coordinate activities during emergency situations.
- Ensure that all necessary permits and safety information provided by the client is disseminated to other site personnel and is maintained in an organized manner.
- Communicate with the PM on health and safety issues.
- Reports all injuries, illnesses and near-misses to the PM.
- Ensures that necessary safety equipment is maintained and used at the site.
- Ensure that all safety documentation gathered for this project is maintained in an organized manner.

5. Project Hazards and Control Measures

5.1 Hazard Analysis

Using the Hazard Analysis Risk Control (HARC) process (see Risk Assessment Matrix - Table 1 below) to assess the hazards for project field tasks. The scale of consequences from “0” to “5”is used to indicate increasing severity. The consequences are those of credible – worst case- scenarios (taking the prevailing circumstances into account) that can develop from the release of a hazard. The potential consequences, rather than the actual ones, are used. These can be thought of as the consequences that could have resulted from the released hazard if circumstances are less favorable: e.g. the risk controls failed and developed into a consequence.

After estimating the potential consequence(s), the likelihood on the horizontal axis is estimated on the basis of historic evidence or experience that such consequences have materialized within the industry, the company or a smaller unit (Division, Practice or Project). Note that it is the likelihood of the consequence occurring and not the likelihood of the hazard released.

Estimation of the likelihood and the severity of consequences is not an exact science. The consequences are based on foreseen scenarios of what “might happen” and likelihood estimates are based on historical information that such a scenario has happened under similar conditions, knowing very well that circumstances are never exactly the same.

When assessing the risk of a particular scenario, first estimate the severity of the potential consequence starting at the bottom (for people, severity rating 5): “multiple fatalities”. Ask the question: “in this particular situation” can multiple (more than one) fatalities occur when all the risk control measures fail? If this is not possible, move one box up (severity rating 4) and ask the question: “can a PTD or 1 fatality” occur? If not, again move up one box (severity rating 3) and ask the question: “can major health effect or injury” occur? Suppose the answer is yes, than the next step is the estimation of the likelihood that “major health effect or injury” occurs. In the RAM go first to the likelihood “E”: “happens several times per year at ARCADIS work site”. If this is not the case, move to the next box: likelihood “D”: “happens several times per year at ARCADIS U.S.”. If the likelihood is less, move to likelihood box “C”: “has happened in the ARCADIS group”. Suppose this likelihood is correct, then the estimated risk is “People 3C”. This is a “medium risk”.

If consequences can occur to people and property from the same hazard, the risk will be assessed for both with the higher risk level being used for the overall risk ranking.

Likelihoods “E” – “C” are generally well known by staff. The likelihoods “A” and “B” are often not known by staff. Corporate H&S will maintain a record of likelihoods with a low to very low chance.

Estimating the risk is should be done with a small group of experienced and realistic employees. Their focus should be on what is probable (this is more realistic) in a certain situation, rather than on what is possible (this is often theoretical). When seriously in doubt whether the risk is in the blue (low risk) or yellow area (medium risk), it is advised to accept the more serious situation so as to remain at the safe or conservative level.

Table 1. Risk Assessment Matrix

Risk Assessment Matrix		Likelihood Ratings**				
Consequences Ratings*		A	B	C	D	E
People	Property	Never heard of in the world	Heard of incident in industry	Incident has occurred in ARCADIS Group	Happens several times a year in ARCADIS OpCo	Happens several times a year at ARCADIS Worksite
0 - No health effect	0 - No damage	Low	Low	Low	Low	Low
1 - Slight health effect	1 - Slight damage	Low	Low	Low	Low	Low
2 - Minor health effect	2 - Minor damage	Low	Low	Low	Medium	Medium
3 - Major health effect	3 - Local damage	Low	Low	Medium	Medium	High
4 - PTD or 1 fatality	4 - Major damage	Low	Medium	Medium	High	High
5 - Multiple fatalities	5 - Extensive damage	Medium	Medium	High	High	High

☒ Hazards are ranked using the ARCADIS HARC Process: *ARC_HSMS002*

Biological		***Mechanical***		***Chemical/Radiation***	
M	Biting/stinging insects	M	Cuts on equipment/tools		Not applicable
	Biting animals	M	Pinch points on equipment	L	General
L	Poisonous plants	L	Burns from equipment	L	Dusts, toxic
	Phys. damaging plants	M	Struck by equipment	L	Dusts, nuisance
					Chemicals, ARCADIS use
Driving		***Motion***			Chemicals, corrosive
L	Night driving	M	Lifting/awkward body positions		Chemicals, explosive
	Off-road driving	L	Struck by vehicle/traffic		Chemicals, flammable
L	Urban driving				Chemicals, oxidizing
	All terrain vehicle	***Personal Safety***		L	Chemicals, toxic
L	Boat	L	Working late/night		Chemicals, reactive
			Working alone		Radiation, ionizing
Electrical			High crime area		Radiation, non-ionizing
L	Wet environments				
L	Electrical panels	***Pressure***		***Compound Specific***	
L	Electric utilities	L	Utilities (gas, water, etc)	L	PCBs
L	Electric power tools		Compressed gas cylinders		
			Compressed air/aerosols	L	Chromium
Environment		L	Hydraulic systems	L	Copper
L	Heat			L	Lead
M	Cold	***Sound***		L	Mercury
L	Lightning	M	Equipment noise	L	Zinc
L	Inclement weather	M	Tool noise	***Gravity***	
	High wind	L	Traffic noise (vehicle/train/etc)	M	Slip, trip, fall
				L	Fall from height
				L	Ladders or scaffolds
				L	Struck by falling object

5.2 Job Safety Analyses (JSAs), H&S Standards and PPE

A JSA has been completed for each safety critical task, and are included in Appendix B. Hazards identified in the table above are addressed specifically in the JSAs as well as control methods to protect employees and property from hazards. The JSA also lists the type of personal protective equipment (PPE) required for the completion of the project. A detailed list of PPE for the project is located in Appendix D.

ARCADIS H&S Standards applicable to this project are listed below. These standards should be reviewed by the project manager, task manager and site personnel. The Client H&S Resource should be contacted with any questions concerning the standards.

- ARC HSFS019 – Utility Clearance
- ARC HSCS006 – Heavy and Mechanized Equipment
- ARC HSSP0002 – Railroad Workplace H&S Standard
- ARC HSGE015 – Personal Protective Equipment
- ARC HSFS010-H&S Plan Standard
- ARC HSMS010 – Incident Reporting and Investigation Standard
- ARC HSFS003 – Confined Space Entry (Included as a guide for ARCADIS to reference when providing construction oversight of Contractor's work activities)
- ARC DOT-302 – Roadway Work Zone Safety, Traffic Control Employee Safety on Private Roadways and Parking Areas

5.3 Field Health & Safety Handbooks

The Field H&S Handbook (FHSHB) is an ARCADIS document containing information about topic-specific health and safety requirements for the field. This handbook contains relevant general topics and is used as part of the overall HASP process. To aid in the consistency of the HASP process the handbook will be used as an informational source in conjunction with this HASP.

The following handbook sections are required reading for this project:

- Section I - Introduction
- Section II – Health and Safety Administration
- Section III – General Field Health and Safety Requirements
    - A. Daily Safety Meetings/Tailgates
    - C. First Aid/Cardiopulmonary Resuscitation
    - E. General H&S Rules and Safe Work Permits
    - H. Personal Safety and Other Unique Site Conditions
    - I. Severe Weather
    - K. Hazard Communication
    - L. Noise
    - M. Heat and Cold Stress
    - N. Biological Hazards
    - P. Medical Surveillance
    - R. Personal Protective Equipment
    - T. Vehicle Safety Inspection
    - U. Driving
    - V. Trailer Safety
    - X. Boating Operations Safety
    - NN. Backing Safety

- Section IV – General Field Construction H&S
  - D. Excavation /Trenching
  - E. Heavy Equipment
  - M. Underground Construction (Tunnels)
- Section V – Specific Project Sites, Hazards and Activities
  - E. Railroad
  - G. Water Operations Work

6. Hazard Communication (HazCom)

All project required chemicals must be handled in accordance with the ARCADIS-HazCom Standard (ARC HSGE007), and the requirements outlined in the Field H&S Handbook. The table below lists all chemicals that will be brought, used, and/or stored on the site by ARCADIS or its subcontractors. Material Safety Data Sheets (MSDS) for chemicals brought on site are included in Appendix E.

List the chemicals anticipated to be used by ARCADIS on this project subject to HazCom requirements.
(Modify quantities as needed)

	Acids/Bases	Qty
☒	Not applicable	
☐	Hydrochloric acid	<500 ml
☐	Nitric acid	<500 ml
☐	Sulfuric acid	<500 ml
☐	Sodium hydroxide	<500 ml
☐	Zinc acetate	<500 ml
☐	Ascorbic acid	<500 ml
☐	Acetic acid	<500 ml
☐	Other:	

	Decontamination	Qty
☐	Not applicable	
☒	Alconox	≤ 5 lbs
☐	Liquinox	≤ 1 gal
☐	Acetone	≤ 1 gal
☐	Methanol	≤ 1 gal
☐	Hexane	≤ 1 gal
☐	Isopropyl alcohol	≤ 4 gal
☐	Nitric acid	≤ 1 L
☐	Other:	

	Calibration	**Qty.**
☐	Not applicable	
☒	Isobutylene/air	1 cyl
☐	Methane/air	1 cyl
☐	Pentane/air	1 cyl
☐	Hydrogen/air	1 cyl
☐	Propane/air	1 cyl
☐	Hydrogen sulfide/air	1 cyl
☐	Carbon monoxide/air	1 cyl
☐	pH standards (4,7,10)	≤ 1 gal
☐	Conductivity standards	≤ 1 gal
☐	Other:	

	Fuels	Qty.
☐	Not applicable	
☒	Gasoline	≤ 5 gal
☐	Diesel	≤ 5 gal
☐	Kerosene	≤ 5 gal
☐	Propane	1 cyl
☐	Other:	

	Kits	Qty.
☒	Not applicable	
☐	Hach (specify):	1 kit
☐	DTECH (specify):	1 kit
☐	EPA 5035 Soil (specify kit):	1 kit
☐	Other:	

	Remediation	Qty.
☒	Not applicable	
☐	Other:	
☐	Other:	
☐	Other:	
☐	Other:	

	Other:	Qty.
☐	Not applicable	
☒	Spray paint	≤ 6 cans
☒	Bentonite	
☒	Concrete patch	
☐	Pipe primer	≤ 1 can
☐	Mineral spirits	≤ 1 gal

Material safety data sheets (MSDSs) must be available to field staff. Manufacturer supplied MSDSs are preferred, however, if the manufacturer's MSDS cannot be located, use the source provided below. Indicate below how MSDS information will be provided:

- ☐ Not applicable
- ☐ Printed copy in company vehicle
- ☒ Printed copy in the project trailer/office
- ☒ Printed copy attached
- ☐ Electronic copy on field computer

Bulk quantities of the following materials will be stored:

Contact the project H&S contact for information in determining code and regulatory requirements associated with bulk storage of materials.

Find an MSDS	
Source:	www.hz.genium.com
Username:	arcadis_library
Password:	library1

6.1 Chemical Hazards

A focused list of constituents of potential concern (COPCs) for the Site were identified based on a comparison of near-Site sediment data to NYSDEC screening levels for protection of aquatic life and statistical comparisons to background concentrations. Chromium, copper, lead, mercury, and zinc were identified as COPCs for the near shore area of the Site where the dredging is to occur. Sediment investigations conducted in 2006 demonstrated that the sediments within the area to be dredged were not impacting aquatic life and did not represent a direct contact risk to human health. Rather, sediments are being dredged to reduce the overall mass of COPCs near the former industrial outfall.

The same COPCs are anticipated to be in the sediments to be removed from the storm sewer system that discharges to the river. Additionally, there is a potential for trace levels of contaminants to be present in the recycled concrete millings that will be moved from an onsite stockpile and used as interim cover as part of this project. by the contractor, including PCBs at levels near 1 ppm. Community air monitoring for airborne particulates and total volatile organic compounds (VOCs) will be conducted ARCADIS during construction activities, as outlined in the Community Air Monitoring Plan (CAMP) (ARCADIS 2012). The Contractor will monitor the sediment work zone, as needed, air per OSHA requirements, as specified in the Contractor' HASP. The Contractor will be responsible for managing the work to mitigate the generation of dust, as outlined in the CAMP.

7. Tailgate Meetings

Tailgate safety briefings will be conducted at least once daily and may be conducted twice daily (at the start of the job and after mid-day meal break), or as tasks/hazards change. Tailgate safety briefings will be conducted jointly by ARCADIS and the contractor. Each tailgate safety briefing will be documented on the form included in Appendix C, or equivalent, and maintained with the project files. The tailgate safety briefing will serve as a final review for hazard identification and controls to be utilized. JSAs and the ARCADIS FHSHB controls should be reviewed as part of the briefing to ensure hazard controls are adequate for planned work.

8. Medical Surveillance

Medical surveillance requirements are outlined in the ARCADIS Medical Monitoring Program Standard ARCHSGE010. All medical surveillance requirements as indicated must be completed and site personnel medically cleared before being permitted on the project site.

9. General Site Access and Control

The Contractor is responsible for site security and control, and coordination of access with the Village of Sleepy Hollow Department of Public Works (DPW). Under a license agreement with GM LLC, the Village DPW controls the main gate and other gate access and parks DPW trucks and other equipment within the Site. The ARCADIS SSO will coordinate access with the Contractor's SSO. As the work dictates, the Contractor's SSO will establish a work area perimeter. The size of the perimeter will be based on the daily task activities and will be discussed with all project personnel during the tailgate meeting and then documented on the tailgate meeting form. Only authorized personnel will be allowed beyond the perimeter. Other site workers and visitors to the site should be kept out of the work site. If visitors need access to the site, the Contractor's Site Supervisor, the Project Manager, or the ARCADIS SSO will escort the visitor at all times. All visitors will log in and out with the Contractor's Site Supervisor. An example visitor log sheet is included in Appendix C.

9.1 Sanitation at Temporary Workplaces

9.1.1 Potable Water

An adequate supply of potable water must be provided on the site by the Contractor. Portable containers used to dispense drinking water will be capable of being tightly closed, and equipped with a tap. Water will not be dipped from containers. Any container used to distribute drinking water will be clearly marked as to the nature of its contents and not used for any other purpose. Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups will be provided.

9.1.2 Toilet Facilities

Under temporary field conditions, the Contractor will make provisions so that no less than one toilet facility is available. Use of a nearby toilet facility is an acceptable arrangement for mobile crews having transportation readily available. An on-site toilet facility will be located in the general vicinity of the construction trailers.

10. Decontamination Control Zones and Procedures

The decontamination procedures outlined in the Field H&S Handbook are provided for typical Level D and Level C ensembles. Only Level D or modified Level D work will be required.

For work under the control of ARCADIS, the SSO will establish control boundaries for the designated work area. Entrance and exit to the designated work area will only be through controlled access points that will be identified by the SSO during tailgate meeting and documented on the meeting form.

11. Record Keeping and Audit Program

11.1 Safety Book and Other Health and Safety Records

ARCADIS will create, maintain at the jobsite and make available for GM's inspection and copying on demand a comprehensive, organized Safety Book containing at least the following:

i) All health and safety records regarding the work that ARCADIS is required to create, keep or maintain pursuant to any law, statute, code, ordinance or regulation unless such disclosure is prohibited by law

ii) Site-specific procedures provided by GM

iii) ARCADIS' Job-Site Safety Organization chart

iv) ARCADIS' Safety Orientation

v) All information disseminated at Safety Meetings

vi) Project Meeting Minutes pertaining to safety issues

vii) Site-related health and safety audit results for itself or any of its subcontractors

viii) All records that ARCADIS is required to create, keep or maintain, including HASP, Project Meeting Minutes, reports generated pursuant to safety complaints, concerns, injuries, incidents, or near miss injuries or incidents, and reports of discipline

ix) A copy of all certificates of insurance required by GM Safety Requirements

The Contractor's SSO and the ARCADIS SSO will also establish and maintain records of all necessary and prudent monitoring activities as described below:

i) Name, job classification and date of attendance at Health and Safety/Site Orientation Session for their employees involved on specific tasks as well as sign-in sheets for safety meetings.

ii) Records of qualitative fit testing and physical examination results for site personnel.

iii) Records of all OSHA training certification for their site personnel.

iv) Records of training acknowledgment forms.

v) Maintain all MSDS including MSDS required by subcontractors at any tier.

vi) Emergency reports describing any incidents, near misses or accidents. As well as OSHA log of occupational injuries and illnesses, documentation of inspections and corrective action taken.

11.2 Audit Program

The SSO, or their designate, will conduct regular health and safety inspections, or audits, of the work activities performed at site and will document the findings of those audits. Such audits will be conducted no less than once each mobilization, and for Site activities with lengthy, continuous duration (≥60 days), at a *frequency that will be at the discretion of project team, and as approved by GM Project Manager*.

The audit will assess compliance of all ongoing work activities and Site conditions to the procedures described in this HASP as well as other requirements of local, state and federal regulations. Audits of subcontractor's activities will also be conducted, at a minimum, on the work at the site involving in activities where exposure to a hazardous substance is expected or the activity is associated with a safety risk. The auditor will have the authority, and will be so directed, to immediately stop any work activity if a potentially unsafe or non-compliant situation is observed.

The results of the each audit will be documented on the form provided in Appendix B (or on an alternative form as approved by GM). The completed, dated and signed form will be included in the Safety Book (as described in Section 11.1).

Any noteworthy observations, conditions or activities not in full compliance with this HASP, present potentially unsafe conditions**,** or involve potential violations of regulations will be discussed during the Safety Meetings and corrected as soon as possible, but no later than the next field day or the activity will be suspended. For any audit performed on the work of a subcontractor, the Contractor will provide a copy of

the completed audit to the subcontractor and will discuss the findings of that audit with the subcontractor.

The audit form will be sent to the GM project manager as soon as possible after completion, but no later than one week after inspection. Any significant violation or compliance issue will be immediately reported to the GM Project Manager.

12. Client-Specific Health and Safety Requirements

ARCADIS project personnel must comply with the client's specific H&S requirements at all times. Client-specific H&S requirements are as follows:

- *All personnel conducting activities on the Site must conduct their activities in compliance with the Agreement for Environmental Services between General Motors Company and/or General Motors LLC and ENCORE LLC and the Consolidated Supplier Project Delivery System Agreement; Project Memorandum (collectively, the "GM Safety Requirements".*

- *All project activities at the Site will be conducted in accordance with the provisions of a GM reviewed Project HASP (Contractors/subcontractors may develop and provide their own Site-specific procedures; however, they must meet as a minimum the guidelines presented in GM's HASP Template). A copy of this Project HASP will be maintained on-Site (at the point where work is being conducted) whenever activities are in progress.*

- *The Contractor must not interfere with or make more difficult or expensive GM's compliance with any law, code, ordinance, or regulation. If the Contractor's work interferes with or makes more difficult or expensive GM's compliance with any law, code, ordinance, or regulation, GM will notify Contractor, orally or in writing, and the Contractor must, within 48 hours of receiving GM's notification, make whatever changes are necessary to remedy the situation, including, changes in the work schedule, installation of safety devices, etc.*

- *All accidents, incidents and near misses that occur on-Site during field activity will be promptly reported to the Contractor PM and SSO. The Contractor Project Manager immediately must notify the GM PM upon the occasion of any incident or accident involving the Contractor's personnel or their subcontractors, as follows:*

  Near miss, serious miss, critical injury, recordable case, lost work day case or Pedestrian Industrial Vehicle incident:

  - *Notify Site immediately*
  - *A final incident report must follow within 48 hours*

Fatality

- *Notify Site within 1 hour*
- *Within 8 hours submit to Owner a preliminary incident report*
- *A final incident report must follow within 48 hours*

E-mail initial reports, notifications, and completed reports to: Service_Provider_Safety@gm.com. A copy of the e-mail must be sent to the GM PM and Mr. Steve Biechele (steven.biechele@gm.com). Within two weeks of the initial notification, a final incident report is to be prepared by the Contractor PM. The final report should be sent to the same e-mail addresses, although the GM PM will establish the process for reviewing the accident/incident report prior to submission.

- *The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated will result in the removal of Site personnel from that area and re-evaluation of the hazard and the levels of protection*

13. Ground or Air Shipments of Hazardous Materials (HazMat)

All samples, electronic equipment with batteries, powders, gases, liquids, magnetized materials or radioactive materials being shipped by ARACDIS by air or ground transport will be evaluated using the ARCADIS Shipping Determination process to determine if the material or equipment being shipped is hazardous for transport. All materials identified as HazMat and shipped by ARCADIS will be shipped according to applicable DOT and International Air Transport Association (IATA) regulations and requirements as prescribed by the ARCADIS DOT Program.

All ARCADIS employees collecting samples, preparing HazMat packages, or offering HazMat to a 3rd party carrier such as FedEx will have current HazMat training as prescribed by the **ARCADIS DOT Program.**

14. H&S Orientation and Task Improvement Process (TIPs)

As part of any project, no matter how simple or complex, TIPs should be conducted when practical and when able to integrate into normal business activities. TIPs should be scheduled based on the risk of the tasks being performed, and should be conducted for different tasks and at different times. Completion of TIPs by ARCADIS should be documented on the tailgate meeting form.

The following table outlines the TIP plan for the project:

Identified Task for TIP	Schedule Date	Observer Name	Observee Name	Feedback Supervisor Name

15. Subcontractors

A copy of this HASP is to be provided to all ARCADIS subcontractors performing work at the site prior to the start of work so that the subcontractor is informed of the hazards at the site. While the ARCADIS HASP will be the minimum health and safety requirements for the work completed by ARCADIS and its subcontractors, each subcontractor, in coordination with ARCADIS health and safety personnel, is expected to perform its operations in accordance with its own HASP, policies and procedures unique to the subcontractor's work to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to ARCADIS for review prior to the start of on-site activities.

In the event that the subcontractor's procedures/requirements conflict with requirements specified in this HASP, the more stringent guidance will be adopted after discussion and agreement between the subcontractor and ARCADIS project health and safety personnel. Hazards not listed in this HASP, but known to the subcontractor or known to be associated with the subcontractor's services, must be identified and addressed to the ARCADIS project or task manager and SSO prior to beginning work operations.

If the subcontractor prefers to adopt this HASP, the **"Subcontractor Acknowledgement Memo" must be signed and dated by the subcontractor's management and placed in the project file.** Once the signed memo is received by the project manager, an electronic version of our HASP can be submitted to the subcontractor to use as their own. Subcontractors working at the site will need to have this plan with them, and will also need to sign the Subcontractor HASP receipt signature page of the ARCADIS HASP (Appendix C). Subcontractors are responsible for the H&S of their employees at all times, and have the authority to halt work if unsafe conditions arise.

The Project/Task Manager and SSO (or authorized representative) has the authority to halt the subcontractor's operations and to remove the subcontractor or subcontractor's employee(s) from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

16. Project Personnel HASP Certification

All site project personnel will sign the certification signature page provided in Appendix C of this HASP.

17. Roadway Work Zone Safety

All project work performed in a private roadway, regardless of work duration, will require a Site Traffic Awareness and Response (STAR) Plan (Appendix F) and conform to ARC DOT-302 (Appendix B). The STAR template provided in Appendix F will be used to document the site traffic and roadway work zone safety procedures that are provided in the Contractor's equivalent plan.

ARCADIS

Appendix A

HASP Addendum Pages and Log Table

ARCADIS

Addendum Page

This form should be completed for new tasks associated with the project. The project manager and/or task manager should revise the Project Hazard Analysis Worksheet with the new task information and attach to this addendum sheet. JSAs should be developed for any new tasks and attached as well.

Review the addendum with all site staff, including subcontractors, during the daily tailgate briefing, and complete the tailgate briefing form as required. Attach a copy of the addendum to all copies of the HASP including the site copy, and log in the Addendum Log Table A-1 on the next page.

Addendum Number: _____ Project Number: _____

Date of Changed Conditions: _____ Date of Addendum: _____

Description of Change that Results in Modifications to HASP:

Signed: _____ Signed: _____
Project Manager Site Safety Officer

Signed: _____ Signed: _____
H&S Plan Writer H&S Plan Reviewer

ARCADIS

Addendum Log Table

Addendums are to be added to every copy of the HASP, and logged on Table A-1 to verify that all copies of the HASP are current:

Table A-1 Addendum Log Table

Addendum Number	Date of Addendum	Reason for Addendum	Person Completing Addendum
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Make additional copies of this form as necessary.

ARCADIS

Appendix B

JSAs/ARCADIS Standards

Job Safety Analysis

General

JSA ID	2113	**Status**	(3) Completed
Job Name	Infrastructure-Other	**Created Date**	4/7/2010
Task Description	Construction Inspection	**Completed Date**	07/15/2011
Template	True	**Auto Closed**	False

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	NO PROJECT MANAGER

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Moyers, Sam	12/27/2011	7/15/2011	Coppola, Mija	☑
HASP Reviewer	Casaletta, Robert	7/29/2011	7/15/2011	Coppola, Mija	☑
Quality Reviewer	Palmer, Peter	8/4/2011	8/4/2011	Suarez, Gustavo	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Accessing/egressing work location	1	Slips, trips and falls on boats, barges, construction lay down areas and steel fabrication areas	Do not hurry through task, plan routes and focus on walking task. Keep hands free.	ARC HSGE001 Tailgate Meeting
		2	Falls from ladders, scaffolds, or on stairs	Maintain 3 points of contact climbing/descending ladders, Expect boat movement when accessing barge ladders and plan movement when crossing to ladder. Use handrails on stairs, or scaffold stairs, inspect route and plan route on scaffolds.	
		3	Impacts to head, arms, legs and body from suspended or protruding construction equipment, pitching boat.	Plan route and select routes along aisle ways with adequate width. No shortcutting over or under equipment. Always maintain awareness of crane blocking and low overhangs. Stay seated during boat operations. Wear hard hat at all times, even on or in boat.	
		4	Struck by construction equipment	For vehicle and exposed worker, follow STAR Plan for project. For worker, plan routes and communicate with equipment operators.	
		5	Lack of safety briefing may result in injury	Participate in contractor safety briefings to ensure H&S requirements are met during inspection activities and awareness of planned work activities. Use TRACK for all inspection activities.	
2	Performing inspections and observations	1	Cuts and scrapes to hands while inspecting steel and concrete.	Wear protective leather gloves or equivalent gloves. Do not place hands in areas of impaired visibility.	
		2	Falls from height while inspecting steel.	100 percent tie off fall protection is required (double legged lanyard). Plan routes prior to climbing and do not hurry through task. No shortcutting or over reaching when moving at height.	
		3	Impalement or cuts, scrapes from sitting on improvised or non standard seating.	Inspect area prior to sitting for splinters, protruding nails, or similar hazard. Seating should be prefabricated and designed for that purpose or craft made by carpenter.	
		4	Struck by equipment and suspended loads	Maintain awareness of surroundings during inspections, and look up frequently for crane activity overhead. Avoid distractions such as talking on cell phones or radios during inspection work.	

3	Escorting visitors and visitor safety	1	Visitor not knowledgeable of site hazards	Escorts to provide all visitors with safety briefing even if briefing is provided by contractor or USACE. Emphasize the need to wear required PPE at all times.	ARC HSGE001 Tailgate Meeting
		2	Visitor slip trip and fall by not focusing on walking task or unfamiliarity with boat characteristics.	TRACK visitor behaviors and coach/mentor visitors if questionable behaviors are observed. Verify visitor has correct footwear for site.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots	with ankle support and good tread	Required
Hand Protection	work gloves (specify type)	leather or other suitable material	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs	NR 30 or better	Required
Miscellaneous PPE	personal flotation device	Type III or V per SSO	Required
	traffic vest--Class II or III	II or III per SSO, see also STAR Plan	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
	walkie talkie	per SSO or contractor requirement	Required
Miscellaneous	fall protection (specify type)	requires double legged lanyard for harnesses	Required
	fire extinguisher	ABC in vehicle	Required
	first aid kit	in vehicle	Required
Personal	insect repellant		Recommended
	sunscreen		Recommended

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Casaletta, Robert HASP Reviewer Revise 4/14/2010	Add to Job Step 1 : Potential hazard- Personal injury Critical Action- Conduct a Tailgate meeting to review planned work activities for the work period. Cpmplete Tailgate meeting form to document the meeting. HSP Reference ARC HSGE001 Tailgate Meeting.
Employee: **Role** **Review Type** **Completed Date**	Casaletta, Robert HASP Reviewer Approve 7/15/2011	
Employee: **Role** **Review Type** **Completed Date**	Palmer, Peter Quality Reviewer NA 8/4/2011	Good point on the potential hazard associated with distractions due to talking on cell phone or radios during inspections.

Job Safety Analysis

General

JSA ID	1716	**Status**	(3) Completed
Job Name	Construction-Oversight - excavation and construction	**Created Date**	2/26/2010
Task Description	Oversight of dredging activities, placement of materials in a sediment management unit, and dam demolition.	**Completed Date**	04/23/2010
Template	False	**Auto Closed**	True

Client / Project

Client	SCHLUMBERGER TECHNOLOGY CORPORATION
Project Number	MT0010190001
Project Name	TWELVE MILE CREEK PHASE II
PIC	DIAS, KEITH
Project Manager	HALL, SHARON

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Cary, B. Scott	3/26/2010	3/26/2010	Biondolillo, Matthew	☑
Developer	Zorn, Brianne	3/26/2010	3/26/2010	Moody, Christopher	☐
HASP Reviewer	Webster, Charles	4/9/2010	4/16/2010	Insco, Ashly	☐
Quality Reviewer	Hall, Sharon	5/10/2010	5/10/2010	Guillette, Brian	☑
Reviewer	Ketcham, Lance	4/9/2010		VanDewalker, Heather	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Site mobilization	1	Personal injury from encounters with traffic or heavy machinery when accessing site.	Perform TRACK at a tailgate meeting every day to assess the tasks to be completed each day. Wear appropriate PPE on site at all times to ensure visibility and for added protection in case of an unforeseen encounter.	
2	Construction Observation	1	Personal injury or death by accident involving heavy equipment while in operation.	Wear appropriate PPE, such as high visibility vests, hard hat, glasses, and steel toed boots at all times. Be aware of JLA for task being conducted by other contractors. Be prepared to use Stop Work Authority if activities are not safe. Maintain contact with operator at all times. Establish a safe observation zone for personnel so operation of equipment will not be interrupted.	
		2	Exposure to contaminants from splashing or spills	Wear appropriate PPE to protect skin and eyes from impacted sediment or water.	
		3	Slip, trips, or falls from uneven or slippery surfaces.	Personnel shall take caution when walking on the site and be aware of uneven surfaces, poor footing, or slippery conditions.	
		4	Allergic reactions from exposure to biological hazards such as poisonous plants or animals.	Personnel shall take caution when on the work site and be aware of the presence of biological hazards in the observation areas.	
		5	General environmental hazards, including those associated with heat or cold related illnesses.	Breaks shall be taken to rest and consume fluids, as necessary. Appropriate clothing shall be worn for the weather conditions. The Site Safety Officer shall check local weather forescasts daily prior to the commencement of work activities.	
3	Construction Observation from a boat	1	Falling into the water and/or drowning if observing from a boat.	Personnel are to wear a PFD at all times when working on a boat, including when getting on and off the boat. Personnel will perform TRACK before initiating any activities from a boat and will utilize stop work authority if working conditions become unsafe.	JLA 1715 Boating Operations

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	work gloves (specify type)		Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs	if necessary during dredging	Required
Miscellaneous PPE	personal flotation device	when working over water	Required
	traffic vest--Class II or III		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
Personal	sunscreen		Required
	water/fluid replacement		Required

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Webster, Charles HASP Reviewer Approve 4/16/2010	
Employee: **Role** **Review Type** **Completed Date**	Hall, Sharon Quality Reviewer NA 5/10/2010	Good identification of tasks

Job Safety Analysis

General

JSA ID	213	**Status**	(3) Completed
Job Name	General Industry-Water work-with boat	**Created Date**	5/11/2009
Task Description	Boat operations	**Completed Date**	06/08/2009
Template	True	**Auto Closed**	True

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	NO PROJECT MANAGER

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Coppola, Mija	3/20/2012	5/11/2009	Coates, Gary	☑
HASP Reviewer	Moyers, Sam	5/25/2009		Coppola, Mija	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Mobilizing to Job site	1	MVAs can occur if watercraft trailer is not hitched and towed correctly.	Follow JSA on commercial motor vehicles.	JSA Commercial Motor vehicles. Field H&S Handbook-Section III-V ARC HSFS018-Trailer usage
2	Launching watercraft/prepare for operating boat	1	Staff can fall in the water during launch or pinch fingers/body parts	Move all objects away from the operating area of the watercraft launch. All parties should be visible and able to communicate with operator of vehicle backing the trailer.	
		2	Missing equipment or equipment failure can leave boaters stranded on the water.	Make sure boating safety checklist is completed before operating the boat.	
		3	Fuel can leak or spill when fueling equipment.	Do not overfill the tank. Have absorbent pads available in case of spill.	
3	Loading and Unloading watercraft	1	Loss of Equipment in water	Avoid directly carrying anything onboard. Have someone hand them to you one by one. Distribute equipment evenly in vessel.	
		2	Muscle strains can occur when lifting supplies into watercraft	Use proper lifting techniques or team lift.	
		3	Obstacles and wet boat can cause slip/trip/fall hazard	Ensure path is clear, use additional caution in areas that may be slick. Access watercraft from sides rather than ends.	
		4	Unbalanced cargo and personnel can make boat unstable.	Evenly distribute cargo and personnel to assure balance in boat. Always load boat from side to side. Secure all cargo on the watercraft.	
4	Operating watercraft	1	Personnel can fall into the water	All personnel must wear a personal floatation device and remain seated during boat operation. Steering changes must be made slowly. Avoid wakes of other watercraft traffic. Larger watercrafts have the right of way. Maintain a controllable speed.	Field H&S Handbook Section III-X Boating safety; ARC HSFS002-Boating operations
		2	Equipment can be lost in the water	Secure all equipment when the boat is being operated.	
		3	Other watercraft can be struck during boat operation	Assign someone as a spotter. Look constantly for others around you.	
		4	The boat can be damaged when hitting floating objects/debris in the water.	Always be looking for objects in the water. Use a good safe operating speed. Be extra cautious after rain events because more debris in the water is likely.	

4	Operating watercraft	5	Severe weather can impact boating operation	Check for severe weather alerts, and TRACK the weather throughout the day. Boating should cease if high winds are expected, or lightning storms.	
5	Docking watercraft	1	Body parts can be pinched between the boat and dock.	When tying watercraft up, do not put fingers between watercraft and dock/unloading site to avoid pinching hands or fingers. Use leather gloves.	
		2	Wet and uneven surfaces on dock and watercraft can cause slipping/tripping	Make sure watercraft is secure to watercraft dock. Watch footing getting on and off watercraft. Clean out all equipment and supplies in watercraft. Use good housekeeping.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	boots		Required
Hand Protection	work gloves (specify type)	leather	Required
Miscellaneous PPE	personal flotation device		Required

Supplies

Type	Supply	Description	Required
Communication Devices	walkie talkie		Required
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
Personal	sunscreen		Required

Job Safety Analysis

General

JSA ID	404	**Status**	(3) Completed
Job Name	Environmental-Drilling, soil sampling, well installation	**Created Date**	6/8/2009
Task Description	Well Abandonment	**Completed Date**	06/08/2009
Template	False	**Auto Closed**	False

Client / Project

Client	CANADIAN NATIONAL RAILWAY COMPANY
Project Number	DE0002900001
Project Name	CN PONTIAC WELL ABANDONMENT ACTIVITIES
PIC	JONES, MARTINA S.
Project Manager	RUBIS, TERRI

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Linder, Tiffany	6/8/2009	6/8/2009	Bice, David	☑
HASP Reviewer	Zellmer, Gregory	6/22/2009	6/8/2009	Bice, David	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Active Rail Yard	1	Current Operations	Conduct safety tailgate meetings to discuss potential hazards and to ensure yard is aware of schedule of project and work times	ARC HSSP0002 Railroad Workplace Safety
		2	Moving Rail Cars and Locomotives	Be alert to moving trains/cars at all times; do not cross between cars or take refuge beneath cars; no work within 25 feet of track without proper track protection	
		3	Vehicle Traffic	Be alert to vehicle movement; high visibility safety vest required; set up safety cones around work area.	
2	Utility Clearance - Overhead	1	Potential to encounter overhead utilities when using a drill rig	Complete utility clearance using ARCADIS procedure and ensure that all overhead utilities in work area can be cleared by the drill rig.	ARCADIS H&S Procedure ARC HSFS019
3	General drill rig operation	1	Excessive noise is generated by rig operation	Use hearing protection around the rig and make sure the rig operator sees you if you are near the rig.	
		2	Moving parts on drill rig can pull you in causing injury. Pinch points on the rig and auger connections can cause pinching or crushing of body parts	Stay at least 5 feet away from moving parts. Know where the kill switch is, and have the drillers test it to verify that it is working. Do not wear loose clothing and tie back long hair. Do not wear jewlery and cone off the area around the rig to protect the general public.	
		3	Dust and debris can cause eye injury	Wear safety glasses and stay as far away from the drill rig as practible.	
		4	Drilling equipment laying on the ground creates a tripping hazard.	Keep equipment picked up and store away from the primary work area.	
		5	Raised derrick can stike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick and that you are far enough from overhead power lines. See the utility location H&S procedure for guidance.	
4	Monitoring Well Abandonment	1	Abandonment materials can cause a tripping hazard.	Ensure that all materials are clear of the work area to prevent against a trip hazard.	
		2	Heavy lifting can cause muscle strains, and cutting open bags can cause lacerations.	Well abandonment materials are usually 50 lbs or more. Use proper lifting techniques or equipment to lift materials. Always wear gloves when cutting open bags cut away from yourself at all times.	
		3	Well abandonment material can become airborne and get into your eyes.	Wear safety glasses to protect from airborne sand and dust.	

4	Monitoring Well Abandonment	4	Well construction materials could have sharp edges upon removal.	Wear work gloves and grab the material in areas that are not sharp to avoid injury.	
		5	Potential overfill of well with concrete slurry through tremmie pipe.	Be aware of filling rate of well and also wear appropriate boots as the slurry if overfilled could be slippery in the area of the well. Clean up spills as soon as possible.	
		6	Cutting down the top portion of the well construction material.	Wear leather work gloves, cut away from you and make sure you have an appropriate hold on the material while cutting.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)		Recommended
	work gloves (specify type)	Leather	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III	CN Appropriate	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
	flashlight		Recommended
	Other	Field forms and HASP	Required
	Other	Railroad Required Documentation	Required
Personal	eye wash (specify type)		Required
	insect repellant		Recommended
	sunscreen		Recommended
Traffic Control	traffic cones		Required

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Zellmer, Gregory HASP Reviewer Revise 6/8/2009	see pdf for comments
Employee: **Role** **Review Type** **Completed Date**	Zellmer, Gregory HASP Reviewer Approve 6/8/2009	

EXECUTIVE SUMMARY

It is ARCADIS' policy that our staff will not enter confined spaces of any type unless it is absolutely necessary. If it becomes necessary to enter confined spaces, this standard, at a minimum will be strictly followed. A summary of the important requirements for managing the risks of confined spaces are summarized below.

- Potential confined spaces in the work area that could be purposely or mistakenly entered by ARCADIS or subcontractor staff must be identified as confined spaces. Entry is forbidden into these spaces until they are classified. If no entry is necessary, classification is not required.
- If entry is or may be required, the spaces must be evaluated and classified as to being permit-required or non-permit required confined spaces. The client or property owner may have done this already, but this must be verified.
- Non-Permit Required Confined Spaces
    - Entry into non-permit required confined spaces is allowed but only it has been appropriately evaluated and verified that all hazards are adequately controlled - **TRACK**
    - Personnel entering non-permit required spaces must complete confined space awareness training per ARCADIS training requirements
- Permit-Required Confined Spaces
    - Permit-required confined spaces must be marked to identify them as such if not already.
    - A thorough hazard analysis of the space and the activities that could create hazards in the space must be completed – **TRACK**
    - A permit package must be completed prior to any entry, including the evaluation form, the permit form and the confined space entry checklist
    - All hazards must be appropriately controlled and verified before entry
    - Permit must be reissued for each entry and cancelled at the completion of an entry. Cancelled permits should be maintained in the project files.
    - An air monitoring plan and implementation of the plan is required for the entry
    - Entrants must be outfitted with appropriate equipment including PPE and rescue
    - A pre-planned rescue plan is required including identification of rescue services and trained personnel
- Awareness level confined space training is required for all staff who work where confined spaces may be present. Those who enter or serve as Attendants, Entry Supervisors or Rescuers must complete classroom training approved by Corporate H&S

1. POLICY

It is ARCADIS' policy that staff will not enter confined spaces of any type unless it is absolutely necessary. If it becomes necessary to enter confined spaces, this standard, at a minimum will be strictly followed.

2. PURPOSE AND SCOPE

2.1 Purpose

This standard sets forth the accepted practice for confined space entry and establishes the requirement for a Confined Space Entry Permit protocol to effectively mitigate or eliminate the hazards presented by entry into confined spaces.

2.2 Scope

This standard applies to all employees of ARCADIS-US who may work around or in confined spaces. Only trained and authorized personnel are permitted to enter confined spaces, supervise confined space activities, serve as an attendant during confined space activities and perform entry or non-entry rescues from confined spaces.

3. DEFINITIONS

See Definitions in Exhibit 1.

4. RESPONSIBILITIES

4.1 Attendants

- An Attendant is prohibited from monitoring the activities of more than one confined space entry.
- An Attendant must be stationed and remain stationed outside the permit space at all times during entry operations. The Attendant may have no other duties besides those listed in this section.
- All Attendants must have training and instruction in their duties and responsibilities regarding confined space entry. The following are assigned duties:
    - Maintain an accurate count of all entrants in the confined space
    - Monitor activities both inside and outside the confined space to verify the continued safety of entrants
    - Maintain visual contact or verbal communication with all entrants in the confined space at all times

- Order evacuation of the confined space if an uncontrolled hazard develops, either within or outside the confined space, or upon observing a behavioral effect of hazard exposure among entrants
- Warn unauthorized persons away from the confined space
- Participate in non-entry rescue
- Summon rescue and other emergency services

- Attendants must maintain current certification in basic first aid and cardiopulmonary resuscitation (CPR).
- Under no circumstances should the Attendant attempt rescue of entrants by entering the confined space.
- In addition to a dedicated Attendant a second standby employee must be present in the area within sight or call to assist as necessary. This standby person could be the Entry Supervisor if different than the Attendant.

4.2 Authorized Entrants

Entrants must have training and instruction in their duties and responsibilities regarding confined space entry. All authorized entrants must:

- Recognize the hazards which may be faced during entry, as well as the signs and symptoms of exposure to the hazard(s).
- Shall confirm that all isolation, Lock/Out and Tag/outs have been completed prior to entry into confined space.
- Maintain visual contact and/or verbal communications with the Attendant at all times.
- Use the PPE, air monitoring and testing equipment that has been provided.
- Maintain an awareness of all external barriers required to protect from external hazards (e.g., blanking, blocking and lockout) and the proper use of those barriers.
- Obey evacuation orders given by the Attendant, Entry Supervisor, automatic alarm activation, or when self-perceived.

4.3 Entry Supervisors (also see Training and Duties of Entry Supervisor)

- Issue, authorize, and post the Entry Permit prior to any confined space entry.
- Interface with the client representative to identify hazards associated with the client's confined space.
- Review existing confined space data (if any) recorded by the client.

- Review the client's confined space standard.
- Investigate the client's permit entry protocol, ensuring that any identified hazards and previous experience with the confined space is properly communicated.
- Coordinate entry operations with the client's employees when both client and ARCADIS employees will be working in or near a permit space.
- Coordinate rescue assistance with either the client's in-house rescue team and/or the offsite rescue assistance specified by the client. The offsite rescue assistance specified by the client must have direct rescue experience in the client's identified confined space or be provided an opportunity to examine the space and practice a rescue.
- Verify that the client takes the necessary precautions in notifying their employees that our employees will be entering the confined space.
- Review the lockout/tagout and isolation measures implemented by the client.
- Immediately report any unusual or unforeseen confined space entry hazard to Corporate Health and Safety prior to authorizing entry.
- Should test all atmosphere conditions prior to entry and shall complete and maintain the confined space permit form, and have it accessible for review on the job site at all times.
- Offer all entrants an opportunity to review the confined space entry testing results and an opportunity to request a reevaluation of the permit space in the presence of the entrant if the entrant has reason to believe that the evaluation of the space may not have been adequate.
- Upon completion of the entry covered by the permit, and after all entrants have exited the permit space, cancel the Entry Permit.
- Verify that copies of the completed and canceled Entry Permits are properly disseminated to Corporate Health and Safety and retained with the project files, as specified in Section 8.0I – Records.
- Identify and label confined spaces under ARCADIS long-term control.

The Entry Supervisor may also function as the Attendant; therefore, the Entry Supervisor must have the training specified for an Attendant and will assume the duties listed for either the Entry Supervisor or Attendant.

4.4 Corporate H&S with Division and Practice Experts

On an annual basis, review and update, as necessary, this standard. In addition, review cancelled entry permits periodically to ensure conformance to this standard. Provide the initial confined space entry training and retraining, or recommend qualified training provider, to all Entry Supervisors, entrants and Attendants. Provide technical assistance regarding confined space entry protocol, atmospheric testing equipment, PPE, hazard assessment

and research information on unusual hazards. Audit project-specific confined space entry for compliance with this SOP. Retain a file of cancelled Confined Space Entry Permits for annual review.

4.5 Principal in Charge (PIC), Project Manager (PM), and Task Manager (TM)

Are responsible to:

- Verify that all confined spaces and entry protocols are properly identified and addressed within the project work plan, project health & safety plan, and/or other project-related documents.
- Verify that their divisional or project team employees have received the proper confined space training provided by Corporate Health & Safety or qualified training source prior to conducting confined space entry activities.
- Verify that the proper confined space entry equipment, including PPE, atmospheric testing equipment and safety equipment, is available for use by their divisional employees.
- Verify that copies of the completed and canceled Entry Permits are properly disseminated to Corporate Health and Safety and retained with the project files.
- Identify client requirements and assure they are communicated to the project team.

4.6 Health and Safety Plan Writers and Reviewers

Utilize this standard as guidance to ensure the appropriate identification, assessment and control of confined space spaces and associated entries for documentation in project HASPs

4.7 Rescue Services

Two types of rescue may be initiated during confined space work, entry rescue and non-entry rescue. Rescue services in this standard refer to both entry rescue and non-entry rescue. Entry rescue is typically provided by an outside service such as a local fire brigade. ARCADIS employees are prohibited from conducting entry rescues, and will only participate in non-entry rescue if trained to do so.

Whenever ARCADIS or subcontractor personnel enter a permit-required confined space, a written plan must be in place for the rescue of those employees from the space, as needed. The rescue service must:

- Be available and always be on alert for all confined space entries as required.
- Be familiar with all equipment used for the task.
- Have proper training and preparation for confined space rescue.
- Use the PPE and rescue equipment necessary for making rescues from confined spaces.

- Know basic first aid and cardiopulmonary resuscitation (CPR); at least one member of the rescue service shall hold current certification in first aid and CPR.
- Perform assigned rescue duties competently.
- Receive the required authorized entrants' training.
- Practice making confined space rescues using the following:
    - Dummies, mannequins or actual people
    - Representatives spaces to simulate the types of confined spaces from which the rescue is be performed
- Complete training at least once every 12 months, with training certification reviewed by the Entry Supervisor.
- Have ready access to the appropriate PPE and equipment necessary to safely retrieve injured or collapsed personnel from the confined space
- Consider ready access to first aid provisions during job planning
- Gather information on every confined space entry task, including exact location, immediately prior to work commencing and before and after breaks

4.8 All ARCADIS Employees

Use the TRACK process described below regularly and frequently. In addition, employees read and understand all documented hazard identification and risk assessments conducted using the HARC process and documented in HASPs, JSAs, and other written plans that are associated with their work. ARCADIS employees will:

- Participate in entry operations only if trained and authorized to do so
- Never enter a confined space without an authorized Attendant, Entry Supervisor, and a completed Entry Permit
- Never attempt entry rescue within a confined space unless trained in entry rescue
- If unexpected conditions arise during entry, immediately notify other entrants, evacuate the space and inform the Entry Supervisor

5. PROCEDURES AND PRACTICES

Structures or facilities that could be deemed confined spaces may include but not be limited to:

- Enclosed drains or sewers
- Excavations and trenches
- Process vessels and exchanges

- Road and rail tankers
- Silos
- Storage tanks
- Sumps
- Well vaults
- Crawl spaces

A confined space can be permitted or non-permitted, which is determined by through the completion of a comprehensive evaluation of hazards to appropriate controls are implemented to ensure entry is completed safely.

5.1 What is a Confined Space?

A Confined Space is any enclosed space which:

- Is large enough and so configured that an employee can bodily enter and perform work.
- Has limited or restricted means for entry or exit.
- Is not intended for continuous employee occupancy.

5.2 What is a Permit-Required Confined Space?

A Permit-Required Confined Space is a confined space that has one or more of the following characteristics:

- Contains or has a known potential to contain a hazardous atmosphere.
- Contains a material with the potential for engulfment of an Entrant.
- Has an internal configuration such that an Entrant could be trapped or asphyxiated by inwardly converging walls or a floor which slopes downward and tapers to a smaller cross-section.
- Contains any recognized safety or health hazard capable of causing injury or death.
- Contains job-introduced hazards such as welding, cutting, grinding, hot riveting, burning, heating, or the introduction or sources of ignition within the confined space, asbestos or lead containing material removal, or the use of flammable or toxic cleaning solvents.

5.3 What is Confined Space Entry?

Entry constitutes the act by which an employee intentionally passes through an opening into a permit-required confined space. Entry is considered to have occurred as soon as any part of the employee's body breaks the plane of the opening into the space.

5.4 What are the Potential Hazards of a Confined Space?

All parties involved in confined space entry will be competent to recognize hazards that may be associated with a confined space. The parties involved, as part of the evaluation process, will perform a hazard analysis and assessment of the space to identify associated hazards for each space identified if entry is required. Appropriate controls will then be implemented before entry. The potential hazards of a confined space include but are not limited to:

- Presence of flammable substances and oxygen enrichment which can lead to fire or explosion (Chemical).
- Toxic gases, fumes or vapors which can result in acute local or systemic health effects (Chemical).
- Inert gases which can result in asphyxiation (Chemical).
- Oxygen-deficient atmospheres which can result in asphyxiation (Chemical).
- Liquids or solids that can engulf an Entrant (Mechanical, Motion).
- Extreme temperatures which can result in heat-stress, cold stress, or mental acuity decline (Environment).
- Mechanical or electrical equipment which can result in bodily injury if contacted (Mechanical, Electrical).
- Working at heights when entering and exiting which can result in falls (Gravity).
- Slippery or uneven walking surfaces (Gravity, Mechanical).
- Elevated noise levels from activities and echoing (Sound).
- Low light levels (Radiation, Environment).
- Stressful, confined work areas (Personal safety).
- Poisonous or biting insects or animals, bacteria, biological materials, sanitary wastes (Biological).

5.5 Confined Space Identification and Evaluation

On an ARCADIS project site or work location, information about confined spaces, including their location and characteristics, near the work site must be obtained from the owner or operator of the confined space. In turn, ARCADIS will then inform its subcontractors, as appropriate.

In addition, prior to the initiation of activities, ARCADIS will:

- Verify the location of the identified confined spaces and confirm no others exist in its work area

- Evaluate each space in accordance with the criteria defined in this Program utilizing the Confined Space Evaluation Form and Instruction Guide. This form then becomes part of the Entry permit package if entry is necessary.

- Classify the confined spaces as to whether they are permit- or non-permit required. This may include additional consulting with the client, outside agencies and other necessary entities, as appropriate. ARCADIS can upgrade the classification beyond the client's classification; however ARCADIS will not downgrade the classification.

- Ensure the spaces are marked accordingly by either the client, site owner, or ARCADIS, as appropriate.

Permit-required confined spaces will be marked as indicated below or similarly:

Danger - - Permit-Required Confined Space, Do Not Enter

Non-permit required spaces may also be marked as appropriate to notify others that it is a confined space.

5.6 General Requirements for Confined Space Entry

5.6.1 Communications

Prior to any confined space entry, a communication system will be established.

For communication during a permit-required space, there should be an established system between:

- the Attendant and the Entrant

- the Attendant and the Entry Supervisor

- The Attendant and the assigned Rescuers. The Attendant will be in constant and direct communication with the Entrants.

Acceptable forms of communication between the Entrant and the Attendant are:

- Hand signals, as long as the Entrants are in constant view of the Attendant

- Intrinsically safe portable radios

The appointed rescue team(s) shall be informed of every permit-required confined space entry task, including the exact location, both immediately prior to work commencing and before and after work breaks. Intrinsically safe portable radios or cellular telephones of summoning help from a rescue service shall be available.

5.6.2 Confined Space Entry Equipment

Confined space entry, whether it be permit or non-permit required entry may require a variety of equipment. This will be evaluated as part of the hazard analysis and evaluation process. This equipment may include, but not limited to the following:

- Signs, barricades or other devices to control access to the confined space and to control the area around the confined space where people will be working.

- Energy control devices as specified by the ARCADIS Lockout / Tagout (LOTO) Control of Hazardous Energy standard.

- Entry devices – ladder, tripod and winch, harness or other mechanism to allow safe entry and non-entry rescue – rescue equipment is required for all permit-required spaces.

- Safety equipment – fire extinguishers, lights, cooling vests.

- Ventilation equipment – fans, blowers or other methods to maintain safe atmospheric conditions within the space.

- Air monitoring – meters to measure the air quality, at a minimum confined space entry meters will be able to measure oxygen, lower explosive limit (LEL), hydrogen sulfide (H_2S) and Carbon monoxide (CO) – these may not be necessary for non-permit required spaces.

- Personal Protective Equipment – selected based on the hazards.

Other equipment may be required based on the nature of the entry and the activities. For example, self-contained breathing apparatus may be necessary for external rescuers for entry rescuers. All equipment must be appropriate for the activities of the entry and be approved or certified as specified by regulatory requirements.

5.7 Non-Permit-Required Confined Space Requirements

If the site, as a result of the evaluation process, is revealed to contain any non-permit required confined spaces, ARCADIS will inform affected employees. Entry into these spaces can be made as follows:

- Entry into a non-permit confined space will be allowed only after review of the inventory/ evaluation form to determine what potential hazards may exist.

- Entry into the non-permit confined space will occur only after all hazards, if any, have been eliminated.

If there are changes in the use or configuration of a non-permit confined space, the space in question must be re-evaluated to determine if any hazards exist. If the hazards cannot be eliminated, the space must be reclassified as a permit required confined space.

Non-Permit Entry is permitted when all atmospheric, egress and other recognized hazards can be eliminated. If this is a sustainable situation, the confined space can be entered as a non-permit required entry. **The confined space entry checklist must still be completed.**

5.8 Reclassifying a Permit-Required to a Non-Permit-Required Confined Space

To reclassify a space from permit required to non-permit required, the following procedures must be used:

- Without entering the space, if all the hazards in the space can be eliminated, (including atmospheric or potential atmospheric hazards), the space may be reclassified as a non-permit required.
- If it is necessary to enter the space to eliminate existing hazards, all requirements for permit required confined space entry must be followed. Once testing or inspection during this entry demonstrates that the hazards within the space have been eliminated, the space may be reclassified as a non-permit required.
- Prior to reclassifying a permit required confined space to a non-permit required confined space, all relevant data that demonstrates the basis for the reclassification must be documented and referenced on the evaluation form.

5.9 Permit-Required Confined Space Entry

After a confined space is determined to be permit-required and entry is necessary to complete the activities, ARCADIS staff will:

- Complete the entry permit package which includes the completed evaluation form, the entry permit, and the entry checklist.
- Evaluate the hazards external to the confined space that may impact the confined space operations including but not limited to pedestrians and vehicles
- Determine the appropriate hazard controls appropriate for the space using the hazard control hierarchy of eliminate, substitute, isolate, engineer out, administratively manage, and provide personal protective equipment
- Develop an appropriate air monitoring program based on the characteristics of the space
- Identify competent Entry Supervisor, Attendant, Entrants and Rescue personnel and establish procedures for the coordination of these staff

5.9.1 Entry Permit Package and Process

The Confined Space Entry Permit Package is made up of the completed Evaluation form, the Entry Permit, and the Entry Checklist. The Entry Permit will be:

- Completed, signed and issued by the Entry Supervisor who will verify that the confined space has been properly evaluated, isolated, drained, washed, purged, flushed ventilated, and tested as appropriate, and that the Entry Checklist and the Evaluation form are completed and part of the permit package.
- Posted at the entrance to the space and remain for the duration of the entry
- Weather-protected to maintain integrity.

In addition, prior to authorizing the Entry Permit, the Entry Supervisor, along with the attendant and Entrants must ensure the following, as applicable.

- All mechanical apparatus (such as agitators) within or connected to the confined space are de-energized, locked-out, and tagged as per the ARCADIS Lockout/Tagout standard.
- All lines connected to the confined space where the nature of the service could present a hazard, such as nitrogen, steam, solvent, acid, or hot water, are isolated from the confined space. Acceptable isolation methods include removing a valve, spool piece, or expansion joint, and blanking or capping the opened end; inserting a suitable full-pressure blank in the piping between connecting flanges; and/or closing and locking at least two valves in the pipeline and locking open to atmosphere a chain valve between the two closed and locked valves.
- All electrical equipment in and around the confined space is de-energized and locked out.
- For confined spaces which have contained a known hazardous chemical (e.g., vessels, storage tanks), have been thoroughly cleaned by appropriate means, e.g., overflowing with water, steaming, etc.
- For confined spaces containing known atmospheric hazards, mechanical ventilation is operating to maintain atmospheric hazards within permit parameters.
- The atmosphere of the confined space is initially checked to verify that it contains acceptable levels of oxygen (19.5 to 23.5%) and is free of hazardous levels of explosive/combustible or toxic gases or vapors. The Atmospheric Testing Section, of this standard lists the air quality specifications which must be met. These specifications are also listed on the Entry Permit. Continuous air monitoring may be required depending on the nature of the confined space, as well as the activity(ies) to be conducted within the confined space.
- All necessary entry equipment (e.g., retrieval lines, PPE, respiratory protective equipment) is available, in good condition, and functional.

- All Entrants and Attendants have received the appropriate confined space entry training.
- All rescue arrangements are in-place as per the section on Outside Rescue Assistance, and that an adequate means of communicating with outside assistance is immediately available to the attendant.

The Entry Permit must be canceled and all Entrants ordered to evacuate the confined space when any one of the following conditions arises:

- A change in initial atmospheric conditions which may jeopardize the continued health and safety of Entrants is detected.
- The attendant must leave the work station.
- The attendant is called on to perform duties which do not allow him/her to fulfill his/her duties as an attendant.
- Whenever ordered by the attendant due to factors external to the confined space which may jeopardize the continued safety and health of Entrants.
- At the end of the work shift and/or whenever a different group of Entrants and Attendants will take charge of the confined space.
- Whenever Entrants self-perceive danger and self-initiate evacuation.
- At the termination of confined space entry.
- At the end of the work shift in which the entry occurs.

5.9.2 Other Confined Space Entry Permit Requirements

Additional Entry Permit package requirements are:

- A separate Entry Permit must be generated for each confined space. However, a single Entry Permit may be generated for entry into multiple sewer system manholes in a continuous sewer system.
- The completed permit package is valid for one shift only. A new permit and checklist must be completed with each new entry. However, if the activities are the same as those evaluated on the evaluation form, a new evaluation form is not required.
- A new completed and signed Entry Permit Package must be issued for each new crew of Entrants and Attendants.

5.9.3 Evaluation of External Hazards

Prior to any confined space entry, hazards external to the space will be evaluated to ensure protection of Entrants and others. This evaluation is done as part of the ARCADIS TRACK process, the development of JLAs for the job, and the daily tailgate meeting on site. These external hazards may also be evaluated through the development of the site specific health and safety plan.

5.9.4 Atmospheric Testing

All confined spaces will be tested for atmospheric hazards as outlined below. Results of this testing will be documented on the Entry permit.

- Each confined space will be initially tested prior to the Entry Supervisor authorizing entry.
- Each confined space will also be tested continuously or at intervals as specified by the Entry Supervisor based on the characteristics and hazards identified associated with the space, even when mechanical ventilation is utilized.
- The following are the testing sequence and acceptable air quality criteria:
    - Oxygen content for all confined space entry must be 19.5 to 23.5% (Oxygen must be measured first)
    - Combustible gas or vapor must not exceed 10% of its Lower Explosive Limit (LEL)
    - Toxic gas or vapor must not exceed 50% of the OSHA Permissible Exposure Limit (PEL) or other published exposure guidelines whichever is lower
    - Carbon monoxide must not exceed 10 parts per million (ppm)
    - Hydrogen sulfide must not exceed 0.5 ppm
- If it is necessary to enter a confined space where any of the following atmospheric conditions exist, all Entrants must wear either a NIOSH approved self-contained breathing apparatus (SCBA) of at least 60-minute duration or an air line respirator with emergency SCBA, as delineated below.
    - Initial atmospheric testing indicates conditions outside the parameters listed on the Entry Permit. However, no entry will be made, even with respiratory protection, if combustible gases/vapors are greater than 10% of the LEL or oxygen is greater than 23%
    - Initial atmospheric testing indicates conditions within permit parameters, but where the quality of the atmosphere remains questionable
    - Despite initial atmospheric testing results, activities to be performed while in the confined space would endanger Entrants by creating a sudden change in atmospheric conditions within the space. This activities may include but are

not limited to welding, painting, coating, cutting, using solvents, or agitating bottom sediments

- o Mechanical ventilation will not maintain atmospheric hazards within permit limits

- Under no circumstances is entry into a confined space having an IDLH condition (less than 19.5% oxygen or >5% of the LEL) permitted by any employee of ARCADIS. (10% of the LEL is safe from a flammability standpoint, but may pose certain other hazards from a health risk, thus, entry is not permitted if conditions measure more than 5% of the LEL)

- Results of all atmospheric testing must be recorded on the Confined Space Entry Permit and/or an attached air monitoring log found in the HASP.

- Entrants and their representatives have the opportunity to participate in all air monitoring and air monitoring instrument calibration, and to review all air monitoring data prior to entry to the space.

5.9.5 Mechanical Ventilation

Mechanical ventilation may be:

- Utilized to maintain the atmospheric conditions hazards within entry limits.

- Used to force clean air into a space or remove contaminated air from the space.

Ventilation systems must be set up to adequately ventilate all areas of the space and be locked in the “on” position. The space must be evacuated if the system fails.

Air intake must be positioned to prevent the introduction of air contamination into the confined space (e.g., away from vehicle exhaust, tank vents).

5.9.6 Work Practices

The following Work Practices must be followed for Permit-Required Confined Space Entry.

- All Entrants must wear a retrieval line secured on one end to the Entrant by a full-body harness, or parachute harness, and the end secured outside the space unless this creates more of a hazard.

- If there is not a fixed retrieval line, a suitable means for rescue appropriate for the configuration of space, must be provided.

- For vertical-entry spaces, the lifeline must be secured to a lifting or other mechanical retrieval device affixed to a suitable anchor point. Reliance on manually lifting an Entrant from a vertical confined space is prohibited. If more than one Entrant is entering the space, each line shall be clearly marked to identify the Entrant and the mechanical retrieval system must be rated for multiple Entrant use.

- Whenever a ladder is required for entry, it must be secured and not withdrawn while anyone remains within the confined space, except as necessary to permit extraction during rescue.

- Adequate, explosion proof illumination must be provided for entry as necessary.

- Electrical equipment used within a confined space must be explosion-proof and be inspected prior to use to verify good working condition. The equipment must utilize a ground fault interrupt and/or be properly grounded.

- Whenever the confined space is structured such that visual contact cannot be maintained between Entrants and the attendant, intrinsically-safe, two-way radios must be utilized to maintain continuous contact between Entrants and Attendants.

- All confined spaces must be isolated prior to entry.

- Prior to opening or removing lids, covers, access doors, or hatches of a confined space, precautions must be taken to determine if it is safe to do so.

- Whenever entering spaces with permanent ladders, all rungs must be inspected to verify they are in safe and useable condition.

- When working in a vertical confined space, precautions must be taken to prevent equipment and personnel from falling into the confined space opening. Tools should be lowered and removed from the space using a basket or sling to prevent falls and falling objects.

- A re-evaluation of the hazards associated with the space will be conducted if it is believed or known that conditions in the space have changed, or if an Entrant requests re-evaluation or air monitoring.

- If ARCADIS staff must enter a space with staff from one or more other employers, no entry will take place until the entry supervisors from each employer coordinate activities and determine and communicate the entry, operations, and exit and rescue procedures for the multi-employer space. Responsibilities and designation of each authorized position will be reviewed and authorized positions will be appropriate staffed with qualified personnel.

5.10 Confined Space Rescue

Rescue services will be provided and be prepared for permit-required confined space entries. Non-entry rescues can be performed by qualified and trained ARCADIS staff. Entry rescues will be performed by external sources that are qualified and competent to perform entry rescues.

5.10.1 Non-Entry Rescue

ARCADIS staff or an external rescue team can provide non-entry rescue if they are property trained and qualified. This training must be completed at least annually and include the actual use of the rescue equipment that will be used during the confined

space entry over which they will provide rescue services. In addition, at least one person on the rescue team must be currently certified in first aid and CPR.

Non-entry rescue will involve the use of retrieval systems or methods to assist in the rescue unless the retrieval equipment increases the overall risk of the entry or does not contribute to the rescue of the Entrants.

For non-entry retrieval, non-entry rescuers shall:

- Ensure the use of a full body harness with a retrieval line attached at the center of the Entrant's back near shoulder level or above the Entrant's head by each authorized Entrant.
- Attach the other end of the retrieval line to a mechanical device or fixed point outside the confined space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary.
- Set up a mechanical device and make it ready to retrieve personnel from vertical type confined spaces more than 4 feet deep.
- Use the material safety data sheets or written information if an injured Entrant is exposed to a hazardous substance.
- Provide medical personnel treating the exposed Entrant with the material safety data sheet or written information.

5.10.2 Outside Entry Rescue Assistance

If the Entry Supervisor determines entry rescue may be necessary, an assessment will be completed to verify that the designated rescue service:

- Has adequate resources, training and equipment to provide services for the scope of the planned entry.
- Is within a reasonable response distance/time.

Such rescue assistance must be coordinated with either the client's designated confined space rescue team and/or with a local emergency response team. The selected rescue services must be offered an opportunity to inspect the confined space prior to initiating the entry. Documentation of this offer and the status of the site visit, if conducted, must be maintained by the entry supervisor.

As appropriate, entry shall progress only after proper notification and verification of adequacy of outside rescue assistance prior to the actual entry activity.

An adequate means of communication (e.g., cellular telephone for contacting offsite emergency assistance, air horn, or two-way radio for summoning the rescue team) must be immediately available to the attendant.

5.11 Annual Review of the Confined Space Entry Program

At least annually, ARCADIS will review the confined space program to determine if revisions are required to ensure it is adequate. This review will be accomplished using cancelled entry permits from within the last year, reading and updating this written standard, and via on-site assessments of entry activities. Based on this review, the program and procedures will be revised as appropriate, and then communicated to appropriate staff.

6. TRAINING

All employees who work in the area of potential confined spaces or who enter non-permit required spaces will be trained in awareness level training in order to recognize confined spaces and to understand their hazards. This training is provided during initial and refresher HazWoper training or through specific confined space awareness training.

For entry to permit-required confined spaces, all parties involved including the entry supervisor, Attendants, Entrants and rescuers will take classroom, hands-on training pursuant to their activities. Additional training is provided to these employees if their duties change, or if new hazards are encountered, or if special procedures or activities occur. Site specific training is also provided to address those site-specific hazards and confined spaces encountered on each project.

Rescuers will receive hands-on training pertinent to the type of rescue services they will provide as described in the Rescue section of this document.

All training provided to ARCADIS employees must be reviewed and approved by Corporate Health & Safety and will be managed through the ARCADIS training center.

Documentation of training certification received by attendance at any training course including externally provided training courses will be kept by the employee with copies provided to the ARCADIS training center.

7. REFERENCES

- Confined Space Entry Evaluation Form and Instruction Guide – found on the Community Page of the H&S Team Site
- Confined Space Entry Checklist – found on the Community Page of the H&S Team Site
- Confined Space Entry Permit – found on the Community Page of the H&S Team Site
- ARCADIS Health and Safety Standard ARC HSFS010– Health and Safety Planning
- ARCADIS Health and Safety Standard ARC HSFS004 – Control of Hazardous Energy (Lockout/Tagout)

8. RECORDS

- Training records will be kept by the individual employee with copies of such certificates kept by the ARCADIS training system. Training dates and times will be kept by the ARCADIS training system.
- Confined Space entry permits and cancelled permits will be kept in the project files with copies of cancelled permits kept by Corporate H&S.
- Copies of all HASPs that document confined space procedures will be kept in the project files.

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Michael Thomas, CIH, CPEA, Director H&S Environmental Division

History of Change

Revision Date	Revision Number	Reason for Change
5 May 2008	01	Original document
21 Jan 2009	02	Removed reference to Sewer System Manhole Checklist
27 Jan 2009	03	Corrected discrepancy in acceptable CO levels between Section 5.3.3 and checklist in Exhibit1
29 April 2009	04	Modified and added to several sections to provide more detail per the request of several client via ISN
1 November 2009	05	Modified to include enhancements to the procedures and to meet BP Control of Work Defined Practice for Confined Spaces
1 November 2010	06	Modified format to include an Executive Summary. Also, reviewed and edited text to simplify the text.

Exhibit 1 – Definitions

Attendant is a trained **authorized** individual stationed outside the confined space whose sole duty is to monitor authorized entrants inside the confined space.

Blanking or Blinding is the absolute closure of a pipe, line or duct by the fastening of a solid plate that completely covers the bore and that is designed to withstand the pressure of the pipe, line or duct with no leakage beyond the plate.

Confined Space is any enclosed space which is large enough and so configured that an employee can bodily enter and perform work, has limited or restricted means for entry or exit, and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, storage tanks, vessels, pits, boilers, flues, manholes, ventilation system ductwork, sewers, vaults, pipelines, silos, storage hoppers, diked areas, and wells greater than 4 feet deep.

Confined Space Entry Permit is the document which defines the conditions of confined space entry, the reasons for entering the confined space, the anticipated hazards of the entry, a listing of atmospheric monitoring equipment, and acceptable atmospheric conditions. The Entry Permit identifies the rescue and other contacts which must be summoned in the case of an emergency, provides a listing of authorized attendants and entrants, the date of entry to the confined space, and the expiration of the Entry Permit. For the purposes of this HSP, the Confined Space Entry Permit package consists of the Confined Space Entry Checklist (Exhibit 1), the Confined Space Entry Permit (Exhibit 2), and the Confined Space Evaluation Form (Exhibit 3). The Entry permit package must be re-issued at the beginning of each shift.

Double block and bleed – the closure of a line, duct, or pipe by closing and locking or tagging two inline valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Engulfment is the surrounding and effective capturing of a person by a liquid or finely divided (flow-able) solid substance that can cause death by filling or plugging the respiratory system or exert force on the body to cause death by strangulation, constriction or crushing

Entrants are employee's who are trained and **authorized** to enter a confined space.

Entry constitutes the act by which an employee intentionally passes through an opening into a permit-required confined space. Entry is considered to have occurred as soon as any part of the employee's body breaks the plane of the opening into the space.

Entry Supervisor is the trained, competent and **authorized** employee responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry. The Entry Supervisor may also serve as an authorized attendant.

Hazardous Atmosphere is an atmosphere which exposes employees to a risk of death, incapacitation, injury, or acute illness from one or more of the following:

- An atmospheric concentration of any substance in excess of 50% of its established permissible exposure limit (PEL); or in the absence of a PEL, its assigned threshold limits value (TLV) or other value listed on the Material Safety Data Sheet (MSDS) for the chemical constituent whichever is lower.

- A flammable gas, vapor, or mist in excess of 5% of its lower explosive limit (LEL).
- An airborne combustible dust at a concentration that obscures vision at a distance of 5 feet or less or is above the LEL.
- An atmospheric oxygen concentration below 19.5% (oxygen-deficient atmosphere) or above 23.5% (oxygen-enriched atmosphere).
- An atmosphere which is immediately dangerous to life and health.

Hot Work Permit – the written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately Danger to Life and Health (IDLH) means any condition which poses an immediate threat to loss of life; may result in irreversible or immediate-severe health effects; may result in eye damage, irritation, or other conditions which could impair escape from the confined space.

Inerting – the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) t such an extent that the resulting atmosphere is non-combustible. This procedure produces an IDLH oxygen deficient atmosphere.

Isolation involves removing equipment/systems in and around the space from service. This includes but is not limited to lockout/tagout, double blanking and bleeding, disconnecting and securing or restraining equipment.

Lower Explosive Limit (LEL) is the minimum concentration (percentage) of a flammable gas that will propagate a flame in the presence of an ignition source. The more explosive the gas, the lower the LEL. LEL is usually expressed as a percentage (from zero to 100 percent explosive) and is often used interchangeably with lower flammability limit

Non-Permit Confined Space is a confined space that does not contain or have the potential to contain any hazards capable of causing death or serious physical harm.

Oxygen-deficient Atmosphere is an atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen-enriched Atmosphere is an atmosphere containing more than 23.5 percent oxygen by volume.

Permit-Required Confined Space (Permit Space) is a confined space that has one or more of the following characteristics:

- Contains or has a known potential to contain a hazardous atmosphere
- Contains a material with the potential for engulfment of an entrant
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a floor which slopes downward and tapers to a smaller cross-section
- Contains any recognized safety or health hazard capable of causing injury or death.

- Contains job-introduced hazards such as welding, cutting, grinding, hot riveting, burning, heating, or the introduction or sources of ignition within the confined space, asbestos or lead containing material removal, or the use of flammable or toxic cleaning solvents

- Is an excavation or trench that is deeper than three feet.

Prohibited Condition is any condition in a permit space that is not allowed by the permit during the period when entry is authorized

Rescue Service is the team or entity designated to rescue personnel from confined spaces

Self-rescue is an entrant's ability to escape unaided from a confined space

Retrieval system – the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from confined spaces.

EXECUTIVE SUMMARY

ARCADIS employs a wide range of heavy, mechanized equipment in various operations. Operating heavy equipment requires, at minimum, the policies set forth in this Standard. In addition to federally mandated requirements, each state may enforce more stringent standards related to training, licensure, inspection and documentation.

The requirements set forth in this policy provide direction in heavy equipment operations:

- Only authorized personnel will operate heavy equipment.
- If Operator training is required, it will occur under controlled conditions.
- Specific training for Powered Industrial Trucks (forklifts) will be in compliance with OSHA 29CFR 1910.178. Refer to ARCADIS Forklifts HS Procedure ARC HSSP006 for additional details and requirements.
- All employees involved in Heavy Equipment Operations shall read and understand documented hazard identification and risk assessments conducted using the Hazard Assessment and Risk Control (HARC) Process.
- ARCADIS Utility Location Standard shall be followed prior to beginning work which involves heavy or mechanized equipment. A minimum of 3 lines of evidence is required for subsurface activities.
- Preventative maintenance and pre-operation checks in accordance with the manufacturer's requirements shall be conducted prior to equipment usage.
- Understand and actively use TRACK and Stop Work Authority during heavy equipment operations.
- Supervisors shall verify clients' operating procedures and identify site hazards.
- PICs, PMs and TMs will be responsible for verifying operator training, maintaining equipment and operator documentation, identifying all operations which use heavy equipment in the work plan and researching and adhering to any additional policies required by the state in which the project operates.
- Maintain all current and applicable licensing, permits and project documentation as required by federal and state regulations. Required operation permits and checklists can be found in Exhibit 2.
- Work Practices associated with Heavy Equipment Operations such as PPE usage, illumination, equipment testing, travel path verification and maximum capacity rating adherence shall be strictly followed at all times. A complete list of Work Practices can be found in section 5.2.

1. POLICY

It is ARCADIS-US policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. To those means, it is ARCADIS' policy that our staff will be adequately trained and experienced before operating heavy and mechanized equipment. If it becomes necessary for ARCADIS employees to operate heavy or mechanized equipment, this procedure, at a minimum, will be strictly followed.

2. PURPOSE AND SCOPE

2.1 Purpose

To effectively mitigate or eliminate the hazards presented by working with or around heavy or mechanized equipment, i.e. back-hoes, track-hoes, bobcats, concrete crushers, etc.

2.2 Scope

This procedure Equipment Checklist, Operator Permit and Hazard Review apply to all employees of ARCADIS-US. Only trained and authorized personnel are permitted to operate heavy or mechanized equipment.

3. DEFINITIONS

Definitions related to Heavy Equipment Operations can be found in Exhibit 1.

4. RESPONSIBILITIES

4.1 Corporate H&S with Division and Practice Experts

Review and update, as necessary, this standard and associated attachments.

Audit Business Unit documentation files of authorized equipment operators and Site Project Supervisors.

4.2 Principal in Charge (PIC), Project Manager (PM) and Task Manager (TM):

- Verify that all activities that require use of heavy or mechanized equipment are properly identified and addressed within the project work plan, project health & safety plan, and/or other project-related documents.
- Investigate the State and Local licensure and/or certification requirements for mechanized equipment operation and verify ARCADIS operators or subcontractors have required licenses and certifications.
- Verify that their divisional or project team employees have received the proper training and have the required experience and skills to operate heavy or mechanized equipment.

- Verify that copies of the completed Hazard Review and Evaluation for Heavy Equipment Operators form(s) are maintained in the project files and maintained in a central file managed by the Business Unit.

- Verify that copies of the completed Heavy Equipment Inspection Checklists are submitted and retained with the project files.

4.3 Health and Safety Plan Writers and Reviewers

Use this procedure as guidance to ensure the appropriate identification, assessment and control of heavy and mechanical equipment operations are covered in the HASP.

Investigate the State and Local licensure and permit requirements for mechanized equipment operation and verify all ARCADIS operators or subcontractors have required licenses and certifications. A summary of state specific requirements is provided as an attachment. However, the latest regulations should be consulted.

4.4 Site Project Supervisors

Site Project Supervisors are responsible for evaluating, qualifying, monitoring and coaching/mentoring of Heavy Equipment Operators.

Site/Project Supervisors will have a minimum of 3 years construction management and/or hands-on operating experience and demonstrated proficiency with the skills required for heavy and mechanized equipment. A list of Site/Project Supervisors will be maintained by the Business Unit Management.

Specific job responsibilities include:

- Interface with the client representative to identify hazards associated with the client's project site.

- Review the client's equipment operating procedures and permit requirements, as applicable.

- Review and ensure compliance with the ARCADIS Utility Clearance Standard ARC HSFS019 before any heavy equipment operation.

- Evaluate prospective Authorized Operators using the attached Hazard Review and Evaluation for Heavy Equipment Operators and determine if an adequate level of hands-on skill has been demonstrated to safely operate the equipment.

- Upon completion of the Hazard Review and Evaluation for Heavy Equipment Operators form, complete the Heavy Equipment Operator Permit and retain a copy in the project files and maintain central file within Business Unit to document those employees evaluated and qualified as Heavy Equipment operators. In addition, the Heavy Equipment Operator Permit must be available on the project site for review.

- Verify that copies of the Heavy Equipment Inspection Checklists are being completed and retained with the project files, as specified in Section 8.0 – Records.

- Monitor Authorized Operators and provide coaching and feedback as necessary.
- Revoke operating privileges as necessary, if required skill level is not maintained. Outline a specific Corrective Action Plan and discuss with employee and supervisor. Training Group must be notified and operator "Authorized" status revoked until necessary skill/competency is demonstrated and verified by Site Project Supervisor.

4.5 Authorized Operators

Must have adequate training and instruction in their duties and responsibilities regarding equipment operation, as documented in the Hazard Review and Evaluation for Heavy Equipment Operators form.

Responsibilities include:

- Complete required daily preventive maintenance and pre-operation checks in accordance with the manufacturer's requirements and the attached Equipment Inspection Checklist (Equipment/Manufacturer Specific Checklists may be used in lieu of this form where appropriate to cover all required items).
- Conduct TRACK Assessment in order to identify, assess and control the hazards which may be faced during equipment operation as well as the signs and symptoms of exposure to the hazard(s) of the work environment.
- Review and comply with the ARCADIS above grade and subsurface utility clearance standard ARC HSFS019 before any heavy equipment operation.
- Above grade utilities in proximity to a heavy equipment work area must be marked with warning signs, shields or other protective measures, if the minimum required clearance distances cannot be maintained.
- Maintain visual contact and/or verbal communications with the spotters and other personnel in the area at all times.
- Use the PPE, air monitoring and testing equipment as specified in the HASP.
- Maintain an awareness of all barriers, operating limits and other warning devices required to protect from external hazards (e.g., traffic, pedestrians) and the proper use of those barriers.
- Obey "Stop Work" orders given by personnel in the area automatic alarm activation, or when self-perceived.

4.6 Affected Employees

- Conduct TRACK Assessment and monitor activities near areas where heavy and mechanized equipment is in operation.
- Maintain visual contact or verbal communication with all Authorized Operators and Designated Signal Person prior to approaching or when within the operating range of the equipment.

- Order evacuation of the area if a hazard develops, either within or outside the operating area.
- Warn unauthorized persons away from the operating area.
- Summon rescue and other emergency services as necessary.
- Minimum Class II High visibility vests shall be worn by Affected Employees.

4.7 All ARCADIS Employees

Use the TRACK process described below regularly and frequently. In addition, employees read and understand all documented hazard identification and risk assessments conducted using the HARC process. ARCADIS employees will:

- Participate in entry operations only if trained and authorized to do so.
- Never enter an active work area without first getting acknowledgment and approval of the operator and Designated Signal Person, as applicable.
- Use STOP WORK Authority if unsafe or unexpected conditions arise during operation and immediately notify other personnel in the area.

5. PROCEDURE

Heavy and mechanized equipment operation can present a unique set of hazards. Only trained, qualified, authorized employees will be allowed to operate heavy or mechanized equipment in accordance with this standard. Prior to starting work with heavy or mechanized equipment all of the required permits, clearance and required project documentation will be in place. The ARCADIS Utility Location Procedure ARC HSFS 019 will be followed prior to starting work with heavy or mechanized equipment.

For work with Powered Industrial Trucks (Forklifts) refer to ARCADIS Standard ARC HSSP006 for details.

5.1 Operator Approval

Prior to operating any heavy or mechanized equipment including but not limited to:

- Track-hoes and Wheel Mounted Excavators
- Back-hoes
- Articulating Trucks
- Street Sweepers
- Compactors
- Tractors

- Water trucks
- Hydro seeding and other truck or vehicle mounted equipment
- Concrete crushers
- Other Heavy Mechanized Equipment

All operators must be evaluated by a Site Project Supervisor and be observed on the specific equipment that will be in use. The Site Project Supervisor will complete the attached Hazard Review and Evaluation for Heavy Equipment Operators form and the Heavy Equipment Operator Permit. Both documents must be maintained in the project files and copies maintained in a central file within Business Unit to document those employees evaluated and qualified as Heavy Equipment operators.

All equipment will be inspected daily prior to use using the attached Equipment Inspection Form or an equivalent inspection form provided by the manufacturer or vendor to address equipment specific items.

Note: **Gantry and Bridge Cranes and other equipment that require more formal certification or licensure are not covered by this procedure. Project managers are required to verify that selected contractors have the required training, certification and equipment maintenance programs in place.**

5.2 Heavy Equipment Requirements

All vehicles used in construction must have:

- brake lights;
- appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment;
- service, parking and emergency brakes;
- fenders on vehicles with rubber tires made after 1972;
- mud flaps on vehicles with rubber tires made before 1972;
- seats and compliant seat belts for the intended number of passengers;
- an audible warning system;
- an audible reverse alarm if the vehicle travels in reverse with an obstructed view;
- lights, if the vehicle operates in dimness or darkness;
- a defroster, if windshields fog;
- a windshield and wipers on vehicles with cabs; and
- *rollover protective structure* (ROPS)

5.3 General Requirements

The following Work Practices must be followed for Heavy and Mechanized Equipment operations:

- Must be equipped with appropriate lights or reflectors.
- Controls must be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise.
- Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.
- All cab glass shall be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of equipment.
- Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.
- For power lines rated 50 kV or below, minimum clearance between the lines and any part of the equipment or load shall be 10 feet.
- In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50 kV, and 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV.
- Keep the vehicle on safe roadways and inclines. Do not move or cause to be moved construction equipment or vehicles upon any access roadway or grade unless the access roadway or grade is constructed and maintained to accommodate safely the movement of the equipment and vehicles involved.
- Maintain 3-points of contact with the steps and hand rails while getting on/into the equipment. Do not use the controls or steering wheel as a handhold.
- Operate equipment only in well ventilated areas.
- Select a gear that will prevent excessive speed when going downhill – Do not coast downhill.
- Lower all the hydraulic equipment before shutting down or getting off the machine.
- Adequate illumination in accordance with OSHA standards and work activities must be provided for all work areas. An approved type (explosion-proof as necessary) lighting device must be used.
- Rigging and lifts will only be made when the operator judges it a safe operation.
- Personnel in the vicinity of equipment will wear hard hats, safety-toe shoes, high visibility vests and safety glasses.
- Hoist hooks will have safety latches.

- Equipment will only be used within the maximum rated capacity.
- Personnel will remain at a distance from overhead loads.
- Test directional and speed controls prior to operation.
- Test limit switches (as applicable) and the emergency stop.
- Not engage in practices that will divert attention while operating the equipment.
- Respond to signals only from the person who is directing the lift or appointed signal person.
- Not move a load over people.
- Avoid excessive force pulls.
- Determine the center of gravity and balance of the equipment and the load before moving it.
- Verify the stability of the structure or area that the equipment will be used on. When working on an elevated level a Professional Engineer or qualified building inspector must determine the adequacy of the work surface prior to placing equipment.
- Initially lift the load only a few inches to test the rigging and balance.
- Check the travel path in order to avoid personnel and obstructions.
- Center the sling over the load to keep the cables from slipping, and to prevent the load from swinging when it is lifted.
- Use a tag line when loads require precise control.
- Lift the load only high enough to clear the tallest obstruction in the travel path.
- Start and stop slowly.
- Choose a safe landing.
- Land the load when the move is finished.
- Never leave suspended loads unattended.

5.3.1 Motor Vehicle Specific Requirements

- Must be inspected at the beginning of each shift to ensure that the equipment and safety controls are in safe operating condition.
- Must have a service brake system, an emergency brake system, and a parking brake system.
- When working in areas of low visibility, motor vehicles must be equipped with at least two headlights and two taillights, which are operable.

- If motor vehicle has an obstructed rear view, it must be equipped with reverse signal alarm that must be audible above the surrounding noise level or the vehicle is backed up only when an observer signals that it is safe to do so.
- Dumping, lifting and hauling vehicles must have overhead protection for the operator.
- Operating levers controlling hoisting or dumping devices on haulage bodies must be equipped with a latch or other device which will prevent accidental starting or tripping of the mechanism.
- Trip handles for tailgates of dump trucks shall be so arranged that, in dumping, the operator will be in the clear.
- Never exceed load capacities for the vehicle.
- Use the parking brake when parking and chock the wheels when needed to prevent rolling.
- Secure loose tools in the cab with workers.
- Dumping and lifting mechanisms must be secured when not in use.
- Verify that areas are clear before lifting, loading and unloading.
- All controls shall be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise

5.3.2 Earthmoving Equipment

- Use seat belts and do not carry passengers where not intended on the vehicle. Seat belts need not be provided for equipment which is designed only for standup operation. Seat belts need not be provided for equipment which does not have roll-over protective structure (ROPS) or adequate canopy protection.
- All bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction.
- Use the audible reverse alarm or signals from another worker when driving in reverse with an obstructed view.

5.3.3 Designated Signal Person

The site will use only Designated Signal Person(s) to direct heavy equipment.

Only persons who are competent and qualified by experience and/or training with the operations being directed shall be used as signal persons.

Where manual (hand) signals are used, only one person shall be designated to give signals to the operator. This signal person shall be located to see the load and be clearly visible to the operator at all times.

Manual (hand) signals may be used when the distance between the operator and signal person is not more than 100 ft (30.4 m). Radio, telephone, or a visual and audible electrically operated system shall be used when the distance between operator and signal person is more than 100 ft (30.4 m) or when they cannot see each other.

Standard hand signals shall be posted at the operator's position, signal control points, and other points as necessary to inform those concerned.

Signal persons shall back one vehicle at a time. While under control of a signal person, the heavy equipment driver shall not back or maneuver until directed and the driver shall stop when visual contact with the signal person is lost.

The signal person shall have a warning device of clear range and penetrating sound to warn persons when the load is coming in so they have time to get in the clear.

Minimum Class II High visibility vests shall be worn by flag and signal persons.

5.3.4 Refueling

- If refueling on site, the fueling area must be clearly marked (NO SMOKING), ignition sources eliminated and spill kit available.
- Turn off the engine before refueling.
- If refueling could result in gasoline/diesel coming into contact with hot engine parts, shut off and cool the engine and any electrical equipment before refueling.
- Ensure the fueling area is well ventilated.
- Do not smoke while refueling. Keep open flames and sparks away from area.
- Ground the funnel or fuel nozzle against the filler neck to avoid sparks when refueling.
- Do not use gasoline or diesel fuel for cleaning parts.
- A dry chemical or carbon dioxide fire extinguisher (rated 6:BC or larger) is in a location accessible to the fueling area.

Diesel cold start systems contain ether which is explosive. Keep away from heat, sparks, and open flames. Work in a well-ventilated area.

- If swallowed, breathed or contacted on skin or eyes seek medical attention immediately. Follow recommendations on the Material Safety Data Sheets.
- Point the openings of the valve, tube or atomizer away from yourself and others while testing the diesel cold start system.
- Store replacement ether cylinders in a cool dry place away from direct sunlight. Do not keep them in the operator’s compartment.

6. TRAINING

Training, when required, will be provided by a qualified vendor or through supervised operation by a Site Project Supervisor under controlled conditions.

7. REFERENCES

ARCADIS Health and Safety Procedure ARC HSFS010 – Health and Safety Planning

ARCADIS Employee Field Health & Safety Handbook

OSHA 29 CFR 1910 Subpart O - Motor Vehicles, Mechanized Equipment and Marine Operations

8. RECORDS - DATA RECORDING AND MANAGEMENT

Certification and Training records will be kept by the individual employee with copies of such certificates kept by Corporate Training. Training dates and times will be kept by Corporate Training.

Operator evaluation and certification documentation will be maintained at the project site and retained with the project files. Operator certification will be valid for 1 year after the date of initial issue.

9. APPROVALS AND HISTORY OF CHANGE

Approved by: Anthony Tremblay, CSP – Infrastructure Division Director of Health & Safety

History of Change

Revision Date	Revision Number	Reason for change
22 November 2011	01	Original document

Exhibit 1 – Definitions

Affected Employees – Employees who are trained and authorized to work on projects where heavy or mechanized equipment is in use by either ARCADIS employees or subcontractors.

Authorized Operator – A trained, authorized individual with the experience, training, license (as applicable) and demonstrated skills to safely operate heavy or mechanized equipment in accordance with this procedure and applicable regulatory requirements.

Backhoe-Loader – As the name implies, it has a loader assembly on the front and a backhoe on the back.

Bulldozer – A powerful crawler (caterpillar tracked tractor) equipped with a blade.

Crane – A machine for hoisting and moving heavy objects by means of cables attached to a movable boom. Cranes can include the following types: overhead, gantry, locomotive and truck. Requirements for cranes are covered under ARCADIS standard ARCHSCS003. Cranes are not usually operated by ARCADIS employees; the PM is responsible for verifying proper qualifications and licensure for crane operation by subcontractors.

Earthmoving Equipment – Scrapers, loaders, crawler or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment.

Excavator – An engineering vehicle consisting of a backhoe and cab mounted on a pivot (turntable is a more apt description) atop an undercarriage with tracks or wheels.

Heavy Equipment – includes excavators/track-hoes, back-hoes, bucket loaders, bulldozers, articulating all terrain trucks, graders, agricultural and industrial tractors, sweepers and other powered mechanical equipment.

Manlifts – includes boom lifts, scissor lifts and other powered equipment designed to provide an elevated work surface. Manlifts require training by an authorized vendor or provider that includes a hands-on demonstration of competency that meets regulatory requirements and meets fall protection requirements. Refer to the ARCADIS Aerial Lifts Standard ARC HSFS017 for details.

Motor Vehicles (as referenced in this standard) – Vehicles that operate within an off-highway jobsite, not open to public traffic. The definition of Motor Vehicles does not include earthmoving equipment.

Powered Industrial Truck (Forklift) – includes fork trucks, tractors, platform lift trucks, motorized hand trucks and other specialized industrial trucks powered by electric motors or internal combustion engines. Forklifts require training by an authorized vendor or provider that includes a hands-on demonstration of competency and meets the regulatory requirements. Refer to the ARCADIS Powered Industrial Truck (Forklift) Standard ARC HSSP006 for details.

Site Project Supervisor – The employee responsible for reviewing the project scope and determining if an acceptable skill level has been achieved and demonstrated by an employee, prior to being considered an Authorized Operator.

Skid Loader – Also called a skid steer, is a compact, low capacity machine used for pushing or lifting material and for digging. It is typically used for earth moving during construction and landscaping in limited spaces but is also used to move loose materials in farming and industry.

Skidder – A type of vehicle used in forestry for pulling cut down trees (timber) out of a forest (logging).

Exhibit 2 – Permits, Operator Evaluation, Inspection Checklists and State Summary

Equipment Operator Permit

Hazard Review and Evaluation for Heavy Equipment Operators

Heavy Equipment Inspection Checklist

State by State Summary of Equipment Operations Regulations

1. POLICY

An Incident is defined as "a sudden and unplanned event or chain of events, which has, or could have caused, injury or illness and/or damage to assets".

It is ARCADIS US' policy that:

- All incidents are reported. This includes near losses.
- Reporting of incidents is every employee's responsibility
- Incidents involving injury are reported to WorkCare first to ensure proper medical care and management if they are non-emergency in nature
- All incidents are investigated
- Incident investigation is the supervisor's responsibility to initiate and lead
- The level of investigation is based on the severity of the outcome or the potential outcomes of the incident
- All incident investigations result in learning that is communicated to appropriate staff

2. PURPOSE AND SCOPE

2.1 Purpose

The purpose of reporting and investigating incidents is to prevent similar or more serious incidents from recurring. This is completed by determining the contributing factors to the incident and the root causes of those factors using the Root Cause Analysis standard (ARC HSMS011).

2.2 Scope

The types of incidents reported and investigated under the ARCADIS H&S program include:

- Work-related injuries and illnesses
  - fatality/permanent disability
  - lost time
  - restricted duty
  - medical treatment
  - first aid
- Near losses

- Motor vehicle accidents
- Environmental releases
- Equipment or property damage
- Regulatory violations
- Operational or system inefficiencies or losses

This standard is also followed for any of the above-listed incidents incurred by subcontractors providing services to ARCADIS. The investigation team will include subcontractor workers and a subcontractor supervisor. ARCADIS personnel may also participate on the investigation team to provide knowledge of the project site and to facilitate the proper use of the process.

Additional client-specific and contract requirements may also be required and implemented.

3. DEFINITIONS

See Exhibit A of ARC HSMS000 – ARCADIS US HS Management System.

4. RESPONSIBILITIES

	All Personnel (Field and office employees)	Supervisor	H&S Professional	PM, PIC, Area Manager or Department Manager	Senior Leadership
Incident Occurs	If a non-emergencywork-related injury or illness,call Work Care first for proper medical care Notify supervisor and stop operation until it is determined safe to resume operations. Co-workers are considered authorized to accompany the employee to the medical care facilty as appropriate.	Complete initial verbal reporting of incident to H&S professional; evaluate risk of incident reoccurrence. If Motor Vehicle Accident or damage, notify Corporate H&S and Corporate Insurance coordinator	Ensure that the ARCADIS Workers Compensation manager has been notified of any injury-related incident Complete reporting and notification process	Receive initial notification based on severity of the incident	Receive initial notification as appropriate

	All Personnel (Field and office employees)	Supervisor	H&S Professional	PM, PIC, Area Manager or Department Manager	Senior Leadership
Investigation	Participate as team member in investigation; help to identify root causes and develop solutions.	Initiate investigation process; select personnel for investigation team; participate/lead investigation team.	Participate as necessary.	Participate as appropriate.	Participate as appropriate.
Investigation Report	Participate in completing investigation report form.	Participate in completing investigation report form; assign reviewers.	Review investigation reports and provide feedback as necessary.	Review investigation reports and provide feedback as necessary.	Review investigation reports and provide feedback as necessary. Steward process for quality, timeliness, participation, and provide feedback.
Communication **Safety Alert and Info Sharing Report**	Participate in the development of a Safety Share or other communications as able and as appropriate. Review incident related communications, Safety Shares.	Participate in the development of Safety Shares written by reporting employees. For others, communicate incident related information to personnel, including Safety Alerts and Info Sharing Reports, as appropriate.	Communicate information internally as necessary. Review Safety Shares as appropriate	Communicate information internally as necessary.	Steward Safety Shares
Solution Implementation, Verification & Validation of Effectiveness	Implement as directed. Notify supervisor of effectiveness.	Manage implementation; field verify and validate solutions.	Field verify and validate solutions and provide feedback as appropriate	Field verify and validate solutions and provide feedback	Field verify and validate solutions and provide feedback.

5. PROCEDURE

- The procedures discussed in this section are broken down into several steps as to the completion of the reporting and investigation of incidents including:
- Near losses
- Investigation Team
- Stop Work

- Reporting and Notification
- Case Management and WorkCare Intervention
- Timing of investigation
- Initiating the investigation
- Documentation
- Fact gathering
- Incident descriptions
- Conclusions
- Root Causes
- Solutions
- Review
- Validation and Verification

5.1 Near Losses

Near losses are incidents and are, therefore, an integral part of the incident investigation process. Health and safety research indicates that for every major incident there are hundreds of near losses that could potentially result in a major injury or other type of loss can be avoided. In other words, by managing near losses, incidents involving a loss can be prevented.

Therefore, employees are required to report all near losses without fear of reprimand or peer pressure, and no individual should feel threatened about honest reporting of a near-loss. A near loss is simply an injury, illness or other loss that was avoided because of more favorable circumstances, or "luck." By managing near losses, we have an opportunity to be proactive in the identification and resolution of hazards before an injury, illness or other loss occurs.

5.2 Reporting and Notification

The employee is responsible for reporting any incident including reporting to the Supervisor/PM and/or the client as outlined in the project H&S Plan. Reporting and notification times vary depending on the incident, but all should be done as soon as possible and no later than as outlined in the Incident Reporting and Investigation Process flowchart in Exhibit A. This reporting will be completed via telephone to the appropriate person or via the Near Loss Hotline.

As necessary, an ARCADIS employee that is present on the site where the injury occurred is authorized to and will accompany the employee to the treating facility.

5.3 Case Management and WorkCare Intervention

Every non-emergency, work-related injury or illness is required to be called into WorkCare via their reporting hotline number to ensure proper medical management of the injury. WorkCare will manage the case along with the ARCADIS Workers Compensation manager to ensure the appropriate and effective care is provided to the employee and so that the interests of the company are also represented. A flowchart of the WorkCare internvention process is shown in Exhibit B

5.4 Investigation Team

Team composition varies depending on the type, location, and severity of the incident. Personal knowledge and experience are key to the success of the investigation. Furthermore, the people who perform the tasks that led to an incident have the knowledge to identify the real root cause(s) and develop the solution(s) that will likely keep the incident from recurring.

The recommended members of the investigation team are listed in the Investigation Flowchart in Exhibit A. Management may designate personnel in addition to the members listed, as appropriate (e.g., legal department, technical specialist).

5.5 Incident Investigation Process

Immediately following an incident, **STOP** operations until it is determined that it is safe to resume! This assessment may be as simple as performing TRACK or as complex as a team assessment of practices and conditions.

5.6 Initiating the Investigation

Information or conditions that may change with time must be captured immediately. This may include taking pictures of damage before it is repaired and of the site before conditions change, and getting names of witnesses before they leave the area. The longer the delay in examining the incident scene and interviewing witnesses the greater the possibility of obtaining erroneous or incomplete information.

The severity or potential severity of the incident will determine when the formal investigation should be initiated. If a person sustains a major injury, or if the incident had the potential for serious or fatal injury, the operation must be stopped and the investigation initiated immediately. Other incidents, including near losses should be initiated as soon as possible.

5.7 Fact Gathering

It is essential that proper information and data gathering take place at all times during the investigation. The accuracy and thoroughness with which the investigators obtain and record information and data largely determines the quality of the final report and the effectiveness of corrective actions.

For minor incidents, the information may be gathered by the supervisor or other personnel immediately following the incident. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the incident, determine the root cause, and develop solutions. More complex situations may require the

investigation team to revisit the incident site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and any damaged equipment or property should be taken from all sides and from various distances. Sketches or drawings could also be pertinent to the investigation. This is especially important when the investigation team is not able to visit the incident scene.

5.8 Starting an Investigation

The supervisor, as it relates the activity being conducted at the time of the incident, is responsible for initiating the investigation process. The incident investigation is initiated once the area is secure, injured people have received appropriate medical attention, and appropriate notifications have been made.

5.9 Investigation Reporting Form

All incident investigations are maintained in the LPS database. Information is documented on the ARCADIS Incident/ Investigation Form and then entered into the database or entered directly in the LPS database. The purpose of the form is fourfold:

- State clearly what happened;
- Conclude why the incident occurred by identifying causal and contributing factors;
- Determine root cause(s); and
- Develop and implement solution(s) to prevent similar events from occurring in the future.

5.10 Description of Incident

It is critical to accurately describe what happened. Do not speculate on causes, state "just the facts." The description should be clear and concise. For example:

> "Mechanics opened the flange on transfer line Number 2 from Tank 101 and 50 gallons of diesel fuel was released No injuries occurred. Spill was contained in the area drainage system".

5.11 Conclusion: Determining the Causal and Contributing Factor(s)

The contributing factors section describes WHY the loss or near loss occurred. Avoid repeating what happened and focus instead on causal and contributing factors. It is important to investigate beyond mere symptoms to identify fundamental causes and contributing factors that led to the event. Only then can accurate root causes be identified.

5.12 Determining the Root Cause(s) of the Causal and Contributing Factor(s)

The Root Cause Analysis Flow Chart presented in ARC HSMS011will be used by the investigation team to identify the root cause(s) for all investigations. This chart leads investigators through a range of possibilities for factors that cause or contribute to incidents. This keeps investigators focused on potential root causes, steering them away from

symptoms.

Any incident may have one or more root cause. Those that relate to the person involved in the incident, his/her peers, the supervisor, or manager are referred to as "personal factors." Causes that pertain to the system or environment within which the incident occurred are referred to as "job factors."

5.13 Development of Solution(s)

Each root cause must be addressed by a solution, with a responsible person identified and notified for solution implementation. The investigation team cannot identify a root cause and then make no recommendation to address it. Furthermore, there must be a "match" between the root cause and the solution.

There are a few guidelines that should generally be adhered to when deciding what solution to recommend... The solutions are:

Practical: The most effective solutions to most incidents address basic worker activities, require that standards for job procedures are developed and maintained, and confirm that the right tools are provided for and used by workers.

Specific and Verifiable: The solution should be specific to something that can be verified as having been implemented and effective not only by those involved, but by other personnel not involved in the incident. For example, "Always work safely" is neither specific nor verifiable.

Controllable: The most effective solutions are those that focus on personal or job factors that the worker or supervisor can control.

Cost Effective: A $1M solution is not needed for a $100 hazard. Again, the majority of effective solutions are relatively inexpensive and are implemented with resources within one's own organization.

Sustainable: This solution is not merely for the week or month; it must be sustainable. If solutions are made that are even remotely unsustainable, the solutions must be re-evaluated. Otherwise, the road is being paved for "loss of credibility."

5.14 Review Process

The roles and responsibilities of the investigation and review processes are outlined in the Incident Reporting and Investigation Process flowchart presented in Exhibit A. Review and follow-up on incident investigations is important to verify the effectiveness of the process.

Quality reviews of incident investigations begin with the immediate project or department manager and continue up through the executive management levels. At each level, there is an opportunity to provide positive feedback or constructive advice for the continued improvement of LPS tool effectiveness.

5.15 Validation and Verification

Management provides follow-up on incident investigations by verifying that the solutions have been implemented and validating that the solutions have adequately addressed the root

cause(s) of the incident. Again, each of these steps provides opportunities for positive management feedback to those involved in the investigation.REFERENCES (regulation citation, technical links, publications, etc.)

6. TRAINING

All employees receive Incident Reporting and Investigation training during LPS training

7. REFERENCES

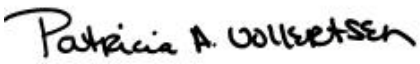
ARC HSMS011 – Root Cause Analysis and Solution Development

8. RECORDS

All incidents are recorded and stored in the LPS database and maintained per ARCADIS recordkeeping requirements.

9. APPROVALS AND HISTORY OF CHANGE

Approved by:



Patricia A. Vollertsen, Director, H&S Administration

History of Change

Revision Date	Revision Number	Reason for change
22 October 2007	01	Original document
9 June 2009	02	Revision and update to incude WorkCare intervention which has been implemented since 2006 but documented in separate document. Also update new LPS terminology
26 June 2009	03	Revision to include language that, when necessary, an injured employee will be accompanied to medical care by authorized employee

Revision Date	Revision Number	Reason for change
6 Ocotober 2010	04	Change name from Procedure to Standard; revision to section 5.2 & App A to clarify client must be notified when required by the HASP

Exhibit A
Incident Reporting and Investigation Process Flow

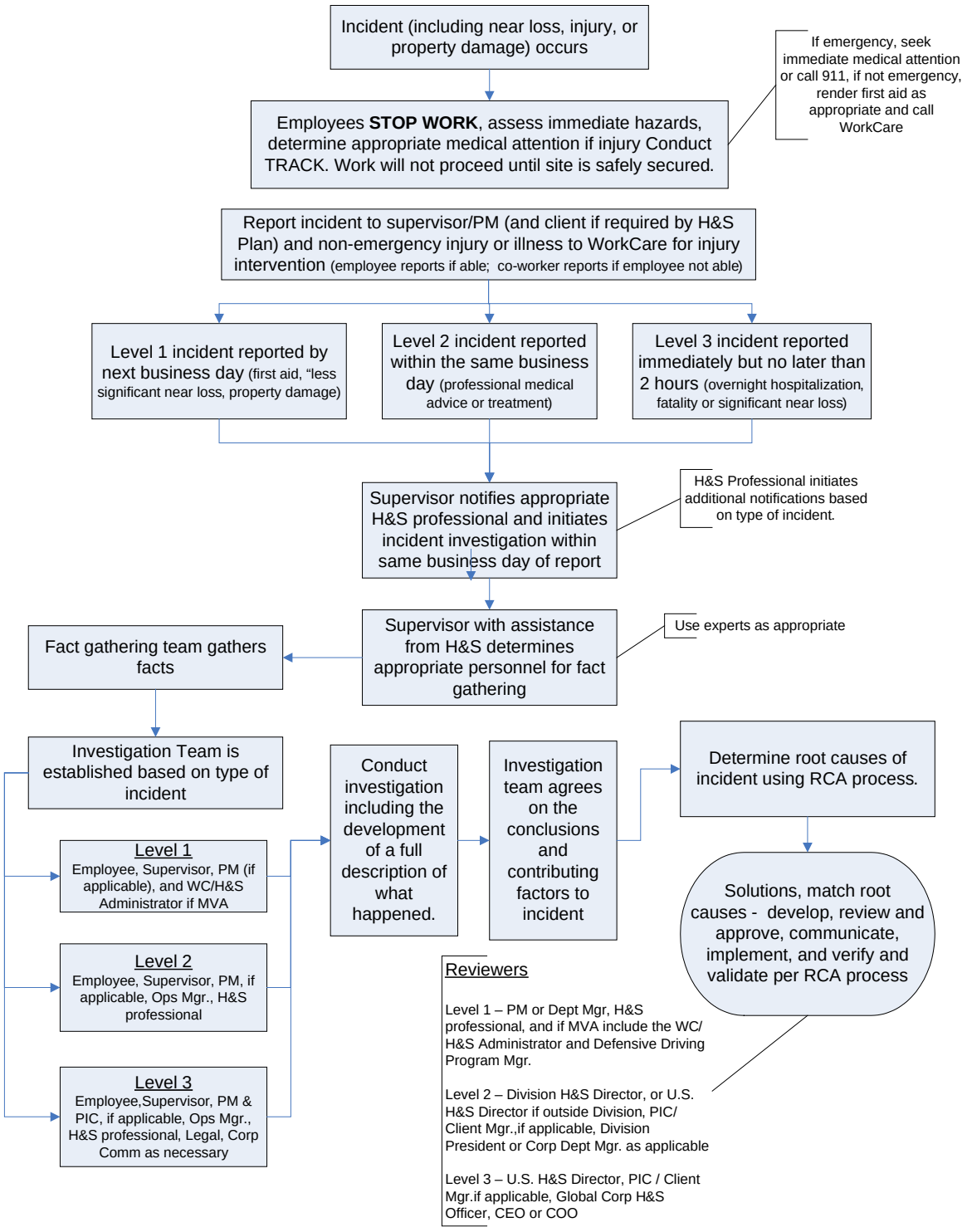
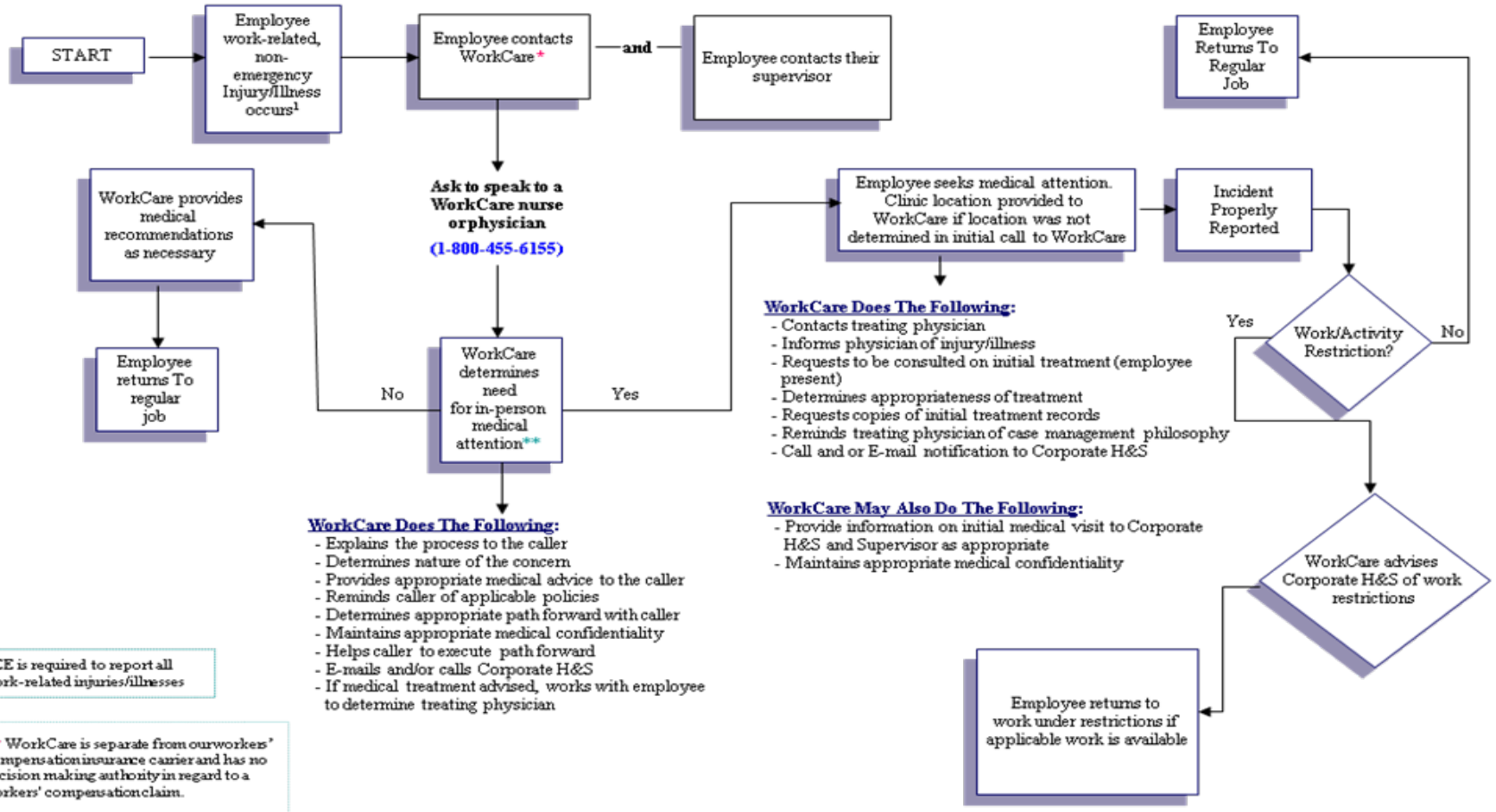


Exhibit B

ARCADIS WorkCare Incident Intervention®

For work-related injuries or illnesses that are not life threatening or emergencies



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EXECUTIVE SUMMARY

Through the use of personal protective equipment (PPE), ARCADIS employees are protected from occupational hazards in the event that engineering and administrative controls are not sufficient or practical. PPE will be provided to ARCADIS full time and permanent part time employees that regularly conduct field work or visit project sites outside of office environments at no cost following training on the proper use and maintenance of PPE.

Project managers are responsible for assessing potential hazards on a worksite and determining the applicable PPE.

Project personnel are responsible for understanding and utilizing “Stop Work Authority” should a hazard present itself that was not previously identified or in doses higher than anticipated.

PPE selection will be based on an evaluation of the performance characteristics of the PPE relative to the following:

- The requirements and limitations of the tasks or work environment
- The task-specific conditions and duration
- The hazards and potential hazards identified at the site

PPE may be categorized into levels A, B, C or D.

- Level A offers the highest skin and respiratory protection
- Level B offers a high degree of respiratory protection with lesser levels of skin protection
- Level C is used when the concentration and type of airborne substance is known, and the criteria for using an air purifying respirator are met
- Level D offers the least skin and respiratory protection

PPE training will include, at minimum:

- When and what PPE is necessary
- How to put on, adjust, wear and take off the PPE
- Limitations of the PPE
- Proper care, maintenance, useful life, and proper disposal of PPE

1. POLICY

It is the policy of ARCADIS to assess the workplace to identify and assess hazards in order to appropriately implement controls for those hazards. In addition, it is ARCADIS policy to supply personal protective equipment (PPE) for employees in a working environment where engineering and administrative controls are not feasible or effective in the control of hazards. ARCADIS will train and supply this PPE at no cost to the employee.

2. PURPOSE AND SCOPE

2.1 Purpose

The purpose of PPE is to shield or isolate individuals from the chemical, physical and biologic hazards that may be encountered in their work environment. A hazard analysis or assessment will be performed before a job task is begun to evaluate if PPE is necessary to protect an employee from identified hazards and determine the type of PPE required. This analysis will include the identification of hazards/suspected hazards and their routes of exposure.

Combinations of protection may be needed to provide the appropriate level of protection for any given work environment. The level of PPE may change during a job, so periodic evaluation will be done to ensure that the most appropriate PPE is being used. Over-protection, as well as under-protection, can be hazardous and should be avoided where possible.

Subcontractors and other non-ARCADIS employees must supply their own PPE. ARCADIS will not supply PPE to any non-ARCADIS employees unless specific arrangements and agreements are made with the other party.

This Health and Safety Standard (HSS) provides guidance on the proper selection, use, care and maintenance of PPE.

2.2 Scope

Whenever possible, engineering, substitution and administrative controls will be used to reduce or eliminate hazards, but when they are not feasible, practical or adequate, PPE will be used to protect employees from exposure to hazards during ARCADIS-related work tasks.

3. DEFINITIONS

Definitions related to personal protective equipment can be found in Exhibit 1.

4. RESPONSIBILITIES

4.1 ARCADIS Management

Responsible for providing resources for the acquisition of PPE and for the conduct of hazard assessments.

4.2 Project Managers

Project Managers are responsible, as part of the project hazard assessment, for determining PPE necessary to complete the project. In addition, the Project Manager is responsible for determining client requirements with respect to PPE. Project Managers notify health and safety staff of biological, chemical and physical hazards present or potentially present on the site. Project Managers are also responsible for ensuring that project staff has the appropriate and applicable training for PPE use prior to those staff beginning work.

4.3 Corporate Health and Safety

Corporate Health and Safety is responsible for keeping this standard up-to-date with current regulatory requirements and best practices and for assisting in determining the appropriate PPE for a particular task and work environment and for assisting in the identification of appropriate vendors of such PPE.

4.4 Health and Safety Staff

Project Health and Safety Staff including designated Writers and Reviewers of Project Health and Safety Plans (HASPs) are responsible for developing control processes and techniques on specific projects based on the physical, chemical and biological hazards expected to be encountered on project facilities.

4.5 ARCADIS Staff

ARCADIS staff is responsible for completing PPE training as required by this policy and standard, and for following all hazard control processes designated by the Project Manager, Project Health and Safety Staff and the project HASP. If project personnel believe that a hazard is present that was not previously identified or is at levels that are higher than expected, they should stop work and notify project health and safety staff or the project manager immediately and not proceed until authorized.

5. PROCEDURE

5.1 Minimum PPE Requirements

All full time and permanent part time employees that regularly conduct field work or visit project sites outside of office environments will be issued a field bag that contains, at a minimum, the following PPE:

- An ARCADIS logo'd hardhat

- Two pair of safety glasses, one clear pair and one tinted pair, or one pair of prescription safety glasses with transitional lenses
- Hearing protection
- A minimum, Type 2 reflective vest in either orange, lime green or yellow
- Steel toe safety boots

Temporary full time/part time employees (temp staff) will be provided all of the above PPE; however, standard steel toed safety boots will only be provided to temp staff employees with the approval of the adminstistrative supervisor and Project Manager. If the administrative supervisor or Project Manager elects to not provide standard steel toe boots or other non-specialty required footwear to temp staff, the employee will be informed of the requirement to provide their own footwear meeting project health and safety requirements prior to hire.

Office locations will stock extra bags with the equipment listed above for use by other staff that do not regularly go to field locations. Additional PPE and H&S equipment will be issued to staff based on the hazards they face on specific projects (i.e. respirators, goggles, chaps, etc.).

No ARCADIS staff should arrive at a field or project site without this minimum PPE.

5.2 The PPE Program

The basic objectives of a PPE program are to protect the wearer from safety and health hazards; and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. This document serves as the overall ARCADIS PPE program and is used as guidance for the development of a project-specific PPE program which becomes part of a project-specific health and safety plan. A project-specific PPE program in combination with this HSS will address the following:

- PPE selection based upon site hazards (Hazard Identification/Assessment).
  - Identify the hazards/suspected hazards and their potential routes of exposure (e.g., skin, inhalation, ingestion or eye contact).
- The use and limitations of the equipment including limitations during temperature extremes and under certain medical conditions;
- The work mission duration;
- Maintenance, storage, decontamination and disposal of PPE;
- Training including proper fit and how to properly put on and take off PPE;
- PPE inspection procedures prior to, during, and after use; and

- Periodic evaluation of the effectiveness of the PPE program.

5.3 PPE Selection

The use of PPE can itself create significant worker hazards, such as heat stress, physical and psychological stress and impaired vision, mobility and communication. Over-protection, as well as under-protection, can be hazardous and should be avoided where possible. Site or project-specific health and safety plans take into consideration engineering, substitution, and administrative controls first as a means to eliminate/reduce the need for PPE. When it is not feasible or practical to eliminate the use of PPE, PPE selection will be based on an evaluation of the performance characteristics of the PPE relative to the following:

- The requirements and limitations of the tasks or work environment;
- The task-specific conditions and duration; and
- The hazards and potential hazards identified at the site.

The level of protection will be increased whenever it is shown that increased protection is necessary to reduce employee exposures to the hazards. It may be decreased when it is shown that this will not result in hazardous exposure to employees.

5.4 Levels of PPE Protection

For work on hazardous sites, a combination of PPE may be categorized into levels A, B, C, or D with level A offering the highest level of protection and D the lowest. Monitoring the effectiveness of PPE will be done throughout a project to ensure that the appropriate level of protection is being worn. These levels of protection are described below.

5.4.1 Level A Protection

Level A PPE offers the highest level of respiratory and skin protection and should be worn when:

- The hazardous substance has been identified and requires the highest level of protection of the skin, eyes, and respiratory system based on either:
  - The measured (or potential) high concentrations of atmospheric gases, vapors, or particulates; or
  - If site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates which are harmful to skin eyes, or the respiratory system.
- There is a known or suspected high degree of hazard to the skin and skin contact is possible.

- Conducting work in a confined, poorly ventilated area and the other criteria requiring Level A PPE have not been determined.

Level A equipment includes:

- NIOSH approved positive pressure, full-face piece self contained breathing apparatus (SCBA), or positive pressure supplied airline respirator with escape SCBA;
- Totally encapsulating chemical-protective suit (material based on the hazard);
- Chemical resistant outer **and** inner gloves (type and material based on the hazard);
- Chemical resistant boots with steel toe and shank;
- Disposable protective suit, gloves and boots (depending on suit construction, may be worn over the totally encapsulating suit);
- Coveralls (optional, as applicable);
- Long underwear (optional, as applicable); and
- Hard-hat - under suit (optional, as applicable).

5.4.2 Level B Protection

Level B PPE offers a high degree of respiratory protection with lesser levels of skin protection. Level B PPE should be worn when:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection but less skin protection;
- The atmosphere contains less than 19.5 percent oxygen; or
- The presence of incompletely identified vapors or gases is indicated by direct reading organic vapor detection instruments, but the vapors and gases are not suspected of containing high levels of chemical harmful to the skin or capable of being absorbed through the skin. Level B is the minimum level of protection that should be worn when there is insufficient information to determine the hazards or potential hazards of the substance.

Level B PPE equipment includes:

- NIOSH approved positive pressure, full face piece self contained breathing apparatus 1(SCBA), or positive pressure supplied air respirator with escape SCBA;

- Hooded chemical resistant clothing (overalls and long sleeve jacket; coveralls; one or two piece chemical splash suit; disposable chemical resistant overalls) (materials based on the hazards);
- Chemical resistant outer **and** inner gloves (material based on the hazards);
- Chemical resistant boots with steel toe and shank;
- Coveralls (optional, as applicable);
- Outer chemical resistant boot covers (optional, as applicable);
- Hard hat (optional, as applicable); and
- Face shield (optional as applicable).

5.4.3 Level C Protection

Level C PPE is used when the concentration and type of airborne substance is known, and the criteria for using an air purifying respirator are met. It should be worn when:

- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
- The types of air contaminants have been identified, concentrations measured, and an air purifying respirator is available that can remove the contaminants; and
- All criteria for the use of an air purifying respirator are met.

Level C PPE equipment includes:

· NIOSH approved full face or half mask air purifying respirator (with appropriate cartridges based on the hazards);

- Hooded chemical resistant clothing (overalls and long sleeve jacket; coveralls; one or two piece chemical splash suit; disposable chemical resistant overalls) (materials based on the hazards);
- Chemical resistant outer **and** inner gloves (materials based on the hazards);
- Chemical resistant boots with steel toe and shank;
- Coveralls (optional, as applicable);
- Outer chemical resistant boot covers (optional, as applicable);

- Hard hat (optional, as applicable);
- Escape mask (optional, as applicable); and
- Face shield (optional, as applicable).

5.4.4 Level D Protection

Level D PPE offers the least skin and respiratory protection and should be worn when the atmosphere contains no known hazards, and work functions preclude splashes, immersions or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Level D PPE equipment may include any or all of the following depending on the hazards of the site:

- Chemical resistant boots with steel toe and shank (optional, as applicable);
- Coveralls (optional, as applicable);
- Gloves (optional, as applicable);
- Outer chemical resistant boots (disposable) (optional, as applicable);
- Safety glasses or chemical splash goggles (optional, as applicable);
- Hard hat (optional, as applicable);
- Escape mask (optional as applicable); and
- Face shield (optional as applicable).

5.5 Combinations of Protection

Combinations of protection are acceptable if the task hazard analysis and the site conditions warrant modification of PPE levels.

5.6 Equipment List

5.6.1 Eye/Face Protection

All employees engaged in or working in or adjacent to areas with eye-hazardous activities or operations, such as but not limited to flying objects and hazardous chemicals shall wear appropriate eye protection.

- Safety glasses with side shields are required for impact protection and shall meet ANSI Standard Z87.1 requirements.

- Chemical goggles (for protection against chemical splash).
- Face shields (for face protection from chemical splash and are not a substitute for primary eye protection).
- Full-face respirators can provide eye and face protection in lieu of safety glasses, goggles or face shields.
- Shaded eye protection meeting the minimum shade requirements established in 29 CFR 1910.133 (for employees exposed to sources of injurious light radiation [e.g., welding, cutting, lasers]).
- For prescription eye protection contact your supervisor to fill out an AOSafety order form available on APEX. For temp staff, standard prescription safety glasses will be provided with the approval of the administrative supervisor and Project Manager. If the administrative supervisor or Project Manager elects to not provide standard prescription safety glasses to temp staff, the employee will be informed of the requirement to provide their own prescription safety meeting project health and safety requirements prior to hire.

5.6.2 Respiratory Protection

Respirators will be provided and used in accordance with the ARCADIS Respiratory Protection Policy/Standard ARC HSGE017 and 29CFR 1910.134.

5.6.3 Hearing Protection

Hearing protection will be provided and used in accordance with the ARCADIS Hearing Conservation Policy/Standard ARC HSIH008 and 29CFR 1910.95.

5.6.4 Foot Protection

- Basic foot protection is required for all ARCADIS job sites and industrial locations. Specialized footwear will be provided as required by the nature of the work. Special foot protection may include, but is not limited to, chemically resistant, thermally shielded, metatarsal guards, etc.
- Leather Safety Boots will be provided for employees; one pair of leather safety boots will be provided as necessary by ARCADIS. The employee purchasing the footwear is required to ensure that it meets any of the consensus standards as specified by OSHA 29 CFR 1910.136 which include:
  - ASTM F-2412-2005, "Standard Test Methods for Foot Protection," and ASTM F-2413-2005, "Standard Specification for Performance Requirements for Protective Footwear"
  - ANSI Z41-1999, "American National Standard for Personal Protection -- Protective Footwear"

- ANSI Z41-1991, "American National Standard for Personal Protection -- Protective Footwear"
- All consensus standards are incorporated by reference in OSHA 29CFR 1910.6

· In general, for most work done by ARCADIS, safety boots must be equipped with steel toes. Puncture resistant soles or in-soles equipped in the safety boots are project driven based on the Hazard Assessment. Some clients may require puncture resistant soles or in-soles.

· The maximum expenditure or reimbursement for approved safety shoe purchases will be $150. Reimbursement requests must be approved by the employee's supervisor.

· Athletic-style safety shoes ("safety sneakers") are prohibited (due to the difficulties created by these styles in supervising proper use of protective footwear).

5.6.5 Head Protection

Hard hats meeting ANSI Z89.1 will be provided to protect employees from impact, penetration, falling objects and/or limited electrical shock and burn, as appropriate for work site hazards. A hard hat must be replaced when it becomes damaged, contaminated (and contamination cannot be removed) or it has been struck by an object of sufficient size to potentially compromise its integrity.

Hardhats must resist penetration by objects, be water resistant and slow burning, and have a chin strap if it is worn while working at elevation. It must be worn square on the head and not be pushed back, to the side or forward.

There are two types and three classes of head protection described in ANSI standard.

Other hazard situations to consider are:

· In areas of heavy vegetation or in any area where hunters may be present, it is recommended that some type of brightly colored head protection be worn. For example, a bright orange or yellow baseball cap or stocking cap.

· If cold exposure is an issue, hardhat liners are available (made specifically for the particular hardhat) or if a hardhat is not required, some type of insulated head protection such as a stocking cap should be worn.

5.6.6 Hand Protection

Appropriate hand protection will be provided if employee's hands are exposed to hazards while on the job.

Such as:

· pinch points

- sharp/pointed tools or objects
- incorrect or inadequate tool use
- improper use
- rotating/energized/automated parts
- abrasive materials
- inadequate job planning
- lack of/inadequate protection
- changing weather conditions and extreme temperatures
- hazardous material
- jewelry and loose clothing.

Once these hazards are identified, the appropriate glove or hand protection must be selected. When choosing gloves, keep in mind:

- Hazardous Chemicals/Substances to be Contacted
- Nature of Contact (total immersion, splash, etc.)
- Duration of Contact
- Area of Protection (hand only, forearm, arm)
- Equipment (rotating, sharp edges, etc.)
- Grip (dry, wet, oily)
- Thermal Protection
- Abrasion/Cut/Puncture Resistance
- Tear/Tensile Strength
- Ergonomics (size, heat stress, dexterity)
- Decontamination/Disposal

In selecting chemically protective gloves, the toxic properties of the chemical(s) will be determined. Information provided on the manufacturer's label or by chemical compatibility charts regarding breakthrough time, permeation rate and degradation should be considered during selection.

5.6.7 Body Protection

Protective clothing, gloves, boots, and other protective equipment will be provided as appropriate for the hazards associated with the tasks being performed.

Long pants are required for all field work unless approval is granted by corporate H&S. Additional protection such as cooling vests may be required. In environments with potential biological hazards such as ticks, plants or snakes, gloves and long sleeves should be worn along with head protection of some kind to protect the scalp. In areas of roadway work or other vehicle traffic high visibility Class II safety vests will be worn.

Chemically Protective Clothing (CPC) will be selected by evaluating the performance characteristics of the CPC against the requirements and limitations of the site and task-specific conditions. This selection should be performed by an employee with training and experience taking into consideration:

- Permeation, degradation, penetration of the CPC by the chemical and;
- Durability, flexibility, fit, temperature effects, ease of decontamination, compatibility with other necessary equipment (e.g., hardhats, SCBA, etc.); and duration of use that could affect the employees ability perform the task.

Where required, appropriate Fire Resistant (FR) protective clothing must be used where there is a potential for electrical arc flash hazards (refer to the ARCADIS Electrical Safety Standard HSFS006 for additional information). Jobs that expose workers to fire dangers require the use of FR protective clothing.

5.6.8 Specialized Equipment

All other specialized safety equipment required for an assignment (e.g., work gloves, specialized protective clothing, hip boots, field rain gear, personal floatation devices) will be provided by ARCADIS as specified in the HASP.

5.6.9 Extreme Cold Environments

Supervisors are responsible for ensuring that staff is properly equipped to protect themselves while working in extreme cold environments. The following is suggested as appropriate PPE for cold conditions:

- Hats/hat liners and gloves
- Thermal clothing
- Hi-Visibility clothing
- Winter footwear

Use of specialized equipment will be charged to projects in accordance with established policy and rental rates.

5.7 Maintenance/Storage/Disposal

5.7.1 PPE Maintenance and Disposal

PPE must be inspected by the user before and after each use for defects, rips, tears and/or damaged parts. Damaged or compromised PPE will not be used and must be repaired before re-use or disposed. PPE must be disposed of according to the HASP and other project plans for the site. If non-disposable, PPE must be decontaminated and sanitized before being reused according to the HASP Contaminated PPE which cannot be properly decontaminated by normal procedures must be disposed of accordingly.

5.7.2 PPE Storage

All PPE must be stored to protect against dust, sunlight, extreme heat and cold, excessive moisture and damaging chemicals. Storage must be in accordance with the manufacturer's specifications and OSHA requirements.

5.7.3 Contaminated Boots

Single-use boots or boot covers which become contaminated on the job will be waste profiled, as necessary, and properly disposed. Work boots will be properly decontaminated upon exiting contaminated work zones (exclusion zones). Work boots that are damaged on the job must be replaced.

6. TRAINING

Training in the proper use of PPE will generally be provided in conjunction with HAZWOPER training or via coursework selected and approved by Corporate H&S. Training will be completed prior to the employee's use of PPE, when changes in the work place alter the use or type of PPE, and when inadequacies in the employee's knowledge or use of PPE are noted.

The training will include at a minimum:

- When and what PPE is necessary;
- How to put on, adjust, wear and take off the PPE;
- Limitations of the PPE; and
- Proper care, maintenance, useful life, and proper disposal of PPE.

7. REFERENCES (regulation citation, technical links, publications, etc.)

29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response"

29 CFR 1910 Subpart I "Personal Protective Equipment"

29 CFR 1910.136 Foot Protection

29 CFR 1910.6 Incorporation by reference

8. RECORDS - DATA RECORDING AND MANAGEMENT

Records of the PPE training are retained by the employee and in the ARCADIS training database. Medical clearance for respirator use is maintained by the employee and ARCADIS' medical vendor.

9. APPROVALS AND HISTORY OF CHANGE

Approved by: Tony Tremblay, Corporate Health and Safety

History of Change

Revision Date	Revision Number	Reason for change
20 February 2009	01	Original document
19 August 2011	02	Updated footwear protection consensus standards, clarified contaminated work boot section and updated document format
2 February 2012	03	Clarified temp staff PPE issues in sections 5.1 and 5.6.1

Exhibit 1 – Definitions

Eye/Face Protection - Equipment designed to provide eye or face protection when exposed to hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

Foot Protection - Footwear designed to provide foot and toe protection when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and/or where an employee's feet are exposed to electrical hazards. These include such measures as steel toe and boot warmers.

Hand and Body Protection - Equipment designed to provide protection to the hands and body during exposures to potential hazards such as potential for skin absorption of harmful substances, sharp objects, abrasive surfaces, punctures, temperature extremes and chemical contact.

Hazard Assessment - The process utilized to identify hazards in the workplace and to select the appropriate PPE to guard people against potential hazards.

Head Protection - Equipment designed to provide protection to the head during exposure to potential hazards such as falling objects, striking against objects or electrical hazards.

Hearing Protection - Equipment designed to provide protection to an individual's hearing during exposure to excessive noise levels and any 8hr work day with noise levels consistently 85dB or above.

Personal Protective Equipment (PPE) - Equipment designed to provide protection to the wearer from potential hazards to the eyes, face, hands, head, feet, ears, extremities and respiratory system.

Respiratory Protection - Equipment designed to provide protection to the wearer from potential inhalation hazards such as vapors, mists, particulates and gases.

EXECUTIVE SUMMARY

To ensure safe work performance on all rail projects and projects for non-rail clients involving rail hazards, the following is required:

- This standard applies to all projects, whether under contract to the railroad or not, that involves railroad related hazards.
- ARCADIS expects 100% compliance with all applicable railroad regulations and H&S standards.
- Project Managers and Task Managers must know and communicate to junior staff client specific railroad H&S requirements for the projects they will be working on.
- Employees working in the field must use TRACK and Stop Work Authority to ensure safe work performance.
- Only properly trained and security cleared staff are permitted to be within 25 ft of the rails.
- All tools and equipment used will meet client expectations.
- Except as permitted by this standard or affiliated guidance document, cell phone use within 25 of the rails is prohibited.
- A ready method of communication with the railroad Point of Contact (POC) will be maintained when working within 25 ft of the rails.
- All required PPE will be worn at all times while on railroad property.
- All required badges will be worn at all times while on railroad property.
- Employees must track their hours worked and report to the ARCADIS site management or Task Manager if hours worked exceeds 120 hours in the current day plus previous 9 days as prescribed in the fatigue management program (section 5.10 of this standard).

1. POLICY

This ARCADIS standard applies to all railroad work and is adapted as follows for all railroad-related work for which ARCADIS is responsible. ARCADIS:

ARCADIS expects 100% compliance with railroad rules and regulations.

- Has a systematic approach to the management of health and safety (H&S) risks while working on railroad-related projects.
- Complies with the applicable legal and client requirements including FRA and our individual clients who may have more restrictive requirements than the FRA and this standard.
- Identifies and meets client-specific H&S expectations without compromising our values.
- Defines and assigns responsibility for H&S to railroad project management and field supervision.
- Assures the necessary competence of and assign H&S responsibilities to all staff and subcontractors who work on railroad projects.
- Appraises staff for positive H&S behavior on railroad projects and other activities.
- Requires our subcontractors to be in alignment with this H&S policy.
- Tracks and reports our H&S performance as requested by our railroad clients.

2. PURPOSE AND SCOPE

2.1 Purpose

2.1.1 ARCADIS, along with its Railroad clients, is committed to providing a safe work environment for our employees, subcontractors, clients and visitors.

2.1.2 The purpose of this standard is to provide a standard consistent policy on the H&S requirements and processes when working on railroad sites to prevent accidents, injuries and equipment damage.

2.1.3 This standard provides minimum standards applicable for all railroad-related work performed by ARCADIS. It will be the ARCADIS employee responsible for a particular railroad client to determine if additional H&S requirements apply to individual projects.

2.1.4 U.S. Federal Railroad Administration (FRA) requirements for Roadway Workers set forth in Title 49 Code of Federal Regulations Part 214 are met in this standard.

2.2 Scope

2.2.1 This standard applies to every project and all operations conducted by ARCADIS and its subcontractors on railroad-related work where active railroad tracks are present or wherever it is determined by ARCADIS or the client that Roadway Worker Safety requirements are applicable.

This Standard applies to all projects in all Divisions with rail hazards.

2.2.2 Where projects are conducted in other countries outside the jurisdiction of the U.S. Federal Railroad Administration, the most stringent of ARCADIS, FRA or local laws, regulations or requirements will prevail.

2.2.3 This standard also applies to all non-railroad client operations where railroad tracks, equipment or similar equipment are encountered. The specific applicability is determined on a project by project basis and will be coordinated with the host railroad having authority over the tracks where work will be performed.

3. DEFINITIONS

Definitions used in this standard are presented in DOT Facts-201j.

4. RESPONSIBILITIES

4.1 Project Managers and Task Managers – Are responsible for following all applicable ARCADIS H&S requirements and implementing the requirements of this standard on any project that poses railroad-related hazards to ARCADIS employees or employees of its subcontractors, clients, and other organizations present in the vicinity of work controlled by ARCADIS. In addition, they are responsible for determining and communicating any specific client requirements that are applicable to the project. The Project Managers and Task Managers are responsible for communicating with and appropriately managing subcontractors, ensuring that employees have appropriate training and qualifications, and for ensuring all client railroad H&S requirements are met. Responsibilities also include involving the appropriate ARCADIS H&S Staff, railroad client staff, as necessary, and for ensuring that all subcontractors have been communicated with concerning the minimum H&S requirements for the project.

PMs and TMs must know client H&S requirements and communicate those requirements to junior staff

In addition, as project and client agents and on behalf of ARCADIS, the Project Managers and Task Managers for railroad-related work shall be responsible for:

- The understanding and compliance by employees with H&S rules and the requirements
- Guaranteeing each employee the absolute right to “Stop Work” in good faith until it is determined, to the satisfaction of all parties, whether the on-track safety procedures to be applied at the job location comply with the

rules of the operating railroad, and the right to remain clear of the track until the challenge is resolved.

- Using the ARCADIS Incident Investigation process for formally resolving a "Stop Work" condition.

- Reinforce ARCADIS' commitment to fatigue management rules during derailment work as described in this standard or associated supplement.

4.2 Corporate H&S Director and ARCADIS DOT Compliance Manager– Are responsible for communicating with all offices within ARCADIS and ensuring they are aware of this standard and for ensuring it is being implemented effectively.

4.3 Divisional H&S Managers and Specialists – Are responsible for facilitating the implementation of the requirements of this standard within their respective areas of responsibility.

4.4 Divisional and Sector Managers - Each Division Manager and Sector Manager has managerial oversight responsibilities for the H&S of employees in their respective operations. Each will assure that appropriate time is provided to facilitate the implementation of this standard.

4.5 ARCADIS Employees – ARCADIS employees working within 25 ft of rails shall adhere to this railroad standard, H&S plans, etc. set forth by ARCADIS Corporate H&S and communicate H&S concerns, issues and questions to their supervisor or their assigned H&S Manager. In addition:

Employees must stop work if unsafe conditions exist

- Each employee is responsible for following the on-track safety rules of the railroad upon which the employee is performing work.

- An employee shall not foul a track except when necessary for the performance of duty and only if the appropriate on-track safety has been established.

- Each employee is responsible to ascertain that on-track safety is being provided before fouling a track.

- Each employee has "Stop Work Authority" if any directive received from ARCADIS or the client railroad appears to violate an on-track safety rule, and shall inform ARCADIS project management and the representative railroad client whenever the employee makes a good faith determination that on-track safety provisions to be applied at the job location do not comply with the rules of the operating railroad.

- Each employee is responsible for complying with ARCADIS fatigue management rules for rail work as prescribed by this standard. Employees shall stop work and will report to site ARCADIS management or the Task Manager for the project if hours worked exceed limits specified by the ARCADIS fatigue management rules.

5. PROCEDURE

5.1 Employee Use of TRACK

TRACK and Stop Work Authority are critical to safe work performance

Each employee performing rail related field work will use TRACK and act on any hazard identified that is not adequately controlled. Due to the dynamic environment of rail work, employees will perform TRACK any time site conditions change.

Employees should not only perform TRACK on their own work activities but also extend TRACK to their coworkers (employees or subcontractors) on a routine basis, without regard to utilization of a formal observation process, to identify unsafe behaviors or conditions by coworkers that could result in injury or property damage. Field teams should communicate their TRACK findings with their coworkers and work together to ensure any findings are properly addressed and mitigated.

5.2 Stop Work Authority

Each employee has "stop work authority" if any directive received from ARCADIS or the client railroad appears to violate an on-track safety rule or if the employee feels any conditions of the workplace or task are not safe. The employee will inform ARCADIS project management and the representative railroad client, when applicable, whenever the employee makes a good faith determination that on-track safety provisions do not comply with the rules of the operating railroad or this standard. The employee is not permitted in the work area until the issue is resolved to the satisfaction of all parties.

The ARCADIS project manager works with the client representative to resolve the issue and follows internal ARCADIS requirements under the client's railroad "Challenge Procedure" until the issue is resolved.

5.3 General Procedures and Requirements

The Project Manager, or their approved designate, will coordinate with the client or operating railroad to determine work procedures and processes to be used when working on railroad property. General procedures for conduct of work within the railroad right-of-way are presented in DOT Facts-201g.

5.4 Employee Training, Security Clearance and Badge Issuance

Only properly trained staff are permitted to work within 25 ft of the rails.

Each ARCADIS employee and employees of ARCADIS subcontractors will be trained in the health and safety procedures prescribed by the client or operating railroad. In selected work situations, employees may be required to be trained in accordance with 49 CFR Part 214 as Roadway Workers. DOT Facts-201a and 201b provide an overview of training requirements by Class I railroad and many other rail related clients.

Each employee and subcontractor employee will participate in rail security awareness training and undergo background security clearance when required by the client or operating railroad. All Class I railroads, and many other rail

clients typically utilize a common vendor, eRailsafe, to perform these functions. DOT Facts-201a provides additional information on eRailsafe requirements.

Any badge issued by a railroad, their H&S vendor and/or eRailsafe will be prominently displayed at all times while on rail property. Additionally, several rail clients require an ARCADIS issued photo badge. A general badge template is available on the DOT Team Site of the APEX.

5.5 Supervision and Communication

5.5.1 Supervision and Job Briefings

All ARCADIS work on rail property will be coordinated with a central railroad point of contact (POC). The POC may be the Employee-in-Charge or other designated employee of the railroad and the POC may be present on or off site as permitted by the client or operating railroad; however, ARCADIS must be able to contact the POC at all times while on railroad property.

The POC is required to participate in job briefings if track fouling is required to perform work activities. The POC is encouraged to participate in other rail related job briefings either in person or by phone or radio.

DOT Facts-201d provides additional guidance POC accessibility.

5.5.2 Communication Devices

Maintaining communication with railroad POC is critical and expected

Except as directed by the client railroad, use of cell phones for purposes other than direct communication with the railroad or emergency services is prohibited within 25 ft of the rail. Refer to DOT Facts-201c for guidance on cell phone use on railroad property.

5.5.3 Working Radio

If directed by the client, designated ARCADIS employees may use radios capable of monitoring railroad communications (a working radio). Employees designated to use a working radio must be proficient in its use. If an employee is designated to perform job duties meeting the requirements of an employee responsible for providing on-track safety must have a working radio as prescribed in 49 CFR Part 220. Refer to DOT Facts-201d and 201e for additional information concerning working radios.

5.6 Clothing and Personal Protective Equipment (PPE)

Staff will wear required PPE at all times

The Project Manager or their approved designate must coordinate with the client or operating railroad on proper PPE required to be worn while working on railroad property. Although PPE requirements are generally consistent among all railroads, there are significant variations between railroads on specific PPE requirements. DOT Facts-201h provides general PPE requirements for rail related work. The project specific HASP will address all railroad specific PPE requirements.

5.7 Tools and Equipment

Tools and equipment used on rail property must conform to client or operating railroad equipment specifications and requirements. The Project Manager or their approved designate must coordinate with the railroad on acceptable tools and equipment permitted on rail property, especially within 25 ft of the rails, and manage tools and equipment properly.

Only tools and equipment inspected and in good condition will be used

All tools and equipment will be inspected prior to use. Defective tools or equipment or equipment found to have fluid leaks will be promptly repaired or removed from rail property.

General tool and equipment guidelines for all rail related work are presented in DOT Facts-201i. The project specific HASP will address specific tool hazard and construction requirements that may be specific to the railroad client.

5.8 Bridge Worker HS Requirements

Some work assignments of ARCADIS for client railroads may require ARCADIS or its subcontractor employees to be classified as Railroad Bridge Workers. In this event, the Project Manager or their approved designate will ensure that the work is carried out in strict compliance with the client railroad's procedures and requirements for railroad bridge work and that of Title 49 CFR Part 214, Subpart B – Bridge Worker Safety Standards. This entails additional programs and HS procedures to be developed for the project specific HASP and implemented.

The minimum requirements for railroad bridge work are as follows:

- ARCADIS does not perform railroad bridge work without the approval and authorization of the client railroad.
- ARCADIS coordinates with the client railroad to provide fall protection whenever ARCADIS or subcontractor employees are performing bridge work more than six feet above the next lower level (including water) where other work place protection like guardrails, etc. are not in place.
- Where work is performed above water that could pose a threat of drowning, ARCADIS provides it employees with personal floatation devices and has appropriate rescue equipment available.

5.9 Work Involving Hi-Rail Vehicles

Occasionally, ARCADIS is required to perform work from hi-rail vehicles. In these cases, the ARCADIS employee is strictly a passenger in the vehicle and is prohibited from operating the vehicle at any time. ARCADIS or its subcontractor employees follow the rules and requirements for passengers per the client railroad procedures for riding in hi-rail vehicles. The Project Manager is responsible for working with the client railroad on the procedures for ARCADIS or subcontractor employees to work as passengers in a hi-rail vehicle.

5.10 Fatigue Management

Employees are prohibited from working in excess of 120 hours in any 10 day period

Fatigue is a significant hazard in rail sector work, especially during derailment response. ARCADIS has established a fatigue management program for railroad work and employees are expected to track their hours worked, stop work and report to site ARCADIS management or the Task Manager if hours worked exceed limits specified in the fatigue management program. ARCADIS will audit hours worked to monitor fatigue management compliance during high hazard work activities such as derailment work.

DOT Facts-201f provides specific working limits under the fatigue management program. No employee will work in excess of 120 hours in a 10 day period (current workday plus previous 9 days) without performing a 48 hour rest period.

5.11 Relationship of the Standard to Other ARCADIS H&S Standards

All other ARCADIS H&S Standards are applicable to rail sector work. If there is conflict between an ARCADIS Standard and rail client H&S procedure, the rail client procedure will take precedence.

6. TRAINING

Employees performing work on rail projects or within 25 ft of the rails, whether under contract to a railroad or not, will be familiar with the contents of this standard and will be trained as prescribed by this standard and the client or host railroad.

7. REFERENCES

- Department of Transportation Federal Railroad Administration Regulations – Title 49 CFR Part 214 – Railroad Workplace Safety
- Department of Transportation Federal Railroad Administration Regulations – Title 49 CFR Part 220 – Railroad Communications
- DOT Facts-201a, What is Roadway Worker Training (RWT)?
- DOT Facts-201b, Do I Need Special Training to Work On or Near the Tracks?
- DOT Facts-201c, Use of Cell Phones and Other Electronic Devices Near Active Tracks
- DOT Facts-201d, EIC Accessibility and Working Radios
- DOT Facts-201e, Short Term Fouling of Tracks
- DOT Facts-201f, Fatigue Management
- DOT Facts-201g, General Requirements for Working in the Railroad Right of Way

- DOT Facts-201h, Personal Protective Equipment for Railroad Work
- DOT Facts-201i, Tools and Equipment Used in Railroad Work
- DOT Facts-201j, Railroad Standard Definitions
- ARC HSFS019 Utility Clearance Standard

8. RECORDS - DATA RECORDING AND MANAGEMENT

All training records will be maintained by the ARCADIS Training Center. All documents required by this standard will be maintained in the project files.

9. APPROVALS AND HISTORY OF CHANGE

History of Change

Revision Date	Revision Number	Reason for change
11 December 2006	01	Original document
15 March 2007	02	Put in new company format
6 September 2007	03	Changing over to new template format
February 8, 2011	04	Inclusion of DOT Facts and restructuring of standard content

ARCADIS
Infrastructure, environment, facilities

Imagine the result

Root Cause Analysis and Solutions Development

HSP: ARC HSMS011

Revision #1

Revision Date: 22 October 2007

ARCADIS

TABLE OF CONTENTS

Approval Signatures **ii**

1. Policy **1**

2. Purpose and Scope **2**

2.1 Purpose 2

2.2 Scope 2

3. Definitions **3**

4. Responsibilities **4**

5. Procedure **5**

5.1 The Five Why's 5

5.2 Root Cause Flow Chart 5

5.3 Solutions 6

6. Training **7**

7. References **8**

8. Records **9**

Exhibits

A Root Cause Analysis and Solutions Development Process Flow

ARCADIS

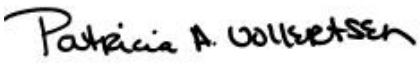
Root Causes Analysis and Solutions Development

Approval Signatures

Approved by:

Michael A. Thomas, CIH, Corporate HS Director

Approved by:



Patricia A. Vollertsen, Corporate HS Manager

Revision Date	Revision Number	Reason for change
22 October 2007	01	Original document

ARCADIS

1. Policy

It is the policy of ARCADIS to determine the Root Cause(s) of all incidents (as defined in ARC HSMS010) to allow for the proper development and implementation of solutions that will prevent similar incidents from occurring in the future.

ARCADIS

2. Purpose and Scope

2.1 Purpose

Identifying and addressing root cause(s) of incidents, questionable behaviors identified during a Loss Prevention Observation (LPO), and findings from inspections, audits, and reviews and developing appropriate solutions that match those root causes is essential in ARCADIS' efforts to prevent incidents and recurrence of incidents.

2.2 Scope

Root cause analysis and solution development procedures will be utilized for the following types of incidents reported and investigated:

- Work-related injuries and illnesses
  - fatality/permanent disability
  - lost time
  - restricted duty
  - medical treatment
  - first aid
- Near misses
- Motor vehicle accidents
- Environmental releases
- Equipment or property damage
- Regulatory violations
- Operational or system inefficiencies

In addition, root cause analysis and solution development is used whenever questionable behaviors are identified during the LPO process. It can also be used to address the findings resulting from audits, inspections, reviews, LPS field assessments, or other activities.

This procedure is also followed for any of the above as they pertain to subcontractors providing services to ARCADIS. Additional client-specific and contract requirements may also be required and implemented. In such cases, the investigation team will include subcontractor workers and a subcontractor supervisor. ARCADIS personnel may also participate on the investigation team to provide knowledge of the project site and to facilitate the proper use of the process.

ARCADIS

3. Definitions

See Exhibit A of ARC HSMS000 – ARCADIS US HS Management System.

Supervisor

As the employee's administrative supervisor may not be the person involved in the employee's day-to-day activities, the following defines what is meant by "supervisor" as it relates to the incident investigation, Loss Prevention Observations, and audits, inspections, reviews and assessments:

- For Field work/Client Site:
  - The "supervisor" is whoever provides regular daily direction to the person being observed in an LPO or the person(s) involved in an incident. This could be the PM, TM or field supervisor.

- For Office/Non-Field or Client Site Work:
  - The "supervisor" is the person to whom the employee reports administratively.

ARCADIS

4. Responsibilities

Supervisor - leads the investigation of the incident (per ARC HSMS010) for which the root causes are being determined, and is responsible for leading the investigation team in determining the appropriate root causes and the matching solutions. For the LPO process, leads LPO feedback session to determine appropriate root causes and solutions.

Employees – are responsible for following the solutions implemented and completing solutions as assigned.

Reviewers – are responsible for reviewing root causes and ensuring appropriateness and for providing comment on the solutions to assist in ensuring they match the root causes identified.

Managers – are responsible for validating and verifying the solutions.

ARCADIS

5. Procedure

Root cause analysis is used whenever questionable behaviors are identified during the LPO process and incident investigation processes. It can also be used at times following LPS field assessments and other H&S reviews when deficiencies are identified and require correction or prevention. Eight categories of root causes are used to guide the analysis process.

5.1 The Five Why's

To uncover issues that may be contributing to the incidents that occur, to questionable behaviors identified during an LPO, to findings from an LPS Field Assessment or to H&S project or office audit or review, a simple but effective tool should be used: "5 Whys." This method simply asks why something happened as many as five times.

For example, I tripped over the extension cord.

- Why did you trip? I caught my foot on it and lost my balance.
- Why did you catch your foot? I didn't see it.
- Why didn't you see it? I wasn't looking.
- Why, where were you looking? I was reading a report.
- Why were you reading? I was rushing to a meeting.

In this example, one contributing factor was that the individual was rushing to a meeting. This is what would be entered in the Section 5 of the LPO and the Contributing Factor section of the incident report. Then, the 5 Whys would be used to determine the second contributing factor: the position of the extension cord.

5.2 Root Cause Flow Chart

Once the contributing factors have been more clearly identified, follow the root cause process flow presented in Exhibit A to identify the root cause(s) of each of the contributing factors. It should be remembered that there could be more than one root cause. Start with the Personal Factors, move through the Job Factors and end with the External Factors to determine the root causes of each contributing factor.

The root causes for observed deviations from standards could be any one, or a combination of, the following:

- Personal factors:
  - lack of skill or knowledge
  - correct way takes more time and/or requires more effort

- short-cutting standard procedures is positively reinforced or tolerated
- in the past, no incident occurred when procedures were not followed

- Job factors:
  - lack of or inadequate operational procedures or work standards
  - inadequate communication of expectations regarding procedures or standards
  - inadequate tools or equipment

- External factors
  - Should rarely be used and are only for things fully out of the control of the person or the organization.

5.3 Solutions

After identifying the root cause(s), solutions are developed with a responsible person identified and notified for solution implementation with a set due date for completion. The investigation team cannot identify a root cause and then make no recommendation to address it. Furthermore, there must be a "match" between the root cause and the solution. All root causes and solutions are entered into the LPS database associated with the appropriate tool being used that resulted in the identification of incidents, questionable behaviors, audit, inspection, and review findings.

Solutions address and relate to the root cause(s) and contributing factor(s) to be effective. Solutions should be practical, cost beneficial and sustainable for the long term, and should focus on factors that can be controlled by the individual or supervisor. Effective solutions typically are "SMART" solutions:

- **S**pecific
- **M**easurable/observable
- **A**chievable
- **R**elevant
- **T**imely

Following the review and approval process (per the process being conducted that resulted in the activation of the root cause analysis process), the appropriate supervisor contacts the person(s) responsible for implementing the solution(s). Personnel must agree to both the solution(s) and the due date(s).

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6. Training

All employees receive Root Cause Analysis and Solutions Development training in the LPS training received by all employees.

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7. References

- ARC HSMS010 – Incident Reporting and Investigation
- ARC HSMS015 – Loss Prevention Observation
- ARC HSMS013 – HS Management System Assessment
- ARC HSGE013 – Agency Inspections
- ARC HSMS009 – Project and Office Compliance Auditing

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8. Records

All Root Cause Analysis and Solutions Development records are recorded and stored in the LPS database and maintained per ARCADIS recordkeeping requirements.

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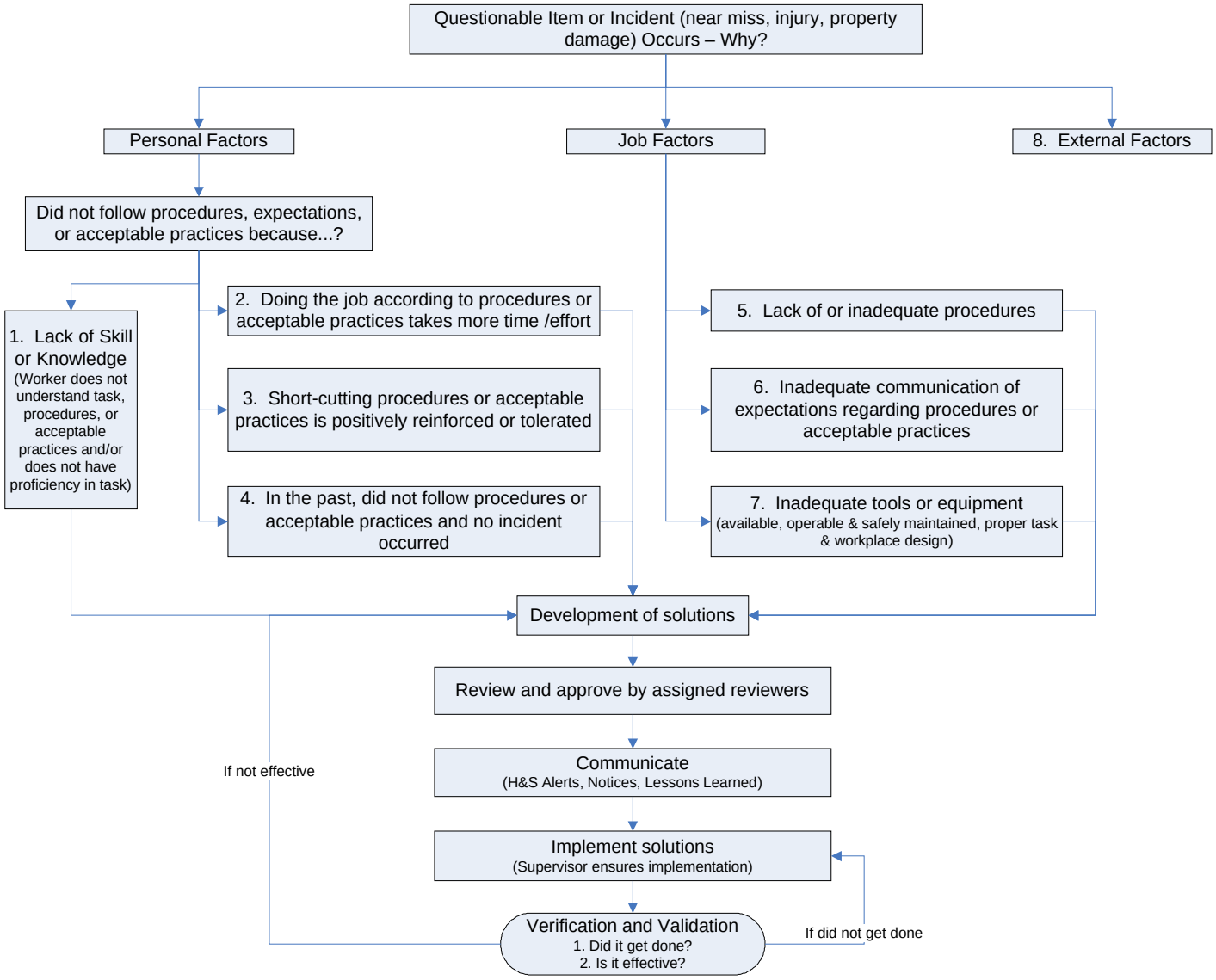
Exhibit A - Loss Prevention System Root Cause Analysis and Solution Development Process Flow



EXECUTIVE SUMMARY

Damaging an underground or above ground utility can result in serious injury and loss of life, disrupt essential services, and create significant liability to ARCADIS, clients and subcontractors. Therefore, it is ARCADIS' policy that the presence of all existing utilities will be investigated and cleared (to the extent feasible) by locating, marking, and, where appropriate, visually verifying before the start of any field operation. The following requirements are mandatory under this policy:

- A minimum of three (3) reliable lines of evidence are required for an acceptable utility clearance.
- Additional lines of evidence are required if the primary lines of evidence cannot adequately identify subsurface, submarine or above ground utilities with reasonable certainty.
- The lines of evidence used will be reasonable and appropriate for the conditions expected to be encountered and the type of utilities expected to be encountered (e.g., gas line versus an irrigation line).
- Utility clearance information will be documented on the ARCADIS Utility and Structures Checklist or equivalent client provided checklist or permit presenting equivalent information.
- Employees overseeing utility clearance activities will:
    - Be familiar with the contents of this standard;
    - Have one year field experience in the identification of utilities; and
    - Have training and six months experience in the proper operation and results interpretation of any clearance equipment used by ARCADIS employees, including without limitation, magnetometers and ground penetrating radar.
- All utility strikes must be reported to Corporate Health and Safety and Legal within 24 hours using the Utility Line Strike Investigation Form. Do not enter the incident into 4-Sight until approved to do so by Corporate Legal.

Report Utility Incident Now

1. POLICY

It is the practice of ARCADIS and its affiliated companies to implement appropriate, reasonable and practical standards within acceptable and customary industry practices to promote the health and safety of its employees, and avoid and mitigate exposure of risk in the performance of their work. In furtherance of this policy, ARCADIS promotes and encourages compliance by all employees with this policy and standards relating to work in the vicinity of subsurface, submarine or aboveground utilities.

2. PURPOSE AND SCOPE

2.1 Purpose

This standard directs general safety standards and best practices associated with the identification and management of subsurface, submarine and aboveground utilities on project sites.

2.2 Scope

This standard assigns responsibilities and expectations for proper utility clearance by both ARCADIS employees and ARCADIS subcontractors at project sites.

3. DEFINITIONS

Refer to ARC HSFS-019 Supplement 1 for definitions of terms used in this standard.

4. RESPONSIBILITIES

4.1 Project Manager Responsibilities

For every project site having the potential to come into contact with utilities, Project Managers must ensure that:

- The requirements of this standard are followed.
- Local regulations governing utility clearance are followed. This includes ensuring local and or state laws defining activities or depth of intrusive work/excavation requiring utility clearance are reviewed as they vary by location.
- Efforts are made to work with the client, project site representatives and subcontractors to identify the nature of any utilities, and to determine what control processes need to be implemented by ARCADIS and the subcontractors to prevent damage to these utilities and to properly manage the effects in the event there is utility damage.
- Utility clearance activities are only delegated to a Task Manager or other individual meeting the requirements of section 4.2 below, as appropriate. However, even if the Project Manager delegates certain responsibilities, the

Project Manager maintains primary responsibility for a complete utility clearance.

4.2 Field Personnel Responsibilities

ARCADIS field personnel conducting work on a project site having the potential to come into contact with utilities have the responsibility to:

- Read, understand, and follow this standard and complete the appropriate checklists during the on-site utility locate process.
- Complete a minimum of 1 year of utility clearance related experience before accepting responsibility for any utility clearance tasks.
- Complete training and have 6 months of experience in operating and interpreting the results of remote sensing technologies, including without limitation, magnetometers and ground penetrating radar, before operating such technologies.
- Use their Stop Work Authority to eliminate any reasonable concern if utilities cannot be reasonably located.
- Ensure that ARCADIS subcontractors conduct their own reasonable independent utility clearance efforts as required by ARCADIS' standard subcontract, and are aware of any ARCADIS clearance standards used onsite.
- Be on site during any active intrusive activities involving contractor under contract to ARCADIS.

4.3 ARCADIS Subcontractor Responsibilities

According to ARCADIS' standard subcontract, subcontractors have agreed to take responsibility for any damages resulting from a utility impact cause by their work. Therefore, ARCADIS subcontractors are expected to take reasonable time and diligence to conduct their own independent utility clearance using reasonable standards and processes. Subcontractors have the responsibility to stop their work if utility concerns are identified and will report those concerns to the ARCADIS employee overseeing their work activities. ARCADIS staff should reinforce these responsibilities with subcontractors during job safety briefings.

In jurisdictions where the actual contractor performing the intrusive work activity is required to perform utility clearance notifications, the contractor will perform the clearance notification and will provide evidence of the notification to ARCADIS (ticket or ticket number, etc).

5. STANDARD

5.1 General

Protocols to be followed during utility clearance activities are outlined in:

- Best Practices for Project Managers (or Their Delegates) Concerning Utility Clearance (ARC HSFS-019 Supplement 2).

- Best Practices for Field Personnel Concerning Utility Clearance (ARC HSFS-019 Supplement 3).

5.2 Lines of Evidence

A minimum of 3 lines of evidence are required for an appropriate utility clearance as defined in this standard. Generally, the following lines of evidence may be utilized to meet this requirement:

- Contact the State One Call or equivalent service (Nationwide "811" is acceptable) if working within the right-of-way or public areas served by such services. For work on private property or in areas not served by such services, utilize a reputable private utility locating company to locate and mark the utilities. Utilization of a private utility locator is encouraged for all projects with subsurface or submarine utility issues.

- Use detailed scaled site utility plans, preferably in the form of an "as-built" or "record" drawing, to identify and/or confirm utility locations.

- Conduct a detailed visual site inspection to identify and/or confirm utility locations. For underground utilities, conduct an inspection for structures that tend to indicate the presence and general location of such utilities, including, but not limited to manholes, vaults, valve covers, valve markers, telephone pedestals, transform housings, fire hydrants, spigots, sprinkler heads, air relief valves, backflow preventers, meters, downspouts going into the subsurface, power poles with wring going into the subsurface and line markers. Saw cut lines and concrete /asphalt repairs often yield valuable information regarding utility locations. Always discuss the presence of utilities with the site owner, operator or occupant to identify any potential utilities that might not be readily identified by non intrusive clearing methods or may be:

    - At depths > 5 ft below ground surface; or

    - At very shallow depths (< 2ft below ground surface) such as electrical conduits/wiring, irrigation lines, etc.

View the Utilities and Structures Checklist

If one of the above lines of evidence cannot be utilized, or if using the above lines of evidence does not adequately identify utilities with reasonable certainty, one or more additional lines of evidence must be utilized. Commonly used lines of evidence are listed on the Utility and Structures Checklist.

A discussion of use and limitations associated with common utility clearance methods is provided in ARC HSFS-019 Supplement 4.

The lines of evidence will be recorded on the Utility and Structures Checklist or equivalent client provided checklist or permit presenting equivalent information.

5.3 Color Codes Used for Utility Markings

The following colors are used for marking utilities. Some government agencies or large industrial facilities may use additional colors not provided below. ARCADIS policy is to assume any paint marking or pin flag color not provided below is a subsurface utility marking until proven otherwise.

COLOR	Utility Line
WHITE	Proposed Excavation
PINK	Temporary Survey Markings
RED	Electrical Power Lines, Cables, Conduit and Lighting Cables
YELLOW	Gas, Oil, Steam, Petroleum or Gaseous Materials
ORANGE	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE	Potable Water
PURPLE	Reclaimed Water, Irrigation and Slurry Lines
GREEN	Sewer and Drain Lines

APWA and ANSI standard Z-53.1

5.4 Working in Close Vicinity of Subsurface Utilities

No work will be conducted within 30 inches of a subsurface utility marking, or as prescribed by the utility owner, unless the utility is exposed through hand clearing. Make sure to factor the diameter of the utility when determining the 30 inch buffer zone as this may increase the distance from the actual marking (if the markings do not indicate diameter of utility).

Manual clearing methods such as shoveling, using pick axes, digging bars and other hand tools should be used with caution. Excessive down force, prying or use in poor/obstructed visibility conditions is prohibited as these tools can damage utilities.

For borings and excavations, if the utility is known to be at depths where hand clearing is not reasonable or creates additional safety concerns, no work will be performed within 30 inches vertically or horizontally of the utility unless manual clearing is performed under the oversight of an Excavation Competent Person as defined in the ARCADIS Excavation and Trenching H&S standard (ARC HSCS005).

For horizontal borings, to avoid potential of utility strike, damage from vibration, damage by pressure of the advancing boring, do not plan the drill boring location within 30 inches vertically of utilities. This requirement applies even if the operating contractor has technology that places the location to within a few inches. Make sure to factor the diameter of the utility when determining the 30 inch buffer zone.

Additional cautions are required when coring/cutting through or removing concrete or asphalt. Utilities may be encased within these materials or in the gravel sub grade under these materials and may be damaged during the utility clearance process. Always work slowly, methodically and frequently stop work to evaluate conditions during these work activities.

Additional cautions for horizontal borings include gravity utilities such as sewers and storm drains as the depth of these utilities will change (sometimes significantly) as they run across the project site. Always obtain the utility depth at the location where the boring will actually cross the line.

5.5 Acceptable Clearance for Working in Vicinity of Overhead Power Lines

No work will be performed by ARCADIS or a subcontractor where any equipment is within the limits specified below, unless the power line has been properly covered or de-energized by the owner or operator of the power line:

Power Line Voltage Phase to phase (kV)	Minimum Safe Clearance (feet)
50 or below	10
Above 50 to 200	15
Above 200 to 350	20
Above 350 to 500	25
Above 500 to 750	35
Above 750 to 1,000	45

ANSI standard B30.5-1994, 5-3.4.5

5.6 Reporting Utility Incidents

ARCADIS field personnel involved with any subsurface, submarine, and above-ground utility strikes should immediately stop work and contact the Project Manager to discuss the incident. The utility strike must be reported to Corporate Health and Safety and Legal Departments within 24 hours. Use the Utility Line Strike Investigation Form as part of the notification process.

Selected utility strike incidents may also utilize a conference call with operations management to review findings and lessons learned. The Divisional Health and Safety Manager will make the determination concerning the need to have the call, and will arrange the call, if deemed necessary.

5.7 Relationship of this standard to the Project Specific HASP

With the exception of the Utility and Structures Checklist, this standard, including most supplements, are not designed to be printed off and attached to project HASPs. During project health and safety planning, this standard will be reviewed

and applicable clearance technologies and methods will be documented on the Utility and Structures Checklist.

Additionally, emergency action standards specific to utility strikes should be addressed. ARC HSFS-019 Supplement 5 provides general guidelines for emergency response to utility strikes. Applicable information may be attached to the Utility and Structures Checklist to facilitate communication of response expectations.

5.8 Required Contract Terms and Conditions

ARCADIS' standard client and subcontractor contracts contain required terms and conditions defining responsibility for utility clearance and the allocation of risk associated with an impacted utility. These terms and conditions have prescribed language concerning subsurface work that is presented in ARCADIS client contracts and ARCADIS subcontractor contracts. If such provisions cannot be agreed upon, the reasons are documented and other risk-management actions should be identified, such as limits of liability, additional physical investigations, additional lines of evidence or utility location, assignment of risk to subcontractors, etc. In addition, any changes to these terms and conditions require approval by Legal Services.

6. TRAINING

Employees responsible for coordinating or conducting utility clearance activities will be familiar with the requirements of this standard.

7. REFERENCES

- Utility and Structures Checklist
- Utility Line Strike Investigation Form
- HSFS-019 Supplement 1, Utility Definitions
- HSFS-019 Supplement 2, Best Practices for Project Managers (or Their Delegates) Concerning Utility Clearance
- HSFS-019 Supplement 3, Best Practices for Field Personnel Concerning Utility Clearance
- HSFS-019 Supplement 4, Use and Limitations Associated with Common Utility Clearance Methods
- HSFS-019 Supplement 5, Emergency Action Plan guidelines for Utility Strikes
- ARC HSCS005 Excavation and Trenching
- Required client contract language concerning subsurface work

- Required subcontractor language concerning subsurface work

8. RECORDS

8.1 Utility Clearance Records

All records (maps, checklists and documentation of communications) used to determine the location of utilities should be retained and kept in the project file.

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Tony Tremblay, Environment Division Health and Safety Manager

History of Change

Revision Date	Revision Number	Reason for change
13 December 2006	01	Original document
26 March 2007	02	Put in new company format
15 May 2007	03	Added nation-wide 811 number
6 September 2007	04	Changing over to new template format
22 February 2008	05	Changing over to new template format
13 January 2009	06	Define lines of evidence
4 October 2010	07	Reformatting and addition of utility clearance information
13 February 2012	08	Modified link information for utility strike reporting, clarified local/state requirements in section 4.1 and 4.3

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Appendix C

HASP Forms

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Document Control Number:TGM - _____

TGM + *project number plus date as follows: xxxxxxxx.xxxx.xxxxx - dd/mm/year*

TAILGATE HEALTH & SAFETY MEETING FORM

This form documents the tailgate meeting conducted in accordance with the Project HASP. Personnel who perform work operations on-site during the day are required to attend this meeting and to acknowledge their attendance, at least daily.

Project Name:			**Project Location:**
Date:	**Time:**	**Conducted by:**	**Signature/Title:**
Client:		**Client Contact:**	**Subcontractor companies:**

TRACKing the Tailgate Meeting

Think through the Tasks (list the tasks for the day):

1 _____ 3 _____ 5 _____

2 _____ 4 _____ 6 _____

Other Hazardous Activities - Check the box if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations ☐ If there are none, write "None" here: _____

If yes, describe them here: _____

How will they be controlled? _____

Prework Authorization - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:

	Doc #		Doc #		Doc #
☐ Not applicable		☐ Working at Height		☐ Confined Space	
☐ Energy Isolation (LOTO)		☐ Excavation/Trenching		☐ Hot Work	
☐ Mechanical Lifting Ops		☐ Overhead & Buried Utilities		☐ Other permit	

Discuss following questions (for some review previous day's post activities). **Check if yes :**

☐ Incidents from day before to review?	☐ Lessons learned from the day before?	☐ Any Stop Work Interventions yesterday?
☐ Any corrective actions from yesterday?	☐ Will any work deviate from plan?	☐ If deviations, notify PM & client
☐ JLAs or procedures are available?	☐ Field teams to "dirty" JLAs, as needed?	☐ All equipment checked & OK?
☐ Staff has appropriate PPE?	☐ Staff knows Emergency Plan (EAP)?	☐ Staff knows gathering points?

Comments: _____

Recognize the hazards (check all those that are discussed) (Examples are provided) and **Assess** the Risks (Low, Medium, High - circle risk level) - Provide an overall assessment of hazards to be encountered today and briefly list them under the hazard category.

☐ Gravity (i.e., ladder, scaffold, trips) (L M H)	☐ Motion (i.e., traffic, moving water) (L M H)	☐ Mechanical (i.e., augers, motors) (L M H)
☐ Electrical (i.e., utilities, lightning) (L M H)	☐ Pressure (i.e., gas cylinders, wells) (L M H)	☐ Environment (i.e., heat, cold, ice) (L M H)
☐ Chemical (i.e., fuel, acid, paint) (L M H)	☐ Biological (i.e., ticks, poison ivy) (L M H)	☐ Radiation (i.e., alpha, sun, laser) (L M H)
☐ Sound (i.e., machinery, generators) (L M H)	☐ Personal (i.e. alone, night, not fit) (L M H)	☐ Driving (i.e. car, ATV, boat, dozer) (L M H)

Continue TRACK Process on Page 2

TAILGATE HEALTH & SAFETY MEETING FORM - Pg. 2

Control the hazards (Check all and discuss those methods to control the hazards that will be implemented for the day): Review the HASP, applicable JLAs, and other control processes. Discuss and document any additional control processes.

☒	**STOP WORK AUTHORITY** (Must be addressed in every Tailgate meeting - (*See statements below*)				
☐	Elimination	☐	Substitution	☐	Isolation
☐	Engineering controls	☐	Administrative controls	☐	Monitoring
☐	General PPE Usage	☐	Hearing Conservation	☐	Respiratory Protection
☐	Personal Hygiene	☐	Exposure Guidelines	☐	Decon Procedures
☐	Emergency Action Plan (EAP)	☐	Fall Protection	☐	Work Zones/Site Control
☐	JLA to be developed/used ***(specify)***	☐	LPO conducted ***(specify job/JLA)***	☐	Traffic Control
☐		☐		☐	Other ***(specify)***
☐		☐		☐	

Signature and Certification Section - Site Staff and Visitors

Name/Company/Signature	Initial & Sign in Time	Initial & Sign out Time	I have read and understand the

Important Information and Numbers

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

In the event of an injury, employees will call WorkCare at 1.800.455.6155 and then notify the field supervisor who will, in turn, notify Corp H&S at 1.720.344.3844.

In the event of a motor vehicle accident, employees will notify the field supervisor who will then notify Corp H&S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.

In the event of a utility strike or other damage to property of a client or 3rd party, employees will immediately notify the field supervisor, who will then immediately notify Corp Legal at 1.678.373.9556 and Corp H&S at

Visitor Name/Co - not involved in work

In	Out
In	Out
In	Out
In	Out

I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB,** I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.

Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)

- ☐ Lessons learned and best practices learned today: _____
- ☐ Incidents that occurred today: _____
- ☐ Any Stop Work interventions today? _____
- ☐ Corrective/Preventive Actions needed for future work: _____
- ☐ Any other H&S issues: _____

Keep H&S 1st in all things

WorkCare - 1.800.455.6155

Real Time Exposure Monitoring Data Collection Form

Document all air monitoring conducted on the Site below. Keep this form with the project file.

Site Name: _____ Date: _____

Instrument: _____ Model: _____ Serial #: _____

Calibration Method: (Material used settings, etc.)	
Calibration Results:	
Calibrated By:	

Activity Being Monitored	Compounds/Hazards Monitored	Time	Reading	Action Required? Y/N

Describe Any Actions Taken as a Result of this Air Monitoring and Why (does it match Table 5-1):

_____

_____

Employee Signature Form

I certify that I have read, understand, and will abide by the safety requirements outlined in this HASP.

Printed Name	Signature	Date

Subcontractor Acknowledgement: Receipt of HASP Signature Form

ARCADIS claims no responsibility for the use of this HASP by others although subcontractors working at the site may use this HASP as a guidance document. In any event, ARCADIS does not guarantee the health and/or safety of any person entering this site. Strict adherence to the health and safety guidelines provided herein will reduce, but not eliminate, the potential for injury at this site. To this end, health and safety becomes the inherent responsibility of personnel working at the site.

Printed Name	Company	Signature	Date

Visitor Acknowledgement and Acceptance of HASP Signature Form

By signing below, I waive, release and discharge the owner of the site and ARCADIS and their employees from any future claims for bodily and personal injuries which may result from my presence at, entering, or leaving the site and in any way arising from or related to any and all known and unknown conditions on the site.

Name	Company	Reason for Visit	Date/Time On Site	Date/Time Off Site

ARCADIS

Incident / Near-Miss Investigation Process
Employee/Witness Report Form (Form A)

Employee Reporting Requirements (see Form B, Section B1 for definitions of Level of Incident). The involved employee or subcontractor reports the incident, completes this form and provides to ARCADIS Supervisor ASAP but no later than the following timelines: **Level 1**: By the next business day (*Can also be reported via the Near Miss Reporting Hotline: 866-242-4304);* **Level 2**: Within the same business day; **Level 3:** Immediately, but no later than 2 hours. Other ARCADIS employees who witness the incident, as well as non-ARCADIS witnesses may also be asked to complete this form. If more space is necessary for any section, please use a separate sheet and attach.
Supervisor Reporting Requirements, see Form B, Section B2.

Date of Incident: | Time of Event/Exposure: | Office:

Date First Reported: | To whom reported:

Project Information

Project Name:	Project #
Project Location:	Project Manager

Employee

Employees Full Name: ☐ M ☐ F	Employee Number:
Time Employee began work:	Contact Number:
Employment Status: ☐ Regular ☐ Part Time	How long in present job?

Business Practice:

Personnel immediately involved in or witness to incident

Name	Employer	Role at Site

Description of Incident / Near Miss: (Describe what happened and how it happened.) ☐ **Near Miss** ☐ **Incident**

Where did the incident / near miss occur? (number, street, city, state, zip):

Employee's specific activity before and at the time of the incident / near miss (Provided by employee/witness):

Equipment, materials, or chemicals the employee was using when the incident / near miss occurred:

Injury or Illness or Near-Miss Information: ☐ **N/A** **Was WorkCare Called:** ☐ **No** ☐ **Yes**

Was treatment was given away from the injury site: ☐ No ☐ Yes, if yes:

Name of Facility or Physician:	Address:
Treated in Emergency/Urgent Care Room: ☐ No ☐ Yes	Overnight Hospitalization: ☐ No ☐ Yes,
To whom reported:	Other workers injured / made ill in this event? ☐ Yes ☐ No
Fatality: ☐ Yes ☐ No	Describe the specific injury or illness:

Motor Vehicle Accident (MVA) ☐ **N/A**

Company Vehicle? ☐ Yes ☐ No	Leased/Rented Vehicle? ☐ Yes ☐ No	Personal Vehicle? ☐ Yes ☐ No
Seat Belt Worn? ☐Yes ☐No ☐NA	Lease/Rental Company:	
Anyone else injured? ☐ Yes ☐ No	Cell Phone in use at time of accident ☐ Yes ☐ No	

Signatures

Form Completed By (print/sign): Date:

Employee Involved (print/sign): Date:

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Incident / Near-Miss Investigation Process
Investigation Report Form *(Form B)*

Section B1 – Levels of Incidents Definitions:

Level 1: First Aid, "less significant" near miss, and asset damage (includes MVAs)
Level 2: Professional Medical Advice or Treatment (Includes incidents in which WorkCare is called)
Level 3: Overnight hospitalization, fatality, or "significant near miss"

Section B2 – Levels of Incidents and Supervisor Reporting Requirements:

Supervisor reports to the Regional H&S Manager and client (as required) ASAP but no later than outlined below:
Level 1 – No later than the end of the same business day in which the incident was reported
Level 2 – By the end of the same business day in which the incident was reported
Level 3 – Immediately, but no later than 2 hours from the initial report

Section B3 – Investigation Team Members/Signed Initials

Name	Job Title	Date

Section B4 – Investigation Team Decription of Incident

Incident Level Determination (Final determination made by Investigative Team) Level 1 ☐ Level 2 ☐ Level 3 ☐

Estimated Cost of Incident (including labor and expenses): $

Section B5 – Additional Motor Vehicle (MVA) Accident Information ☐ N/A

Vehicle Towed?	☐ Yes ☐ No	Other Vehicle Towed?	☐ Yes ☐ No	# Vehicles Towed:		# of Injuries:

Section B6 – Spill ☐ N/A

Material Spilled:	Quantity:	Source:
Agency Notifications:		

Section B7 – Third Party Incidents ☐ N/A

Name of Owner:		Address:	Telephone:
Description of Damage/Injury:			
Witness Name:		Address:	Telephone:
Witness Name:		Address:	Telephone:

#	Section B8 – Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)
1	
2	
3	
4	
5	

Section B9 – Root Cause(s) Analysis (RCA)-the Causative Factors

Personal Factors:

1. Lack of skill or knowledge (Worker does not understand task procedures or acceptable practices and/or have proficiency in task).
2. Doing the job according to procedures or acceptable practices takes more time/effort.
3. Short-cutting procedures or acceptable practices are positively reinforced or tolerated.
4. In past, did not follow procedures or acceptable practices and no incident occurred (injury, product quality incident, equipment damage, regulatory assessment or production delay).

Job Factors:

5. Lack of or inadequate procedures (changing procedures across organization outside of supervisor, workers control).
6. Inadequate communication of expectations regarding procedures or acceptable practices.
7. Inadequate tools or equipment (available, operable & safely maintained; proper task & workplace design).

External Factors:

8. An uncontrollable factor cause or contribute to the incident or questionable work activity or condition.

Section B10 – Root Cause(s) Analysis (RCA)-the Preventative Actions

#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring	Person Responsible	Due Date	Closure Date
1					
2					
3					
4					
5					

Section B11 – Results of Solution Verification and Validation

Reviewed By

Name/Initials	Job Title	Date

Additional Comments:

_____

_____

_____

Exhibit 1 - PROJECT AUDIT CHECKLIST

Project Name: _____

Project Location: _____

Project Number: _____

Project Manager/Task Manager: _____

Audit Conducted by: _____

Date: _____

ITEM 1: PROJECT H&S OVERVIEW

	YES	NO	N/A
OFFICE REVIEW			
1. Is the HASP complete?			
• Was HASP prepared by approved writer?			
• Was HASP reviewed by approved reviewer?			
• Was HASP prepared in advance of fieldwork?			
• Did writer/reviewer meet with project team to discuss hazards?			
• Is Hazard Assessment complete?			
• Is PPE appropriate for hazards?			
• Did all team members review the HASP?			
• Are client-specific requirements presented in the HASP?			
• Are modules attached to the plan?			
• Were modules revised so that they reflect site-specific conditions?			
• Has HASP been reviewed in the past 12 months? Update for new scope			
2. Did Project Manager complete the PM H&S Checklist? BBLES preARCADIS			

NOTE TO AUDITOR: In addition to the Project H&S Checklist, the HASP will become an additional checklist to verify H&S compliance and conformance in the field.

ITEM 2: RECORD KEEPING REQUIREMENTS

	YES	NO	N/A
1. Verify the proper training is complete for the field staff working on the project.			
• 40 Hour HAZWOPER Initial Training			
• 8 Hour HAZWOPER Annual Refresher Training			
• 8 Hour HAZWOPER Supervisor			
• 10 Hour Construction Safety Training			
• 30 Hour Construction Safety Training			
• First Aid/ CPR/ BBP Training Need to maintain 1 per Work Crew			

• Any additional Health & Safety Training (e.g., Confined space entry, Lockout/Tagout, etc.)			
2. Are employees that are part of the medical surveillance program current on their physical? (if applicable)			
3. Are employees current on respiratory fit testing? (environmental practice)			
4. Are the following posted in the project trailer or office (if required):			
• Labor law 5-in-1 poster			
• State required labor poster			
• Worker's compensation poster			
• Emergency numbers and nearest emergency facility (if posting not required, are numbers available in HASP?)			

Comments: _____

_____

ITEM 3: PERSONAL PROTECTIVE EQUIPMENT (PPE)

	YES	NO	N/A
1. Is PPE being worn as outlined in the HASP? List any additional PPE that should be required, that is not listed in the HASP:			
2. Decontamination procedures are followed and match the requirements of the HSP			
3. Is PPE stored in a clean and sanitary manner?			

Comments: _____

_____

ITEM 4: VEHICLE SAFETY - ARCADIS Owned, Leased or Rented Vehicles

	YES	NO	N/A
1. Are ARCADIS vehicles equipped with safety and emergency equipment?			
2. Have weekly "walkarounds" been completed and documented?			
3. Are seat belts in working order?			
4. Are insurance card(s) and registration valid?			
5. Are vehicles parked out of the way of moving traffic?			
6. For undeveloped sites:			
• Are vehicles parked on even ground?			
• Is there a vehicle pathway that is cleared, free of obstructions and free of sharp slopes?			
• Is a four wheel drive vehicle being used when driving in undeveloped areas?			

Comments: _____

_____

ITEM 5: EMERGENCY RESPONSE

	YES	NO	N/A
FIRE EXTINGUISHERS			
1. Are portable fire extinguishers fully charged and marked?			
2. Are extinguishers in a location where they are easy to find and readily available?			
3. Have employees received annual fire extinguisher training?			
4. Are monthly fire extinguisher checks completed and documented?			
FIRST AID KITS			

5. Are there first aid supplies or a first aid station on-site that conforms with the HASP requirements?			
6. Are first aid supplies stored in a dry, clean location?			
7. Are supplies replenished regularly?			
8. Are monthly first aid kit checks completed and documented?			

Comments: _____

_____

ITEM 6: TOOLS AND EQUIPMENT

	YES	NO	N/A
HAND AND POWER TOOLS			
1. Is the proper tool being used for the job?			
2. Are hand tools stored neatly?			
3. Are tools in good condition (i.e. handles damaged or cords splitting?)			
4. Are ground-fault circuit interrupters (GFCI) used for all 120-volt, single-phase, 15- and 20-ampere receptacle outlets on construction sites which are not a part of the permanent wiring of the building or structure and which are in use by employees?			
5. If grounding is required, is this being done?			
6. Are safeguards in place for power tools?			
7. Are tools being used as designed per the manufacturers instructions?			
8. Are tools inspected and maintained?			
EQUIPMENT			
8. Is equipment in good condition (not damaged or leaking)?			
9. Is fuel for gas-powered equipment stored according to NFPA regulations?			
10. Are there any exposed electrical hazards?			
11. Is equipment turned off at the end of the day and/or unplugged and stored in a safe place?			
REMEDIATION SYSTEMS/EQUIPMENT			
12. Remediation systems within structures:			
• Is building in good condition and able to be secured?			
• Does building have adequate lighting?			
• Does the buidling have adequate emergency exit signage?			
• If in California or as required by local code, does the treatment system exit door meet Cal OSHA/local code requirement for emergency exit doors (Latching and locking doors that are hand activated and which are in a path of travel, shall be operable with a single effort by lever type hardware, by panic bars, push-pull activating bars or other hardware designed to provide passage without requiring the ability to grasp the opening hardware)?			
• Is housekeeping sufficient (floors dry, no trash or filters lying around)?			
• Have the following hazards been identified and addressed? Slip/trip/falls (pipes on floor, raised floor), protruding objects (valves, spigots), caught on/between (sharp edges, uneven shelving), struck by/on (heavy objects stored high). Verify these hazards marked with signs, etc.			
• Are combustible materials kept away from energized equipment?			
• Are step ladders used to reach high places?			
• Is equipment in good condition?			
• Are tools put away?			
• If hearing protection is required are signs posted?			
• Is there a fire extinguisher mounted in the building?			
• Any power cords running across the floor?			
• Are electrical receptacles overloaded?			
• Is storage permitted in electrical room?			
• Are electrical panels easily accessible (i.e. not blocked by objects)			

13. Mobile Remediation Systems/Equipment			
• Are trailers in good condition, and is it monitored as part of the office's vehicle safety program?			
• Does trailer meet weight limits and are load sizes controlled?			
• Is the hitch/ball appropriate for trialer and vehicle type and weight?			
• Is equipment properly secured on the trailer?			
• Are brake lights and warning devices operative?			
• Is employee trained on trailer safety including trailer hook-up and towing safety techniques?			
• If a Commercial Driver's License is required, does the employee have one?			
• Are ladders used to reach equipment on the trailer?			
• For molasses trailer, is the trailer cleaned after each use?			
• Are hoses properly stored?			
14. Energized Equipment			
• Has energized equipment been evaluated to identify all hazardous energy points (thermal, pneumatic, hydraulic, etc.).			
• Is this assessment of hazardous energy points on a written document attached to the HASP and posted at the equipment?			
• Have employees been trained on the energized hazards of the particular system or piece of equipment?			
• Are lockout/tagout (LOTO) procedures completed prior to maintenance of the system/equipment?			
• Has employee been trained in LOTO and are they authorized (per OSHA definition) to perform LOTO and system maintenance?			
• Is LOTO equipment made available for employees to use?			
• Do employees use LOTO equipment (even when working alone)?			
• Is electrical equipment properly grounded?			
• Is electrical equipment properly labeled (NFPA/NEC) and covered? (e.g., no exposed electrical hazards)			

Comments: _____

_____

ITEM 7: DRILLING OPERATIONS

	YES	NO	N/A
1. Was the ARCADIS Utility Location Policy followed?			
2. Are personnel wearing tight fitting clothing?			
3. Is hair tied back?			
4. Is ARCADIS employee(s) set-up where they can be easily seen by the drill rig operator? Is eye contact maintained?			
5. Were physical hazards (pinch points, utility lines, uneven ground) assessed during the tailgate safety briefing?			
6. Does drilling subcontractor have their own HASP?			
7. Is drill rig moved with the mast down?			
8. Do ARCADIS employees stay a minimum of five feet from the moving augers and hammer rods?			
9. For geoprobe: When cutting geoprobe plastic liners does employee use appropriate sharp device and cut away from his/her body?			
10. Is hearing protection, safety glasses and hard hat used at all times when drilling is in progress?			

Comments: _____

_____

ITEM 8: EXCAVATION AND TRENCHING	YES	NO	N/A
1. Was the ARCADIS Utility Location Policy followed?			
2. Are ARCADIS Employees set-up in a location that is out of the way of moving excavation equipment?			
3. Are eye contact and hand signals used by employees when walking around the site?			
4. Do employees stay a minimum of four feet from the sides of an excavation?			
5. Is equipment a safe distance from the edge?			
6. Are heavy equipment ramps adequate (slope not too great)?			
7. Are public roads and sidewalks supported and protected?			
8. Is adequate lighting provided at night?			
9. If an excavation must be entered:			
• Is benching/shoring required and being used?			
• Is shoring and sheeting being used as needed for soil and depth of excavation?			
• If excavation is a trench greater than **5 feet** in depth, is trench box or other wall supporting equipment being used?			
• If excavation is a trench greater than **4 feet** in depth, are ladder(s) in place for employee use in/out of the trench?			
• If employees are entering into excavation/trench greater than **4 feet** in depth, is air monitoring (oxygen, LEL, CO, H_2S) being conducted?			

Comments: _____

_____

ITEM 9: CHEMICAL AND MATERIAL STORAGE	YES	NO	N/A
CHEMICAL STORAGE			
1. Are flammable/combustible liquids in approved safety cans and contents labeled?			
2. Are chemicals properly labeled and stored?			
3. Are compressed gas cylinders properly stored? Valve protection caps in place?			
4. Are MSDSs readily available for all chemicals brought/stored on-site?			
5. Are employees aware of the proper handing procedures of the chemicals?			
6. Is an appropriate fire extinguisher(s) in close proximity to chemical storage area?			
WASTE HANDLING			
7. Are drums stored with lids secured?			
8. Are drums properly labeled as to their contents?			
9. Are drum contents segregated per their contents? (i.e. soils, water, sludge, debris)			
10. Are drums staged in a safe location (i.e. out of the way of moving vehicles or construction equipment)			
11. Are drums removed from the site according to RCRA waste time requirements.			
12. Is disposal of hazardous or non-hazardous material properly manifested under the client's name?			

Comments: _____

_____

ITEM 10: WATER OPERATIONS	YES	NO	N/A
1. Are waterway rules and regulations observed?			
2. Are life jackets/preservers used?			
3. Are employees properly trained on operation of waterway equipment?			
4. Are communication tools available on the boat?			

5. Is proper emergency equipment available per regulations (fire extinguisher, paddle, etc.)			
6. Is boat launched in a safe place?			

Comments: _____

ITEM 11: CONFINED SPACE OPERATIONS

	YES	NO	N/A
1. Are there known or suspected confined spaces at the project site that ARCADIS staff may have to enter or are under our controls? If yes, complete the remainder of this section.			
2. Have the confined spaces been evaluated, and labeled as required, in accordance with the ARCADIS SOP?			
3. Are staff that will have to work in or around confined spaces trained?			
4. If designated as a permit-required confined space, have appropriate emergency response capabilities been provided for?			
5. Are all elements of the Confined Space SOP being implemented effectively?			

Comments: _____

ITEM 12: ELECTRICAL WORK and HAZARDOUS ENERGY CONTROL

	YES	NO	N/A
1. Have affected staff reviewed the ARCADIS Electrical Work and Hazardous Energy Control (LOTO) Procedures?			
2. Are employees properly trained as authorized employees if applying energy control devices?			
3. Are ARCADIS employees properly trained and approved as Qualified Electrical Workers if performing live electrical work (includes troubleshooting with volt meter)?			
4. Have subcontractors been approved and qualifed to perform the assigned work?			
5. Are the Electrical Work and Hazardous Energy Control Procedures being properly implemented on the project?			

Comments: _____

ITEM 13: WORK ZONE

	YES	NO	N/A
1. Site zones are set up and observed where appropriate (EZ, CRZ, and SZ)			
2. Air monitoring is performed and documented as described in the HSP			
3. Access to the work area is limited to authorized personnel			
4. Traffic control measures have been implemented (STAR Plan or Traffic Control Plan details required barricades, cones, warning signs)			
5. Overhead utilities do not present a hazard to field equipment/personnel ((Must be 10 feet away from overhead utility lines <50 kilovolts. Must add 4 inches more distance for each 10 kV over 50 kV)			

Comments: _____

ITEM 14: FALL PROTECTION

	YES	NO	N/A
1. Are employees trained in fall protection requirements?			
2. Are employees working at a level that is less than 6 feet above unguarded walking surfaces?			
3. If working at a level that is equal to or greater than 6 feet, is there a fall protection system in place (e.g., guardrail, safety net, personal fall arrest system, positioning device, warning line and/or controlled access zone)			
4. If personal fall arrest equipment is the selected fall protection system, is adequate fall protection equipment available and inspected prior to each use?			

Comments: _____

_____

Additional Comments or Findings:

_____

_____

_____

_____

_____

_____

_____

ARCADIS

Appendix D

PPE Equipment List

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PPE CHECKLIST

R = Equipment required to be present on the site. **O =** Optional equipment. Subcontractors must have the same equipment listed here as a minimum.

Description (Put Specific Material or Type in Box)	Level of Protection		
	D	C	B
Body			
Coveralls	O		
Chemical Protective Suit (include type in cell, e.g., Tyvek, Saranex, PVC, etc.)			
Splash Apron			
Rain Suit			
Traffic Safety Vest (reflective)	R		
Head			
Hard Hat (if does not create other hazard)	R		
Head Warmer (depends on temperature and weather conditions)	O		
Eyes & Face			
Safety Glasses (incorporate sun protection as necessary)	R		
Goggles (based on hazard)			
Splash Guard (based on hazard)			
Ears			
Ear Plugs	R		
Ear Muffs	O		
Hands and Arms			
Outer Chemical Resistant Gloves (specify the type of glove based on chemical hazard)			
Inner Chemical Resistant Gloves (specify the type of glove based on chemical hazard)			
Insulated Gloves	O		
Work Gloves*	R		
Foot			
Safety Boots (steel toe and shank)	R		
Rubber, Chemical Resistant Boots			
Rubber Boots			
Disposable Boot Covers			
Respiratory Protection			
1/2 Mask APR			
Full Face APR			
Dust Protection			
Powered APR			
SCBA			
Air Line			

ARCADIS

Appendix E

MSDSs

MATERIAL SAFETY DATA SHEET

ALCONOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	**ALCONOX®**
CHEMICAL FAMILY NAME:	Detergent.
PRODUCT USE:	Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER:	Not Applicable
U.N. DANGEROUS GOODS CLASS:	Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME:	Alconox, Inc.
ADDRESS:	30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE:	**TOLL-FREE in USA/Canada** 800-255-3924
	International calls 813-248-0585
BUSINESS PHONE:	914-948-4040
DATE OF PREPARATION:	May 2011
DATE OF LAST REVISION:	February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white granular powder with little or no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable solid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS

Non-Regulated

CANADA (WHMIS) SYMBOLS

EUROPEAN and (GHS) Hazard Symbols

Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1
EC# 205-633-8 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-838-7 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-767-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 207-638-8 Index# 011-005-00-2
EC# 205-788-1 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):

Eye Irritant Category 2A

Hazard Statement(s):

H319: Causes serious eye irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray
P264: Wash hands thoroughly after handling
P271: Use only in well ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection/

Hazard Symbol(s):

[Xi] Irritant

Risk Phrases:
R20: Harmful by inhalation
R36/37/38: Irritating to eyes, respiratory system and skin

Safety Phrases:
S8: Keep container dry
S22: Do not breath dust
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS: ACUTE: Eye, respiratory System, Skin CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Sodium Bicarbonate	144-55-8	205-633-8	1044	33 - 43%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Tripolyphosphate	7758-29-4	231-838-7	1469	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tetrasodium Pyrophosphate	7722-88-5	231-767-1	1140	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Carbonate	497-19-8	207-638-8	1135	1 - 10%	HAZARD CLASSIFICATION: [Xi] Irritant RISK PHRASES: R36
Sodium Alcohol Sulfate	151-21-3	205-788-1	0502	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing dificulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

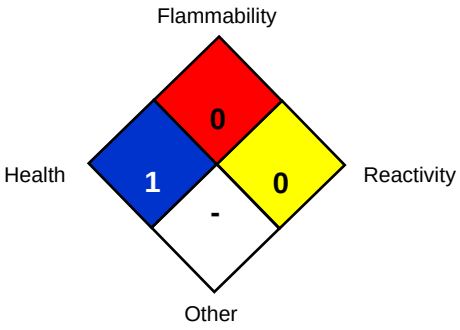
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT: Not Flammable
AUTOIGNITION TEMPERATURE: Not Applicable
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): NA Upper (UEL): NA
FIRE EXTINGUISHING MATERIALS: As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is non-flammable and has no known explosion hazards.
Explosion Sensitivity to Mechanical Impact: Not Sensitive.
Explosion Sensitivity to Static Discharge: Not Sensitive
SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD (BLUE)	1
FLAMMABILITY HAZARD (RED)	0
PHYSICAL HAZARD (YELLOW)	0

PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8

For Routine Industrial Use and Handling Applications

Hazard Scale: **0** = Minimal **1** = Slight **2** = Moderate **3** = Serious **4** = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.
SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Sweep, shovel or vacuum spilled material and place in an appropriate container for re-use or disposal. Avoid dust generation if possible. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Sodium Bicarbonate	144-55-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Tripolyphosphate	7758-29-4	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Tetrasodium Pyrophosphate	7722-88-5	5 mg/m³	5 mg/m³	5 mg/m³
Sodium Carbonate	497-19-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Alcohol Sulfate	151-21-3	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Based on test data, exposure limits should not be exceeded under normal use conditions when using Alconox Detergent. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
APPEARANCE & ODOR:	White granular powder with little or no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	Not Applicable
VAPOR DENSITY (AIR=1):	Not Applicable.
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Applicable.
BOILING POINT (C°):	Not Applicable.
FREEZING POINT (C°):	Not Applicable.
pH:	9.5 (1% aqueous solution)
SPECIFIC GRAVITY 20°C: (WATER =1)	0.85 – 1.1
SOLUBILITY IN WATER (%)	>10% w/w
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable
DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx)
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Contact with incompatible materials and dust generation.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is available for mixture:

CAS# 497-19-8 LD50 Oral (Rat)	4090 mg/kg
CAS# 497-19-8 LD50 Oral (Mouse)	6600 mg/kg
CAS# 497-19-8 LC50 Inhalation (Rat)	2300 mg/m³ 2H
CAS# 497-19-8 LC50 Inhalation (Mouse)	1200 mg/m³ 2H
CAS# 7758-29-4 LD50 Oral (Rat)	3120 mg/kg
CAS# 7758-29-4 LD50 Oral (Mouse)	3100 mg/kg
CAS# 7722-88-5 LD50 Oral (Rat)	4000 mg/kg

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.
IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.
SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.
REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: No Data available at this time.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Non-Regulated Material
HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable
UN IDENTIFICATION NUMBER: Not Applicable
PACKING GROUP: Not Applicable.
DOT LABEL(S) REQUIRED: Not Applicable
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable
MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:
This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):
This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:
This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: Yes Chronic Health: No Fire: No Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Controlled Product, Hazard Class D2B as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory if Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF ALCONOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDA certified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-inplace. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.

Material Safety Data Sheet Collection
Genium group inc.
1171 RiverFront Center, Amsterdam, NY 12010
(518) 842-4111

Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification 61

Material Name: Bentonite **CAS Number:** 1302-78-9
Chemical Formula: Unknown
EINECS Number: 215-108-5
ACX Number: X1006363-7
Synonyms: ALBAGEL PREMIUM USP 4444; BENTONITE; BENTONITE 2073; BENTONITE MAGMA; COLLOIDAL CLAY; HI-JEL; IMVITE I.G.B.A; MAGBOND; MONTMORILLONITE; OTAYLITE; PANTHER CREEK BENTONITE; SOUTHERN BENTONITE; TIXOTON; VOLCALY BENTONITE BC; VOLCLAY; WILKINITE; WILKONITE
General Use: emulsifier for oils; base for plasters; pharmaceutic aid; granular carrier; liq clarifier; reagglomerating agent for iron ore; cracking catalyst for petro; agent in drilling mud; in foundry molding sands; lubricant for extrusion of animal feed; absorbent in pet litter, for purifying oils, etc; in sugar purification, brewing, paper industries; cement slurries for oil-wells, canal walls; asphalt modifier; thickener in greases & fireproofing; cosmetics; decolorizing agent; filler in ceramics, etc; polishes & abrasives; food additive.

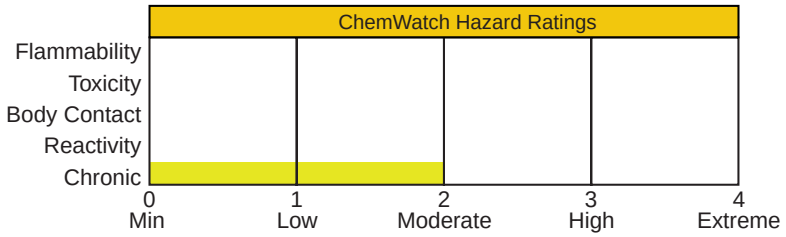
Section 2 - Composition / Information on Ingredients

Name	CAS	%
bentonite	1302-78-9	>95

OSHA PEL **NIOSH REL**

ACGIH TLV

Section 3 - Hazards Identification



ANSI Signal Word

Caution

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Cream to pale brown powder; in massive condition varies from yellowish-white to almost black; light yellow or green, cream, pink, gray to black; odorless. Irritating. Other Acute Effects: may be harmful. Chronic: lung irritation; asthma.

Potential Health Effects

Target Organs: eyes, skin, respiratory system
Primary Entry Routes: accidental skin and eye contact, inhalation of generated dusts
Acute Effects

Inhalation: The dust is discomforting to the upper respiratory tract. Persons with impaired respiratory function, airway diseases, or conditions such as emphysema or chronic bronchitis may incur further disability if excessive concentrations of particulate are inhaled. Effects on lungs are significantly enhanced in the presence of respirable particles.
Eye: The dust may produce eye discomfort and abrasive eye inflammation.
Skin: The material may be abrasive to the skin.
Ingestion: Considered an unlikely route of entry in commercial/industrial environments. The solid/dust is slightly discomforting to the gastrointestinal tract.

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Carcinogenicity: NTP - Not listed; IARC - Not listed; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Not listed; MAK - Not listed.

Chronic Effects: Chronic dust inhalation has been associated with lung disease. Symptoms are those of nodular fibrosis and respiratory impairment is characterized by obstruction and restriction of lung function. Long-term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray. Repeated exposures, in an occupational setting, to high levels of fine-divided dusts may produce a condition known as pneumoconiosis which is the lodgement of any inhaled dusts in the lung irrespective of the effect.

Section 4 - First Aid Measures

Inhalation: • If dust is inhaled, remove to fresh air.
• Encourage patient to blow nose to ensure clear breathing passages.
• Ask patient to rinse mouth with water but to not drink water.
• Seek immediate medical attention.

Eye Contact: • Immediately hold the eyes open and flush with fresh running water.
• Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
• Seek medical attention if pain persists or recurs.
• Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: • Wash affected areas thoroughly with water (and soap if available).
• Seek medical attention in event of irritation.

Ingestion: • DO NOT induce vomiting. Contact a Poison Control Center. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
• Observe the patient carefully.
• Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e., becoming unconscious.
• Give water (or milk) to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
• Seek medical advice.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Long-term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than
0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray.

Section 5 - Fire-Fighting Measures

Extinguishing Media: There is no restriction on the type of extinguisher which may be used.

General Fire Hazards/Hazardous Combustion Products: • Noncombustible.
• Not considered to be a significant fire risk; however, containers may burn.

Fire Incompatibility: None known.

Fire-Fighting Instructions: • Contact fire department and tell them location and nature of hazard.
• Wear breathing apparatus plus protective gloves.
• Prevent, by any means available, spillage from entering drains or waterways.
• Use fire fighting procedures suitable for surrounding fire.

Section 6 - Accidental Release Measures

Small Spills: • Clean up all spills immediately.
• If exposure to workplace dust is not controlled, respiratory protection is required; wear NIOSH-approved dust respirator.
• Use dry clean up procedures and avoid generating dust.
• Place in clean drum then flush area with water.

Large Spills: • Clear area of personnel and move upwind.
• If exposure to workplace dust is not controlled, respiratory protection is required; wear NIOSH-approved dust respirator.
• Prevent, by any means available, spillage from entering drains or waterways.
• Use dry clean up procedures and avoid generating dust.
• Recover uncontaminated product in clean, dry, labeled containers.
• Collect recoverable product into labeled containers for recycling.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: • Limit all unnecessary personal contact.
• Wear protective clothing when risk of exposure occurs.
• Use in a well-ventilated area.
• Avoid contact with incompatible materials.

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- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Follow good occupational work practices.
- Observe manufacturer's storage and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- Avoid generating and breathing dust.

Recommended Storage Methods: Multi-ply paper bag with sealed plastic liner or heavy gauge plastic bag. Bags should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse. Check that all containers are clearly labeled and free from leaks.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls:
- Use in a well-ventilated area. Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of: (a): particle dust respirators, if necessary, combined with an absorption cartridge; (b): filter respirators with absorption cartridge or canister of the right type; (c): fresh-air hoods or masks
- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Personal Protective Clothing/Equipment:

Eyes: Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Safety glasses with side shields.

Hands/Feet: PVC gloves.

Other: No special equipment needed when handling small quantities. Otherwise:
- Overalls.
- Barrier cream.
- Eyewash unit.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Light pink, off white impalpable powder with no distinct odor. Insoluble in common organic solvents. Extremely slippery when wet.

Physical State: cream to pale brown powder, in massive condition varies from yellowish-white to almost black; light yellow or green, cream, pink, gray to black

Specific Gravity (H_2O=1, at 4 °C): approximately 2.6

pH: In presence of water 9

Freezing/Melting Point: 1337 °C (2439 °F)

Water Solubility: Insoluble in Water or Acids

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: No data found.

Section 11 - Toxicological Information

No significant acute toxicological data identified in literature search.

See *RTECS* CT9450000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: No data found.

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible. Bury residue in an authorized landfill. Recycle containers if possible, or dispose of in an authorized landfill.

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Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: No data found.

Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed
CERCLA 40 CFR 302.4: Not listed
SARA 40 CFR 372.65: Not listed
SARA EHS 40 CFR 355: Not listed
TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

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Material Safety Data Sheet Collection
Genium group inc.
1171 RiverFront Center, Amsterdam, NY 12010
(518) 842-4111

Issue Date: 2006-06

Unleaded Petrol
AUT5000

Section 1 - Chemical Product and Company Identification 61

Material Name: Unleaded Petrol **CAS Number:** 8006-61-9
Chemical Formula: Mixture of hydrocarbons
EINECS Number: 232-349-1
ACX Number: X1003056-5
Synonyms: AUTOMOTIVE GASOLINE, LEAD-FREE; GASOLINE; MOTOR FUEL; MOTOR SPIRITS; NATURAL GASOLINE; PETROL; UNLEADED PETROL
General Use: Lead free motor fuel for internal combustion engines, 2-stroke and 4-stroke.

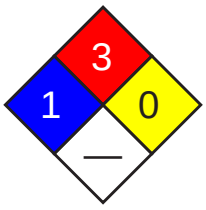
Section 2 - Composition / Information on Ingredients

Name	CAS	%
gasoline	8006-61-9	>90
benzene	71-43-2	5 max.

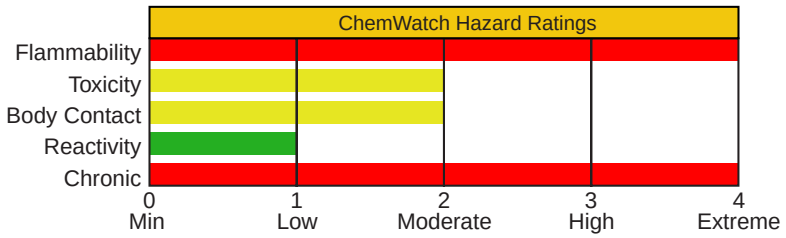
OSHA PEL **NIOSH REL**

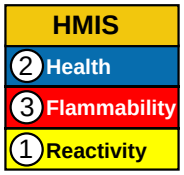
ACGIH TLV
TWA: 300 ppm, 890 mg/m^3;
STEL: 500 ppm, 1480 mg/m^3.

Section 3 - Hazards Identification



Fire Diamond





ANSI Signal Word

Danger!

Flammable

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Clear liquid; distinctive odor. Irritating to eyes/skin/respiratory tract. Other Acute Effects: dizziness, drunkenness, unconsciousness. Chronic Effects: dermatitis. Possible cancer hazard. Flammable.

Potential Health Effects

Target Organs: skin, eye, respiratory system, central nervous system (CNS)
Primary Entry Routes: inhalation, ingestion, skin contact

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Acute Effects

Inhalation: The vapor is discomforting to the upper respiratory tract and may be harmful if exposure is prolonged. Inhalation hazard is increased at higher temperatures. Acute effects from inhalation of high concentrations of vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination. If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death. WARNING: Intentional misuse by concentrating/inhaling contents may be lethal. High inhaled concentrations of mixed hydrocarbons may produce narcosis characterized by nausea, vomiting and lightheadedness. Inhalation of aerosols may produce severe pulmonary edema, pneumonitis and pulmonary hemorrhage. Inhalation of petroleum hydrocarbons consisting substantially of low molecular weight species may produce irritation of mucous membranes, incoordination, giddiness, nausea, vertigo, confusion, headache, appetite loss, drowziness, tremors and anesthetic stupor. Massive exposures may produce central nervous system depression with sudden collapse and deep coma; fatalities have been recorded. Irritation of the brain and/or apneic anoxia may produce convulsions. Although recovery following overexposure is generally complete, cerebral micro- hemorrhage of focal post-inflammatory scarring may produce eleptiform seizures some months after the exposure. Pulmonary episodes may include chemical pneumonitis with edema and hemorrhage. The lighter hydrocarbons may produce kidney and neurotoxic effects. Liquid paraffins may produce anesthesia and depressant actions leading to weakness, dizziness, slow and shallow respiration, unconsciousness, convulsions and death. C_{5-7} paraffins may also produce polyneuropathy. Aromatic hydrocarbons accumulate in lipid-rich tissues (typically the brain, spinal cord and peripheral nerves) and may produce functional impairment manifested by nonspecific symptoms such as nausea, weakness, fatigue, vertigo; severe exposures may produce inebriation or unconsciousness. Many of the petroleum hydrocarbons are cardiac sensitizers and may cause ventricular fibrillations.

Eye: The liquid may produce eye discomfort and is capable of causing temporary impairment of vision and/or transient eye inflammation, ulceration. The vapor is discomforting to the eyes. Petroleum hydrocarbons may produce pain after direct contact with the eyes. Slight, but transient, disturbances of the corneal epithelium may also result. The aromatic fraction may produce irritation and lachrymation. The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Skin: The material is moderately discomforting to the skin if exposure is prolonged. The material contains a component that may be absorbed through the skin and may cause drying of the skin, which may lead to dermatitis from repeated exposures over long periods. Toxic effects may result from skin absorption. Open cuts, abraded or irritated skin should not be exposed to this material. The material may accentuate any pre-existing dermatitis condition.

Ingestion: Considered an unlikely route of entry in commercial/industrial environments. The liquid may produce gastrointestinal discomfort and may be harmful if swallowed. Ingestion may result in nausea, pain and vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis. Ingestion of petroleum hydrocarbons may produce irritation of the pharynx, esophagus, stomach and small intestine with edema and mucosal ulceration. Resulting symptoms include a burning sensation in the mouth and throat. Large amounts may produce narcosis with nausea and vomiting, weakness or dizziness, slow and shallow respiration, swelling of the abdomen, unconsciousness and convulsions. Myocardial injury may produce arrhythmias, ventricular fibrillation and electrocardiographic changes. Central nervous system depression may also occur. Light aromatic hydrocarbons produce a warm, sharp, tingling sensation on contact with taste buds and may anesthetize the tongue. Aspiration into the lungs may produce coughing, gagging, and a chemical pneumonitis with pulmonary edema and hemorrhage.

Carcinogenicity: NTP - Not listed; IARC - Group 2B, Possibly carcinogenic to humans; OSHA - Not listed; NIOSH - Listed as carcinogen; ACGIH - Class A3, Animal carcinogen; EPA - Not listed; MAK - Not listed.

Chronic Effects: Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes. Prolonged or continuous skin contact with the liquid may cause defatting with drying, cracking, irritation and dermatitis following. Chronic poisoning may occur from vapor inhalation or skin absorption. The most significant toxic effect is insidious and irreversible injury to the blood-forming tissue by benzene. Leukemia may develop. Chronic exposure may cause headache, fatigue, loss of appetite and lassitude with incipient blood effects including anemia and blood changes. Gasoline "sniffing" has caused severe nerve damage. Repeated or prolonged exposure to mixed hydrocarbons may produce narcosis with dizziness, weakness, irritability, concentration and/or memory loss, tremor in the fingers and tongue, vertigo, olfactory disorders, constriction of visual field, paresthesias of the extremities, weight loss and anemia and degenerative changes in the liver and kidney. Chronic exposure by petroleum workers to the lighter hydrocarbons has been associated with visual disturbances, damage to the central nervous system, peripheral neuropathies (including numbness and paresthesias), psychological and neurophysiological deficits, bone marrow toxicities (including hypoplasia, possibly due to benzene) and hepatic and renal involvement. Chronic dermal exposure to petroleum hydrocarbons may result in defatting which produces localized dermatoses. Surface cracking and erosion may also increase susceptibility to infection by microorganisms.

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Section 4 - First Aid Measures

Inhalation: Remove to fresh air. Lay patient down. Keep warm and rested.
If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital, or doctor.

See DOT ERG

Eye Contact: Immediately hold the eyes open and wash continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids. Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately remove all contaminated clothing, including footwear (after rinsing with water). Wash affected areas thoroughly with water (and soap if available). Seek medical attention in event of irritation.

Ingestion: Contact a Poison Control Center. If swallowed, do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short term repeated exposures to petroleum distillates or related hydrocarbons:

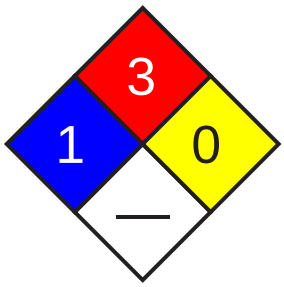
1. Primary threat to life from pure petroleum distillate ingestion and/or inhalation is respiratory failure.
2. Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO_2 <50 mm Hg or pCO_2 >50 mm Hg) should be intubated.
3. Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
4. A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.
5. Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.
Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
6. Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients.

Section 5 - Fire-Fighting Measures

Flash Point: -43 °C
Autoignition Temperature: 280 °C
LEL: 1.4% v/v
UEL: 7.6% v/v

See DOT ERG

Extinguishing Media: Foam. Dry chemical powder.
Bromochlorodifluoromethane (BCF) (where regulations permit). Carbon dioxide.



Fire Diamond

General Fire Hazards/Hazardous Combustion Products: Liquid and vapor are highly flammable. Severe fire hazard when exposed to heat, flame and/or oxidizers. Vapor forms an explosive mixture with air. Severe explosion hazard, in the form of vapor, when exposed to flame or spark. Vapor may travel a considerable distance to source of ignition. Heating may cause expansion/decomposition with violent rupture of containers. On combustion, may emit toxic fumes of carbon monoxide (CO).

Fire Incompatibility: Avoid contamination with oxidizing agents, i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc., as ignition may result.

Fire-Fighting Instructions: Alert fire department and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or water ways. If safe, switch off electrical equipment until vapour fire hazard removed. Use water delivered as a fine spray to control fire and cool adjacent area. Avoid spraying water onto liquid pools. Do not approach containers suspected to be hot. Cool fire exposed containers with water spray from a protected location. If safe to do so, remove containers from path of fire.

Section 6 - Accidental Release Measures

Small Spills: Remove all ignition sources. Clean up all spills immediately. Avoid breathing vapors and contact with skin and eyes. Control personal contact by using protective equipment. Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.

See DOT ERG

Large Spills: Clear area of personnel and move upwind. Alert fire department and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or water ways. No smoking, naked lights or ignition sources. Increase ventilation. Stop leak if safe to do so.
Water spray or fog may be used to disperse/absorb vapor. Contain spill with sand, earth or vermiculite. Use only

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spark-free shovels and explosion proof equipment. Collect recoverable product into labeled containers for recycling. Absorb remaining product with sand, earth or vermiculite. Collect solid residues and seal in labelled drums for disposal. Wash area and prevent runoff into drains.
If contamination of drains or waterways occurs, advise emergency services.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Avoid generating and breathing mist. Avoid all personal contact, including inhalation. Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area. Prevent concentration in hollows and sumps. DO NOT enter confined spaces until atmosphere has been checked. Avoid smoking, bare lights, heat or ignition sources. When handling, DO NOT eat, drink or smoke. Vapor may ignite on pumping or pouring due to static electricity. DO NOT use plastic buckets. Ground and secure metal containers when dispensing or pouring product. Use spark-free tools when handling. Avoid contact with incompatible materials. Keep containers securely sealed. Avoid physical damage to containers. Always wash hands with soap and water after handling. Work clothes should be laundered separately. Use good occupational work practices. Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

Recommended Storage Methods: Metal can, metal drum. Packing as recommended by manufacturer. Check all containers are clearly labeled and free from leaks.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: CARE: Use of a quantity of this material in confined space or poorly ventilated area, where rapid build-up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear. Use in a well-ventilated area. If inhalation risk of overexposure exists, wear a NIOSH approved organic-vapor respirator. Correct respirator fit is essential to obtain adequate protection. In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus. Provide adequate ventilation in warehouse or closed storage areas.

Personal Protective Clothing/Equipment:

Eyes: Safety glasses with side shields; or as required, chemical goggles.
Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Barrier cream with polyethylene gloves or PVC gloves. Safety footwear. Do NOT use this product to clean the skin.

Respiratory Protection:

Exposure Range >300 to 1000 ppm: Air Purifying, Negative Pressure, Half Mask
Exposure Range >1000 to 15,000 ppm: Air Purifying, Negative Pressure, Full Face
Exposure Range >15,000 to 300,000 ppm: Supplied Air, Constant Flow/Pressure Demand, Full Face
Exposure Range >300,000 to unlimited ppm: Self-contained Breathing Apparatus, Pressure Demand, Full Face
Cartridge Color: black

Other: Overalls. Ensure that there is ready access to eye wash unit. Ensure there is ready access to an emergency shower.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Purple, highly flammable, volatile liquid with characteristic sharp odor. Floats on water. Consists of a complex mixture of hydrocarbons with small amounts of residual benzene from the refining operations.

Physical State: Liquid
Odor Threshold: 0.005 ppm
Vapor Pressure (kPa): 53.33 at 20 °C
Vapor Density (Air=1): > 2
Formula Weight: Not applicable.
Specific Gravity (H_2O=1, at 4 °C): 0.72-0.735 at 15 °C
Evaporation Rate: Fast
pH: Not applicable
pH (1% Solution): Not applicable.
Boiling Point: 38.89 °C (102 °F)
Freezing/Melting Point: Not available
Volatile Component (% Vol): 100
Decomposition Temperature (°C): Not available.
Water Solubility: Insoluble

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Presence of incompatible materials. Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: Avoid storage with oxidizers.

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Section 11 - Toxicological Information

Toxicity
Oral (rat) LD_{50}: 18800 mg/kg

Irritation
Skin (rabbit): 500 mg/24h mild

Section 12 - Ecological Information

Environmental Fate: No data found.
Ecotoxicity: No data found.
Biochemical Oxygen Demand (BOD): 8%, 5 days

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options and recycle where possible. Follow all applicable federal, state, and local laws. Incinerate residue at an approved site. Recycle containers where possible, or dispose of in an authorized landfil.
BEWARE: Empty solvent, paint, lacquer and flammable liquid drums present a severe explosion hazard if cut by flame torch or welded. Even when thoroughly cleaned or reconditioned, the drum seams may retain sufficient solvent to generate an explosive atmosphere in the drum.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: Gasoline
ID: UN1203
Hazard Class: 3 - Flammable and combustible liquid
Packing Group: II - Medium Danger
Symbols:
Label Codes: 3 - Flammable Liquid
Special Provisions: 139, B33, B101, T8
Packaging: **Exceptions:** 150 **Non-bulk:** 202 **Bulk:** 242
Quantity Limitations: **Passenger aircraft/rail:** 5 L **Cargo aircraft only:** 60 L
Vessel Stowage: **Location:** E **Other:**

Section 15 - Regulatory Information

EPA Regulations:
RCRA 40 CFR: Not listed
CERCLA 40 CFR 302.4: Not listed
SARA 40 CFR 372.65: Not listed
SARA EHS 40 CFR 355: Not listed
TSCA: Listed

Section 16 - Other Information

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Material Safety Data Sheet Collection
Genium group inc.
1171 RiverFront Center, Amsterdam, NY 12010
(518) 842-4111

Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification 61

Material Name: Isobutene
CAS Number: 115-11-7
Chemical Formula: C_4H_8
Structural Chemical Formula: $(CH_3)_2C=CH_2$
EINECS Number: 204-066-3
ACX Number: X1003822-9
Synonyms: Isobutene; ISOBUTYLENE; ASYM-DIMETHYLETHYLENE; GAMMA-BUTYLENE; 1,1-DIMETHYLETHYLENE; ISO-BUTENE; ISOBUTENE; ISOPROPYLIDENEMETHYLENE; LIQUEFIED PETROLEUM GAS; 2-METHYL-1-PROPENE; 2-METHYLPROPENE; 2-METHYLPROPYLENE; 1-PROPENE,2-METHYL-; PROPENE,2-METHYL-; UNSYM. DIMETHYLETHYLENE
General Use: Production of butene polymers used as adhesives, tackifiers, oil additives.
Butyl rubbers, copolymer resins with butadiene, acrylates and methacrylates.
Also to produce anti-oxidants for foods, food supplements, plastics and in production of isooctane and high-octane aviation gasoline.
Used in closed pressurized systems, fitted with safety relief valve.
Vented gas is flammable, denser than air and will spread. Vent path must not contain ignition sources, pilot lights, bare flames.

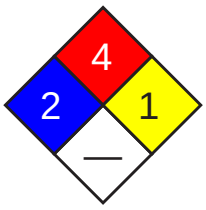
Section 2 - Composition / Information on Ingredients

Name	CAS	%
isobutene	115-11-7	>99

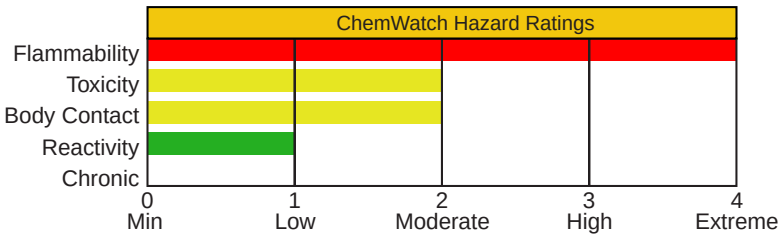
OSHA PEL **NIOSH REL**

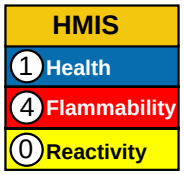
ACGIH TLV

Section 3 - Hazards Identification



Fire Diamond





ANSI Signal Word

Danger!

Flammable

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Colorless gas. Acute Effects: Simple asphyxiant which can displace available oxygen; initial symptoms: rapid respiration, air hunger, diminished mental alertness, impaired muscular coordination. Can form explosive mixtures in air. Flammable.

Potential Health Effects

Target Organs: None reported
Primary Entry Routes: inhalation
Acute Effects
Inhalation: The gas is a simple asphyxiant (precludes access to oxygen) and is harmful if exposure is prolonged and inhalation may cause loss of consciousness.

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Acute effects from inhalation of high concentrations of gas / vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination.
If exposure to highly concentrated atmosphere of gas is prolonged this may lead to narcosis, unconsciousness, even coma, and unless resuscitated, death.
Iso-butene is a simple asphyxiant and may have a narcotic action.
Material is highly volatile and may quickly form concentrated atmosphere in confined or unventilated area. Vapor is heavier than air and may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.
Hydrocarbons may sensitize the heart to adrenalin and other circulatory catecholamines; as a result cardiac arrhythmias and ventricular fibrillation may occur. Abrupt collapse may produce traumatic injury.
Central nervous system (CNS) depression may be evident early. Symptoms of moderate poisoning may include giddiness, headache, dizziness and nausea.
Serious poisonings may result in respiratory depression and may be fatal.
The paraffin gases C1-4 are practically non-toxic below their lower flammability limits (18000-50000 ppm). Above this level, incidental effects include CNS depression and irritation but these are reversible upon cessation of the exposure. The C3 and iso-C5 hydrocarbons show increasing narcotic properties; branching of the chain also enhances the effect.
The C4 hydrocarbons appear to be more highly neurotoxic than the C3 and C5 members. Several fatalities due to voluntary inhalation of butane have been reported, possibly due to central, respiratory and circulatory effects resulting from anesthesia, laryngeal edema, chemical pneumonia or the combined effects of cardiac toxicity and increased sympathomimetic effects.
Inhalation of petroleum gases may produce narcosis, due in part to olefinic impurities. Displacement of oxygen in the air may cyanosis.
If present in sufficient quantity these gases may reduce the oxygen level to below 18% producing asphyxiation.
Symptoms include rapid respiration, mental dullness, lack of coordination, poor judgement, nausea and vomiting.
The onset of cyanosis may lead to unconsciousness and death.

Eye: The liquid is highly discomforting and may cause severe cold burns and is capable of causing pain and severe conjunctivitis.
Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.
The gas is regarded as non-irritating to the eyes.

Skin: Vaporizing liquid causes rapid cooling and contact may cause cold burns, frostbite.The liquid is discomforting to the skin and may rapidly cause severe cold burns.
Bare unprotected skin should not be exposed to this material.
There is no evidence of skin absorption but contact may cause frostbite,

Ingestion: Overexposure is unlikely in this form.
Considered an unlikely route of entry in commercial/industrial environments.
The liquid is highly discomforting if swallowed and may cause severe cold burns.

Carcinogenicity: NTP - Not listed; IARC - Not listed; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Not listed; MAK - Not listed.

Chronic Effects: Chronic overexposure may produce dermatitis.

Section 4 - First Aid Measures

Inhalation: Avoid becoming a casualty and remove to fresh air.
Lay patient down. If breathing is shallow or has stopped, ensure clear airway and apply resuscitation.
If available, medical oxygen should be administered by trained personnel.
Transport to hospital or doctor, without delay.

See DOT ERG

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.
Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: In case of cold burns (frost-bite): Bathe the affected area immediately in cold water for 10 to 15 minutes, immersing if possible and without rubbing.
Do not apply hot water or radiant heat. Apply a clean, dry dressing.
Transport to hospital or doctor.

Ingestion: Contact a Poison Control Center. DO NOT induce vomiting. Observe the patient carefully. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. Give water (or milk) to rinse out mouth. Then provide liquid slowly and as much as casualty can comfortably drink. Transport to hospital or doctor without delay.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to petroleum distillates or related hydrocarbons:
1.Primary threat to life from pure petroleum distillate ingestion and/or inhalation is respiratory failure.

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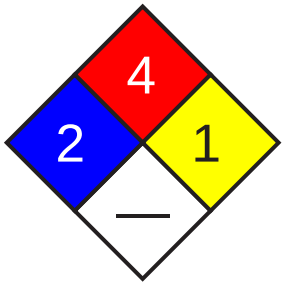
2.Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO_2 <50 mm Hg or pCO_2 >50 mm Hg) should be intubated.
3.Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
4.A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.
5.Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.
Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
6.Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients.

Section 5 - Fire-Fighting Measures

Flash Point: -76.111 °C
Autoignition Temperature: 465 °C
LEL: 1.8% v/v
UEL: 9.6% v/v
Extinguishing Media: Water spray or fog; dry chemical powder.
Carbon dioxide.
Foam.

See DOT ERG



Fire Diamond

General Fire Hazards/Hazardous Combustion Products: Flammable gas. Liquid and vapor are highly flammable.
Dangerous hazard when exposed to heat, flame and oxidizers.
Gas may form explosive mixtures with air over a wide area.
Decomposes on heating and produces toxic fumes of carbon monoxide (CO) and carbon dioxide (CO_2).
Fire Incompatibility: Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.
Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.
May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.
Do not extinguish burning gas. If safe to do so, stop flow of gas.
If flow of gas cannot be stopped, leave gas to burn.
Cool fire-exposed containers with water spray from a protected location.
Do not approach cylinders suspected to be hot.
If safe to do so, remove containers from path of fire.
Fight fire from a safe distance, with adequate cover.

Section 6 - Accidental Release Measures

Small Spills: Avoid breathing vapor and any contact with liquid or gas. Protective equipment including respirator should be used. Do NOT enter confined spaces where gas may have accumulated. Shut of all sources of possible ignition and increase ventilation. Clear area of personnel. Stop leak only if safe to so do. Remove leaking cylinders to safe place. Release pressure under safe controlled conditions by opening valve. Keep area clear of personnel until gas has dispersed.

See DOT ERG

Large Spills: DO NOT touch the spill material. Shut off all possible sources of ignition and increase ventilation. Restrict access to area. Clear area of personnel and move upwind.
May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.
Avoid spraying water onto liquid pools.
Use extreme caution to avoid a violent reaction.
Stop leak if safe to do so.
DO NOT enter confined places where gas may have collected. Remove leaking cylinders to a safe place. Fit vent pipes. Release pressure under safe, controlled conditions by opening valve. Burn issuing gas at vent pipes.
Do not exert excessive pressure on valve; do not attempt to operate damaged valve.
Keep area clear of personnel until gas has dispersed
Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use good occupational work practices. Use in a well-ventilated area.

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Obtain a work permit before attempting any repairs.
Do not attempt repair work on lines, vessels under pressure.
Atmospheres must be tested and O.K. before work resumes after leakage.
Wear protective clothing and gloves when handling containers.
No smoking, bare lights, heat or ignition sources.
Use spark-free tools when handling. Ground all lines and equipment.
Prevent concentration in hollows and sumps. DO NOT enter confined spaces until atmosphere has been checked.
Gas may travel a considerable distance to source of ignition.
Vapor may ignite on pumping or pouring due to static electricity.
Avoid physical damage to containers.
DO NOT transfer gas from one cylinder to another.
Natural gases contain a contaminant, radon-222, a naturally occurring radioactive gas. During subsequent processing, radon tends to concentrate in liquified petroleum streams and in product streams having similar boiling points.
Industry experience indicates that the commercial product may contain small amounts of radon-222 and its radioactive decay products (radon daughters). The actual concentration of radon-222 and radioactive daughters in process equipment (IE lines, filters, pumps and reactor units) may reach significant levels and produce potentially damaging levels of gamma radiation. A potential external radiation hazard exists at or near any pipe, valve or vessel containing a radon enriched stream or containing internal deposits of radioactive material. Field studies, however, have not shown that conditions exist that expose the worker to cumulative exposures in excess of general population limits. Equipment containing gamma-emitting decay products should be presumed to be internally contaminated with alpha- emitting decay products which may be hazardous if inhaled or ingested.
During maintenance operations that require the opening of contaminated process equipment, the flow of gas should be stopped and a four hour delay enforced to allow gamma-radiation to drop to background levels. Protective equipment (including high efficiency particulate respirators (P3) suitable for radionucleotides or supplied air) should be worn by personnel entering a vessel or working on contaminated process equipment to prevent skin contamination or inhalation of any residue containing alpha-radiation.
Airborne contamination may be minimized by handling scale and/or contaminated materials in a wet state.

Recommended Storage Methods: Packaging as recommended by manufacturer.
Check that containers are clearly labeled.
Cylinder fitted with valve protector cap.
Ensure the use of equipment rated for cylinder pressure.
Ensure the use of compatible materials of construction.
Cylinder valve must be closed when not in use or when empty.
Cylinder must be properly secured either in use or in storage.
WARNING: Suckback into cylinder may result in rupture.
Use back-flow preventive device in piping.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated areaIf gas concentrations are high: or If risk of overexposure exists, wear NIOSH-approved respirator.
Correct fit is essential to obtain adequate protection.
Used in closed pressurized systems; fitted with temperature and pressure safety relief valves which are vented to allow safe dispersal.
Provide adequate ventilation in warehouse or closed storage areas.

Personal Protective Clothing/Equipment:

Eyes: Safety glasses with side shields; or as required, chemical goggles.
Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Protective gloves eg. leather gloves or gloves with leather facing. Neoprene rubber gloves.
Safety footwear.

Other: Operators should be trained in correct use & maintenance of respirators Ensure that there is ready access to breathing apparatus.
Protective overalls, closely fitted at neck and wrist. Eye-wash unit.
IN CONFINED SPACES:
1. Non-sparking protective boots.
2. Static-free clothing.
3. Ensure availability of lifeline.
Staff should be trained in all aspects of rescue work.
Ensure there is ready access to an emergency shower.

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Section 9 - Physical and Chemical Properties

Appearance/General Info: Easily liquified flammable gas or colorless highly volatile liquid. Packed as liquid under pressure and remains liquid only under pressure. Sudden release of pressure or leakage may result in rapid vaporization with generation of large volume of highly flammable / explosive gas. Strong gasoline odor. Floats and boils on water giving a flammable / explosive, visible cloud. Soluble in alcohol, ether, benzene and sulphuric acid.

Physical State: Liquefied gas
Odor Threshold: 1.3 to 3.0 mg/m^3
Vapor Pressure (kPa): 182 kPa at 10 °C
Vapor Density (Air=1): 2.01
Formula Weight: 56.11
Specific Gravity (H_2O=1, at 4 °C): 0.59
Evaporation Rate: Very rapid
pH: Not applicable
pH (1% Solution): Not applicable.
Boiling Point: -6.9 °C (20 °F)
Freezing/Melting Point: -140.35 °C (-220.63 °F)
Volatile Component (% Vol): 100
Water Solubility: Practically insoluble in water

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur.
Storage Incompatibilities: Avoid contact with oxidizing agents.

The interaction of alkenes and alkynes with nitrogen oxides and oxygen may produce explosive addition products; these may form at very low temperatures and explode on heating to higher temperatures (the addition products from 1,3-butadiene and cyclopentadiene form rapidly at -150 °C and ignite or explode on warming to -35 to -15 C). These derivatives ("pseudo- nitrosites") were formerly used to characterize terpene hydrocarbons.

Exposure to air must be kept to a minimum so as to limit the build-up of peroxides which will concentrate in bottoms if the product is distilled.

The product must not be distilled to dryness if the peroxide concentration is substantially above 10 ppm (as active oxygen) since explosive decomposition may occur. Distillate must be immediately inhibited to prevent peroxide formation. The effectiveness of the antioxidant is limited once the peroxide levels exceed 10 ppm as active oxygen. Addition of more inhibitor at this point is generally ineffective.

Prior to distillation it is recommended that the product should be washed with aqueous ferrous ammonium sulfate to destroy peroxides; the washed product should be immediately re-inhibited.

A range of exothermic decomposition energies for double bonds is given as 40-90 kJ/mol. The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy released per unit of mass, rather than on a molar basis (J/g) be used in the assessment. For example, in "open vessel processes" (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 J/g are unlikely to present a danger, whilst those in "closed vessel processes" (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 J/g.

Avoid reactions with oxidizing agents, organic acids, inorganic acids halogenated compounds, polymerizable esters, oxygen, cyanohydrins and molten sulphur.

Section 11 - Toxicological Information

Toxicity
Inhalation (rat) LC_{50}: 620000 mg/m^3/4h

Irritation
Nil reported

See *RTECS* UD 0890000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.
Ecotoxicity: No data found.
BCF: no food chain concentration potential
Biochemical Oxygen Demand (BOD): none

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options.
Discharge to burning flare. Return empty cylinders to supplier.

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Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Note: This material has multiple possible HMT entries. Choose the appropriate one based on state and condition of specific material when shipped.

Shipping Name and Description: Isobutylene *see also* Petroleum gases, liquefied
ID: UN1055
Hazard Class: 2.1 - Flammable gas
Packing Group:
Symbols:
Label Codes: 2.1 - Flammable Gas
Special Provisions: 19, T50
Packaging: **Exceptions:** 306 **Non-bulk:** 304 **Bulk:** 314, 315
Quantity Limitations: **Passenger aircraft/rail:** Forbidden **Cargo aircraft only:** 150 kg
Vessel Stowage: **Location:** E **Other:** 40

Shipping Name and Description: Petroleum gases, liquefied *or* Liquefied petroleum gas
ID: UN1075
Hazard Class: 2.1 - Flammable gas
Packing Group:
Symbols:
Label Codes: 2.1 - Flammable Gas
Special Provisions: T50
Packaging: **Exceptions:** 306 **Non-bulk:** 304 **Bulk:** 314, 315
Quantity Limitations: **Passenger aircraft/rail:** Forbidden **Cargo aircraft only:** 150 kg
Vessel Stowage: **Location:** E **Other:**

Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed
CERCLA 40 CFR 302.4: Not listed
SARA 40 CFR 372.65: Not listed
SARA EHS 40 CFR 355: Not listed
TSCA: Listed

Section 16 - Other Information

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Material Safety Data Sheet
[OSHA 29 CFR 1910.1200]

The QUIKRETE® Companies
One Securities Centre
3490 Piedmont Road, Suite 1300
Atlanta, GA 30329

Emergency Telephone Number
(770) 216-9580

Information Telephone Number
(770) 216-9580

Revision: February 2006

MSDS E

SECTION I: PRODUCT IDENTIFICATION

Product Types: QUIKRETE® DRY PACKAGED PORTLAND CEMENT BASED PRODUCTS (SERIES 4)

QUIKRETE® Product Name	Code #	QUIKRETE® Product Name	Code #
MORTAR MIX	1102	MASON MIX	1136
BASE COAT STUCCO	1139	EXTERIOR STUCCO	1209
FINISH COAT STUCCO	1201	FOAM COATING	1219
MASONRY COATING	2400	MARBLE STUCCO	1802
QUIKWALL® SURFACE BONDING CEMENT	1230	HEAVY DUTY MASONRY COATING	1300
POOL PLASTER	1319	GLASS BLOCK MORTAR	1610
ROOF TILE MORTAR	1140	POOL FINISH	1800
POLYMER MODIFIED SANDED TILE GROUT	1489	SANDED TILE GROUT	1156
THIN-SET FLOOR MIX	1548	THIN-SET WALL MIX	1554
OMNI GROUT SANDED	1490	THIN-SET MULTI-PURPOSE	1550
PEBBLE FINISH	1806	THIN-SET SANDED	1547
BULK MASONRY MORTARS	1162	INCA 1000 MINE SEALANT	1225-50
VENEER STONE MORTAR	1137		
PRO FINISH QUIKRETE ® BLENDED MORTAR MIX			1136-58
QUIKRETE® ONE COAT FIBERGLASS REINFORCED STUCCO SANDED (FORMERLY KNOWN AS QUIKWALL® FIBERGLASS REINFORCED STUCCO			1200
QUIKRETE® ONE COAT FIBERGLASS REINFORCED STUCCO CONCENTRATED (FORMERLY KNOWN AS QUIKWALL FIBERGLASS REINFORCED STUCCO CONCENTRATED)			1216

(ALSO APPLIES TO SPECIALTY AND/OR CUSTOM DESIGNED MORTARS & STUCCOS)

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components	CAS No.	PEL (OSHA) mg/M^3	TLV (ACGIH) mg/M^3
Silica Sand, crystalline	14808-60-7	$\frac{10}{\%SiO_2+2}$	0.05 (respirable)
Portland Cement	65997-15-1	5	5
May Contain one or more of the following ingredients:			
Pulverized Limestone	01317-65-3	5	5
Iron Oxide Pigments	01309-37-1	5	5
Lime	01305-62-0 or 39445-23-3	5	5
Clay	01332-58-7	5	5

Other Limits: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M^3 (respirable free silica) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Appearance: Gray to gray-brown colored powder. Some products contain coarse aggregate. (Quikrete Vinyl Concrete Patcher available in white)

Specific Gravity:	2.6 to 3.15	**Melting Point**	2700 ^{o}F	**Boiling Point:**	2700 ^{o}F
Vapor Pressure:	None	**Vapor Density:**	None	**Evaporation Rate:**	None
Solubility in Water:	Slight	**Odor:**	None		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flammability: Noncombustible and not explosive.

SECTION V - REACTIVITY DATA

Stability: Stable.
Incompatibility (Materials to Avoid): Contact of silica with powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, may cause fires.
Hazardous Decomposition or By-products: Silica will dissolve in Hydrofluoric Acid and produce a corrosive gas - silicon tetrafluoride.
Hazardous Polymerization: Will Not Occur.
Condition to Avoid: Keep dry until used to preserve product utility.

SECTION VI - HEALTH HAZARD DATA

Route(s) of Entry: Inhalation, Skin, Ingestion
Acute Exposure: Product becomes alkaline when exposed to moisture. Exposure can dry the skin, cause alkali burns and effect the mucous membranes. Dust can irritate the eyes and upper respiratory system. Toxic effects noted in animals include, for acute exposures, alveolar damage with pulmonary edema.
C**hronic Exposure:** Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis. Respirable crystalline silica (quartz) can cause silicosis, a fibrosis (scarring) of the lungs and possibly cancer. There is evidence that exposure to respirable silica or the disease silicosis is associated with an increased incidence of Scleroderma, tuberculosis and kidney disorders.

Carcinogenicity Listings:	NTP:	Known carcinogen
	OSHA:	Not listed as a carcinogen
	IARC Monographs:	Group 1 Carcinogen
	California Proposition 65:	Known carcinogen

NTP: The National Toxicology Program, in its "Ninth Report on Carcinogens" (released May 15, 2000) concluded that "Respirable crystalline silica (RCS), primarily quartz dusts occurring in industrial and occupational settings, is *known to be a human carcinogen*, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to RCS and increased lung cancer rates in workers exposed to crystalline silica dust (reviewed in IAC, 1997; Brown *et al*., 1997; Hind *et al*., 1997)
IARC: The International Agency for Research on Cancer ("IARC") concluded that there was "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz or cristobalite." The overall

IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans (*Group 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances or studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of carcinogenic Risks to Humans, Volume 68, "Silica, Some Silicates..." (1997)

Signs and Symptoms of Exposure: Symptoms of excessive exposure to the dust include shortness of breath and reduced pulmonary function. Excessive exposure to skin and eyes especially when mixed with water can cause caustic burns as severe as third degree.

Medical Conditions Generally Aggravated by Exposure: Individuals with sensitive skin and with pulmonary and/or respiratory disease, including, but not limited to, asthma and bronchitis, or subject to eye irritation, should be precluded from exposure. Exposure to crystalline silica or the disease silicosis is associated with increased incidence of scleroderma, Tuberculosis and possibly increased incidence of kidney lesions.

Emergency First Aid Procedures:

Eyes: Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

Skin: Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.

Inhalation: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalation of large amounts of portland cement require immediate medical attention.

Ingestion: Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Spills: If spilled, use dustless methods (vacuum) and place into covered container for disposal or use if not contaminated or wet. Use adequate ventilation.

Waste Disposal Method: The packaging and material may be land filled; however, material should be covered to minimize generation of airborne dust. This product is not classified as a hazardous waste under RCRA or CERCLA.

SECTION VIII - CONTROL MEASURES/PERSONAL PROTECTION

Inhalation: DO NOT BREATE DUST. In dusty environments, the use of an OSHA, MSHA or NIOSH approved respirator is recommended. Local exhaust can be used, if necessary, to control airborne dust levels.

Eyes: Wear tight fitting goggles.

Skin: The use of barrier creams or impervious gloves, boots and clothing to protect the skin from contact is recommended. Following work, workers should shower with soap and water. Precautions must be observed because burns occur with little warning -- little heat is sensed.

WARN EMPLOYEES AND/OR CUSTOMERS OF THE HAZARDS AND REQUIRED OSHA PRECAUTIONS ASSOCIATED WITH THE USE OF THIS PRODUCT.

NOTE: The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to silica contained in our products.

Material Safety Data Sheet

The information presented in these forms is believed to be correct and sufficient to meet the requirements of OSHA Hazard Communication standard (29 CFR 1910.1200) concerning worker's right to know.

The following material safety data sheet covers the hazardous ingredients associated with more than one color aerosol product. As per 29 CFR 1900. 1200 paragraph (g); whenever the hazards associated with similar mixtures are the same, then one MSDS may be prepared to cover several products. This MSDS covers the following Aervoe aerosol products.

PRODUCT NAME: Survey Marking Paint

Non-Fluorescent Colors		Fluorescent Colors	16 oz. I.A.C.		High Delivery	Metallic
201 Red	207 White	220 Red	261 Red	270 Fluorescent Red	281 Red	210 Silver
202 Yellow	208 Hi Visibility Yellow	222 Orange	262 Yellow	272 Fluorescent Orange	282 Yellow	
203 Blue	209 Light Blue	224 Green	263 Blue	274 Fluorescent Green	288 Fluorescent Orange	
204 Green	212 Purple	226 Yellow	265 Orange	275 Fluorescent Red/Orange		
205 Orange		227 Blue	267 White	279 Fluorescent Pink		
206 Black		229 Pink				
		230 Red/Orange				

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: Aervoe Industries, Inc.
ADDRESS: 1100 Mark Circle, Gardnerville, NV 89410
INFORMATION PHONE: 775-783-3100
EMERGENCY PHONE: 1-800-424-9300
DATE REVISED: April 2, 2012
REASON REVISED: Updated

SECTION II - HAZARDOUS INGREDIENTS / SARA III INFORMATION
OCCUPATIONAL EXPOSURE LIMITS

HAZARDOUS COMPONENTS	WEIGHT PERCENT	OSHA PEL	ACGIH TLV		LD50 SPECIES & ROUTE	LC50 SPECIES & ROUTE
Hydrocarbon Propellant (CAS 68476-86-8)	10 - 30	1000 ppm	1000 ppm		N / AV	N / AV
Aliphatic Petroleum Distillates (CAS 64742-89-8)	10 - 30	N / AV	300 ppm		N / AV	N / AV
*Hexane (CAS 110-54-3)	7 - 13	500 ppm	50 ppm (skin)		2870 mg / kg (Rat-Oral)	N / AV
Aliphatic Petroleum Distillates (CAS 64742-88-7)	1 - 5	100 ppm	100 ppm		N / AV	N / AV
Non-Fluorescent Colors Also Contain:						
Acetone (CAS 67-64-1)	7 - 13	1000 ppm	500 ppm		5800 mg / kg (Rat-Oral)	21000 ppm / 8 hr (Rat-Inha)
Metallic Colors Also Contain:						
Acetone (CAS 67-64-1)	30 - 60	1000 ppm	500 ppm		5800 mg / kg (Rat-Oral)	21000 ppm / 8 hr (Rat-Inha)
n-Butyl Acetate (CAS 123-86-4)	1 - 5	150 ppm	150 ppm	200 ppm	N / AV	N / AV
Aliphatic Hydrocarbon (CAS 64742-47-8)	1 - 5	N / AV	N / AV	1200 mg / m^3	N / AV	N / AV

*Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372.

NOTE: N / AP = Not Applicable N / AV = Not Available

SECTION III - PHYSICAL / CHEMICAL CHARACTERISTICS

BOILING POINT: N / AP
SPECIFIC GRAVITY (H20=1): 0.9
VAPOR DENSITY: Heavier than air
SOLUBILITY IN WATER: Partial
EVAPORATION RATE: Faster than n-Butyl Acetate
APPEARANCE AND ODOR: Opaque liquid with hydrocarbon odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: < 0° F (-18° C) METHOD USED: Estimated FLAMMABLE LIMITS - LEL: 0.9% UEL: 13.0%
EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, water spray.
SPECIAL FIRE FIGHTING PROCEDURES: Use water spray to cool containers exposed to heat or fire to prevent pressure build up. Self-contained breathing apparatus should be used if product is involved in fire.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Treat as cylinders of compressed gas. Closed containers may rupture due to pressure build up from extreme temperature.
FLAMMABILITY: Yes - Flammable aerosol under conditions of sparks, flame, or hot surfaces.
SENSITIVITY TO IMPACT: Do not puncture
SENSITIVITY TO STATIC DISCHARGE: Primarily vapors

SECTION V - REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: Open flames, sparks, electrical arcs.
INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizing agents.
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon Monoxide, Carbon Dioxide.
HAZARDOUS POLYMERIZATION: Will not occur

SECTION VI - HEALTH HAZARD DATA

INHALATION: Respiratory tract irritant. May cause dizziness, light-headedness and / or headaches. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.
SKIN CONTACT: Prolonged or repeated contact may cause irritation and dermatitis.
EYE CONTACT: Painful with slight to moderate irritation.
INGESTION: May be harmful or fatal if swallowed
EFFECTS OF CHRONIC OVEREXPOSURE: Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage. Repeated overexposure can also damage kidneys, lungs, liver, heart and blood.
CARCINOGENICITY: The ingredients are not listed as a human carcinogen by IARC, ACGIH, NTP, or OSHA.
TERATOGENICITY: Not established MUTAGENICITY: Not established
MEDICAL CONDITION GENERALLY AGGRAVATED BY EXPOSURE: Not established
EMERGENCY AND FIRST AID PROCEDURES: INHALATION - Remove from exposure, seek medical attention if signs/symptoms persist.
SKIN - Wash affected area with soap and water, remove contaminated clothing, seek medical attention if irritation persists.
EYES - Flush immediately with water for 15 minutes, seek medical attention if irritation persists.
INGESTION - Do not induce vomiting. Contact physician or poison control center immediately.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Remove all sources of ignition. Ventilate area. Prevent from entering a watercourse. Use an inert absorbent material and non-sparking type tools.
WASTE DISPOSAL METHOD: Dispose of in accordance with local, state and federal regulations. Do not incinerate closed containers.
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not store above 120° F (49° C). Do not store or use near heat, sparks or flame.
OTHER PRECAUTIONS: Avoid contact with eyes and skin. Do not breathe vapors, take internally or smoke while using this product.

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION: In areas with poor ventilation, use a NIOSH approved Organic Vapor Cartridge Respirator. For concentrations above the TLV (as defined in Section II), use a positive air supplied respirator.
VENTILATION: General ventilation to maintain exposure limits below TLV's as defined in Section II.
PROTECTIVE GLOVES: Chemical resistant gloves such as Neoprene or Nitrile rubber.
EYE PROTECTION: Safety glasses or goggles.
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Not established.
WORK / HYGIENIC PRACTICES: Avoid prolonged or repeated contact. Do not breathe vapors. Wash contaminated clothing prior to reuse.

SECTION IX - DISCLAIMER

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE SO. NOTHING CONTAINED HEREIN CONSTITUTES A SPECIFICATION NOR IS IT INTENDED TO WARRANT SUITABILITY FOR THE INTENDED USE.

Appendix F

STAR Plan Template

Site Traffic Awareness and Response (STAR) Plan for Private Roadways and Parking Areas

1.0 GENERAL

Project Name	
Project Number	
STAR Plan Developer Name	
Reviewed By:	
Duration of Work (hours or days)	
Time restrictions (state times, describe in Section 2.0)	
Posted Speed Limits for Roadway	
Number of Lanes for Roadway (each direction)	

2.0 WORK DESCRIPTION

Provide a brief description of work activities in the roadway or parking area.

3.0 TRAFFIC TYPE

Check all that apply:

- ☐ Automobiles
- ☐ Straight Trucks
- ☐ Semi Trucks
- ☐ Construction Equipment
- ☐ Forklifts
- ☐ Bicycles
- ☐ Pedestrian
- ☐ Other – Specify:

4.0 TRAFFIC CONTROL LAYOUT

For roadway and parking area work, check all that apply and click link to print layout and attach. Manually revise to address specific requirement.

Roadway Work:

- ☐ Work Beyond the Shoulder (DOT Facts-301i)
- ☐ Work on the Shoulder (DOT Facts-301j)
- ☐ Short Duration Work or Mobile Operations Work on the Shoulder (DOT Facts-301k)
- ☐ Shoulder Closure with Minor Encroachment (DOT Facts-301m)
- ☐ Lane Closure on 2 Lane Road with Flagger (DOT Facts-301n)
- ☐ Lane Closure on 2 Lane Road with Low Traffic Flow (DOT Facts-301o)
- ☐ Temporary Road Closure (DOT Facts-301p)
- ☐ Haul Road Crossing (DOT Facts-301q)
- ☐ Work in the Center of Low Volume Traffic Road (DOT Facts-301r)
- ☐ Atypical Roadway Layout or Work in Congested Facilities (Attach Drawing) (DOT Facts-301u)

Parking Area Work:

DOT Fact Sheets for parking areas have numbered scenarios. Select applicable scenario(s) and work duration (S-Short, I – Intermediate, L – Long)

☐ Short Duration (<1 Hour) Retail Gas Station or Small Single Business (DOT Facts-302a) 1 2 3 4 5

☐ Intermediate Duration (1-8 Hours) Retail Gas Station or Small Single Business (DOT Facts-302b) 1 2 3 4

☐ Long Duration (>8 Hours) Retail Gas Station or Small Single Business (DOT Facts-302c) 1 2 3

☐ Multi Business Parking Lot (Malls, Strip Malls, etc) (DOT Facts-302e) 1 2 3 4 5 6 7 8 9 S I L

☐ Facility Parking Area (DOT Facts-302e) 1 2 3 4 5 6 7 8 9 S I L

☐ Parking Garage (develop drawing for controls)

☐ Other:

5.0 REQUIRED TRAFFIC CONTROL DEVICES

Need Sign Help? DOT Facts-301d
Need Channelizing Device Help? DOT Facts-302d (see also DOT Facts-301e)
Need Flagger Help? DOT Facts-301f
Review Flagger training and certification requirements by state: DOT Facts-301w.

Device	Number Required	Wording or Pictogram	Comments
Warning Signs			
Warning Signs			
Stop/Slow Paddle			
Red Flag			
Channelizing Cones 10 lb			
Channelizing Cones 30 lb			
Cones			
Drums[1]			
Tubular Markers			
Vertical Panels[1]			
Barricade[1] (Type I)			
Barricade[1] (Type II)			
Barricade[1] (Type III)			
Arrow Panels			
Other:			
Other:			
Other:			

Notes:

1) Provide with warning lights if night work or traffic control use is required at night.

All vehicles used in the roadways or parking areas should be equipped with functioning high intensity rotating, flashing, oscillating, or strobe lights. If the vehicle is not equipped with supplemental lighting devices use vehicle flashers (be aware of battery drain when using any of the lighting devices).

Personal protective equipment required for this work is listed in the applicable project Job Loss analysis (JLA) or project specific HASP. A Class II (minimum) high visibility vest is required.

6.0 WORK SEQUENCE FOR ROADWAY WORK (PHASING)

Describe the sequence for placement, working and removal of traffic control devices:

Safely enter street and place cones and barricade type II around work area. Always conduct work facing traffic and be aware of traffic and have another person stand watch for dangerous traffic situation. Upon completion of work, remove roadway equipment with caution.

7.0 APPROVALS

STAR Plan Developer	
Designated HASP Reviewer[1]	

1) An individual with Engineering Judgment may also approve this STAR Plan, even if not a designated HASP Reviewer

8.0 REVIEWED BY:

To be signed by each employee working on the project affected by this STAR Plan:

Name Printed	**Signature**

Attach Applicable DOT Fact Sheets or Drawings

ARCADIS

Appendix G

Shipping Determination Form Template

Hazardous Materials Transportation Form

	Vehicle (place X in box)	Type (pick-up, car, box truck, etc.)
Personal		
Rental		
ARCADIS owned/leased		
Government owned		
Trailer		

Materials Transported	Quantity	Storage/Transport Container

List Trained Drivers:

_____

_____

Hazardous Materials Shipment Form

Material Description and Proper Shipping Name (per DOT or IATA)	Shipment Quantity	DOT Hazard Classification	Shipment Method (air/ground)

List Shipper (i.e., who we are offering the shipment to):

_____

_____

List Trained Employee(s):

_____

_____

ARCADIS

Appendix D

Sediment Sampling and Analysis Plan

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

General Motors LLC

Sampling and Analysis Plan

Former General Motors Assembly Plant Site
Sleepy Hollow, New York

November 2012

Sampling and Analysis Plan

Former General Motors Assembly Plant Site
Sleepy Hollow, New York

Prepared for:
General Motors LLC

Prepared by:
ARCADIS of New York, Inc.
6723 Towpath Road
Syracuse
New York 13214-0066
Tel 315.446.9120
Fax 315.449.0017

Our Ref.:
B0064462.0001

Date:
November 2012

ARCADIS

Table of Contents

Acronyms and Abbreviations i

1. Introduction 1

1.1 Site Description 1

1.2 Overview of Remedial Action 1

1.3 SAP Organization 2

2. Field Sampling Procedures 3

2.1 Post-Dredging Sediment Sampling 3

2.1.1 Sampling Objective 3

2.1.2 Sampling Protocols 3

2.1.3 Analytical Laboratory Testing 4

2.2 Dredged Material Profile Sampling 4

2.2.1 Sampling Objective 4

2.2.2 Sampling Protocols 5

2.2.3 Analytical Laboratory Testing 5

2.3 Water Column Monitoring 5

2.3.1 Sampling Objective 5

2.3.2 Sampling Protocols 6

3. Quality Assurance/Quality Control 7

3.1 DQOs 7

3.1.1 DQO Process 7

3.1.2 Project DQOs 9

3.2 Sample Handling, Packaging, and Shipping 10

3.2.1 Sample Containers and Preservation 11

3.2.2 Sample Labeling 11

3.2.3 Sample Packaging 11

3.2.4 Sample Shipping 12

3.2.5 Sample Documentation 12

3.3 Field QA/QC 13

3.3.1 Field Instrument Calibration and Preventive Maintenance 13

3.3.2 Field QA/QC Samples 14

3.3.2.1 Sample Containers 14

3.3.2.2 Field Duplicates 14

3.3.2.3 Rinse Blanks 14

3.3.2.4 Trip Blanks 15

3.3.2.5 MS/MSD 15

3.4 Laboratory QA/QC 15

3.4.1 Laboratory Analytical Procedures 15

3.4.2 Laboratory QC 16

3.5 Data Reduction, Reporting, and Review 16

3.5.1 Field Data Reduction, Review, and Reporting 16

3.5.1.1 Field Data Reduction/Review 16

3.5.1.2 Field Data Reporting 17

3.5.2 Laboratory Data Reduction, Review, and Reporting 17

3.5.2.1 Laboratory Data Reduction/Review 17

3.5.2.2 Laboratory Data Reporting 18

3.5.2.3 Laboratory Data Review and Validation 18

4. References 20

Tables

1-1 SAP Organization (in text)

2-1 Sampling Activities and Responsibilities (in text)

2-2 Summary of Sampling Scope of Work

2-3 Analytical Methods and Sample Counts

2-4 Sample Collection, Handling and Analytical Protocols

2-5 Sediment Sampling Analytical Parameters and Methods (in text)

2-6 Dredged Material Analytical Parameters and Methods (in text)

3-1 Summary of Sampling Data Quality Objectives (in text)

Figures

1 Site Location

2 Post-Dredging Sediment Sample Locations

Attachments

A Standard Operating Procedure – Sediment Sampling

B Standard Operating Procedure – Chain-of-Custody, Handling, Packing, and Shipping

C Standard Operating Procedure – Water Column Monitoring

Acronyms and Abbreviations

ASP	Analytical Services Protocol
BUD	Beneficial Use Determination
COC	constituent of concern
CQA	Construction Quality Assurance
DQO	data quality objective
EDD	electronic data deliverable
ELAP	Environmental Laboratory Approval Program
ft	feet
HASP	Health and Safety Plan
MS/MSD	matrix spike/matrix spike duplicate
NTU	nephelometric turbidity units
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
QA/QC	quality assurance/quality control
SAP	Sampling and Analysis Plan
Site	Former General Motors Assembly Plant Site
SOP	Standard Operating Procedure
USEPA	United States Environmental Protection Agency

1. Introduction

This Sampling and Analysis Plan (SAP) has been prepared in support of the Sediment Remedial Work Plan for the Engineer's sampling activities during sediment remediation at the Former General Motors Assembly Plant Site (Site). The Site is located at 199 Beekman Avenue, Village of Sleepy Hollow, New York. This SAP will be used as a guide for performing the following sampling and analytical activities:

- Post-Dredging Sediment Sampling
- Dredged Material Profile Sampling
- Water Column Monitoring

The remainder of this section presents a description of the site location, a summary of the remedial program, and the organization of this SAP.

1.1 Site Description

The site is situated on the eastern shore of the Hudson River and occupies an area of approximately 96.2 acres within the Village of Sleepy Hollow (Figure 1). It comprises three, noncontiguous parcels: 1) main assembly plant area referred to as the West Parcel (approximately 66.2 acres); 2) eastern parking lot referred to as the East Parcel (approximately 28.3 acres); and 3) former salaried employee parking lot referred to as the South Parcel (approximately 1.7 acres). Sediment remediation and associated work will be confined to the West Parcel and the Hudson River near the West Parcel.

1.2 Overview of Remedial Action

The remedial activities to be performed at the site include, but are not limited to, dredging of sediments from the Hudson River and removal of sediments from west parcel storm sewers, processing of sediments onsite for draining and stabilization, onsite water management, relocation of processed sediments within the site, and movement and grading of concrete millings within the site.

The sediments to be removed from the Hudson River contain elevated concentrations of chromium, copper, lead, mercury, and zinc. These same metals may be present in the sediments within the West Parcel storm sewer system due to particulate deposition from historic industrial wastewater and tidal influx from the river. Sediment removal from the river will be performed under wet conditions using mechanical dredging methods. Sediments within the storm sewer systems will be flushed to catch basins

and removed using vacuum pumps and other specialized equipment. Dredged areas will be backfilled with clean material from an offsite source, as described in the Sediment RWP. During this work, the existing stockpile of concrete millings will be used to construct temporary berms and an interim cover over processed sediments that will be placed in open slab crawl space areas. The millings pile may also be reshaped with some millings redistributed to other areas of the site.

1.3 SAP Organization

This SAP includes field sampling procedures (Section 2), which provide guidance for field sample collection activities by defining the necessary sampling and analytical methods, and a quality assurance/quality control (QA/QC) section (Section 3), which presents policy, functional activities, and QA/QC protocols necessary to achieve data quality objectives (DQOs) dictated by the intended use of the data generated during sampling and analysis. This SAP is organized into the sections outlined in Table 1-1.

Table 1-1 — SAP Organization

Section	Description
Section 1 – Introduction	Provides the objectives of this SAP, description of the site, overview of the site history, summary of the remedial program to be implemented at the work area, and the SAP organization.
Section 2 – Field Sampling Procedures	Presents sampling objectives, locations, procedures, handling, and documentation.
Section 3 – Quality Assurance/Quality Control	Presents QA/QC protocols to be followed during sampling, including analytical procedures; data reduction, review, and reporting; field and laboratory QC checks; and preventive maintenance.
Section 4 – References	Presents the references cited throughout this plan.

2. Field Sampling Procedures

This section provides procedures and responsibilities for implementing the sample collection and analysis activities listed in Table 2-1. The laboratories to conduct the analyses associated with the sampling activities described below have not yet been selected. All laboratories will be New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program- (ELAP-) certified.

Table 2-1 — Sampling Activities and Responsibilities

Sampling Activity	Responsibility
Post-Dredging Sediment Sampling	Engineer
Dredged Material Profile Sampling	Engineer
Water Column Monitoring	Engineer

A summary of the sediment sampling scope of work is presented in Table 2-2. Sampling performed by the Engineer will be reviewed by the Construction Quality Assurance (CQA) Engineer or designee for conformance with the Contract Documents. Field data calculations, transfers, and interpretations for data collected by the Engineer will be conducted by the appropriate personnel and reviewed for accuracy by the CQA Engineer or designee.

2.1 Post-Dredging Sediment Sampling

2.1.1 Sampling Objective

The Engineer will collect post-dredging samples of surface sediments prior to backfill of the removal area to document residual sediment concentrations of site constituents.

2.1.2 Sampling Protocols

Surface sediment cores will be collected from a total of 16 locations (Figure 2). Sediment samples will be collected from the top six inches of surface sediments, after dredging is completed. Sediment sampling will be performed by the Engineer using push core techniques per the procedures outlined in Attachment A. Samples should be collected only from the top six inches of sediment, however, cores may be driven deeper, as needed to cap the core bottom to create a representative sample.

At each sediment core location, in-situ elevations and coordinates will be recorded using project datums NAVD88 vertical datum and NAD83 NY East 3101, respectively. To ensure accurate recordings, a pontoon boat (or equivalent) equipped with spuds will be anchored in place during core collection. Chain-of-custody, handling, packing, and shipping procedures are presented in Attachment B.

A summary of the laboratory analyses and QA/QC samples is included in Table 2-3. A summary of the sample collection, handling, and analytical protocols is included in Table 2-4.

2.1.3 Analytical Laboratory Testing

All analyses (listed in Table 2-5) will be conducted by a NYSDOH ELAP-certified laboratory. All results will be reviewed by the Engineer for conformance with the Contract Documents and disposal facility acceptance protocols/sampling requirements.

Table 2-5 — Sediment Sampling Analytical Parameters and Methods

Constituent	Analytical Method
Select TAL Metals	USEPA SW-846 Method 6010B & 7471A

Note:
Select TAL Metals refer to chromium, copper, lead, mercury, and zinc.

2.2 Dredged Material Profile Sampling

2.2.1 Sampling Objective

The Engineer will collect dredged material profile samples from 500 cy stabilized stockpiles for profile sampling and TCLP analysis. Once the profile sampling results have been received and the material is visually observed to pass the paint filter test (or equivalent), the material will be transported to the on-site placement area per the Beneficial Use Determination (BUD) for Site sediments. Dredged materials will be non-hazardous as defined in 6 NYCRR Part 371 and 40 CFR Section 26, and must be acceptable for importation to the site as intermediate (non-surficial) fill under provisions of the Decision Document for this site.

Offsite transportation and disposal will be limited to materials that do not meet the BUD requirements.

2.2.2 Sampling Protocols

Dredged material profile samples will be collected from 500 cy stockpiles of dredged material after material has been stabilized. Samples may be collected more frequently depending on dredging progress. From each 500 cy stockpile, 5 grabs will be composited into one sample. Chain-of-custody, handling, packing, and shipping procedures are presented in Attachment B.

A summary of the laboratory analyses and QA/QC samples is included in Table 2-3. A summary of the sample collection, handling, and analytical protocols is included in Table 2-4.

2.2.3 Analytical Laboratory Testing

The Engineer will conduct paint filter testing (USEPA SW846 Method 9095) to evaluate the presence of free liquids in a representative sample of sediment prior to transport out of the sediment processing area. Other specific analytical parameters will be based on the requirements of the selected disposal facility(ies).

All analyses (listed in Table 2-6) will be conducted by a NYSDOH ELAP-certified laboratory. All results will be reviewed by the Engineer for conformance with the Contract Documents and disposal facility acceptance protocols/sampling requirements.

Table 2-6 — Dredged Material Analytical Parameters and Methods

Constituent	Analytical Method
TCLP Metals	USEPA SW846 Method 1311

2.3 Water Column Monitoring

2.3.1 Sampling Objective

Water column monitoring (turbidity monitoring) will be performed to identify and respond to potential water column impacts that may result from sediment dredging and backfilling activities. Dredging activities will be stopped or other engineering controls will be implemented if the turbidity at the curtain exceeds the upstream turbidity by 5 Nephelometric Turbidity Units (NTU) when the upstream turbidity is less than 50 NTU or 10 percent when the upstream turbidity is greater than 50 NTU. The project team will be notified of turbidity exceedances and response actions.

2.3.2 Sampling Protocols

Turbidity sampling will be performed daily. Two samples shall be collected during the maximum ebb tide:

- at one site 100-feet upstream and
- at a second site within 20 feet of the downstream side of turbidity curtain.

In-situ turbidity measurements will be collected, at surface, mid-water and near bottom (2 feet off the bottom) with a combination water quality meter (YSI 6920, TROLL 9500, or equivalent). Measurement of in-situ salinity and temperature may be used to support data interpretation.

General Standard Operating Procedures for water quality measurements using these types of instruments are provided in Attachment C. Actual procedures for calibration and use of the combination water quality meter will be performed in accordance with the manufacturer's operating manual, and appended to the SAP.

3. Quality Assurance/Quality Control

This section summarizes appropriate and applicable QA/QC elements and procedures for sampling activities, including:

- Discussion of project DQOs
- Sample handling, packaging, and documentation procedures
- Field QA/QC procedures
- Laboratory QA/QC procedures
- Data reduction, review, validation, and reporting procedures

3.1 DQOs

The overall QA objective for the sediment sampling activities is to generate valid and useable data. Project DQOs are identified in this section for the sampling activities so that the procedures for sampling, laboratory analysis and data review and reporting will be of adequate quality and sufficient quantity to form a sound basis for project decision-making.

3.1.1 DQO Process

The DQO process, as described in the USEPA's QA/G-4 SAP instruction document, is intended to provide a "logical framework" for planning field investigations. The following section addresses, in turn, each of the seven sequential steps in the USEPA QA/G-4 DQO process.

Step 1: State the Problem

- Post-Dredging Sediment Sampling
- Dredged Material Profile Sampling

Previous investigations conducted at the Site indicate the presence of Constituents of Concern (COCs) in sediment. The sediment sampling and analysis activities are intended to generate data to supplement the existing site database and to support project decision-making activities at this Site.

Step 2: Identify the Goal of the Study

The initial use of the data is descriptive (concentration) and there is no decision point for this descriptive application. Subsequent to review of the descriptive information, an evaluation will be performed based on the data. The decision required in this case is to determine if analyzed COCs are present in levels above acceptable standards for the respective sample type.

Step 3: Identify Information Inputs

Information inputs incorporate both the concentration and distribution of COCs in site media. A fundamental basis for decision-making is that a sufficient number of data points of acceptable quality are available to support the project decisions. Thus, the necessary input for the decision is the proportion of non-rejected (usable) data points.

The data will be evaluated for completeness and general conformance with requirements of this SAP, and consistency among data sets and with historical data, as appropriate.

Step 4: Define the Boundaries of the Study

The boundaries for the work area are shown on the figures and Contract Drawings presented in the Request for Quotation (RFQ; ARCADIS 2012).

Step 5: Develop the Analytical Approach

The decision on whether data can be used will be based on the review of laboratory results and results of data review and evaluation (including data validation results if performed). Following review, evaluation, and validation, the data will be flagged, as appropriate, and any use restrictions noted.

Step 6: Specify Performance or Acceptance Criteria

Specifications for this step call for: 1) giving forethought to corrective actions to improve data usability; and 2) understanding the representative nature of the sampling design. This SAP has been designed to meet these specifications. Sampling and analysis activities have been developed based on a review of previous site data and knowledge of present site conditions. Corrective actions are described elsewhere in this SAP.

Step 7: Develop the Plan for Obtaining Data

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results to support the evaluation of the site data. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, data reporting, internal QC, preventive maintenance of field equipment, and corrective action are described in other sections of this SAP.

3.1.2 Project DQOs

DQOs are qualitative and quantitative statements that specify the quality of the data required to support decisions made during site-related activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. The three analytical categories listed below address various data uses and the QA/QC effort and methods required to achieve the desired level of quality:

- Screening Data - Screening data affords a quick assessment of work area characteristics or conditions. Screening data is applicable for data collection activities that involve rapid, non-rigorous methods of analysis and QA. Screening data is generally applied to physical and/or chemical properties of samples, relative concentration differences, and preliminary health and safety assessment.

- Screening Data with Definitive Confirmation - Screening data provides rapid identification and quantitation; however, the quantitation may be relatively imprecise. Screening data with definitive confirmation is available for data collection activities that require qualitative and/or quantitative verification of a select portion of sample findings (10% or more). The data can also be used to verify less rigorous laboratory-based methods.

- Definitive Data - Definitive data are generated using rigorous analytical methods, such as approved USEPA reference methods, which produce tangible raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files. Data are analyte-specific, with confirmation of analyte identity and concentration.

It is anticipated that both the screening and definitive data categories will be used during sediment remediation activities. For sampling activities, three levels of data reporting are available:

- Level 1 - Minimal Reporting - Minimal or "results only" reporting is used for analyses that, either due to their nature (e.g., field monitoring) or the intended data use (e.g., preliminary screening), do not generate or require extensive supporting documentation.

- Level 2 - Modified Reporting - Modified reporting is used for analyses performed following standard USEPA/NYSDEC-approved methods and QA/QC protocols and that, based on the intended data use, require some QC supporting documentation (but not, however, full ASP Category B reporting).

- Level 3 - Full Reporting - Full ASP Category B reporting is used for analyses that, based on the intended data use, require full documentation including back up, for review.

The table below summarizes stated DQOs for each sampling activity, relative to data uses, data reporting level, and data quantity.

Table 3-1 – Summary of Sampling Data Quality Objectives

Sampling Activity	Data Use	Data Reporting Level	Data Quantity
Post-Dredging Sediment Sampling	Document residual sediment concentrations of site constituents	Level 2	Described in Section 2.1
Dredged Material Profile Sampling	Characterize wastes for acceptance under the BUD	Level 2	Per the BUD criteria; described in Section 2.2

3.2 Sample Handling, Packaging, and Shipping

This section describes handling, packaging, and shipping procedures for soil, water, and air samples subject to laboratory analyses. Table 2-4 presents the analytical

parameters and methods, requirements for sample containers, sample preservation, and holding time.

3.2.1 Sample Containers and Preservation

Appropriate sample containers and preservation methods for soil/sediment, air, and water samples will be in accordance with the most recent ASP requirements (NYSDEC 2005), unless otherwise noted. All sample containers will meet the guidelines specified in Specification and Guidance for Obtaining Contaminant-Free Sample Containers (USEPA 540/R-93/051) and Office of Solid Waste and Emergency Response Directive 9240.0-05A (USEPA 1992). The NYSDOH ELAP-certified laboratory will supply appropriate sample containers in sealed cartons, as well as sample labels and preservatives.

3.2.2 Sample Labeling

The field personnel will be responsible for properly labeling containers. Sample labeling procedures are described in the General Procedures for Packing, Handling, and Shipping Environmental Samples, which is included in Attachment B.

3.2.3 Sample Packaging

Sample custody seals and packing materials for filled sample containers will be provided by the NYSDOH ELAP-certified laboratory. The filled, labeled, and sealed containers will be placed in a cooler, on ice, and carefully packed to minimize the possibility of container breakage. Procedures for packaging samples for transport are presented below:

1. Using duct tape, secure the outside and inside of the drain plug at the bottom of the cooler that is used for sample transport.

2. Wrap bottles in bubble wrap or other cushioning material.

3. Place 1 or 2 inches of cushioning material at the bottom of the cooler.

4. Place the sealed sample containers in the cooler.

5. Repackage ice in sealed plastic bags (ice will be double-bagged) and place loosely in the cooler.

6. Fill the remaining space in the cooler with cushioning material.

7. Place chain-of-custody forms in a sealed plastic bag, and tape the forms to the inside of the cooler lid.

8. Close the lid of the cooler and fasten with duct tape.

9. Wrap strapping tape around both ends of the cooler at least twice.

10. Mark the cooler on the outside with the following information: shipping address and return address. Cover the labels with clear plastic tape. Place two signed custody seal labels on the cooler, one each over the front and back of the cooler lid, to be evidence that the lid was not opened during shipment.

3.2.4 Sample Shipping

The packaged samples will be shipped via either express overnight carrier or courier (or hand-delivered by sampling personnel) to the laboratory within 48 hours of sample collection. Additional information regarding sample shipping for environmental samples is included in the General Procedures for Packing, Handling, and Shipping Environmental Samples SOP included in Attachment B.

3.2.5 Sample Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling and chain-of-custody. This documentation will constitute a record that will allow for the reconstruction of sampling events described in this SAP to aid in the data review and interpretation process. All documents, records, and information relating to performance of the sampling events described in this SAP will be retained in the project file onsite until project completion.

Daily documentation of sampling activities (when conducted) will be recorded in a field notebook (i.e., a waterproof, bound notebook) that will contain a record of sampling activities performed at the work area. Applicable notes will be made in the field notebook as to the location of sample collection, physical observations, sample depths, and weather conditions. Field personnel performing sampling activities will also document the activities and conditions using photos taken with a digital camera. A videotape recorder may also be used as necessary.

Chain-of-custody forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. Chain-of-custody forms will be filled out at each sampling location, at a group of sampling locations, or at the end of each day of sampling by one of the field personnel designated to be responsible for sample custody. In the event that the samples are relinquished by the designated sampling person to other sampling or field personnel, the chain-of-custody form will be signed and dated by the appropriate personnel to document the sample transfer. The original chain-of-custody form will accompany the samples to the laboratory and copies will be forwarded to the project files. Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

3.3 Field QA/QC

This section summarizes the QA/QC requirements for field sampling activities associated with sediment remediation activities.

3.3.1 Field Instrument Calibration and Preventive Maintenance

Field personnel will be responsible for maintaining a master calibration/maintenance log, following procedures specified in this SAP, for each measuring device. Each log will include at a minimum, where applicable:

- Name of device and/or instrument calibrated
- Device/instrument serial/ID number
- Device/instrument owner/supplier
- Frequency of calibration
- Date(s) of calibration(s)
- Results of calibration(s)
- Name of person(s) performing calibration(s)
- Identification of calibration gas (as applicable)

- Buffer solutions (pH meter only) and/or other solutions that may be used for measuring field parameters

Equipment to be used each day will be calibrated before beginning the day's activities or as suggested by the manufacturer. Health and safety monitoring equipment will be calibrated and maintained in accordance with the manufacturer's specifications.

In the event that an internally calibrated field instrument fails to meet calibration/ checkout procedures, it will be returned to the manufacturer for service. Equipment found to be out of tolerance during the period of use will be removed from the field.

All equipment that requires charging or batteries will be fully charged and have fresh batteries. Appropriate spare parts will be made available for field meters, as practicable.

3.3.2 Field QA/QC Samples

Field QC checks, including QC checks for field measurements, sample containers, field duplicates, and rinse blanks, are discussed below.

3.3.2.1 Sample Containers

New, certified-clean sample containers for soil and water samples to be analyzed during the field sampling activities will be supplied by the analytical laboratory as described above.

3.3.2.2 Field Duplicates

Field duplicates will be collected to verify the reproducibility of the sampling methods. Field duplicates will be prepared by placing well-homogenized aliquots from the same sample location into individual sample containers, which are submitted blind to the laboratory. In general, field duplicates will be analyzed at a 5% frequency (every 20 samples) for each analytical parameter and sample matrix.

3.3.2.3 Rinse Blanks

Rinse blanks are used to monitor the cleanliness of re-usable sampling equipment and the effectiveness of the sampling device decontamination procedures. Rinse blanks will be prepared and submitted for analysis once for every 20 samples collected (or once per SDG if less than 20 samples in the SDG) with each pre-cleaned sampling

device. Rinse blanks will be prepared by filling sample containers with analyte-free water (supplied by the laboratory) that has been routed through a cleaned sampling device. When dedicated sampling devices are used, or sample containers are used to collect the samples, rinse blanks will not be necessary.

3.3.2.4 Trip Blanks

No samples will be collected for volatile organic compound (VOC) analysis. Therefore, no trip blanks will be required. In the event that VOC analysis is added to this SAP, trip blanks will be prepared at a frequency of one per cooler containing samples for VOC analyses. Trip blanks are applied in sample validation to determine if cross-contamination has occurred between samples during shipment.

3.3.2.5 MS/MSD

As appropriate, triple sample volumes will be collected from select sample locations for each matrix to perform matrix spike/matrix spike duplicate (MS/MSD) analyses. MS/MSD samples will be collected at frequency of one per 20 samples.

3.4 Laboratory QA/QC

This section summarizes the QA/QC requirements for laboratory analytical activities associated with sampling activities. Laboratory QC procedures will be conducted in a manner consistent with relevant regulatory guidance. The laboratory will have current NYSDOH ELAP certification.

3.4.1 Laboratory Analytical Procedures

Table 2-4 summarizes the laboratory analytical requirements, and provides specifics related to each sample medium to be analyzed and methods to be used for this project. Methods specified in the most current ASP (NYSDEC 2005) will be used, where applicable.

Results from the analysis of sediment samples will be reported as dry weight. The QC limits for samples with Level 3 reporting are presented in the most recent version of the ASP (NYSDEC 2005).

3.4.2 Laboratory QC

Internal laboratory QC checks will be used to monitor data integrity. These checks will include method blanks, MSs/MSDs, surrogate spikes, calibration standards, and laboratory control samples (LCS). One method blank will be analyzed with each analytical series associated with no more than 20 samples. MS/MSD pairs will be analyzed at a 5% frequency (every 20 samples). MS blanks will be analyzed at a frequency of one blank associated with no more than 20 samples. Surrogate spike compounds will be selected using the guidance provided in the analytical methods summarized in Table 2-4 and the most recent version of the ASP (NYSDEC 2005).

Instrument calibration procedures will follow the specifications provided by the instrument manufacturer or specific analytical method used. Instrument calibration procedures for all parameters will be as specified in the most recent ASP (NYSDEC 2005) or in the analytical method. Laboratory control charts will be used to determine long-term instrument trends.

3.5 Data Reduction, Reporting, and Review

After field and laboratory data are obtained, the data will be subject to the following activities:

- Reduction or manipulation mathematically or otherwise into meaningful and useful forms
- Review
- Organization, interpretation, and reporting
- Validation/data usability assessment (if necessary based on preliminary data review)

3.5.1 Field Data Reduction, Review, and Reporting

The reduction, review, and reporting of data collected in the field is discussed below.

3.5.1.1 Field Data Reduction/Review

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks, data sheets, and/or on

forms. Such data will be reviewed for adherence to this SAP and for consistency. Concerns identified as a result of this review will be discussed with field personnel, corrected if possible, and (as necessary) incorporated into the data evaluation process.

Field data calculations, transfers, and interpretations for data collected by the Engineer will be conducted by the appropriate personnel and reviewed for accuracy by the CQA Engineer or designee. All logs and documents will be checked for:

- General completeness
- Readability
- Use of appropriate procedures
- Appropriate instrument calibration and maintenance
- Reasonableness in comparison to present and past data collected
- Correct sample locations
- Correct calculations and interpretations

3.5.1.2 Field Data Reporting

Where appropriate, field data forms will be processed and included in appropriate reports. The original field logs, documents, and data reductions will be kept in the project file at the Site.

3.5.2 Laboratory Data Reduction, Review, and Reporting

The laboratory reduction, review, and reporting of analytical data are discussed below.

3.5.2.1 Laboratory Data Reduction/Review

The calculations used for data reduction are specified in each of the analytical methods previously referenced. Whenever possible, analytical data are transferred directly from the instrument to a computerized data system. Raw data are entered into permanently bound laboratory notebooks. The data entered are sufficient to document all factors used to arrive at the reported value.

Concentration calculations for chromatographic analyses are based on response factors. Quantitation is performed using either internal or external standards.

Inorganic analyses are based on regression analysis. Regression analysis is used to fit a curve through the calibration standard data. The sample concentrations are then calculated using the resulting regression equation.

3.5.2.2 Laboratory Data Reporting

Where appropriate, laboratory data forms will be processed and included in appropriate reports. The original logs, documents, and data reductions will be kept in the project file onsite.

Non-aqueous values are reported on a dry-weight basis. Unless otherwise specified, all values are reported uncorrected for blank contamination.

Analytical results for all samples will be delivered in electronic data deliverable (EDD) format and will also be provided in a full data package in a scanned electronic media (Adobe® Acrobat® .pdf). In addition, the final data will be uploaded to NYSDEC's Equis Database, in the format specified by NYSDEC at http://www.dec.ny.gov/chemical/62440.html.

3.5.2.3 Laboratory Data Review and Validation

Data verification and data validation will be conducted after samples have been collected and analyzed. Verification and validation will provide an understanding of the data quality and usability. If correctable data quality issues are discovered as a result of the data verification and validation activities, the findings must be immediately provided to the appropriate data generator so that appropriate corrective action can be taken to prevent the problem from recurring.

The usability of the analytical data will be assessed by using a tiered approach. Data will initially undergo data verification, which will provide the first test of the quality of the results. Criteria-based checking of the laboratory-reported QC results against the limits defined will be used to qualify data. Data verification will be performed on 100% of the data. The specific measures evaluated during verification and the associated criteria will include:

- Holding times

- Accuracy (by evaluating laboratory control spike recovery and MS recovery)
- Precision (by evaluating laboratory duplicate results)
- Blank contamination (laboratory method blanks and field generated blanks)
- Surrogate compound recoveries
- Calibration (this includes but is not limited to tuning and GC/MS calibration for organics or initial/continuing calibration for organics and inorganics, etc., for Level 3 data reporting only)
- Review of Matrix Spike/matrix spike duplicates and lab control samples
- Review of sample results (this includes but is not limited to compound identification, quantitation, and reported detection limit verification, for Level 3 data reporting only)

This verification process will provide an understanding of the data quality based on those QC indicators that have the most influence on qualification of data.

Full data validation (i.e., manual qualitative and quantitative checking) will be performed only on analytical results that are subject to question. Any data validation reports generated will be kept in the project file onsite until completion of the project.

4. References

ARCADIS 2012. Request for Quotation – Sediment Remediation, General Motors LLC, Former General Motors Assembly Plant Site, Sleepy Hollow, New York. July.

NYSDEC. 1994. Technical and Administration Guidance Memorandum (TAGM) 4046, Determination of Soil Cleanup Objectives and Cleanup Levels.

NYSDEC. 2005. Analytical Services Protocol. July.

USEPA. 1992. Specification and Guidance for Obtaining Contaminant-Free Sample Containers (USEPA 540/R-93/051) and OSWER Directive 9240.0-05A.

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Tables

TABLE 2-2
SUMMARY OF SAMPLING SCOPE OF WORK

SEDIMENT SAMPLING AND ANALYSIS PLAN
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE

Task	Objectives	Proposed Work	Laboratory/Field Analytical Parameters
Post-Dredging Sediment Sampling	Document residual sediment concentrations of site constituents	A single (0-6") sample will be collected (using a push coring device) from16 locations.	Sediment samples will be analyzed for select metals(1).
Dredged Material Profile Sampling	Verify that dredged material is acceptable for on site placement per the Beneficial Use Determination	Five grabs composited into one sample per each 500 cy stockpile.	Dredged material samples will be processed by TCLP extraction and analyzed for TCLP metals.
Water Column Monitoring	Evaluate potential water column impacts as a result of work area operations	Upstream and downstream in-situ monitoring for turbidity, twice daily.	None required.

Notes:
1. Select metals are chromium, copper, lead, mercury, and zinc.
2. cy= cubic yards

TABLE 2-3
ANALYTICAL METHODS AND SAMPLE COUNTS

SEDIMENT SAMPLING AND ANALYSIS PLAN
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE

	LABORATORY ANALYSIS	Select TAL Metals [1]	TCLP Metals
	MEDIUM	**SEDIMENT SAMPLES**	**STOCKPILE SAMPLES [2]**
	Water Column Monitoring	**USEPA SW-846 Method 6010B & 7471A**	**USEPA SW846 1311**
Post-Dredging Sediment Sampling	A single (0-6") sample will be collected (using a push coring device) from16 locations.	16	--
Dredged Material Profile Sampling	Five grabs composited into one sample per each 500 cy stockpile.	--	11
TOTAL SAMPLES COLLECTED		**16**	**11**
QA/QC SAMPLES	**Duplicates**	2	2
	Matrix Spike (MS)	1	1
	MS Duplicate (MSD)	1	1
	Field (Rinsate) Blank	2	0
	Trip Blank		
GRAND TOTAL SEDIMENT ANALYSES		**22**	**0**
GRAND TOTAL WATER ANALYSES		**2**	**15**

Notes:
[1] Select TAL Metals refer to chromium, copper, lead, mercury, and zinc.
[2] Sample numbers may increase depending on in-situ conditions.

TABLE 2-4
SAMPLE COLLECTION, HANDLING, AND ANALYTICAL PROTOCOLS

SEDIMENT SAMPLING AND ANALYSIS PLAN
FORMER GENERAL MOTORS ASSEMBLY SITE

Laboratory	Laboratory Analytical Parameter	Analytical Method	Sample Preservation	Analytical Holding Time (days)	Container
	Post-Dredging Sediment Samples				
TBD	Select TAL Metals[1]	USEPA SW-846 Method 6010B & 7471A (mercury)	Cool to 4°C	Analysis (180), except mercury (26)	4 oz glass, wide mouth container with Teflon® lined cap
	Dredged Material Profile Samples				
TBD	TCLP Metals	USEPA SW846 1311	Cool to 4°C	180 days	125 mL widemouth glass or plastic with Teflon®cap

Notes:
[1] Select TAL Metals include, chromium, copper, lead, mercury, and zinc.
[2] TBD = To be determined.

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Figures

REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., WHITE PLAINS, NY, 1967, PHOTOREVISED 1979.

2000' 0 2000'

Approximate Scale: 1" = 2000'

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SAMPLING AND ANALYSIS PLAN

SITE LOCATION MAP

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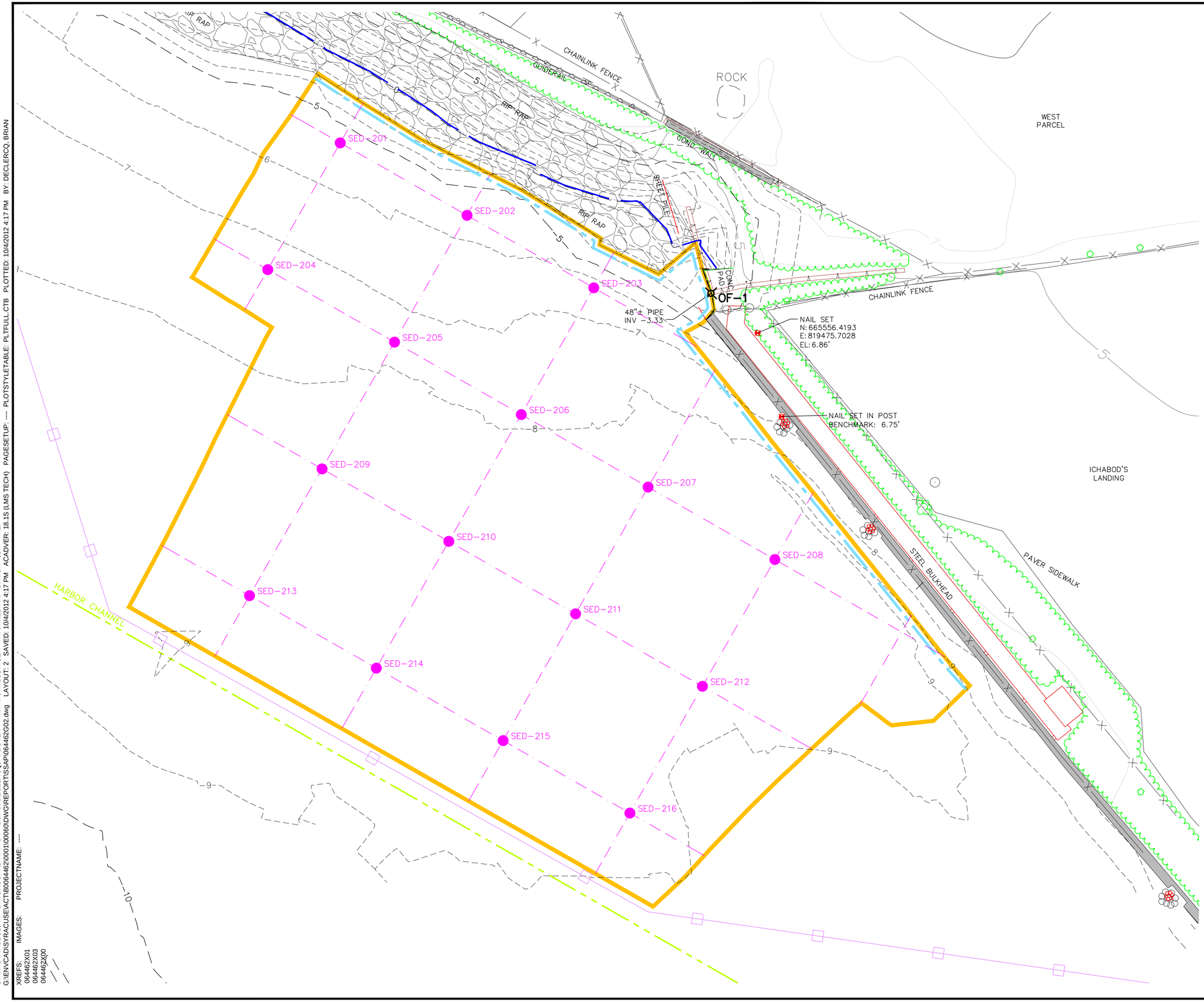
FIGURE
1

09/25/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00060/CDR/64460N01.CDR



LEGEND:

- TEMPORARY SUPPORT
- REMOVAL BOUNDARY
- MSL
- HARBOR CHANNEL
- FENCE
- RIPRAP
- CONCRETE WALL
- GUIDERAIL
- ELEVATION MARK SET
- WOOD PILES
- OF-1 OUTFALL LOCATION
- TURBIDITY CURTAIN
- SED-201 SEDIMENT SAMPLE LOCATION

NOTES:

1. SEDIMENT CORES ARE TO BE COLLECTED AT SEDIMENT SAMPLE LOCATION SHOWN TO A DEPTH OF SIX INCHES. IN SITU ELEVATIONS AND COORDINATES WILL BE RECORDED AT EACH SAMPLE LOCATION USING PROJECT DATUMS.
2. PROJECT ELEVATIONS AND COORDINATES, AS SHOWN, ARE REFERENCED TO NAVD88 VERTICAL DATUM AND NAD83 NY EAST 3101, RESPECTIVELY.
3. BASE MAP INFORMATION TAKEN FROM CHAS H. SELLS, INC. 1997 SURVEY.
4. BATHYMETRY SURFACE WAS SURVEYED AND PROCESSED BY LAND SURVEYING P.C. AND LANDMETRICS ENGINEERING. THE SURVEY WAS PERFORMED ON APRIL 13, 2012 USING A TRIMBLE GEO XT DIFFERENTIAL GPS SYSTEM, OHMEX SONARMITE 200KHZ ECHO SOUNDER. THE SURVEY WAS PROCESSED BY HYPACK SOFTWARE AND WAS PROVIDED TO ARCADIS MAY 18, 2012.

0 10' 20'
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK
SAMPLING AND ANALYSIS PLAN

POST - DREDGING SEDIMENT SAMPLE LOCATIONS

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FIGURE
2

CITY: SYRACUSE, NY DIV/GROUP: ENV/IM-DV DB: B. DECLERCQ, P. LISTER PM/TM: J. MESSINGER TR: J. MELWIKI LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIVE\064462000100060\DWG\REPORT\SSAP\064462G02.dwg LAYOUT: 2 SAVED: 10/4/2012 4:17 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 10/4/2012 4:17 PM BY: DECLERCQ, BRIAN
XREFS: IMAGES: PROJECTNAME: ----
064462X01
064462X03
064462X00

Attachments

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Attachment A

Standard Operating Procedure – Sediment Sampling

TABLE OF CONTENTS

Page

SURFACE SEDIMENT

A. SURFACE SEDIMENT SAMPLING USING AN EKMAN GRAB SAMPLER - INTRODUCTION 1
PROCEDURAL GUIDELINES 1
EQUIPMENT/MATERIALS 4
B. SURFACE SEDIMENT SAMPLING USING A MODIFIED VAN VEEN GRAB SAMPLER - INTRODUCTION....4
PROCEDURAL GUIDELINES 5
EQUIPMENT/MATERIALS 8
C. SEDIMENT CORING USING A DRIVE ROD CHECK VALVE CORER - INTRODUCTION 9
PROCEDURAL GUIDELINES 9
D. SEDIMENT CORING PROCEDURES USING SLIDE-HAMMER AND GRAVITY CORERS - INTRODUCTION 17
PROCEDURAL GUIDELINES 18
E. DETERMINATION OF GRAIN SIZE DISTRIBUTION IN SEDIMENT - INTRODUCTION 27
PROCEDURAL GUIDELINES 27
EQUIPMENT/MATERIALS 29
REFERENCES 29

LIST OF FIGURES

Page

FIGURE 6.2.C-1 DRIVE ROD CHECK VALVE CORER....10

FIGURE 6.2.C-2 DETAIL OF VENT TUBE....11

FIGURE 6.2.C-3 DETAIL OF VALVE....12

FIGURE 6.2.C-4 DETAIL OF SAMPLE TUBE HOLDER....13

FIGURE 6.2.D-1 DIAGRAM OF SLIDE-HAMMER CORER....18

FIGURE 6.2.D-2 DIAGRAM OF 3-INCH DIAMETER GRAVITY CORER....21

FIGURE 6.2.D-3 CROSS SECTION OF BALL VALVE....23

FIGURE 6.2.D-4 DIAGRAM OF CORE EXTRUDER AND EXTRUSION TUBE....25

SURFACE SEDIMENT

A. SURFACE SEDIMENT SAMPLING USING AN EKMAN GRAB SAMPLER - INTRODUCTION

This section describes the procedures used to collect surface sediment with an Ekman grab sampler. Surface sediment is typically analyzed for various physical and chemical variables. For the purposes of this section, surface sediment is defined as the upper 10 cm of the sediment column but may vary given the sampling interval specified in the study design.

A stainless steel Ekman grab sampler is capable of collecting acceptable samples from a variety of soft substrates, such as silt, silt mixed with clay, and silt mixed with some sand. The Ekman grab sampler has two doors on top to allow easy access to the sediment for visual characterization and sampling of surface sediments. The procedures for collecting surface sediment samples using the Ekman grab sampler are described below.

PROCEDURAL GUIDELINES

Decontamination

Before each station is sampled, decontaminate the inner surfaces of the grab sampler and all stainless steel sample compositing equipment. Sediment sampling and compositing equipment will be decontaminated using the following general sequence: site water rinse, Alconox scrub and rinse, site water rinse, solvent rinse (if applicable for a specific project) with acetone and hexane (respectively), and a final site water rinse. Equipment used for compositing the sediment samples will follow the same basic decontamination sequence except that the final rinse will be with laboratory-grade distilled/deionized water. If there is a significant lapse of time between decontamination of the sediment sampling and compositing equipment and collection of the sample, then the decontaminated sediment sampling and compositing equipment will be protected from additional contamination by wrapping it in foil (with the dull side of the foil touching the equipment) and placing it in clean bags for transport, if necessary.

All solvent rinsates will be collected into a bucket or tub and allowed to evaporate over the course of the day. Any rinsate that has not evaporated by the end of the sampling event will be containerized and disposed of in accordance with federal regulations.

Grab Sampler Deployment

1. If the water depth is less than 9 feet, attach the grab sampler to the metal handles. If the water depth is greater than 9 feet, use the rope to deploy the grab sampler.
2. Place the grab sampler on a decontaminated surface and open it.
3. Ensure that the two release wires are securely placed around the release pins.
4. Lower the sampler through the water column at a slow and steady speed.
5. Allow the grab sampler to contact the bottom gently, with only its weight being used to force it into the sediments. The sampler should never be allowed to "free fall" to the bottom because this may result in premature triggering, an excessive wake, or improper orientation upon contact with the bottom.
6. Deploy trigger weight (i.e., messenger) to release the doors on the bottom of the grab sampler.

Grab Retrieval

1. After the grab sampler has rested on the bottom for approximately 5 seconds, begin retrieving it at a slow and steady rate.
2. After the grab sampler breaks the water surface, gently lower it into a clean, flat-bottomed container, while maintaining the grab sampler in an upright position.
3. Open the doors on the top of the grab sampler, and inspect the sample for acceptability. The following acceptability criteria should be satisfied:
   - The sampler is not overfilled with sample to the point that the sediment surface presses against the top of the sampler or is extruded through the top of the sampler.
   - Overlying water is present (indicating minimal leakage).
   - The overlying water is not excessively turbid (indicating minimal disturbance or winnowing).
   - The sediment surface is relatively undisturbed.
   - The desired penetration depth is achieved.

If a sample fails to meet the above criteria, it will be rejected and discarded away from the station.

Penetration depth should be determined by placing a decontaminated stainless steel ruler against the center of the inside edge of the opening on the top of one side of the grab sampler and extending it into the grab sampler until it is almost in contact with the top of the sample. The penetration depth is determined by the difference between that measurement and the total depth of the grab sampler.

Sample Removal and Processing

1. For acceptable samples, remove the overlying water by slowly siphoning it off near one or more sides of the grab sampler. Ensure that the siphon does not contact the sediments or that fine grained suspended sediment is not siphoned off. If sediment is suspended in the overlying water, do not proceed with siphoning until the sediment is allowed sufficient time to settle.
2. After the overlying water is removed, characterize the sample as specified in the study design. Characteristics that are often recorded include:
   - Sediment type (e.g., silt, sand).
   - Texture (e.g., fine-grain, coarse, poorly sorted sand).
   - Color.
   - Approximate percentage of moisture.
   - Biological structures (e.g., chironomids, tubes, macrophytes).
   - Approximate percentage of biological structures.
   - Presence of debris (e.g., twigs, leaves).
   - Approximate percentage of organic debris.
   - Presence of shells.
   - Approximate percentage of shells.
   - Stratification, if any.
   - Presence of a sheen.
   - Odor (e.g., hydrogen sulfide, oil, creosote).
3. After the sample is characterized, remove the top 10 cm using a stainless steel spoon (see site-specific study design for project-specific sampling interval). Unrepresentative material (e.g., large shells, stones, leaves, twigs) should be carefully removed without touching the sediment sample under the supervision of the chief scientist and noted on the field logbook.
4. Remove subsamples for analysis of unstable constituents (e.g., volatile organic compounds, acid-volatile sulfides), and place them directly into sample containers without homogenization.
5. Transfer the remaining surface sediment to a stainless steel mixing bowl or pot for homogenization. Additional grab samples may be required to collect the volume of sediment specified in the study design. The mixing bowl should be covered with aluminum foil (dull side down) while additional grab samples are being collected to prevent sample contamination (e.g., from precipitation, splashing water, falling leaves).
6. After a sufficient volume of surface sediment from a grab is collected (i.e., 0 to 10 cm), move away from the station, open the jaws of the grab sampler, and allow the remainder

of the sediment sample to fall out of the grab sampler. Discard this material away from the station, and rinse away any sediment adhering to the inside of the grab sampler. The grab sampler is now ready for additional sampling at the same station or decontamination before sampling at a new station.

7. After a sufficient volume of sediment is transferred to the mixing bowl, homogenize the contents of the bowl using stainless steel spoons until the texture and color of the sediment appears to be uniform.
8. After the sample is homogenized, distribute subsamples to the various containers specified in the study design and preserve the samples as specified in the study design.

EQUIPMENT/MATERIALS

- Stainless steel Ekman grab sampler (typically 0.25 $feet^2$) with handle and rope.
- Trigger weight (i.e., messenger).
- Teflon® or polyethylene siphon.
- Flat-bottomed container (e.g., dish pan).
- Stainless steel ruler.
- Stainless steel spoons.
- Stainless steel mixing bowl or pot.
- Scrub brush.
- Squirt bottles (for solvents).
- Alconox® (laboratory detergent).
- Acetone and hexane (if applicable for a specific project).

B. SURFACE SEDIMENT SAMPLING USING A MODIFIED VAN VEEN GRAB SAMPLER - INTRODUCTION

This section describes the procedures used to collect surface sediment with a modified van Veen grab sampler. Surface sediment is typically analyzed for various physical and chemical variables. For the purposes of this section, surface sediment is defined as the upper 10 cm of the sediment column.

A modified stainless steel van Veen grab sampler is capable of collecting acceptable samples from a variety of substrates, such as mud, sand, gravel, and pebbles (APHA 1989). The modified van Veen grab sampler incorporates several design improvements over the traditional van Veen grab sampler that improve the quality of the sediment samples. The modified grab sampler has two doors on top to allow easy access to the sediment for visual characterization and

subsampling of surface sediments. The interiors of the doors are made of screens to minimize the bow wake and the resulting disturbance of the sediment surface when the grab sampler is lowered to the bottom. Rubber flaps cover each screen as the grab sampler is retrieved to prevent disturbing the sediment sample as it is raised through the water column. The arms of the modified grab sampler are lengthened and arced to provide a stronger seal when the grab sampler is closed, thereby minimizing sample leakage when the grab sample is retrieved. Finally, the modified grab sampler has four detachable, epoxy-coated lead weights that allow the weight and penetration of the grab sampler to be optimized with respect to the kind of sediment being sampled.

PROCEDURAL GUIDELINES

Decontamination

Before each station is sampled, decontaminate the inner surfaces of the grab sampler and all stainless steel sample compositing equipment. Sediment sampling and compositing equipment will be decontaminated using the following general sequence: site water rinse, Alconox scrub and rinse, site water rinse, solvent rinse with acetone and hexane (respectively), and a final site water rinse. Equipment used for compositing the sediment samples will follow the same basic decontamination sequence except that the final rinse will be with laboratory-grade distilled/ deionized water. If there is a significant lapse of time between decontamination of the sample compositing equipment and collection of the sample, then the decontaminated compositing equipment will be protected from additional contamination by wrapping it in foil (with the dull side of the foil touching the equipment) and, if necessary, placing it in clean bags for transport.

All solvent rinsates will be collected into a bucket or tub and allowed to evaporate over the course of the day. Any rinsate that has not evaporated by the end of the sampling event will be containerized and disposed of in accordance with federal regulations.

Grab Sampler Deployment

1. Attach the grab sampler to the hydrowire with a swivel. The swivel minimizes the twisting forces on the sampler during deployment and ensures that proper contact is made with the bottom. For safety, the hydrowire, swivel, and all shackles should have a load capacity at least three times the weight of a full sampler.
2. Place the grab sampler on the sample collection table, and open it.
3. Ensure that the two release chains and the two retrieval chains are hanging free and are not wrapped around the arms of the sampler.
4. Attach the ring of the release chains to the release mechanism, and insert the safety pin to prevent the mechanism from being activated prematurely.
5. Start the winch, raise the release mechanism and the sampler, and swing it outboard.

6. Remove the safety pin from the trigger, and lower the sampler through the water column at a slow and steady speed (e.g., 30 cm/second).
7. Allow the grab sampler to contact the bottom gently, with only its weight being used to force it into the sediments. The sampler should never be allowed to "free fall" to the bottom because this may result in premature triggering, an excessive bow wake, or improper orientation upon contact with the bottom.
8. Allow approximately 60 cm of slack in the hydrowire after contact with the bottom is made to ensure that the release mechanism is activated.

Grab Retrieval

1. After the grab sampler has rested on the bottom for approximately 5 seconds, begin retrieving it at a slow and steady rate (e.g., 30 cm/second).
2. Ensure that the sampling vessel is not headed into any waves before the sampler breaks the water surface to minimize vessel rolling and potential sample disturbance.
3. After the grab sampler breaks the water surface and is raised above the height of the sample collection table, swing the grab sampler inboard, and gently lower it onto the table, maintaining tension on the hydrowire to prevent the grab sampler from rolling when it contacts the table.
4. When the grab sampler contacts the table, insert wedges under both jaws so that the grab sampler will be held in an upright position when tension on the hydrowire is relaxed.
5. Relax the tension on the hydrowire, and remove the release and retrieval chains from the surface of the grab sampler.
6. Open the doors on the top of the grab sampler, and inspect the sample for acceptability. The following acceptability criteria should be satisfied:
    - The sampler is not overfilled with sample to the point that the sediment surface presses against the top of the sampler or is extruded through the top of the sampler.
    - Overlying water is present (indicating minimal leakage).
    - The overlying water is not excessively turbid (indicating minimal disturbance or winnowing).
    - The sediment surface is relatively undisturbed.
    - The desired penetration depth is achieved.

If a sample fails to meet the above criteria, it will be rejected and discarded away from the station.

Penetration depth should be determined by placing a decontaminated stainless steel ruler against the center of the inside edge of the opening on the top of one side of the grab sampler and extending it into the grab sampler until it contacts the top of the sample. The penetration depth

is determined by the difference between that measurement and the total depth of the grab sampler.

Sample Removal and Processing

1. For acceptable samples, remove the overlying water by slowly siphoning it off near one or more sides of the grab sampler. Ensure that the siphon does not contact the sediments or that fine grained suspended sediment is not siphoned off. If sediment is suspended in the overlying water, do not proceed with siphoning until the sediment is allowed sufficient time to settle.
2. After the overlying water is removed, characterize the sample as specified in the study design. Characteristics that are often recorded include:
   - Sediment type (e.g., silt, sand).
   - Texture (e.g., fine-grain, coarse, poorly sorted sand).
   - Color.
   - Approximate percentage of moisture.
   - Biological structures (e.g., chironomids, tubes, macrophytes).
   - Approximate percentage of biological structures.
   - Presence of debris (e.g., twigs, leaves).
   - Approximate percentage of organic debris.
   - Presence of shells.
   - Approximate percentage of shells.
   - Stratification, if any.
   - Presence of a sheen.
   - Odor (e.g., hydrogen sulfide, oil, creosote).
3. After the sample is characterized, remove the top 10 cm using a stainless steel spatula or spoon. Unrepresentative material (e.g., large shells, stones) should be carefully removed without touching the sediment sample under the supervision of the chief scientist and noted on the field logbook.
4. Remove subsamples for analysis of unstable constituents (e.g., volatile organic compounds, acid-volatile sulfides), and place them directly into sample containers without homogenization.
5. Transfer the remaining surface sediment to a stainless steel mixing bowl for homogenization. Additional grab samples may be required to collect the volume of sediment specified in the study design. The mixing bowl should be covered with aluminum foil while additional samples are being collected to prevent sample contamination (e.g., from precipitation, splashing water).

6. After the surface sediment for a sample is collected, move the sampling vessel away from the station, open the jaws of the grab sampler, attach the ring of the deployment chains to the release mechanism, insert the safety pin, start the winch, raise the grab sampler, and allow the remainder of the sediment sample to fall onto the sample collection table. Discard this material away from the station, and rinse away any sediment adhering to the inside of the grab sampler. The grab sampler is now ready for additional sampling at the same station or decontamination before sampling at a new station.
7. After a sufficient volume of sediment is transferred to the mixing bowl, homogenize the contents of the bowl using stainless steel spoons until the texture and color of the sediment appears to be uniform.
8. After the sample is homogenized, distribute subsamples to the various containers specified in the study design and preserve the samples as specified in the study design.

EQUIPMENT/MATERIALS

- Stainless steel van Veen grab sampler (typically 0.06 m^2 or 0.1 m^2).
- Winch and hydrowire (with load capacities ≥3 times the weight of a full sampler).
- Sample collection table.
- Teflon® or polyethylene siphon (inner diameter = 1.27 cm, length = 60–90 cm).
- Stainless steel ruler.
- Stainless steel spatulas.
- Stainless steel spoons.
- Stainless steel mixing bowl or pot.
- Scrub brush.
- Squirt bottles (for solvents).
- Alconox® (laboratory detergent).
- Acetone and hexane (if applicable for a specific project).
- Socket and crescent wrenches (for adding or removing the detachable weights of the grab sampler).
- Water pump and hose (for rinsing the grab sampler, sampling utensils, and sample collection table).

C. SEDIMENT CORING USING A DRIVE ROD CHECK VALVE CORER - INTRODUCTION

This section describes the procedure for collecting sediment core samples using a drive rod check valve corer. The drive rod check valve corer is designed for collecting short cores (<60 cm) in water less than about 30 feet deep. The corer is lowered through the water column and then driven into the sediment using drive rods. This corer has the advantage over gravity corers in that the drive rods allow up to 200 pounds of driving force to be used without having to handle or lift a heavy weight.

PROCEDURAL GUIDELINES

The sample is held in the core tube with the suction provided by a check valve at the top of the corer. Unlike free-floating check valves, this valve is actuated from the boat using a cord. As the corer is lowered, the valve is held open so water flows freely through the corer as it approaches the sediment, thus reducing the wake that can disrupt the surficial sediments. Because it is not a piston-type corer, some compaction of the sample will occur depending on the sediment type and core length. The internal cross-sectional area of the 3-inch diameter corer is 39 cm^2, which yields about 2 g of dry solids per centimeter of sample thickness at a porosity of 98 percent and about 15 g of solids per centimeter of thickness at a porosity of 85 percent.

There are five basic steps to collecting sediment with this corer:

1. Prepare the corer.
2. Measure the water depth.
3. Drive the corer.
4. Retrieve the corer.
5. Remove the core.

When reading instructions, refer to Figures 6.2.C-1, 6.2.C-2, 6.2.C-3, and 6.2.C-4.

Preliminary Considerations

It is best to work from a platform that is anchored and will not drift. This setup helps to prevent collecting a poor quality sample and damaging the equipment. A platform with a low free-board, such as a pontoon boat, is best.

Core tubes can vary in length from about 70 to 200 cm. The core tube should be about 50 cm longer than the sample length needed to provide for overlying water and errors in the depth driven. It is desirable to have about 20 to 30 cm of water overlying the sediment in the core

tube. The overlying water provides a buffer that reduces agitation of the surficial sediments when handling the core tube. The corer should be pushed into the sediments deeper than the length of core needed. If the sediments are soft, it is possible to overpenetrate and run the sediment–water interface up into the valve. A long core tube will help prevent such an occurrence. For the tube to retain the sample, the minimum sample length is about three to four times the diameter depending on the sediment type.

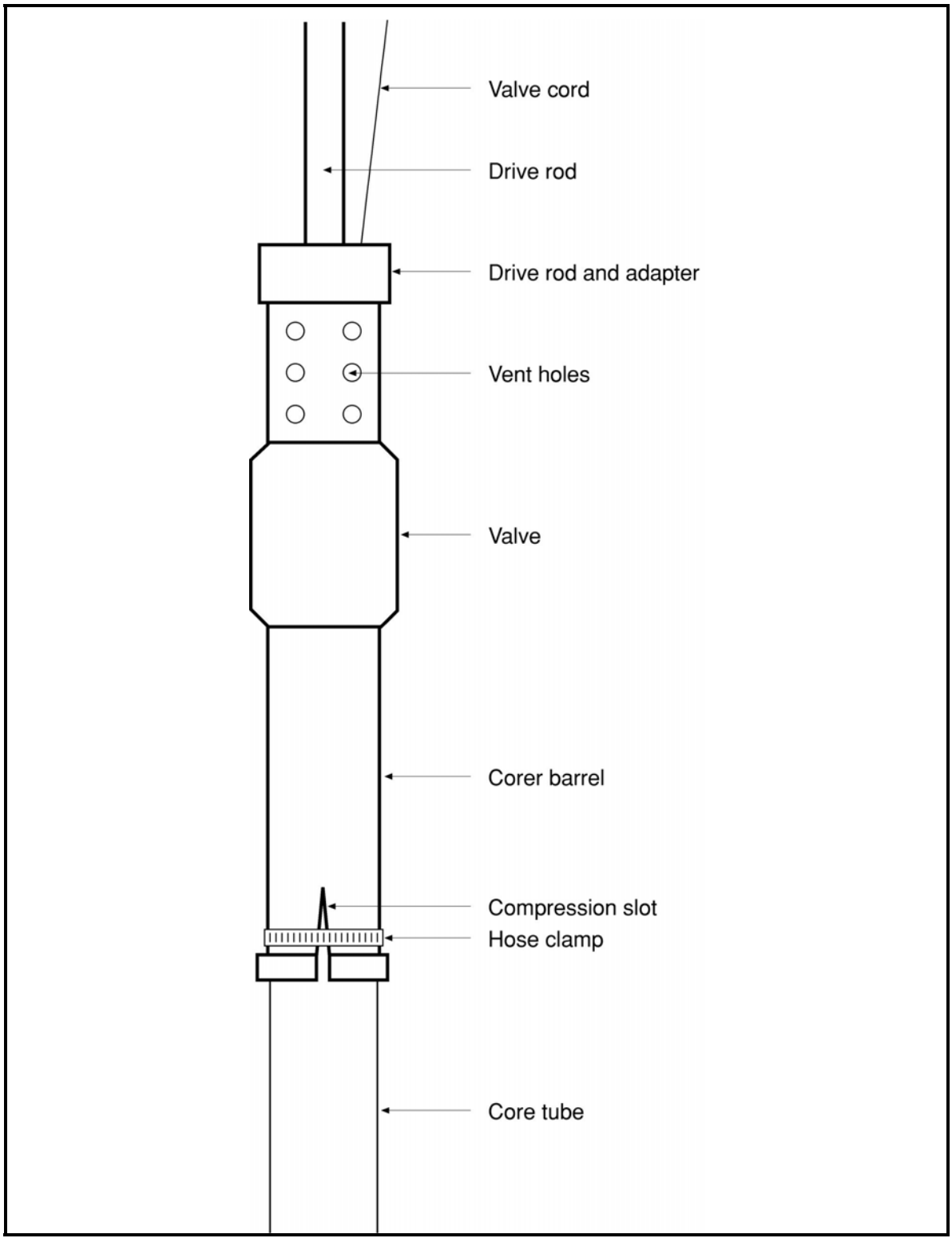

Figure 6.2.C-1 Drive rod check valve corer

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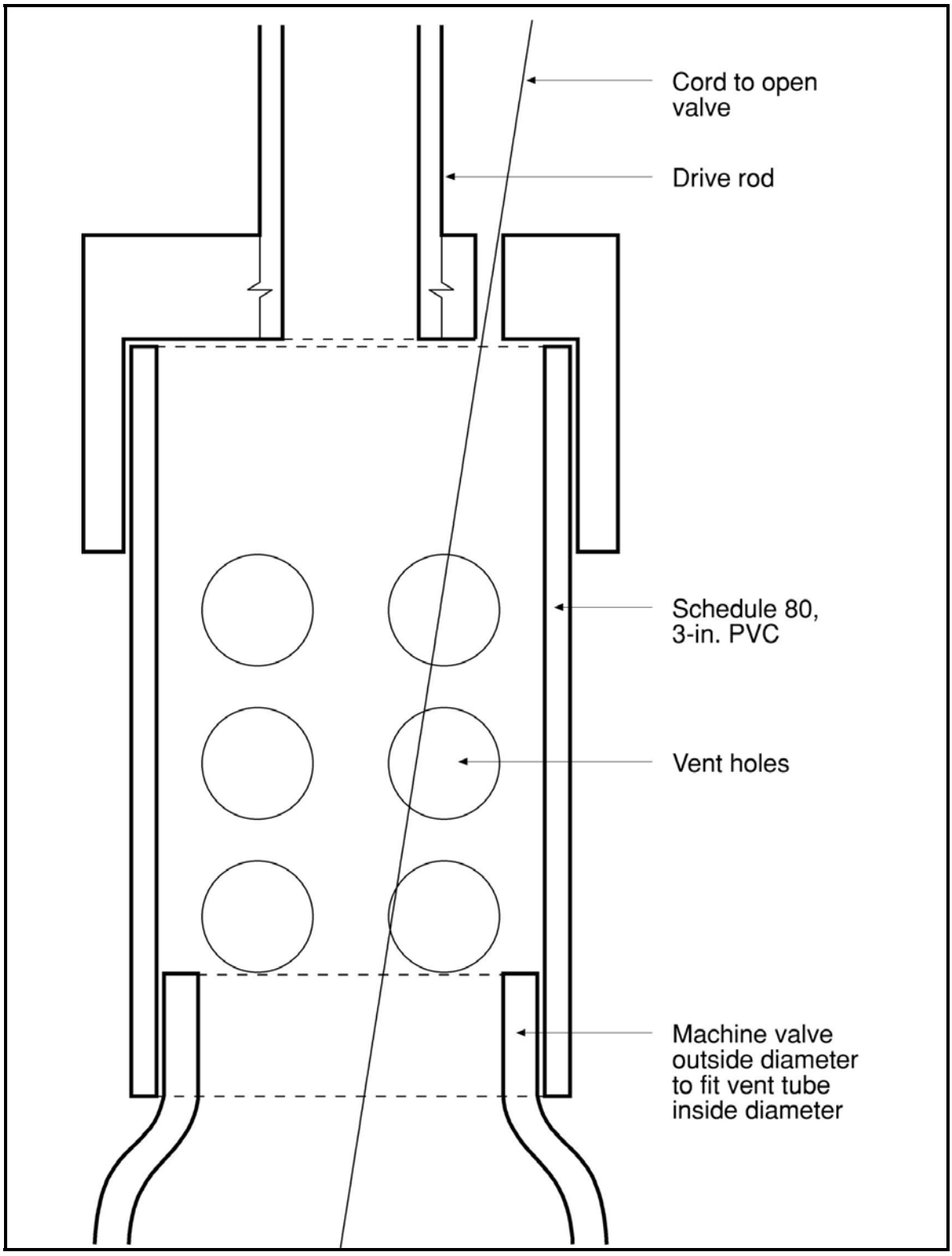

Figure 6.2.C-2 Detail of vent tube

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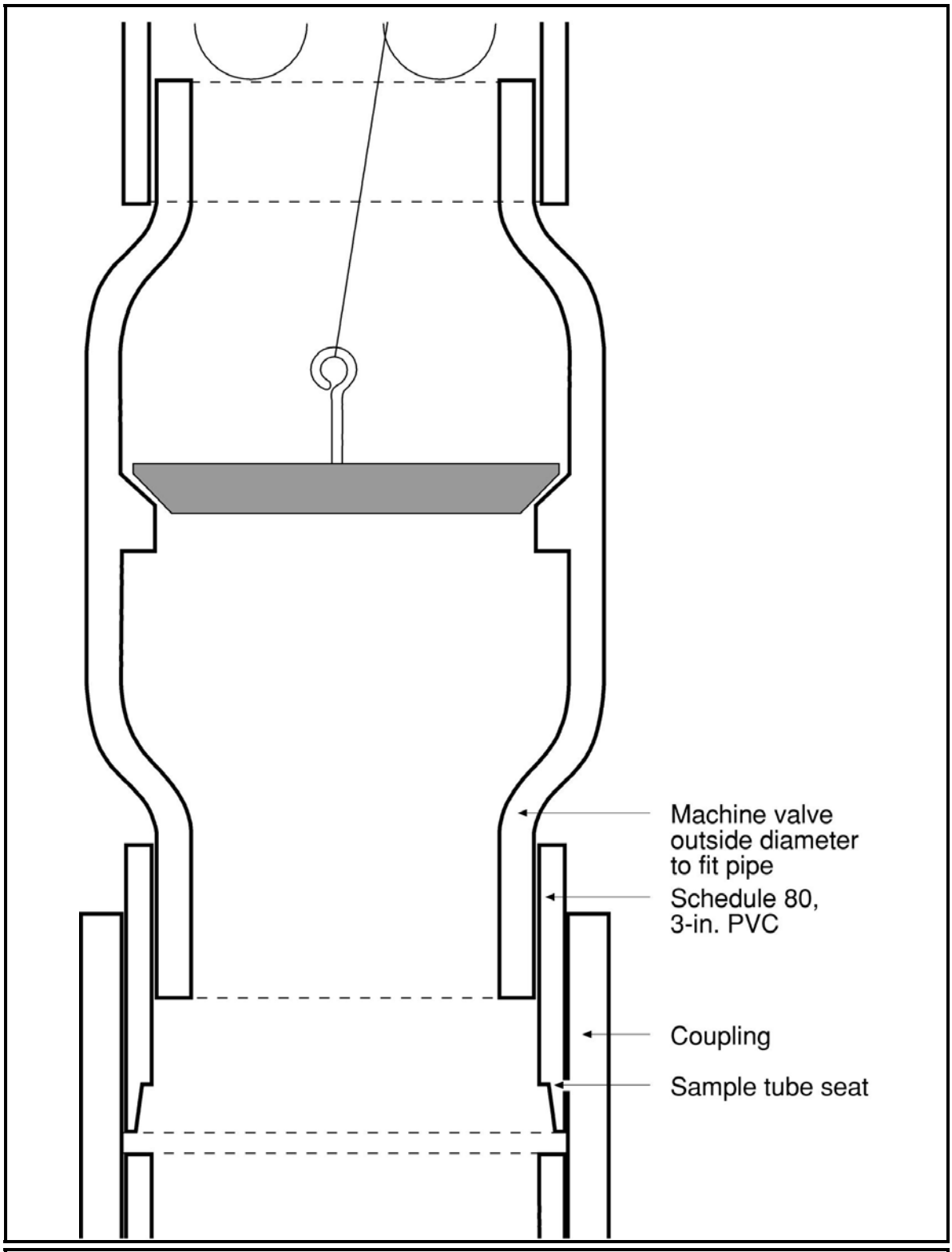

Figure 6.2.C-3 Detail of valve

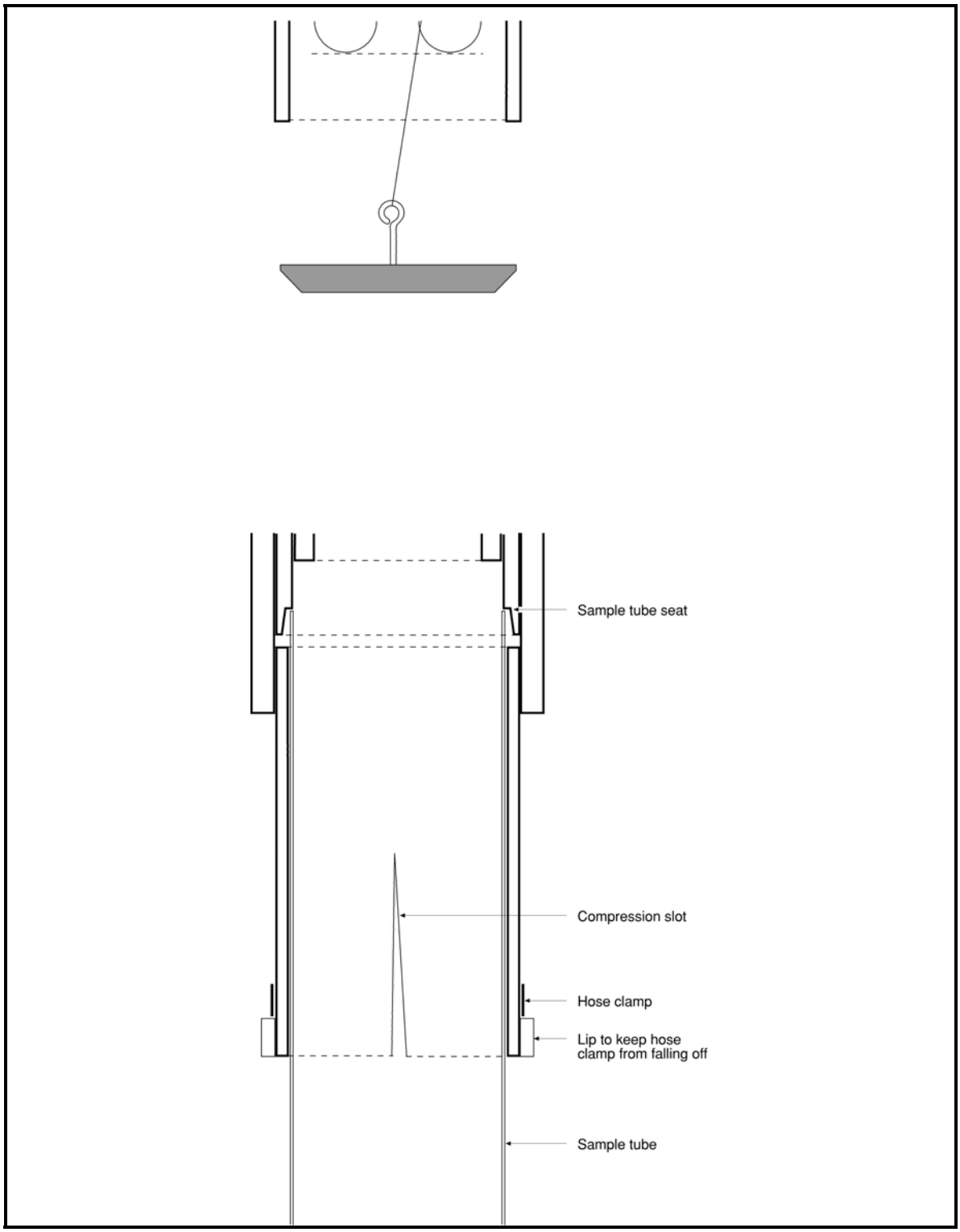

Figure 6.2.C-4 Detail of sample tube holder

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Instructions

1. **Prepare the Corer—**Before using the corer, inspect it for worn or broken parts, and repair as necessary.

   1.1 Clean the corer; sandy material in particular can foul the valve and other seals. If the corer has been used in a sandy area, sand caught on the seat might prevent the valve from sealing. To clean the valve, run or spray water through it while repeatedly opening and closing the valve. Test the valve for leaks by releasing the valve cord and pouring water into the top of the corer and watching for leakage. No more than about 1 mL per minute should leak.

   1.2 Insert a core tube into the corer barrel and push it in until you feel the top end of the tube contact the sealing ring at the top of the corer barrel. To seat the tube, push it hard for about a tenth of an inch; you will feel it seat into position. If the bottom edge of the core tube is beveled to improve cutting action, make sure the tube is not upside down. Tighten the hose clamp at the bottom of the barrel so that the core tube cannot be rotated by hand within the corer barrel. Make sure that the drive rod is tightly screwed into the adapter.

2. **Measure the Water Depth —** Measure the water depth to within about a foot of the true depth, using a weighted measuring tape or sonar.

   You will need to know the depth so you can attach the correct length of drive rods and so you can determine how close the corer is to the sediment as it is being lowered.

3. **Drive the Corer**

   3.1 While keeping the valve open with the valve line, lower the corer and keep adding drive rods until the corer is near the sediment. Only a couple pounds of lifting force is required to keep the valve open, so do not lift too hard on the valve line. With the corer and drive rods hanging vertically, lower the corer slowly until you feel it contact the sediment, and then with one smooth motion, push the corer into the sediment. Be careful to push vertically on the corer. If the platform moves laterally and the drive rods are at an angle, attempting to drive the corer may damage it.

   3.2 After the corer is driven to the desired depth, release the valve cord so the valve closes.

4. **Retrieve the Corer—**After the valve is closed, the corer can be retrieved; retrieval is best done with two people.

   4.1 Lift steadily on the drive rods until you feel the corer break loose from the sediments. As the corer approaches the water surface, have a rubber stopper ready to place in the bottom of the core tube. If the sediments are sandy and the samples tend to erode from the bottom of the tube as it is lifted through the water column, it may be necessary to keep the corer submerged just below the surface while another person reaches underwater and places the stopper in the tube. If sampling is performed from a large boat that has a lot of free-board, it may be

necessary to have someone near the water level on a skiff to insert the stopper. While the corer is being lifted onboard, support the rubber stopper so it and the sample do not fall out.

4.2 After the corer is onboard, seat the stopper so it is entirely inside the core tube by placing a second stopper on the deck and pushing the corer down on top of it. Keep the corer vertical at all times to prevent the sample from shifting, and avoid rapid movements that can disrupt the interface.

5. **Remove the Core**

5.1 As a second person holds the corer vertical and keeps the valve open, loosen the hose clamp at the bottom of the core barrel and hold the bottom of the core tube firmly against the deck.

5.2 While holding the core tube, have the second person lift the corer off the tube. If the tube is seated very firmly in the barrel from the force of driving the corer, twist the barrel slightly while lifting it off the tube to break it loose. It is best to rotate the barrel, not the core tube, because when it breaks loose, the rapid rotation of the core tube may disrupt the sediment–water interface. As the core barrel is lifted off the tube, the water in the valve assembly will spill. Before moving or lifting the core tube, seal the top of the core tube with a test plug. The core is now ready to be extruded and sectioned.

5.3 If possible, extrude and section the sample immediately in accordance with FMG 6.2.D - Sediment Coring Procedures Using Slide-Hammer and Gravity Corers. Immediate extrusion and sectioning is essential if the sample is to be analyzed for redox-sensitive elements. Oxygen diffuses through the polycarbonate core tube and oxidizes ferrous iron in the pore water. This process is fairly rapid, and an orange iron oxide precipitate will visibly form on the inside walls of the core tube within a day. There is some evidence that this oxidation does not extend more than a couple millimeters into the sample. If the sample cannot be extruded immediately, keep it cool and out of the sun by refrigerating it or wrapping it with aluminum foil.

Troubleshooting

Problem 1: The Corer is Not Retaining the Sample

There are two possible causes to this problem. One is that the sediments are sandy and not cohesive so they do not stick to the core tube walls or themselves. As a result, the core erodes from the bottom as it is lifted through the water. This problem can be solved in several ways.

- Drive the corer deeper into the sediments, where there may be a more cohesive layer. It is not unusual for a fine grained cohesive layer to lie below coarser layers.

- Place a stopper in the bottom of the tube as soon as possible using one of two methods: 1) use a rod that holds the stopper in the correct position, maneuver the rod below the tube, and lift it up to insert the stopper, or 2) have a diver insert the stopper.
- Use a smaller diameter corer so there is relatively more cohesion of the sediment with the walls.

The second possible cause is a leak in the suction of the corer that allows the whole core to start slipping out of the core tube. There are two places where the suction can be lost: the valve, and the seat between the core barrel and the core tube. Inspect and clean both the valve and the seat, and check that the valve is not stuck in the open position.

Problem 2: The Sediment Interface is Not Distinct

There are several possible causes to this problem. One is that the bottom end of the core tube was moving horizontally when it first contacted the sediments. Further evidence of this cause is if the sediment interface is tilted. In this case, make sure the platform is not moving and that the corer and drive rods are allowed to hang vertically just before driving the corer. Another common cause is the formation of gas bubbles in the sediments of productive or eutrophic systems. When a corer is pushed into this type of sediment, bubbles are released that entrain and resuspend sediment. There is no easy solution to this problem other than to let the resuspended sediment settle before processing the sample. Another possible cause is rough handling of the sample.

Problem 3: The Core is Compacted

Little can be done to prevent compaction other than to use a piston corer. However, the amount of compaction can be quantified. One easy method is to apply Velcro® tape to the outside of the corer barrel and determine the depth of penetration by noting where sediment is caught in the Velcro®.

D. SEDIMENT CORING PROCEDURES USING SLIDE-HAMMER AND GRAVITY CORERS - INTRODUCTION

This section describes the procedure for collecting and processing sediment core samples using slide-hammer and gravity corers. These corers can be used for sampling both coarse, consolidated sediment and fine grained, cohesive sediment. The same corer barrel is adapted for use as either a slide-hammer or gravity corer by changing a few parts. In both coring methods, heavy weights are supported overhead by ropes or cables and pulleys. Therefore, hardhats are required in the vicinity of the equipment. Sample processing using a hydraulic extruder is also described.

Both corers rely on a one-way valve at the top of the corer that allows water to pass through the corer while being lowered and provides suction to prevent the sample from slipping out while being raised. The corers use 3-inch outside diameter tubing with a 1/16-inch wall thickness. The main corer barrel accepts liners that are 150 cm long and can be used for cores of up to about 140 cm long. Cores up to 3 m in length can be collected by adding 1 m and 1.5 m barrel extensions. Before use, the corer should be inspected for worn and damaged parts and should be cleaned.

Slide-Hammer Coring

This coring method uses a slide hammer that pounds the corer into the sediment with repeated impacts. This method is most useful in nearshore zones where the sediment is difficult to penetrate and would require more than 500 pounds of static weight if a gravity corer were used. The slide-hammer corer is illustrated on Figure 6.2.D-1. The slide-hammer corer uses one cable for lowering and retrieving the corer and one rope for actuating the hammer. The slide hammer works best when the hammer is heavier than the rest of the corer so, before use, all of the weights should be removed from the corer. The following procedures are based on using the corer aboard a pontoon boat equipped with a 12-foot tripod, a power winch, and a hole in the floor centered below the tripod. Because the coring is typically done in shallow water, the boat must be anchored with at least three anchors so the boat will not drift.

1. With the corer laying flat on the boat, screw the hammer guide onto the impact plate, slide the hammer onto the hammer guide, and screw the eyebolt onto the top of the hammer guide (see Note 1). Run the main cable and the hammer rope through the appropriate pulleys. Attach the main retrieval line to the eyebolt. Caution: When handling the slide-hammer assembly, be careful to keep hands away from the area where the hammer slides to avoid injury.
2. After the ball and valve are cleaned, align the holes in the top of the corer and impact plate, and attach the impact plate to the top of the corer with the 0.5-inch diameter bolt. Inspect the bolt periodically for wear near the cap and 3.5 inches from the cap.
3. Attach the two thimbles at the ends of the slide-hammer bridle to the two eyebolts at the top of the hammer with small carabiniers, and secure the middle thimble to the hammer rope. The hammer rope should be at least 0.5 inch in diameter so it is easy to hold by hand.
4. Insert the 3-inch outside diameter polycarbonate liner into the corer barrel, making sure that about 0.75 inch protrudes out the end (see Note 2). Wrap the threads on the corer with Teflon® plumber's tape, and screw the nose piece onto the barrel by hand until it is as tight as possible.

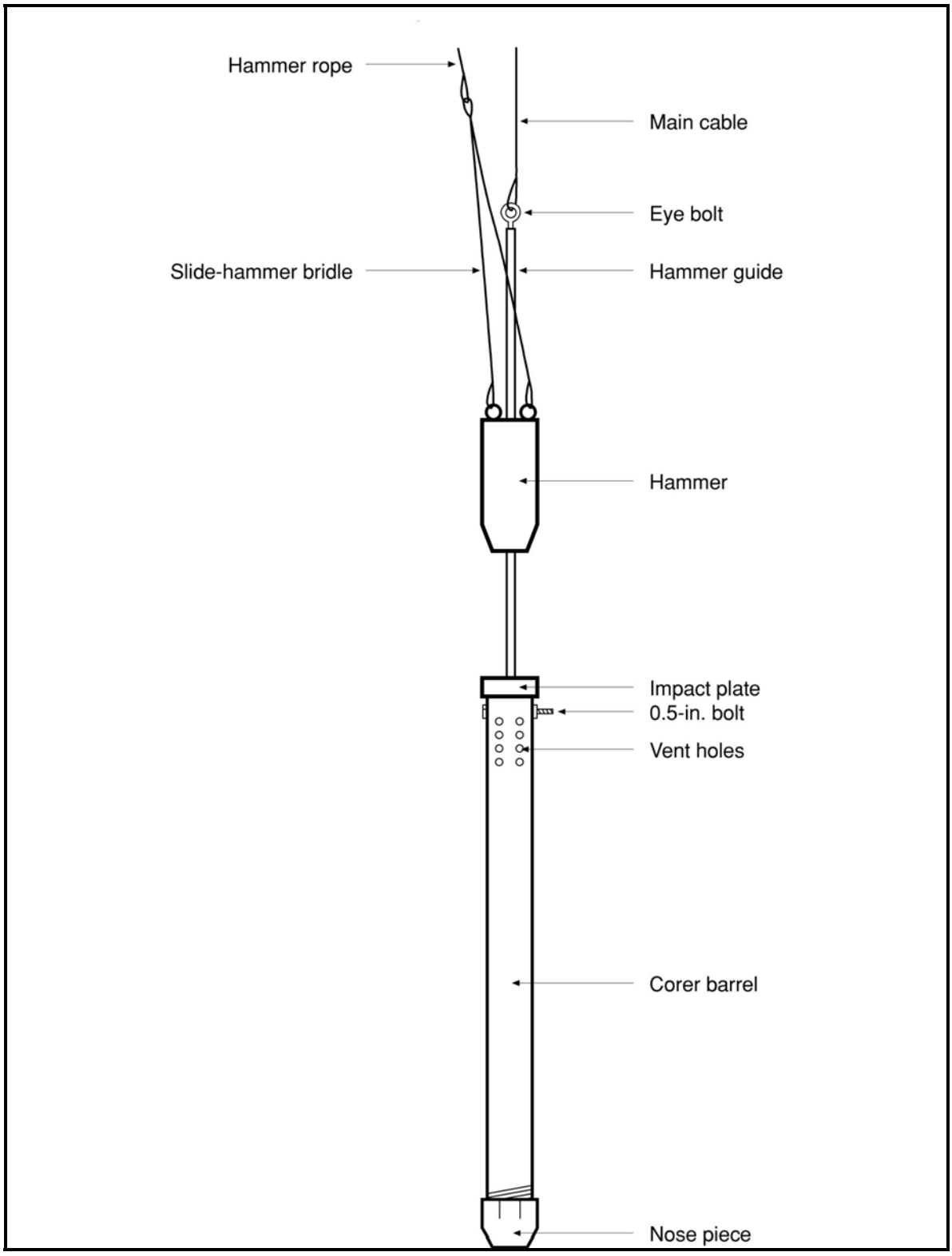

Figure 6.2.D-1 Diagram of slide-hammer corer

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5. Slide the hammer down to the impact plate, being careful to keep hands free from the path of the hammer, and raise the corer to the vertical position using the main retrieval cable.

6. Lower the corer and let out the hammer rope at the same rate. As the corer is being lowered, valve popping can be heard as water displaces air inside the corer. Continue lowering the corer slowly until the nose piece contacts the sediment. Keep tension on the main retrieval cable, measure the length of the core needed from the water surface upward, and mark this point on the main cable with a piece of tape.

7. With just enough tension on the main retrieval cable to keep the corer vertical but still allow the cable to be let out at a rate of a few inches per impact, lift the hammer about 4 feet, and release the rope. Caution: Before releasing the hammer rope, be sure that no one is standing on the rope or that the rope is not caught on anything.

8. Repeat Step 7 until the piece of tape is slightly below the water. When lifting the hammer, be careful not to lift so fast and high that it hits the eyebolt at the top of the hammer guide and hammers the corer back out of the sediment. Depending on how much the sediment core is compacted, it may be necessary to pound the corer until the tape is well below the water surface. Penetration should be stopped before the headspace between the sediment-water interface and the valve is less than about 15 to 20 cm.

9. When the corer has been pounded to the necessary depth, start retrieving the corer slowly at first until it is free of the sediment, and then more rapidly until the nose piece is above the water. Slow the rate of retrieval until the nose piece clears the deck, and stop when there is 6 inches of clearance. Have two bolted rubber stoppers on top of one single stopper next to the hole in the deck and lower the corer onto the rubber stoppers until they are completely inside the nose piece. Caution: When guiding the corer onto the stopper, keep hands away from the area between the nose piece and the deck.

10. Cover the hole and tie-off the hammer rope to a cleat. With two people supporting the corer in a vertical position, release some, but not all, tension on the main retrieval cable. Disconnect the impact plate from the corer by removing the 0.5-inch bolt. Increase tension on the main retrieval line until the impact plate is free of the corer. Caution: When the impact plate is free of the corer, it is able to swing so it should be stabilized immediately. This can be a problem when the boat is rocking. While maintaining tension on the main cable, untie the hammer rope, and lower the slide hammer assembly to the deck. Connect the shackle to the top of the corer with the 0.5-inch bolt, and connect the main cable to the shackle.

11. Lift the corer about 1 foot with the main cable. While one person holds the corer barrel so it does not turn, unscrew the nose piece slowly. When it is unscrewed, be prepared to support the weight of the liner and sample by holding the nose piece and the stoppers from the bottom, then lower the nose piece and liner to the deck. While stabilizing the liner and corer, lift the corer until it is free of the liner. Lower the corer onto the deck, and cover the hole. For cores 1.5 m and longer, see Note 3.

12. Remove the nose piece from the liner by pushing down and rocking it slowly from side to side. The single stopper will come off with the nose piece, but the others should remain in place. Watch carefully that the other stoppers do not slip. In moving the liner with the sample, always support the liner from the bottom so the stoppers cannot slip.
13. Process the sample as described in *Sample Extrusion and Sectioning*.

Gravity Coring

This method uses gravity to force the corer into the sediment. It is designed for use in soft sediment that is typically found in more than 20 feet of water. However, it may be used in shallower waters if the sediment is soft. The gravity corer is illustrated on Figure 6.2.D-2. The weight can be adjusted using any combination of six 60-pound weights and one 30-pound weight (in addition to the barrel, which weighs 10 lb/ft) to achieve the necessary penetration. This gravity corer is not designed for free-fall into the sediment. Because gravity coring is much faster than slide-hammer coring and water depths are usually greater, boat drift is not a problem, and anchoring is not necessary.

1. With the corer laying on the deck, insert the liner into the corer barrel until it contacts the bottom of the valve seat; about 0.75 inch of liner should protrude from the corer barrel. Wrap the threads with Teflon® plumber's tape where the nose piece screws in. Screw on the nose piece, making sure the liner seats on the lowest shoulder inside the nose piece (about 1 inch from the bottom edge of the nose piece). Tighten as much as possible by hand.
2. Add the appropriate amount of weight to the corer and secure it with a hose clamp. Slide the weights upward until the top of the top weight is a few inches below the vent holes. Slide the shaft collar upwards until it contacts the bottom of the bottom weight, and tighten it so it will not slip when it supports all the weights. It is a good idea to wrap a few layers of duct tape right below the shaft collar so that if it slips, it will become wedged on the tape.
3. Attach the shackle to the top of the corer with the 0.5-inch bolt, and connect the retrieval cable to the shackle.
4. While supporting the corer so that it does not swing freely, raise it with the winch. Watch the weights to see that they do not slip. Lower the corer at any rate that is practical until the nose is about 10 feet above the sediment, then reduce the rate to about 1 feet/second. This reduces the shock wave preceding the corer and helps retrieve a good interface. Let the line go slack for about 5 seconds (see Note 4).
5. Pull the corer slowly at first to break it loose from the sediment. Raise the corer up through the water column at a rate that is practical until the top of the corer approaches the surface, then slow the retrieval rate to about 1 feet/second. As soon as the nose clears the water surface, stop retrieval, push a double rubber stopper up into the corer, and

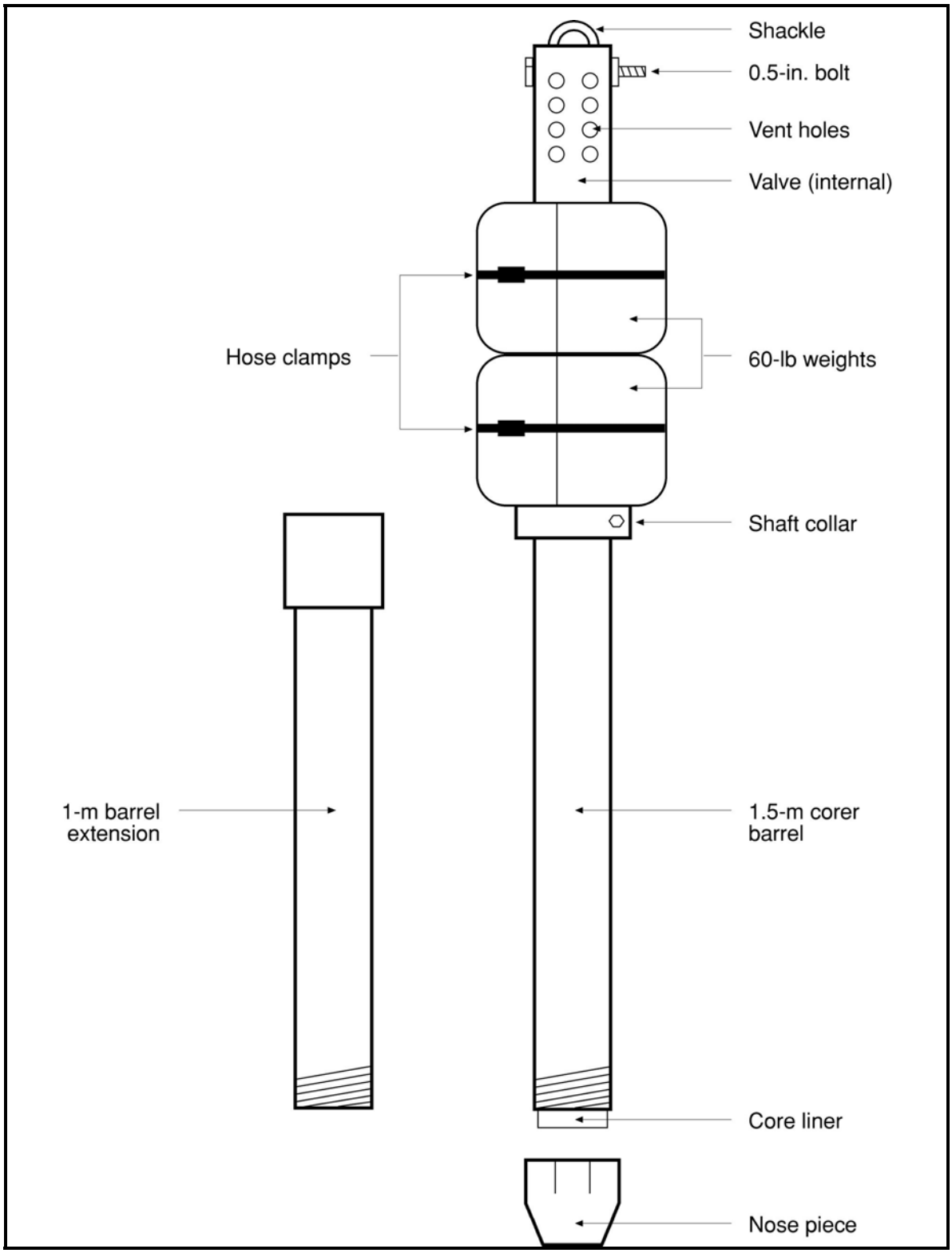

Figure 6.2.D-2 Diagram of 3-inch diameter gravity corer

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support the stoppers so they are not pushed out by the sample. Have another stopper ready on the deck. Raise the corer, and lower it onto the other stopper to push the double stopper further into the liner. Caution: When guiding the corer onto the stopper, keep hands away from the area between the nose piece and the deck.

6. Lift the corer about 1 feet with the main cable. With one person holding the corer barrel so that it does not turn, unscrew the nose piece slowly. When it is unscrewed, be prepared to support the weight of the liner and sample by holding the nose piece and the stoppers from the bottom, then lower the nose piece and liner to the deck. While stabilizing the liner and corer, lift the corer until it is free of the liner. Lower the corer onto the deck, and cover the hole. For cores 1.5 m and longer, see Note 3.
7. Remove the nose piece from the liner by pushing down and rocking it slowly from side to side. The single stopper will come off with the nose piece, but the others should remain in place. Watch carefully that the other stoppers do not slip. In moving the liner with the sample, always support the liner from the bottom so the stoppers cannot slip.
8. Process the sample as described in *Sample Extrusion and Sectioning*.

Maintenance and Troubleshooting

Cleaning the Ball Valve

The ball valve should be cleaned 1) at a minimum on each day of sampling, 2) if there is evidence that sediment entered the valve, and 3) whenever coring is conducted in nearshore zones where the sediment is sandy. A diagram of the valve is shown on Figure 6.2.D-3. To clean the valve, remove the 0.5-inch bolt from the top of the corer barrel and disconnect the impact plate or the shackle. Before removing the thin ball retaining wire, make sure the ball cannot roll overboard. Then remove the wire, reach in the corer, and remove the ball. Inspect the ball for materials or scratches that may prevent seating or sealing. Wipe off the ball with a paper towel, and place it in a clean place. Do not drop the ball because this will scratch the surface and prevent the ball from seating properly. Also, be careful not to damage the O-ring seal by placing any tools in the valve assembly. Wash out the valve with a hose to remove most of the dirt. Using a paper towel, reach inside the top of the corer, wipe off the valve seat, and inspect the towel for dirt. Take a small quantity of Vaseline® (about the volume of a typical pencil eraser), and rub it on the ball. If the valve needs to be replaced, remove the two valve retaining wires, and slide the valve out.

Insufficient Sample

The corer may not collect enough sample because of 1) inadequate penetration, 2) good penetration but too much compaction, or 3) adequate penetration but loss of sample during retrieval. Solutions to these problems are as follows:

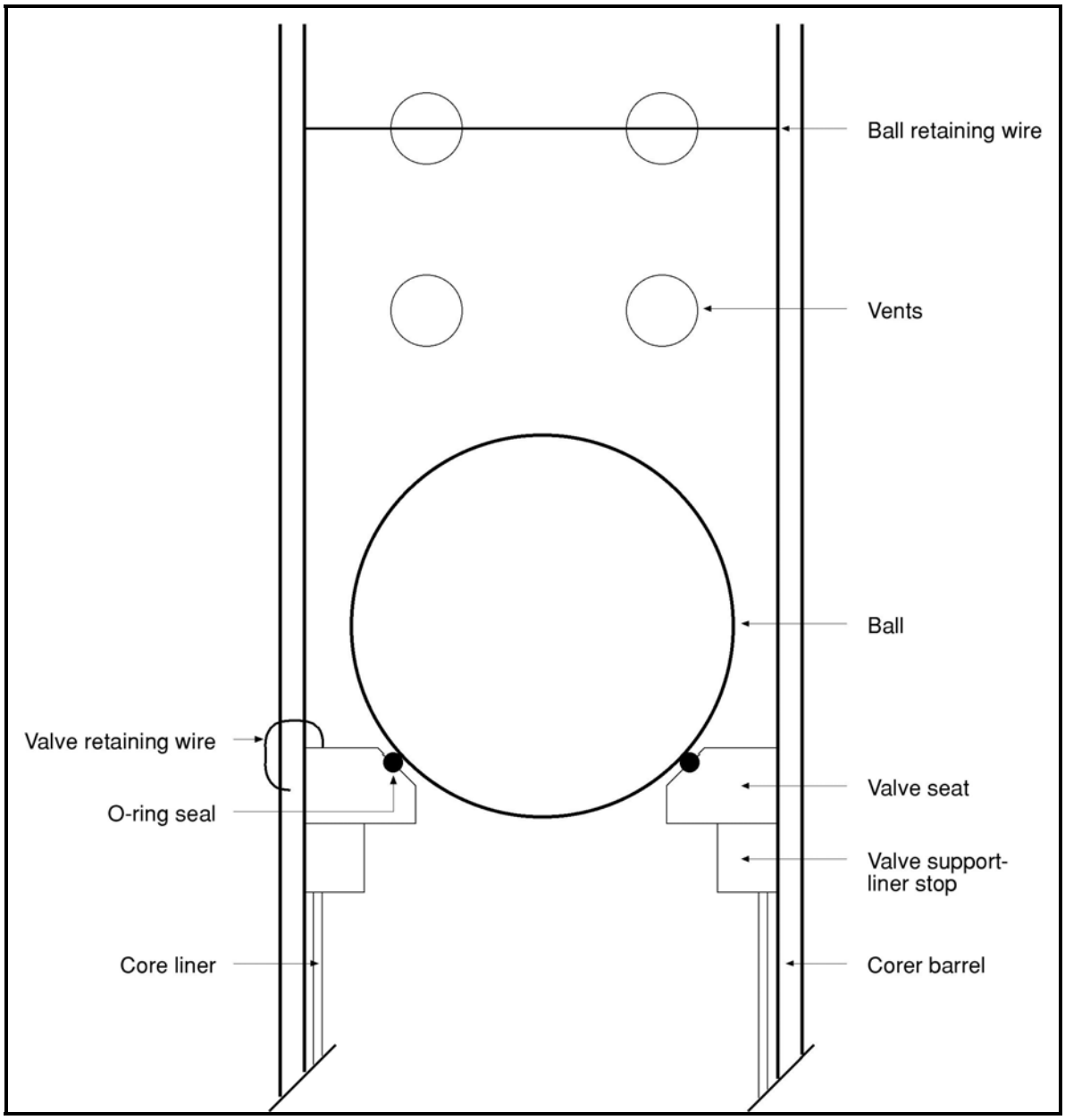

Figure 6.2.D-3 Cross section of ball valve

- **Inadequate Penetration—**Add more weight to the corer, or pound it in farther.
- **Too Much Compaction—**Add an extension and more weight to get more penetration.
- **Loss of Sample During Retrieval—**Sample slipping out the bottom of the corer is caused by a loss of suction. There are several places at which suction can be lost: the valve seat, the valve assembly, the nose piece, and couplings between the barrel and extensions. To reduce sample loss, clean the valve seat/O-ring, and grease the ball as described above. Make sure

the valve assembly is sealed. Use Teflon® plumber's tape on the threads and duct tape on the outside of the couplings and nose piece.

Penetration of the corer can be measured by putting white Velcro® tape on the outside of the corer. Velcro® tape can also be used on the inside of the liner during testing to see how far up inside the liner the interface moves, how much sample slips out the bottom, and how much compaction occurs.

Sample Extrusion and Sectioning

Sediment samples are extruded from the core liner using a hydraulic or mechanical extruder and are cut into desired section thicknesses using a calibrated sectioning tube. A diagram of the hydraulic extruder and sectioning apparatus is shown on Figure 6.2.D-4. The extruder can be used for 2- to 3-inch diameter cores and can be used vertically or horizontally.

1. With no core liner attached to the extruder, submerge the inlet hose of the extruder in a bucket of water or overboard into the lake. Pump water through the system rapidly to clear all air out of the hose, valves, pump, and socket. Observe the water coming out of the socket and pump until no air bubbles come out.
2. Rinse grit from the bottom of the core liner so that the liner will slip smoothly onto the socket. With the shaft collar loosened and already around the socket, lift the core liner onto the socket, and push it down onto the socket with a twisting motion. While holding the liner down, pump water through the socket slowly to remove air bubbles at the base of the rubber stoppers. While still holding the liner down, slip the shaft collar up and around the liner, and tighten it very tightly with the hexagonal wrench. Push gently on the pump to check for leaks. Pump until the sediment-water interface is level with the top of the core liner.
3. Place the calibrated sectioning tube on the top of the liner. Hold it down so it seats firmly on the liner, and pump until the desired sample thickness is extruded into the tube. The extruder will extrude about 1 inch of sample per pump. While one person holds the liner steady, another person holds the sectioning tube and cuts the extruded sample by inserting the semicircular cutter between the liner and the tube. Cut the core and slide (do not lift) the cutter and the tube horizontally off the top of the liner. Hold the cutter and tube firmly together. Invert the tube, and slide the cutter out to discharge the sample into the mixing bowl.
4. Repeat Step 3 until the lowest desired depth of sample is collected. Pump the rest of the sample out of the liner with the rubber stoppers.

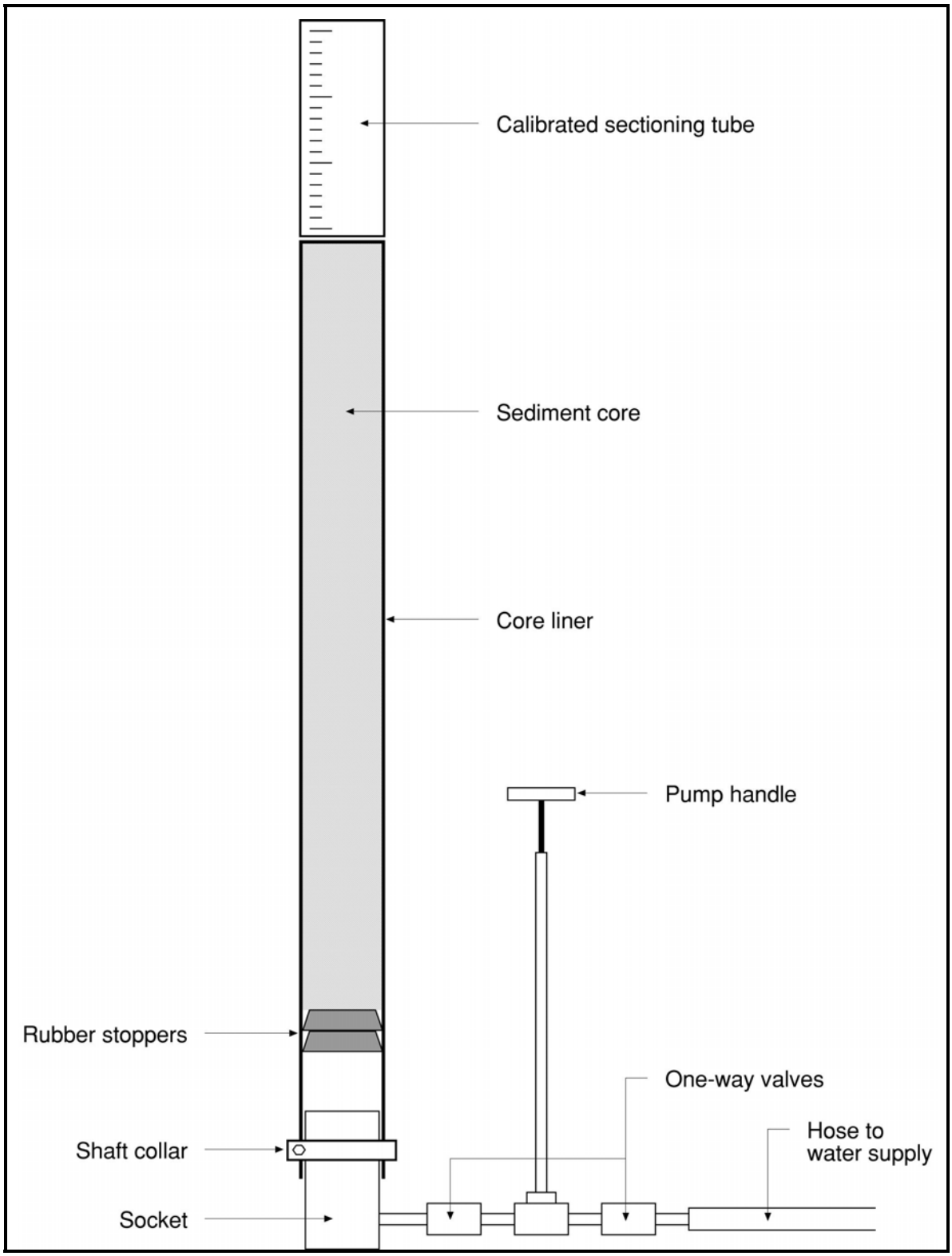

Figure 6.2.D-4 Diagram of core extruder and extrusion tube

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Note:

1. *The eyebolt at the top of the hammer guide may become unscrewed because of the pounding vibrations and should be checked at each station before coring.*
2. *For long cores that require more than one piece of liner, butt the ends of the two pieces of liner squarely together and tape them securely so no leaks occur. Do not use too many layers of tape or the liner will not fit into the barrel.*
3. *For cores 1.5 m and longer, the tripod is not tall enough to lift the corer so that the barrel will clear the top edge of the liner when removing the liner. To remove the liner in this case, upon unscrewing the nose piece, lower the nose piece and liner into a pail that has a rope securely tied to the handle. While the corer is raised by the winch, lower the pail through the hole in the deck and into the water (if necessary) until the top edge of the liner clears the bottom edge of the barrel. Then lift it back onto the deck.*
4. *If the sediment is too hard for the amount of weight on the corer, and the corer does not penetrate significantly, the corer will contact the bottom, tip over, and fall sideways. When this happens, the line will initially go slack, then quickly snap to the side as the tension increases. In this case, try doubling the weight; if this does not work, try using the slide hammer.*
5. *Periodically check the water level in the bucket. If air gets into the system, pumping becomes less efficient. At the end of each day, unscrew the cap at the top of the pump, lift the pump handle to remove it, wipe the O-rings with a paper towel, and grease the O-rings with Vaseline®. Avoid using water with coarse particles because they may interfere with proper valve function.*

E. DETERMINATION OF GRAIN SIZE DISTRIBUTION IN SEDIMENT - INTRODUCTION

PROCEDURAL GUIDELINES

Field Screening

Grain-size distribution in sediment is measured in the field because the information is needed to direct further sampling. This procedure provides a gross field measurement of percent fines in a sediment sample. This field measurement is not intended to take the place of grain size distribution analysis in the laboratory, but to aid in directing collection of toxicity test samples and reference samples, which can be dependent upon percent fines. Equipment required to perform this field measurement includes:

After collecting a sediment sample, perform the following procedures:

1. Thoroughly rinse the sieve and all other equipment and visually inspect to ensure that no sediment or other detritus is present.
2. Collect a sediment aliquot from the grab sampler in the 50 mL cup, ensuring that exactly 50 mL is collected by "shaving" excess sediment from the top of the cup and rinsing any sediment off the sides of the cup.
3. Transfer the sediment aliquot from the 50 mL cup to the sieve using the spoon. Thoroughly rinse the cup and the spoon into the sieve with water to ensure that the entire aliquot has been transferred.
4. Gently rinse the sieve with running water and observe the stream of water coming from the bottom of the sieve. During this step, the fines are being rinsed away. Rinse until the stream of water appears clear, indicating that all fines have passed through the sieve. Gently rinse the remaining sediment to one side of the sieve.
5. Place the plastic funnel into the 100 mL graduated cylinder and position the lip of the sieve over the funnel. Using the squirt bottle, rinse the sediment into the graduated cylinder, directing the stream of water through the back of the sieve. Continue rinsing until all sediment has been transferred to the graduated cylinder. If needed, rinse any sediment that may have adhered to the funnel. The rinse water should not overflow the graduated cylinder. If it appears that the graduated cylinder will overflow before all sediment has been transferred, discard the sample and repeat the entire procedure.
6. Allow the sediment to settle completely in the graduated cylinder and record the amount of sediment present. This measurement represents the volume retained. Also record any turbidity observed in the overlying water.

The volume retained (in mL), subtracted from the original 50 mL aliquot, provides the volume that passed through the sieve, or volume of fines in 50 mL of sample. Multiplying this difference by 2 gives the volume of fines in 100 mL, or percent fines. The formula can be stated as:

Percent fines = (50 mL – Volume Retained in mL) × 2

<u>Field Laboratory Method</u>

1. Weigh approximately 100 g of the dried sediment.
2. Sieve the sediment material to <100 μm using a stainless steel sieve.
3. Determine the weights of the >100- and 100 μm size fractions.
4. Determine the sand/silt/clay fractions by the pipette method (Day 1965).

Contract Laboratory Method

Analysis for grain size distribution will be completed using the wet sieve and hydrometer technique described in ASTM Method D422 (ASTM 1998).

Quality Assurance and Quality Control

Quality assurance and quality control samples will consist of duplicates (1 in 20).

EQUIPMENT/MATERIALS

- USA Standard Testing Sieve #230 (63 μm opening).
- 50 mL measuring cup.
- 100 mL graduated cylinder.
- Small plastic funnel.
- Teaspoon.
- Squirt bottle filled with water.

REFERENCES

APHA. 1989. Standard methods for the examination of water and waste water. Seventeenth Edition. Prepared and published by American Public Health Association, the American Water Works Association, and the Water Pollutant Control Federation.

Day, P.R. 1965. Particle fractionation and particle-size analysis. pp. 545–566. In: Methods of Soil Analysis. C.A. Black (ed). American Society of Agronomy, Incook of ASTM Standards. American Society for Testing and Materials, West Conshohocken, PA.

Attachment B

Standard Operating Procedure –
Chain-of-Custody, Handling, Packing, and Shipping

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

Chain-of-Custody, Handling, Packing, and Shipping

I. Scope and Application

This standard operating procedure (SOP) describes the chain-of-custody, handling, packing, and shipping procedures for the delivery of samples that are protected from cross-contamination, tampering, misidentification, and breakage, and are maintained in a controlled environment from the time of collection until receipt by the analytical laboratory.

II. Personnel Qualifications

Field sampling personnel will have current health and safety training, including 40-hour training in accordance with the Occupational Safety and Health Administration (OSHA) Regulation 29CFR1910.120 (HAZWOPER), site supervisor training, current LPS training, and site-specific training, as needed. In addition, field sampling personnel will be versed in the relevant SOPs and possess the skills and experience necessary to successfully complete the desired field work.

III. Equipment List

The following equipment and materials, as required, will be available during chain-of-custody, handling, packing, and shipping procedures:

- indelible ink pens
- polyethylene bags (re-sealable-type)
- clear packing tape, strapping tape, duct tape
- custody seal evidence tape
- appropriate sample containers, labels, and chain-of-custody forms
- large (e.g., 30- to 40-gallon) insulated coolers
- ice
- cushioning and absorbent material (e.g., vermiculite)
- thermometer
- field notebook

IV. Cautions

N/A

V. Health and Safety Considerations

Follow health and safety procedures outlined in the project-specific Health and Safety Plan (HASP).

VI. Chain-of-Custody Procedures

Prior to collecting samples, complete the chain-of-custody form header information by filling in the project number, project name, and the name(s) of the sampling technician(s). (Note: it is important that chain-of-custody information is printed legibly using indelible ink).

2. After sample collection, enter the individual sample information by filling in the following chain-of-custody fields:

   A. STA. NO. - Indicates the station number or location that the sample was collected. Appropriate values for this field are described in the Work Plan.

   B. Date - Indicates the date that the sample was collected. The date format to be followed should be mm/dd/yyyy (e.g., 03/07/2000).

   C. Time - Indicates the time at which the sample was collected. The time value should be presented using the military format. For example, 3:15 P.M. should be entered as 15:15.

   D. Comp - This field should be marked with an “X” if the sample was collected as a composite.

   E. Grab - This field should be marked with an “X” if the sample was collected as an individual grab sample.

   F. Station Location - This field should represent the complete sample name; although, in some instances it may be similar to the STA. NO. field. Please note that it is very important that the use of hyphens in sample names and the depth units (i.e., feet or inches) remain consistent for all samples entered on the chain-of-custody form. Sample names may also use the abbreviations “MS/MSD”, “FB”, “TB”, and “DUP” as prefixes or suffixes to indicate that the sample is a matrix spike/matrix spike duplicate, field blank, trip blank, or field duplicate, respectively.

G. Number of Containers - This field represents the number of containers that were collected at the sampling location to be submitted for analysis.

H. Analytical Parameters - The analytical parameters that the samples are being analyzed for should be written legibly on the diagonal lines to the right of the “number of containers” column. As much detail as possible should be presented to allow the analytical laboratory to properly analyze the samples. Multiple methods and/or analytical parameters may be combined for each column. These columns should also be used to present project specific parameter lists. Quality assurance/quality control (QA/QC) information may also be entered in a separate column for each parameter (e.g., MS/MSD) to identify a sample that the laboratory is to use for a specific QA/QC requirement. Each sample that requires a particular parameter analysis will be identified by placing an “X” in the appropriate analytical parameter column.

I. Remarks - The remarks field should be used to communicate special analytical requirements to the laboratory. These requirements may be on a per sample basis such as “extract and hold sample until notified” or may be used to inform the laboratory of special reporting requirements for the entire sample delivery group (SDG). Reporting requirements that should be specified in the remarks column include: 1) turnaround time, 2) contact and address where data reports should be sent, 3) name of laboratory project manager, and 4) type of sample preservation that was utilized.

J. Relinquished By - This field should contain the signature of the sampling technician that relinquished custody of the samples to the shipping courier or the analytical laboratory.

K. Date - Indicates the date that the samples were relinquished. The date format should be mm/dd/yyyy (e.g., 03/07/2000).

L. Time - Indicates the time that the samples were relinquished. The time value should be presented using the military format. For example, 3:15 P.M. should be entered as 15:15.

M. Received By - This field should contain the signature of the sample courier or laboratory representative that received the samples from the sampling technician.

3. Complete as many chain-of-custody forms as necessary to properly document the collection and transfer of the samples to the analytical laboratory.

4. Upon completion of the chain-of-custody forms, forward two copies to the analytical laboratory and retain one for the field records.

VII. Sample Handling Procedures

1. After completing the sample collection procedures, record the following information in the field notebook with indelible ink:

   - project number and site name
   - sample identification code and other sample identification information, if appropriate
   - sampling method
   - date
   - name of sampler(s)
   - time
   - location (project reference)
   - any comments

2. Fill in sample label with the following information in indelible ink:

   - sample type (e.g., surface water)
   - project number and site name
   - sample identification code and other sample identification information, if applicable
   - analysis required
   - date
   - time sampled
   - initials of sampling personnel
   - sample type (composite or discrete)
   - preservative added, if applicable

3. Cover the label with clear packing tape to secure the label onto the container.

4. Check the caps on the sample containers to ensure that they are tightly sealed.

5. Wrap the sample container cap with clear packing tape to prevent it from becoming loose.

Place a signed custody seal label over the cap such that the cap cannot be removed without breaking the custody seal. Alternatively, if shipping several containers in a cooler, custody seal evidence tape may be placed on the shipping container as described below.

VII. Packing Procedures

Using packing tape, secure the outside and inside of the drain plug at the bottom of the cooler that is used for sample transport.

2. Place each container or package in individual polyethylene bags (re-sealable-type) and seal. If a cooler temperature blank is supplied by the laboratory, it should be packaged following the same procedures as the samples. If the laboratory did not include a temperature blank, do not add one, since the sample temperature will be determined by the laboratory using a calibrated infrared thermometer.

3. Place 1 to 2 inches of cushioning material (e.g., vermiculite) at the bottom of the cooler.

4. Place the sealed sample containers upright in the cooler.

5. Package ice or blue ice in small re-sealable-type plastic bags and place loosely in the cooler. Do not pack ice so tightly that it may prevent addition of sufficient cushioning material. Samples placed on ice will be cooled to and maintained at a temperature of approximately 4°C. Note that air sample canisters must be shipped at ambient temperatures (i.e., without ice).

6. Fill the remaining space in the cooler with cushioning material.

7. Place the completed chain-of-custody forms in a large re-sealable-type bag and tape the bag to the inside of the cooler lid.

8. Close the lid of the cooler and fasten with packing tape.

9. Wrap strapping tape around both ends of the cooler.

10. Mark the cooler on the outside with the following information: shipping address, return address, “Fragile” labels on the top and on one side, and arrows indicating “This Side Up” on two adjacent sides.

11. Place custody seal label over front right and back left of the cooler lid and cover with clear plastic tape.

(Note: Procedure numbers 2, 3, 5, and 6 may be modified in cases where laboratories provide customized shipping coolers. These coolers are designed so the sample bottles and ice packs fit snugly within preformed styrofoam cushioning and insulating packing material.)

VIII. Shipping Procedures

All samples will be delivered by within 48 hours of sample collection. Alternatively, a laboratory courier may be used for sample pickup. If parameters with short holding times are being analyzed, sampling personnel will take precautions to assure that the maximum holding times for these parameters will not be exceeded.

The following chain-of-custody procedures will apply to sample shipping:

- Relinquish the sample containers to the laboratory via express carrier (FedEx or UPS) or laboratory courier. The signed and dated forms should be included in the cooler. The express carrier will not be required to sign the chain-of-custody forms.

- When the samples are received by the laboratory, the laboratory personnel shall complete the chain-of-custody by recording the data and time of receipt of samples, measure and record the internal temperature of the shipping container, and then check the sample identification numbers on the containers to ensure that they correspond to the chain-of-custody forms.

VIII. Data Recording and Management

Copies of chain-of-custody forms will be maintained in the project file.

IX. Quality Assurance

N/A

X. References

N/A

Attachment C

Standard Operating Procedure –
Water Column Monitoring

Water Quality Monitoring

I. Scope and Application

Water quality parameters (e.g. turbidity, specific conductivity, pH, and temperature) of natural waters are usually measured in the field. The temperature, pH, specific conductivity, dissolved oxygen, and turbidity of surface water will be measured in-situ with a combination water quality meter (Horiba U-10 or equivalent).

Conductivity is the ability of a solution to pass an electric current. This current is carried by inorganic dissolved solids. The measurement of conductivity is useful to relate the chemical purity of the water and the amount of dissolved solids in a solution.

The measurement of turbidity is useful in that it expresses the relative amount of suspended particles in the water column.

II. Personnel Qualifications

ARCADIS field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site supervisor training, and site-specific training, as needed. In addition, ARCADIS field sampling personnel will be versed in the relevant standard operating procedures (SOPs) and possess the skills and experience necessary to successfully complete the desired field work.

III. Equipment List

The following materials, as required, shall be available during field measurement of water quality:

- Health and safety equipment, as required by the site Health and Safety Plan (HASP)
- Cleaning equipment
- Combination water quality meter
- Standard solutions for calibration
- Distilled deionized water
- Extra batteries for the meter
- Appropriate forms and field notebook

IV. Cautions

Follow health and safety procedures outlined in the site HASP.

V. Health and Safety Considerations

Follow health and safety procedures outlined in the site HASP.

VI. Procedure

1. Standard Procedures

   A. Calibration

      The meter will be calibrated following the manufacturer's instructions. Calibration information will be recorded in the field notebook. Additional details for pH, conductivity, temperature, dissolved oxygen, and turbidity calibration are presented in Equipment-Specific Procedures (Item 2. below).

   B. Operation

      The meter will be operated following the manufacturer's instructions. Two readings will be made and the average will be recorded in the field notebook. Additional details for pH, conductivity, temperature, dissolved oxygen, and turbidity operation are presented in Equipment-Specific Procedures (Item 2. below).

   C. Maintenance

      The meter will be maintained according to the manufacturer's instructions. Maintenance information will be recorded in the field notebook. A replacement meter and probes will be available onsite or ready for overnight shipment, as necessary. Additional details for pH, conductivity, temperature, dissolved oxygen, and turbidity maintenance are presented in Equipment-Specific Procedures (Item 2. below).

2. Equipment-Specific Procedures

   A. Calibration

      The pH meter will be calibrated daily.

1. Switch on instrument.
2. Connect electrode to meter via the BNC connector and remove protective cap from electrode.
3. Rinse end of electrode in distilled/deionized water.
4. Measure and record temperature of buffer solutions.
5. Immerse pH electrode in pH buffer 7.00, set the temperature adjust dial to that of the buffer 7.00, and allow sufficient time for the electrode to stabilize. Adjust the calibration dial for the correct readout.
6. Remove electrode from buffer and rinse with distilled/deionized water.
7. Immerse pH electrode in buffer 4.00, set the temperature control to that of the buffer 4.00, and allow sufficient time for the electrode to stabilize. Adjust the slope control for the correct readout.
8. Rinse electrode with distilled/deionized water. The meter is calibrated and ready for use.

B. Operation

1) Calibrate pH meter.
2) Rinse probe in distilled/deionized water.
3) Fill two 100-mL plastic disposable beakers with water from the sample.
4) Measure and record temperature of sample. Adjust temperature dial for ambient water temperature.
5) Insert probe into one sample beaker and obtain a reading. The meter will read between 0 and 14, in 0.01 increments.
6) Rinse probe off with distilled/deionized water.
7) Repeat Steps 4, and 5, and 6 in other beaker.
8) Log results in field notebook – the average will be the actual result.
9) Rinse probe off with distilled/deionized water.

C. Maintenance

1) Replace batteries on a regular basis.
2) Store electrode in protective casing when not in use.
3) Keep records of usage, maintenance, calibration, problems, and repairs.
4) After use, the meter will be inspected and the inspection recorded in the field notebook.
5) A replacement meter will be available onsite or ready for overnight shipment.
6) pH meter will be sent back to the manufacturer for service when needed.

3. Procedures for Measuring Conductivity

Conductivity is the ability of a solution to pass an electric current. This current is carried by inorganic dissolved solids. The measurement of conductivity is useful to relate the chemical purity of the water and the amount of dissolved solids in a solution.

A. Calibration

The conductivity meter will be calibrated daily.

1) Be sure the probe is clean.
2) Soak the probe in distilled/deionized water for at least 30 minutes.
3) Remove the probe from the water and fling out drops clinging inside.
4) Immerse the probe to or beyond the vent holes in a beaker containing a 1,000 mg/L Sodium Chloride Standard Solution. Agitate vertically to remove entrapped air.
5) Repeat Steps 3 and 4 at least once more.
6) Press the Power key and CND key. Verify that the LO BAT indication does not appear.
7) Press the 2 milliSiemens per centimeter (mS/cm) range key.
8) Check the reading on the display. It should be 1.990 mS/cm. If adjustment is needed, use a small screwdriver to adjust the CAL control next to the display. Counterclockwise adjustment increases the reading.

B. Operation

1) Calibrate the conductivity meter.
2) Rinse probe in distilled/deionized water.
3) Fill two 100-mL plastic disposable beakers with water from the sample.
4) Turn meter on to the 2 mS/cm scale.
5) Insert probe into sample beaker and obtain a reading. The meter will read between 0 and 2.0 mS/cm in 0.001 increments.
6) Repeat Step 5 with other beaker
7) Record both results in the field notebook and average.
8) Rinse probe in distilled/deionized water.
9) If the electrodes become coated with foreign compounds, the probe should be cleaned with a detergent solution and then rinsed with distilled/deionized water.

C. Maintenance

1) Replace batteries on a regular basis.
2) Store electrode in protective casing when not in use.

3) Keep records of usage, maintenance, calibration, problems, and repairs.
4) After use, the meter will be inspected and the inspection recorded in the field notebook.
5) A replacement meter will be available onsite or ready for overnight shipment.
6) Conductivity meter will be sent back to the manufacturer for service when needed.

4. Procedures for Measuring Temperature

Temperature readings will be taken at each water sampling location to assist in pH and conductivity measurement. It will also assist in chemical and biological interpretations. A thermometer may be part of a pH/conductivity meter or separate.

A. Operation

1) Rinse thermometer in distilled/deionized water.
2) Immerse thermometer in the water sample and read it to the nearest degree Celsius (°C).
3) Record reading in the field notebook or relevant log.

B. Preventative Maintenance

1) Use of a Teflon®-coated thermometer lends extra strength and shock resistance to guard against accidental breakage.
2) Store in protective casing when not in use.

5. Procedures for Measuring Dissolved Oxygen (DO)

The DO test is an important analysis in determining the quality of natural waters. The effects of wastes on rivers/streams, the suitability of water for fish and other organisms, and the progress of self-purification can be measured or estimated from the DO content.

A. Calibration

The DO meter will be calibrated daily using the air calibration method.

1) Prepare the probe with a thin Teflon® membrane stretched over the sensor.

2) Perform the battery check and obtain a barometric pressure reading from a daily weather report.
3) With the unit off, adjust the meter pointer to zero with the screw in the center of the meter panel.
4) Switch dial to ZERO and adjust pointer using the ZERO knob.
5) Switch dial to FULL SCALE and adjust pointer using the FULL SCALE knob. Check batteries if pointer cannot reach full scale.
6) Attach probe to unit and tighten.
7) Turn unit on
8) Allow 15 minutes for optimum probe stabilization and polarization.
9) Switch dial to CALIB O2.
10) Hold probe in the air for 10 minutes or until reading is stable.
11) Using the CALIB knob, set the pointer to the mark associated with the local barometric pressure and ambient air temperature. If barometric pressure unknown, a correction value of 97% should be used.

B. Operation

1) Calibrate the DO meter.
2) Perform the battery check.
3) Set mode switch to operate and the operation switch to the desired range.
4) Place probe into water sample
5) Take a water temperature measurement and adjust temperature dial.
6) Switch to DO content measurement and allow reading to stabilize.
7) Record water temperature and DO on appropriate form or in the field notebook.

C. Maintenance

1) Replace batteries on a regular basis, at a suggested interval of every 6 months or every 1,000 hours of operation.
2) Store electrode in protective casing when not in use.
3) Keep records of usage, maintenance, calibration, problems, and repairs.
4) A replacement DO meter will be ready for overnight shipment
5) DO meter will be sent back to the manufacturer for service when needed.

6. Procedures for Measuring Turbidity

The measurement of turbidity is useful in that it expresses the amount of suspended particles in the water samples.

A. Standardization

Standardization will be performed before each set of tests to ensure consistently accurate results.

1) Turn the instrument off and check the mechanical zero setting. Adjust to a zero NTU reading if necessary.
2) Turn power switch on and perform a battery check.
3) Place the focusing template into the cell holder. This will block all light from reaching the detector and allow the instrument to be zeroed electronically in Steps 4 and 5.
4) Press the 1.0 range switch and adjust the Zero Control for a reading of zero NTU.
5) Press the 10.0 range switch to verify that the meter still indicates zero NTU. Readjust the Zero Control if necessary.
6) Remove the focusing template and place the appropriate Gelex secondary standard for the turbidity range to be used into the cell holder. Use the index mark on the standard to orient the vial in the same position each time, thereby eliminating variation due to rotation.
7) Place the light shield over the turbidity standard and allow the meter to stabilize.
8) Adjust the SPAN control for a meter reading equal to the value of the Gelex standard in the cell holder. Remove the light shield and turbidity standard. The instrument is now ready for use.

B. Calibration

Each range is calibrated at the factory, but should be checked from time to time against fresh Formazin turbidity standard dilutions. Three trimmer potentiometers on the amplifier circuit board provide an adjustment for each range. Check each range as described in the following procedure and make the appropriate adjustments when necessary using the procedures described in Range Calibration (Item C. below).

1) With the instrument turned off, check the mechanical zero adjustment on the meter face. Adjust for a zero reading if necessary.
2) Turn the instrument on and perform a battery check. Change battery if needed.
3) Place the focusing template into the cell holder, press the 1.0 range switch, and adjust the Zero Control to obtain a zero NTU reading.
4) Remove the focusing template and insert a 0.75 NTU turbidity standard. Adjust the SPAN control for a corrected 0.75 NTU reading.
5) Remove the 0.75 NTU standard and replace it with a 10 NTU standard. Press the 10.0 range switch. The meter should indicate 10 (+0.2) NTU. If

it does not, the 10.0 range potentiometer needs adjustment as described in the Range Calibration procedure. Adjust the SPAN control for a reading of exactly 10 NTU.

6) Remove the 10 NTU standard and replace it with the cell riser and 100 NTU standard. Press the 100 range switch. The meter should indicate 100 (+2) NTU. If it does not, the 100 range potentiometer needs adjustment as described in the Range Calibration procedure.
7) Remove the 100 NTU standard and cell riser and insert the 10 NTU standard. Press the 1.0 range switch. The meter should indicate the corrected value for the 0.75 NTU standard (+0.02). If it does not, the 1.0 range potentiometer needs adjustment as described in the Range Calibration procedure.

C. Range Calibration

In the event the range adjustment potentiometers on the amplifier circuit board require adjustment, remove the instrument from its case and proceed as follows:

1) With the instrument turned off, check the meter's mechanical zero adjustment. Adjust for a zero reading if necessary.
2) Turn on power and perform a battery check.
3) Place the focusing template into the cell holder, press the 1.0 range switch, and adjust the SPAN control fully counterclockwise.
4) Adjust the Zero Control clockwise to obtain a 0.05 NTU reading on the 1.0 scale.
5) Adjust the SPAN control clockwise to obtain a reading on 0.15 NTU on the 1.0 scale. Do not alter the SPAN control setting for the remainder of this procedure.
6) Press the 100 range switch and adjust the Zero Control for a zero reading.
7) Remove the focusing template and insert the cell riser and 100 NTU Formazin turbidity standard. Cover the standard with the light shield and allow the meter to stabilize. Adjust the 100 range adjustment potentiometer to obtain a full-scale reading.
8) Remove the 100 NTU standard and cell riser and insert the focusing template into the cell holder.
9) Press the 10.0 range switch and adjust the Zero Control for a zero reading.
10) Remove the focusing template and substitute the 10 NTU Formazin standard. Cover with the light shield and allow the meter to stabilize. Adjust the 10.0 range adjustment potentiometer to obtain a full-scale reading.

11) Remove the 10 NTU standard and insert the focusing template.
12) Press the 1.0 range switch and adjust the Zero Control for a zero reading.
13) Remove the focusing template and insert the 0.75 NTU Formazin turbidity standard. Cover with the light shield and allow the meter to stabilize. Adjust the 1.0 range adjustment potentiometer to obtain a reading equal to the corrected NTU value determined when adding the turbidity of the dilution water to the nominal value of the standard.

D. Measurement

1) Turn power switch on and perform a battery check.
2) Press the appropriate range switch: 0-1, 0-10, 0-100 NTU.
3) Place the focusing template into the cell holder and adjust the Zero Control for a reading of zero NTU. Remove focusing template.
4) Fill a clean sample cell to the white line with the sample to be measured and place it into the cell holder. Use the white dot on the sample cell to orient the cell in the same position each time. Cover sample with the light shield and allow meter to stabilize.
5) Read and record the turbidity of the sample.
6) Perform a duplicate sample every 10 or set of samples, whichever is more frequent.

E. Maintenance

1) Recharge battery on a regular basis.
2) Store in protective casing when not is use
3) Keep records of usage, maintenance, calibration, problems, and repairs.
4) After use, the meter will be inspected and the inspection recorded in the field notebook.
5) A replacement meter will be ready for overnight shipment.
6) Keep Nephelometric sample tubes clean inside and out. Replace them when they become scratched or etched. Do not handle the tubes in the region where the light beam enters them.
7) Clean lens periodically.
8) Nephelometer will be sent back to the manufacturer for service when needed.

VII. Waste Management

N/A

VIII. Data Recording and Management

N/A

IX. Quality Assurance

N/A

X. References

N/A

ARCADIS

Appendix E

Preliminary Project Schedule

Sediment Remediation
Sleepy Hollow, New York
General Motors, LLC

ID	Task Name	Start	Finish
1	Contract Award & Notice to Proceed	8/22/12	8/22/12
2	**Pre-Mobilization Activities**	**8/23/12**	**10/17/12**
3	Sediment RWP Preparations	8/23/12	10/17/12
4	Owner Review Sediment RWP	9/7/12	10/8/12
5	Submit Sediment RWP to NYSDEC	9/17/12	10/8/12
6	SES General Project Submittals	8/23/12	10/17/12
7	**General Conditions**	**10/15/12**	**1/18/13**
8	Project Management	10/15/12	1/18/13
9	Temporary Facilities	10/15/12	1/18/13
10	Health and Safety Requirements	10/15/12	1/18/13
11	Odor and Dust Control	10/20/12	1/18/13
12	Water Management and Treatment	10/26/12	1/12/13
13	**General Mobilization**	**10/9/12**	**10/25/12**
14	Installation of Trailers and Utilities	10/15/12	10/19/12
15	Mobilization of SES & Rental Equipment	10/9/12	10/25/12
16	Mobilization of Water Handling System	10/15/12	10/19/12
17	**General Site Preparation**	**10/15/12**	**10/26/12**
18	Utility Relocation Survey	10/15/12	10/16/12
19	Construct Containment Area for WTP	10/17/12	10/20/12
20	Erection of Water Handling System	10/19/12	10/25/12
21	Construct Sediment Staging Areas	10/18/12	10/20/12
22	Construct Equipment Decon Facility	10/20/12	10/22/12
23	General Erosion Control Measures	10/22/12	10/24/12
24	Installation of Temporary Fence	10/24/12	10/26/12
25	**Storm Sewer Pipe Cleaning**	**10/25/12**	**11/29/12**
26	Survey Locations of Underground Storm Sewers	10/25/12	10/31/12
27	Construct Access Ways to Sewer Lines	10/25/12	10/31/12
28	Setup & Operate By-Pass Pumps Systems	10/25/12	11/29/12
29	Clean Sewer Lines	10/25/12	11/29/12
30	Video Sewer Lines	10/25/12	11/29/12
31	Place Covers Over Openings	11/27/12	11/29/12
32	**Temporary Support Wall**	**10/25/12**	**1/7/13**

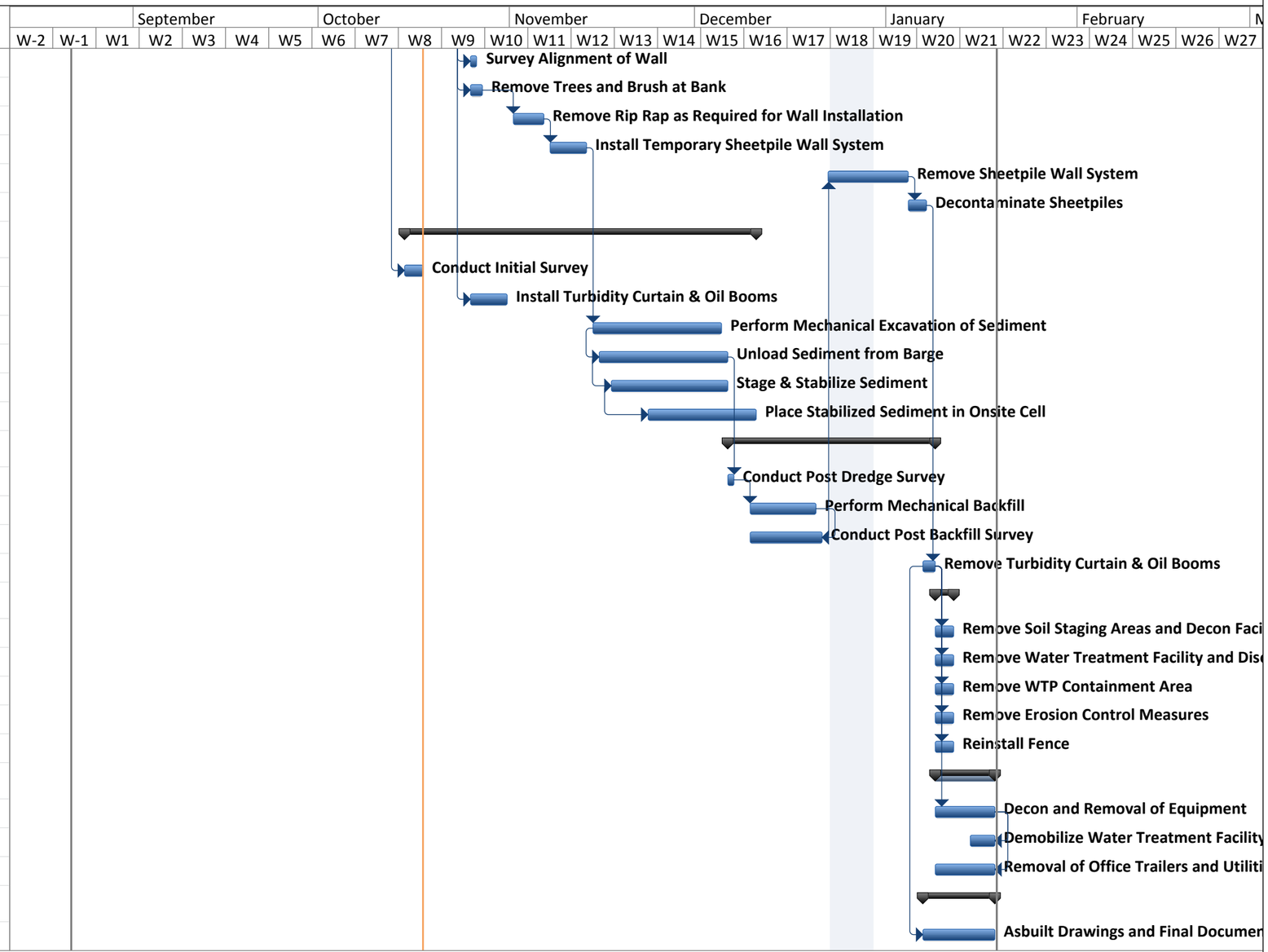
Project: GM-Sleepy Hollow-6day-
Date: 10/18/12

Task | Milestone | Project Summary | Duration-only | Manual Summary
Split | Summary | Manual Task | Manual Summary Rollup | Progress

Sevenson Environmental Services, Inc.

Sediment Remediation
Sleepy Hollow, New York
General Motors, LLC

ID	Task Name	Start	Finish
33	Survey Alignment of Wall	10/25/12	10/26/12
34	Remove Trees and Brush at Bank	10/25/12	10/27/12
35	Remove Rip Rap as Required for Wall Installation	11/1/12	11/6/12
36	Install Temporary Sheetpile Wall System	11/7/12	11/13/12
37	Remove Sheetpile Wall System	12/22/12	1/4/13
38	Decontaminate Sheetpiles	1/4/13	1/7/13
39	**Sediment Dredging**	**10/15/12**	**12/10/12**
40	Conduct Initial Survey	10/15/12	10/17/12
41	Install Turbidity Curtain & Oil Booms	10/25/12	10/31/12
42	Perform Mechanical Excavation of Sediment	11/14/12	12/5/12
43	Unload Sediment from Barge	11/15/12	12/6/12
44	Stage & Stabilize Sediment	11/17/12	12/6/12
45	Place Stabilized Sediment in Onsite Cell	11/23/12	12/10/12
46	**Backfill Work Area**	**12/6/12**	**1/8/13**
47	Conduct Post Dredge Survey	12/6/12	12/7/12
48	Perform Mechanical Backfill	12/10/12	12/20/12
49	Conduct Post Backfill Survey	12/10/12	12/21/12
50	Remove Turbidity Curtain & Oil Booms	1/7/13	1/8/13
51	**General Site Restoration**	**1/9/13**	**1/11/13**
52	Remove Soil Staging Areas and Decon Facilities	1/9/13	1/11/13
53	Remove Water Treatment Facility and Discharge Pipe	1/9/13	1/11/13
54	Remove WTP Containment Area	1/9/13	1/11/13
55	Remove Erosion Control Measures	1/9/13	1/11/13
56	Reinstall Fence	1/9/13	1/11/13
57	**General Demobilization**	**1/9/13**	**1/18/13**
58	Decon and Removal of Equipment	1/9/13	1/18/13
59	Demobilize Water Treatment Facility	1/14/13	1/18/13
60	Removal of Office Trailers and Utilities	1/9/13	1/18/13
61	**Project Closeout**	**1/7/13**	**1/18/13**
62	Asbuilt Drawings and Final Documentation	1/7/13	1/18/13



Project: GM-Sleepy Hollow-6day-
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Task — Milestone — Project Summary — Duration-only — Manual Summary
Split — Summary — Manual Task — Manual Summary Rollup — Progress

Sevenson Environmental Services, Inc.