CONSTRUCTION QUALITY ASSURANCE PLAN

ONONDAGA LAKE
CAPPING, DREDGING, AND HABITAT

Prepared for

Honeywell

Prepared by

ANCHOR QEA

PARSONS

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
Anchor QEA	Anchor QEA, LLC
ASTM	American Society of Testing and Materials
CMU	cap management unit
CQA	construction quality assurance
CQAP	Construction Quality Assurance Plan
CQC	construction quality control
cy	cubic yards
DMU	dredge management unit
DSC	Dredging Supply Company, Inc.
GAC	Granular Activated Carbon
Honeywell	Honeywell International Inc.
ILWD	in-lake waste deposit
mcy	million cubic yards
NAVD88	North American Vertical Datum of 1988
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
RA	Remediation Area
RFI	Request for Information
ROD	Record of Decision
RTK GPS	Real Time Kinematic Global Positioning System
SCA	Sediment Consolidation Area
SCADA	supervisory control and data acquisition
Sevenson	Sevenson Environmental Services, Inc.
SMU	Sediment Management Unit
SOP	Standard Operating Procedure
USEPA	U.S. Environmental Protection Agency

EXECUTIVE SUMMARY

Honeywell International Inc. (Honeywell) is implementing remediation and restoration of Onondaga Lake and adjacent wetlands over the next five years. As part of this effort, approximately 2.24 million cubic yards (mcy) of material will be dredged and conveyed through a pipeline to a Sediment Consolidation Area (SCA), where it will be contained within geotubes and eventually capped with an impermeable liner system. Further, approximately 450 acres of the lake bottom and restored adjacent wetlands will be capped with materials specifically engineered to isolate the contaminants and achieve a restored surface for habitat and wetland restoration. In addition, approximately 27 acres of the profundal (deep water) zone will receive a thin-layer cap. In addition to the above, several lake shore improvements and tributary work as well as nitrate addition in deeper water sections of the lake are also planned over the next five to seven years.

This document presents the Construction Quality Assurance Plan (CQAP) for the dredging and capping (including habitat layer) aspects for the remediation of Onondaga Lake and adjacent wetlands. Key participants in the construction quality control (CQC)/construction quality assurance (CQA) process are listed below.

- Honeywell has selected Sevenson Environmental Services, Inc. (Sevenson), a contractor experienced in sediment dredging and capping, to implement the project. Sevenson brings state-of-the-art dredging and capping equipment with advanced electronic control systems that will allow precise dredging and cap placement operations in the lake. Thus, through its experienced personnel and advanced equipment with demonstrated accuracy and precision, Sevenson will provide the first step in the CQC of the executed project.
- Honeywell has selected Parsons, a design and construction firm with demonstrated success in delivery of several large scale construction projects, to lead the field construction efforts. Sevenson will work as a subcontractor to Parsons. Parsons has assembled a highly qualified team to provide construction management, as well as CQC. Thus, Parsons will be the primary check over Sevenson's work to assure compliance with design documents. Parsons will achieve this not only through its team of construction personnel, but also through a series of detailed checks and measures to verify dredge accuracy (to demonstrate removal limits), cap materials,

and cap placement (to demonstrate layer thickness, elevation, and material consistency).

- Honeywell has selected Anchor QEA, LLC (Anchor QEA), a firm with first-hand experience in more than two dozen national sediment remediation design and construction projects to serve in a CQA role for the project and report directly to Honeywell. Anchor QEA will provide a secondary and independent check over Sevenson's work to confirm compliance with design documents. Anchor QEA will have a team of sediment remediation personnel who will observe the construction progress and take independent measurements as needed to verify compliance with the design as well as to maintain protectiveness of the water quality of the lake as the construction proceeds.

A high level summary of the CQC/CQA program is as follows:

- Implementation of dredging in accordance with the design will be confirmed through checks and measures including bathymetric surveys to verify final dredge elevation.
- Achievement of the cap thickness and final elevations specified in the design will be verified through using a series of methods including, but not limited to, catch pans, cores, survey stakes, and bathymetric surveys.
- Compliance with cap material requirements specified in the design will be verified through a series of checks and measures, including chemical and geotechnical laboratory analysis.

Additional details of the measurement, testing, and documentation procedures are presented in the following sections.

1 INTRODUCTION

This document presents the Construction Quality Assurance Plan (CQAP) for dredging impacted sediments and placing a sediment cap (including habitat layer) within Onondaga Lake and adjacent wetlands as part of the site remediation.

1.1 Purpose

This CQAP presents procedures and protocols to be utilized to ensure that sediment removal operations and sediment cap construction within Onondaga Lake and adjacent wetlands are performed in accordance with the approved design. This CQAP has been prepared on behalf of Honeywell International Inc. (Honeywell) and is based on the design set forth in the Capping, Dredging, Habitat and Profundal Zone (Sediment Management Unit 8) Final Design (Final Design; Parsons and Anchor QEA, LLC [Anchor QEA] 2012).

1.2 Background

The Onondaga Lake Final Design provides the design evaluation for the Onondaga Lake Remediation components pertaining to sediment dredging, cap installations, and habitat material placement in the lake and adjacent wetlands. The lake bottom is on the New York State Registry of Inactive Hazardous Waste Sites and is part of the Onondaga Lake National Priorities List (NPL) Site. Honeywell entered into a Consent Decree (United States District Court, Northern District of New York, 2007; 89-CV-815) with the New York State Department of Conservation (NYSDEC) to implement the selected remedy for Onondaga Lake as outlined in the Record of Decision (ROD) issued on July 1, 2005.

1.3 CQAP Organization

This CQAP is organized into seven sections. The purpose and scope of the CQAP are presented in Section 1. The definitions relative to the Quality Management System (which includes both construction quality control [CQC] and construction quality assurance [CQA]) are defined in Section 2. Project management, including roles and responsibilities of the project team, communication, and meetings, is presented in Section 3. Construction oversight tasks, which will verify construction quality through inspections, CQC and CQA testing, and documentation, are presented in Sections 4, 5, and 6. References are included in Section 7.

2 DEFINITIONS AND USE OF TERMS

CQC and CQA are defined as follows:

- CQC – Planned system of inspections and testing taken by the contractor to monitor and control the characteristics of an item, service, removal, or installation in relation to design requirements. The CQC activities provide collection of measurements of construction conditions.
- CQA – Planned and systematic means and actions that provide Honeywell and NYSDEC assurance that materials, dredging, and capping activities meet or exceed design criteria and requirements.

In the context of this document, CQC refers to the following:

- Those actions taken by the General Contractor's team (i.e., Parsons or their subcontractors) to determine compliance of the various components of the dredging, capping, and habitat material placement with the requirements of the approved design.

In the context of this document, CQA refers to the following:

- Means and actions employed by Anchor QEA (or other independent party as directed by Honeywell) to independently assess conformity of the various components of the dredging, capping, and habitat material placement with the requirements of the approved design.

3 PROJECT MANAGEMENT

3.1 Roles and Responsibilities

Sediment dredging, cap placement, and installation of habitat material will take place during multiple years. During this time, Honeywell will maintain overall responsibility for the execution of the project in accordance with the ROD, Consent Decree, and Final Design, and NYSDEC will provide regulatory oversight. Roles and responsibilities of the team members and agencies are described below. Key contact information is presented in Table 3-1.

3.1.1 Agencies

NYSDEC will be the lead regulatory agency during construction. NYSDEC's Project Manager or his representative will participate in weekly progress meetings, have access to the work and documentation, be provided completed dredging and capping area records, and provide regulatory approval for changes to the approved design.

3.1.2 Honeywell

Honeywell is responsible for implementing the remediation in accordance with the Consent Decree (United States District Court, Northern District of New York, 2007; 89-CV-815). Mr. William Hague, Honeywell's Director of Construction and Remediation, will oversee the remedial construction aspects of this project. Mr. John McAuliffe, Honeywell's Syracuse Program Director, will be the primary contact with NYSDEC for overall Onondaga Lake project matters. Mr. Larry Somer, Honeywell's Design and Construction Manager, will be the in-field manager of all construction activities, and will report to Mr. Hague.

Mr. Robert Rule will serve as Honeywell's Lake Program Manager for the capping, dredging, and habitat work. The Lake Program Manager has the following specific duties:

- Chair construction project meetings
- Oversee, track, and report on construction progress and CQC/CQA efforts and serve as the primary contact with NYSDEC for these matters

- Communicate directly with Honeywell's Health and Safety Manager, Parsons' Site Manager, and Anchor QEA's CQA Manager
- Participate in the coordination of design issues with the design engineers

3.1.3 Parsons

Parsons will serve as the General Contractor for the capping, dredging, and habitat work. Mr. Paul Blue will serve as Parsons' Project Manager and be responsible for Parsons' site activities and home office support. The Project Manager has the following specific duties:

- Interpret and plan the work effort
- Communicate directly with the Site Manager, Project Engineer, and CQC/CQA teams
- Define personnel and equipment requirements and secure resource commitments
- Participate in meetings as required

Construction activities will be directed by Mr. Alan Steinhoff, serving as the Site Manager. Mr. Steinhoff will be supported by field engineers and technicians to implement the work. In addition, Parsons will retain several subcontractors for implementation of the various components of the work.

The Site Manager has the following specific duties:

- Implement on-site construction activities and direct the work crew and on-site construction personnel on daily operations
- Prepare for and attend site construction meetings as required
- Procure, contract with, and monitor subcontractors and suppliers as needed
- Establish schedules with milestones
- Assure that documentation is submitted to the Design Engineer as required in the Design Documents
- Maintain construction quality and safety standards
- Communicate closely with the Lake Program Manager

Parsons' Dredge, Cap and Processing Supervisor, David Smith, and Project Engineer, David Steele, P.E., will manage all CQC activities associated with dredging and capping activities.

The CQC team will prepare technical submittals, perform CQC testing, oversee and manage CQC testing performed by their subcontractor(s) and independent testing laboratories, and document CQC results. The Dredge, Cap, and Processing Supervisor and/or Project Engineer will attend construction, safety, and on-site agency meetings, review construction submittals, and coordinate with the Lake Program Manager.

Sevenson Environmental Services, Inc. (Sevenson) has been recognized as Parsons' dredging and capping subcontractor. Parsons will manage Sevenson's activities to ensure execution of the work in accordance with the Final Design, including performance of CQC tasks to be performed by Sevenson.

The Design Engineer for the project is Mr. Edward Glaza, P.E. (New York State) of Parsons. Engineering support will be provided as needed to review construction submittals, Requests for Information (RFIs), and design modifications that require engineering interpretation. If modifications to the approved Final Design are necessary, approval by the Design Engineer, or his designee, will be required.

3.1.4 Anchor QEA

Anchor QEA will perform CQA for the capping, dredging, and habitat work. Anchor QEA's team will be led by Mr. Ram Mohan, P.E., who will act as CQA Director and report directly to Honeywell. Daily project activities will be overseen by Anchor QEA's CQA Manager, Mr. Joseph Detor, P.E., who will attend the weekly construction progress meetings. Mr. Detor will have a direct line of communication with Honeywell's Construction Manager, Mr. Somer, as well as Honeywell's Lake Program Manager, Mr. Rule. Mr. Detor will be supported by a staff of field engineers and technicians from Anchor QEA for the various work elements.

The CQA Manager and team will be on site daily to observe construction activities and perform CQA activities. The CQA Manager will provide support to the construction team by providing CQA data and results, as well as attend construction, safety, and on-site agency meetings, review construction submittals, and coordinate with Honeywell representatives.

3.2 Project Communication

NYSDEC is the lead agency for the project. Once approved work begins, Honeywell will manage all aspects of the project, including work to be completed by Parsons and its subcontractors. Issues or concerns from NYSDEC will be channeled primarily through the Lake Program Manager or, alternatively, the CQA Manager.

Consistent with all Onondaga Lake projects, NYSDEC, Honeywell, or any other project personnel may immediately stop work if a condition is observed that threatens the immediate safety of an on-site worker or the public.

Changes to the approved Final Design will require approval by the Design Engineer, Honeywell, and a NYSDEC representative prior to the change being implemented. Proposed material substitutions (i.e., “or equals”) and determinations associated with construction means and methods, not associated with determining achievement of dredge elevations, cap material thicknesses, Granular Activated Carbon (GAC) or siderite dosages, or post-capping water depth, are not considered a design change and will be approved by the Project Engineer as part of the technical submittal review process. Any determinations associated with construction means and methods associated with determining achievement of dredge elevations, cap material thicknesses, GAC or siderite dosages, or post-capping water depth must be discussed with NYSDEC’s on-site representative and deemed acceptable prior to implementation.

Table 3-1
Key Contact List

NYSDEC

Project Manager
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Table 3-1 (Continued)
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4 DREDGING

This section describes the construction oversight activities, including CQC and CQA tasks, which will be undertaken to verify that dredging within Onondaga Lake has been completed in accordance with the Final Design.

Dredging of contaminated sediments is a significant part of the remediation of Onondaga Lake and adjacent wetlands. Design and performance criteria relative to dredging have been divided into two categories: 1) in-lake waste deposit (ILWD) dredging; and 2) dredging to achieve habitat-based, post-capping elevations.

In addition, specific implementation methods and monitoring of the shoreline barrier walls during adjacent dredging and excavation will be required based on geotechnical stability considerations. A Standard Operating Procedure (SOP) is included as Appendix A.

4.1 Dredge Implementation

The dredging equipment that Sevenson will use to perform work on Onondaga Lake includes state-of-the-art controls, monitoring, tracking, and communication equipment that will provide an advanced level of controls including position, data collection, and production tracking. Work progress will be accurately monitored and documented during dredging operations.

Each hydraulic dredge used to perform work on Onondaga Lake will be fitted with a DeltaMass MT Series Mass Flow and Density Sensor (single unit). The DeltaMass flow meter combines a magnetic flow meter and a low-level gamma ray density sensor for measuring the density of the slurry and the flow rates, which together provide the instantaneous production rate of material being removed. This information will be visible to the dredge operator so they can control the feed and flow in the pipeline to achieve uniform slurry. Output from these two gauges will be fed into a “Totalizer Unit,” which will keep track of the total quantity of material dredged in real time.

Sevenson will use a Real Time Kinematic Global Positioning System (RTK GPS; Trimble 461 with heading) designed and installed for the Onondaga Lake project. The Dredgepack software, which is designed for use with an excavator and/or the hydraulic dredges, will compile information from the RTK GPS and other positioning equipment on the dredges (e.g., inclinometer, tilt sensors) to track the horizontal and vertical positions of the dredge cutterhead or excavator bucket in real time throughout the project. Calibration of the system will be performed by comparing water level and x, y positions derived by the Dredgepack software with independent values derived from a Trimble S6 robotic total station positioned on shore with millimeter accuracy.

Figure 4-1 depicts an example output from the Dredgepack software for a hydraulic dredge, which is an indicator of the operational controls associated with the dredging program.

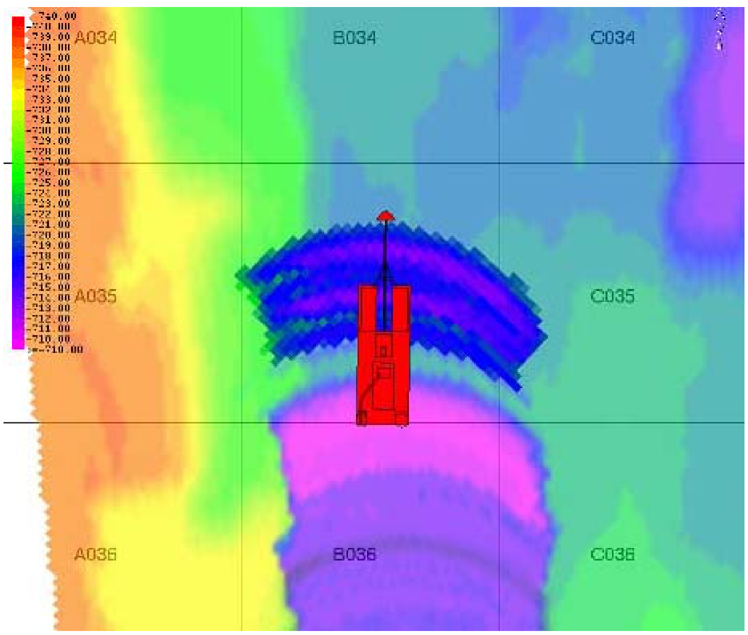


Figure 4-1

Example Output from Dredgepack Software for Hydraulic Dredge

4.2 Post-dredging Verification

As presented above, a critical component of an effective dredging program is the use of state-of-the-art tools to efficiently implement the program. This section presents additional post-dredging verification means and performance criteria that will be implemented to verify that dredging has been completed to the horizontal and vertical extents required by the design.

Verification of the completion of dredging will be performed on a “management unit” basis. A dredge management unit (DMU) is a dredging area within a RA that will be used for assessing compliance with elevation targets and dredging thickness removal (for the ILWD only).

The limits of dredging were delineated based on sediment sampling data and, in some areas, based on the planned thickness of the post-dredging cap and the final desired post-construction water depth. Therefore, post-dredging surveying will be performed to verify that the limits and extents of dredging required by the design within a DMU have been achieved prior to placement of capping and habitat materials.

Subdividing the RAs into DMUs will facilitate continuous tracking of the dredging progress and for post-dredge verification purposes while actively dredging in the vicinity of a DMU. The DMU layouts will generally align with the dredging “lanes,” with each lane ranging in width from approximately 100 to 150 feet based on the swinging radius of the specific dredge operating in a given RA. Multiple adjacent lanes will be grouped together to form DMUs (e.g., ranging from approximately two to five acres); however, smaller and larger DMUs may be delineated depending on specific site conditions and the overall thickness of dredged material to be removed. It is anticipated that dredging will be ongoing within multiple DMUs at any given time based on weather, schedule, site characteristics, and operational considerations. The specific areas anticipated to be dredged for a given year will be developed prior to start of construction in that year and may be revised as dredging progresses.

As part of the CQC program, post-dredging bathymetric surveys will be performed by Parsons, or their subcontractor, using a single-beam (dual-frequency) fathometer in water depths greater than approximately 2 to 4 ft. Pre-dredge surveys will also be performed to set up, program, and calibrate the automated control systems that will be used on the dredge equipment. Surveys will be considered interim in the event post-dredge surveys show that target elevations have not been achieved. In water depths shallower than 2 to 4 ft., post-dredging verification surveys may be performed using a more suitable methodology, such as pole soundings or land-based conventional upland survey methods, when the use of a fathometer is not practical. Survey lines in deeper water (water depths greater than 2 to 4 ft.) will conform to a 25-ft.-grid spacing perpendicular and parallel to the dredge cut, where practical. Survey lines in shallow water will also follow a 25-ft.-grid spacing perpendicular and parallel to the dredge cut, where practical, with survey measurements taken at a maximum spacing of 10 feet along each grid line. Parsons or their subcontractor will process the survey data obtained to verify the target elevations have been achieved. These drawings will serve as the record drawings (as described in Section 6.5). Capping will not be performed in an area until the CQA Manager (Anchor QEA) has verified that the post-dredging completion metrics (described in Section 4.2.1) have been met. This verification will be done in consultation with NYSDEC's on-site representative. Parsons and Anchor QEA will prepare annual construction summary reports for NYSDEC to track cumulative dredge volume progress that will also summarize dredging production and coverage, as detailed in Section 6.4.

Anchor QEA will periodically accompany the CQC surveyor team to observe post-dredging CQC surveys and review equipment calibration procedures and records. Anchor QEA will also perform independent survey measurements using similar methods and equipment as the contractor, or direct and oversee duplicate bathymetry measurements by the contractor, to verify random subsets of CQC elevation measurements.

In deeper water, CQA surveys may be performed by one of two approaches. The first approach will be to verify approximately 10 to 15 percent of the total linear footage of CQC survey transects (e.g., if the CQC survey transects total 1,000 ft. in length for a DMU, the CQA survey will verify 100 to 150 ft. of random transect segments). The second approach will be to verify approximately 10 to 15 percent of the parallel and perpendicular survey grid intersection node locations. In shallow water, the independent CQA surveys will verify approximately 10 to 15 percent of the discrete CQC measurements taken. Anchor QEA will also provide summary CQA verification data to Parsons for developing the annual construction summary reports for NYSDEC.

4.2.1 Post-dredging Completion Metrics

Dredging will be considered complete within non-ILWD DMUs (RAs A, B, C, and E) when post-dredging surveys of the actual dredge footprint confirm that the required dredge elevation has been achieved over 90 percent of the dredge surface area of a given DMU, with the following additional requirements:

- Areas within a DMU above the required elevations (i.e., up to 10 percent total) are relatively isolated (i.e., non-contiguous and less than 1,000 square ft.).
- No more than 5 percent of the total dredge area within a DMU and no contiguous area larger than 1,000 square ft. within this 5 percent will be permitted to exceed the target elevation by more than 0.5 ft. No area will exceed the target elevation by more than 1 foot.
- In areas where the target post-capping water depth is within 2 ft. or less of the lake surface elevation (362.5 ft. North American Vertical Datum of 1988 [NAVD88]), the minimum dredge cut must be met in 100 percent of the area to ensure adequate depth for cap placement with no loss of lake surface area and to establish appropriate habitat-related water depths.

In deeper water areas, the design includes greater tolerance ranges for post-dredging elevations than in shallow water areas. This is due to the Final Design cap elevations including greater tolerance ranges in deeper water areas compared to shallow water areas. Therefore, the acceptance criteria allowing slight variations in the post-dredge elevations as previously outlined still ensure that requirements of the Final Design will be met with no impact to designed habitat objectives.

Target post-cap elevations for the adjacent wetlands being remediated as part of the lake remediation (i.e., Ninemile Creek spits, Wastebed 1-8 connected wetlands, and Wastebed B/Harbor Brook Outboard Area) were not developed as maximum elevations as were the target elevations in the majority of the dredged areas in the lake. As discussed in Section 5, the wetland cap elevation tolerances were specified to be within ±0.5 ft. of the target elevation (Parsons and Anchor QEA 2012). Therefore, no more than 10 percent of the total area within each of the adjacent wetland areas, and no contiguous area larger than 1000 square feet will have a post-dredge elevation above the target elevation by more than 0.5 ft.

Furthermore, no measurable area within a wetland will be allowed to exceed the target elevation by more than 1.0 ft.

The dredging cut line within the ILWD was developed to achieve an average removal of 2 meters, applied individually to the area of the ILWD within Sediment Management Units (SMUs) 1, 2, and 7, plus hot spots, as required by the ROD. Therefore, the dredging goal within the ILWD will be to achieve the specified cut line with an average tolerance of ±0.5 ft. However, final compliance will be based on demonstrating that the amount of overcut is equal to or greater than the amount of undercut and that there are no measureable areas with an undercut greater than 1 ft. To verify compliance with the ROD, post-dredge CQC surveying will be performed in the ILWD to confirm that, at a minimum, the required volume equivalent to a 2-meter average removal plus the hot spots' volume has been removed and the demonstration that the amount of overcut is equal to or greater than the amount of undercut within each individual SMU of the ILWD (SMUs 1, 2, and 7).

The amount of overcut compared to undercut will be monitored as the work progresses to ensure that there is not a significant dredge volume deficit that must be made up at the end of the SMU-specific ILWD dredging. Honeywell will coordinate with NYSDEC on this as the work progresses. In addition, for the combined areas of the ILWD hot spots, the overcut will be greater than the amount of undercut to ensure that the full 1 meter of additional removal is completed prior to capping.

As stated previously, to confirm that dredging is in compliance with the design, post-dredge surveys will be compared to the designed dredge templates. In the event that post-dredge surveying indicates that required dredge elevations have not been achieved in accordance with the compliance criteria previously discussed, the contractor will have the option to either: a) perform additional post-dredge surveying to verify the accuracy of the previous surveys or to supplement with new data (which will both be reviewed by the CQA/CQC team); or b) forego additional surveying and perform additional dredging in the identified non-compliant areas. After any follow up action, a subsequent bathymetric survey will be performed and compliance will be reassessed.

The duration between completion of dredging in an area and capping over the completed dredge area will vary depending on specific site conditions and geometry. In areas where dredging has been completed and the dredge has been relocated to another discrete dredge area (such as in portions of RA C), capping may commence over the previously dredged area upon review and approval of dredge survey results. In areas where DMUs are contiguous, such as RA D, the capping will not commence over an accepted dredge area until the dredge has progressed far enough ahead of the cap so that turbidity mitigation measures (intermediate silt curtains) are effective. Honeywell will coordinate closely with NYSDEC prior to and during implementation regarding sequencing to minimize the time between completion of dredging and subsequent capping, and to minimize the potential for significant changes to the dredging surface elevation prior to capping. Unless discussed with and approved by NYSDEC, all areas dredged to the final elevation within a construction season shall be capped, at least up to and including the erosion protection layer, within that same construction season.

5 CAPPING AND HABITAT

This section describes the construction oversight activities, including CQC and CQA tasks, which will be performed to verify that capping (including habitat layer construction) within Onondaga Lake has been completed in accordance with the Final Design. The CQC and CQA activities will verify that the cap and habitat materials are placed within specified areas, the required thicknesses of the individual cap and habitat layers have been achieved, the required siderite and GAC dosages, where applicable, have been achieved, and the design cap/habitat elevations have been met.

The cap is designed to provide long-term chemical and physical isolation of underlying impacted sediments and to provide a suitable habitat substrate that plants, animals, and fish can use without impacting the chemical isolation layer; therefore, the cap will be composed of specific layers dedicated to various purposes. These layers will include a habitat layer, an erosion protection layer, and a chemical isolation layer, as well as an allowance for mixing of the bottom of the chemical isolation layer with the underlying existing lake sediment.

Honeywell will coordinate closely with NYSDEC during dredging operations to achieve consensus that dredging goals have been met prior to initiating subsequent capping operations. This will allow capping operations to proceed in a timely manner without requiring formal development and signature of the DMU forms (see Section 6.3), which could delay operations.

5.1 Cap Implementation

Similar to the dredging equipment, the capping equipment that will be used on Onondaga Lake includes state-of-the-art controls, monitoring, and tracking equipment that will provide an advanced level of positioning data and placement tracking. Work progress will be accurately monitored and documented throughout construction.

The capping barge will be equipped with a DeltaMass MT Series Mass Flow and Density Sensor (one unit). The DeltaMass flow meter combines a magnetic flow meter and a low-level gamma ray density sensor for measuring the density of the slurry and the flow rates, which together provide the instantaneous production rate of capping and habitat material being placed.

Sevenson will use Dredgepack software to transmit RTK GPS information to a custom control box programmed by the equipment supplier, Dredging Supply Company, Inc. (DSC). The control box enables the capping barge operator to control essential capping parameters such as barge speed and steering through winch controls, as well as cap thickness. Figure 5-1 depicts an example output from the Dredgepack software for a capping barge.

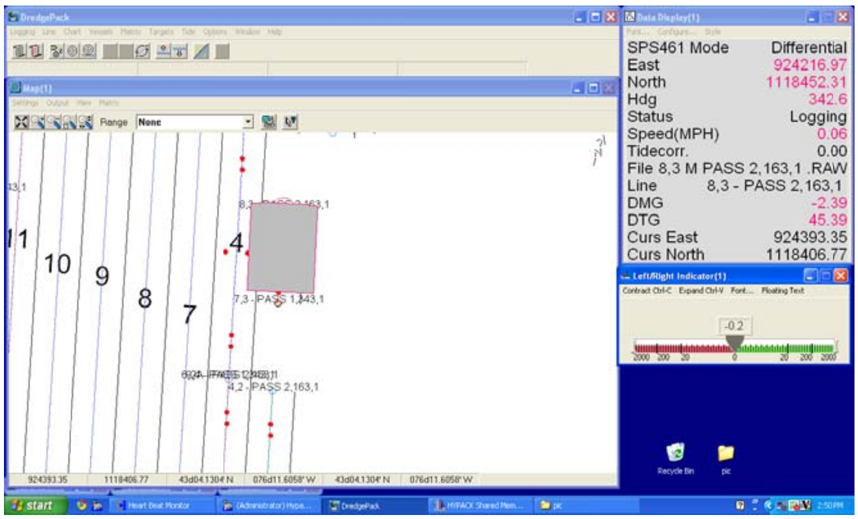


Figure 5-1

Example Output from Dredgepack Software for Capping Barge

In addition to the equipment on the capping barge, land-based equipment and instrumentation will be used to support capping operations. For the hydraulically placed GAC slurry portion of cap material, the system will continuously monitor the GAC feed rates, peristaltic metering pumps, and a slurry density flow meter. For both hydraulically placed GAC and siderite cap material, the system will also continuously monitor the sand and siderite feed rates using gravimetric weigh belt feeders and/or volumetric feeders.

Capping system performance data will be recorded, monitored, and displayed using a supervisory control and data acquisition (SCADA) system. The SCADA system allows operators to continuously monitor and document in real time the performance of specific components within the capping system, and to make any necessary adjustments to maintain the designed system performance. The SCADA system will be programmed with critical system performance criteria and will alert operators should the system be operating outside the optimum design range.

5.2 Cap Material Verification

As presented above, a critical component of ensuring an effective cap placement in the lake is use of state-of-the-art tools and controls. This section presents additional measurements and analyses that will be performed to demonstrate that cap materials used in Onondaga Lake meet the specifications required in the design.

The purpose of the cap material CQC program is to document that the capping materials conform to the specifications of the Final Design. As part of the CQC program, Parsons (or their vendors) will conduct sampling and analyses on the materials that will be used for each cap layer. The following is a list of materials that will be used in the sediment cap:

- Siderite
- GAC
- Medium sand
- Gravelly sand
- Fine gravel
- Coarse gravel (Types A and B)
- Gravelly Cobble
- Topsoil

As part of the CQC program, the GAC and siderite vendors will provide analytical and physical property results and certifications that the materials meet the specifications as described in the Final Design. For all other materials (i.e., medium sand, gravelly sand, fine gravel, coarse gravel, gravelly cobble, and topsoil), Parsons will perform sampling of the capping materials at the source (i.e., prior to delivery to the site) at regular intervals to confirm that the material gradations are in conformance with the specifications in the Final Design. Parsons will perform sampling at regular intervals at the source (as described in Section 5.2.3).

The purpose of the CQA program is to verify that the capping materials conform to the design specifications. As part of the CQA program, Anchor QEA will witness approximately 10 percent of the CQC sample collections at the source. Anchor QEA will also perform desktop reviews of particle-size distribution curve submittals, laboratory chemical analysis results submittals, and siderite and GAC certification documentation provided by the suppliers. Anchor QEA will also maintain physical samples of approved materials on site to use in visual comparison to delivered material.

The following summarizes specific CQC requirements for the various capping and habitat materials.

5.2.1 Siderite

Bulk shipments of siderite will be in clean and enclosed or covered rail cars, barges, or trucks to avoid collection of moisture or loss of material in transit. The interior of vehicles will be clean and free from dirt, corrosion scale, and other extraneous materials. Bulk shipments will be accompanied by certified weight tickets.

The supplier will provide an affidavit of compliance certifying that the siderite furnished complies with the physical and chemical criteria specified in the design.

5.2.2 GAC

Bulk shipments of GAC will be in clean and enclosed or covered rail cars, barges, or trucks to avoid collection of moisture or loss of material in transit. The interior of vehicles will be clean and free from dirt, corrosion scale, and other extraneous materials. GAC may also be transported/delivered using super sacks. Each shipment or container of GAC will have marked legibly on it the net weight of the contents, the name of the manufacturer, country of origin, the lot number, and a brand name (if any), and will bear other markings as required by applicable regulations and laws.

The supplier will provide an affidavit of compliance certifying that the GAC furnished complies with the physical and chemical criteria specified in the design.

The GAC will be in granular form and will require a period of soaking prior to placement. The minimum agitated soaking time for the GAC will be two hours. The GAC unloading time will be recorded, as well as start time for feeding out of the storage tanks.

5.2.3 Aggregate Materials

Samples of aggregate materials (i.e., sand, gravel, gravelly cobble, and topsoil) will be analyzed at the source by the contractor for particle size analysis in accordance with American Society of Testing and Material (ASTM) D422 – Standard Test Method for Particle-Size Analysis of Soils. During the initial phase of construction, QA split samples will be taken on 100 percent of proposed material intended for use in constructing the cap. All 100 percent of these split samples will be sent to a qualified geotechnical laboratory to validate the contractor's methods and sampling accuracy. After the contractor's particle size analysis methods and accuracy have been demonstrated and NYSDEC concurs, the supplier's on-site testing will provide the primary QC results and 5 to 10 percent of the particle size analysis samples will be split and sent to a qualified geotechnical laboratory for QA. The test results will be provided to the Project Engineer. Samples will be collected at the source location at the following frequency:

1. For the first 25,000 cy of each material type from a specific material source, a representative sample will be obtained from each 2,500 cy batch or part thereof.
2. If ten consecutive acceptable test results have been obtained on samples representing the first 25,000 cy or greater of each material type and the material continues to be from the same material source area or process, then the batch size can be increased to 5,000 cy for the subsequent material deliveries.
3. If ten consecutive test results have been obtained on samples representing the first 75,000 cy or greater of each material type and the material continues to be from the same source area or process, then the batch size can be increased to 10,000 cy for the subsequent material deliveries.

In addition to the scheduled CQC testing frequency stated above, materials will be periodically sampled at the source as they are being processed and stockpiled. Results of scheduled and interim sampling will be used, if necessary, to make real-time adjustments to material processing and stockpiling to ensure compliance with the specifications prior to being shipped to the site.

A source for the sands, gravels, and gravelly cobble to be used for the cap construction has been located and an *in situ* sampling program has been developed to document that the materials comply with the Unrestricted Use Soil Cleanup Objectives listed in NYSDEC 6 NYCRR Part 375. If an alternative source of material is recognized and proposed, an alternative program for verification of compliance with the chemical criteria utilizing i*n situ* sampling or a tiered approach similar to that outlined above will be developed and implemented subject to approval by NYSDEC.

5.2.4 Organic Habitat Layer Material

In select areas, the Final Design requires the habitat layer to be composed of topsoil with an organic content requirement. In addition to the grain size testing requirements listed above, the topsoil will be tested for organic content prior to placement, typically prior to shipment from the source. Samples of the mixed material will be submitted to a qualified testing laboratory for analysis in accordance with applicable testing standards (i.e., ASTM D-422, ASTM D-4972, ASTM D-2974, and SW846 7471A). The sampling/testing frequency will follow the same procedure described in Section 5.2.3. The test results will be submitted to the Project Engineer.

5.3 Cap Placement Verification

This section presents verification measurements that will be performed to demonstrate that the caps have been placed to the vertical and horizontal limits and extents required by the design, and that final habitat elevation objectives have been obtained. Similar to the sediment dredging, verification of the completion of the sediment cap will be performed on a "management unit" basis. A cap management unit (CMU) is a capping area within an RA that will be used for assessing compliance with required mixing layer, chemical isolation layer, erosion protection layer, and habitat layer thicknesses. In addition, CMUs will be used for assessing post-construction surface elevations and compliance with habitat objectives.

The CMUs will be developed using a process similar to that for DMUs for assessing placement compliance with the design. The delineation of CMUs will take into consideration the relative size and position of contiguous cap areas, the typical production rate for cap placement, and the various cap designs. CMUs will generally be aligned with the operational lanes of the capping equipment, which are currently anticipated to be approximately 20 ft. wide. Therefore, multiple capping lanes will be grouped together, to the extent practicable, into constructible rectangular "boxes" to form CMUs ranging from approximately 2 to 5 acres. However, smaller and larger CMUs may be delineated depending on specific site conditions. It is anticipated that capping will be ongoing within multiple CMUs at any given time based on operational sequencing considerations.

In general, the CQC and CQA programs involve measuring the thickness of each layer of the cap to verify that the required thickness has been achieved, and then surveying the elevation of the top of the cap to verify that target elevations and the horizontal limits and extents of capping required by the Final Design were achieved. The specific method and measurement technique utilized to verify engineered cap placement will be dependent on the thickness and material physical characteristics of the cap layer being verified (e.g., ranging from a sand chemical isolation layer to a gravelly cobble erosion protection layer) and on the local site conditions (e.g., water depth, size of area).

Available methods for cap layer thickness verification are presented in Table 5-1. Details of the thickness measurements for the chemical isolation layer, erosion protection layer, and habitat layer are described in subsequent sections.

Table 5-1

Available Methods for Thickness Measurement of Engineered Cap Layers

Cap Material Type	Preferred Sample Method	Additional Available Sample Methods
Sand and Fine Gravel	Catch Pans	Survey Stakes, Push Corer, Check Valve Core Sampler, Piston Corer, Poling Surveys, Bathymetry Surveys
Gravel	Catch Pans	Survey Stakes, Poling Surveys, Bathymetry Surveys
Gravelly Cobble	Catch Pans	Survey Stakes, Poling Surveys, Bathymetry Surveys

5.3.1 Chemical Isolation Layer/Cap Amendment Verification

Capping operations in 2012 are planned in portions of RA C and RA D. At the start of capping operations in 2012, an initial "calibration" period that includes several CQC and CQA sampling and testing procedures will be conducted. The purpose of the calibration period is to improve system performance and dosing correlations in areas where cap amendments (i.e., GAC and/or siderite) are required for the chemical isolation layer, and to confirm that the capping methods consistently achieve the *in situ* composition of the amended cap layer consistent with the design requirements. Based on the results of the sampling and testing conducted during this period, adjustments to amendment amounts (e.g., overdosing requirements) will be made, if necessary, for subsequent cap material placements. This period will consist of a more intense sampling and testing program of the chemical isolation layer over an area sufficient to prove out the accuracy of the means, methods, and controls employed.

The calibration period for capping operations will begin in a deep water area that does not require dredging (i.e., cap-only area) and requires both siderite and GAC. Deep water capping areas have greater tolerance ranges for post-cap water depth requirements than shallow water capping areas. This provides the ability to place additional cap material during the calibration period, if required, to achieve the designed amendment dosing while staying within the range of designed water depths.

The results of the capping field demonstration, described in detail in the *Capping Field Demonstration Summary Report* (Parsons 2012), showed that minimal loss, if any, of GAC occurred in the water column, and that the amount of GAC mixed with sand on shore was approximately equal to the amount of GAC in the cap. The field demonstration also showed uniformity of GAC placement following operational modifications, which will be further optimized and demonstrated during the calibration period. The field demonstration indicated that visual observations of *in situ* samples may also be used to verify the presence and vertical distribution of GAC. The results of the field demonstration, in combination with the CQC and CQA activities described in subsequent sections, will ensure that the project design objectives are achieved.

Based on the results of the 2011 capping field demonstration, the GAC mixed with sand chemical isolation layer will be placed using a minimum of two lifts to reduce potential separation of the coarser and finer fractions. Honeywell will work closely with NYSDEC during the calibration phase as well as throughout the entire capping operations to optimize cap placement processes to minimize separation of coarse and fine materials for uniform distribution of the grain sizes.

Honeywell has prepared a separate work plan that has been provided to NYSDEC, which describes the planned GAC and siderite dosing and other procedural details to be implemented during the calibration period. Modifications of the CQAP (including CQC/CQA procedures related to measurement of cap thicknesses, dosages, coarse fraction separation) as well as operations (e.g., number of lifts, overdosing amounts) may be necessary based on the results from this calibration period.

5.3.1.1 Chemical Isolation Layer Quality Control

The contractor will provide and implement an accurately calibrated additive program utilizing the equipment, instrumentation, and data introduced in Section 5.1 as the primary delivery and CQC method of verification that the required siderite and GAC content and distribution have been achieved in the chemical isolation layer. For hydraulically placed cap material, gravimetric weigh belt feeders and/or volumetric feeders with an accuracy of ±2 to 5 percent will be used to control the feed rates of both sand and, where specified, siderite to the sand slurry mix tank. Peristaltic metering pumps with an accuracy of ±1 percent will be used to control the feed rate of the GAC slurry to the sand slurry mix tank discharge pipe. The GAC slurry line will also have a slurry density meter (with an accuracy of ±3 to 5 percent) that will provide an additional means of monitoring in real time the density of GAC in the slurry. Continuous data acquisition and monitoring using the SCADA system will allow real-time system adjustments to be made to ensure the required mix ratios are maintained and design objectives are achieved.

In addition to the accurately calibrated additive program, the contractor will also perform supplementary CQC activities to ensure that the specified thickness of the chemical isolation layer (i.e., sand-siderite layer and sand-GAC layer) is in compliance with the design requirements. An *in situ* sampling program for layer thickness verification, which will include a more intense sampling frequency during the calibration period, will be reduced for full scale operations, following a successful calibration period and after consultation with and approval by NYSDEC. Reducing the number of required *in situ* samples for thickness verification during full scale operations will be essential and help minimize impacts to maintaining the project schedule.

During full-scale operations, *in situ* samples will be collected for thickness verification for the sand/siderite and sand/GAC layers at the following frequency:

1. Phase 1: Eight *in situ* samples per acre will be collected for thickness verification.
2. Phase 2: If two successive sets of samples collected during Phase 1 meet thickness criteria requirements, then the sampling frequency thereafter will be maintained at four *in situ* samples per acre for thickness verification.

The above sampling frequency will be implemented independently for the sand/siderite and sand/GAC layers to ensure that, where required, a minimum of 6 inches of siderite/sand (3 inches in mixing layer and 3 inches in isolation layer) is placed prior to placement of a minimum of 9 inches of GAC/sand.

The primary method that will be used for cap layer thickness and uniform gradation verification will be the placement and recovery of 2 ft. x 2 ft. steel catch pans. The proposed catch pan design is relatively wide and shallow to avoid the edge and shadowing effects that were noted during the capping field demonstration. The height of the catch pans will be approximately 2 inch taller than the minimum cap layer thickness in any particular capping area. Thus, the heights of the catch pans will vary depending on the area and cap layer that is being placed at a given time; see examples below:

- Catch pan height of 8 inches required for 6-inch siderite-amended chemical isolation layer
- Catch pan height of 11 inches required for 9-inch GAC-amended chemical isolation layer
- Catch pan height of 14 inches required for 12-inch layer of topsoil, medium sand, fine gravels, coarse gravels (Type A), gravelly sand and gravelly cobbles
- Catch pan height of 7 inches required for 4.5-inch layer of coarse gravels (Type B)

In addition, cores will be collected from within the catch pans following catch pan retrieval for visual inspection and photo documentation to provide visual verification that GAC is distributed vertically throughout the sand/GAC layer, and there is not significant separation of grain sizes resulting in significant layers of coarser cap material. These cores will be collected away from the pan edges to provide a representative sample of the *in situ* cap material.

The duration of the Phase 1 operations period will be based on meeting the sampling criteria specified for Phase 1 detailed in Sections 5.3.1.1 and 5.3.1.2 of this CQAP. If there are significant changes to the application process, such as changes to the supply or placement equipment, or use of different cap material, additional CQC/CQA procedures, such as re-initiating Phase 1 sampling, will be implemented based on consultation with and acceptance by NYSDEC.

Parsons and Anchor QEA will prepare annual construction summary reports for NYSDEC to track cumulative volume progress as well as capping production and coverage, as detailed in Section 6.4.

5.3.1.2 Chemical Isolation Layer Quality Assurance

An *in situ* analytical program for GAC will verify and reconfirm the onshore capping material mixing methods' consistent ability to achieve the GAC requirements for the chemical isolation layer specified in the design. The *in situ* analytical program will utilize samples collected by the contractor during the *in situ* sampling program for layer thickness verification, to prepare composite samples for CQA analysis. The details of *the in situ* analytical program are described below.

During full-scale operations *in situ* analytical samples will be prepared and analyzed at the following frequency for CQA:

1. Phase 1: Using the eight *in situ* samples collected per acre for layer thickness verification, four composite samples will be prepared and tested for GAC content. The composite samples will be prepared by collecting a 1 ft. x 1 ft. subsample from each of

the catch pans described in Section 5.3.1. Each composite sample will consist of subsamples from two pans.

2. Phase 2: If two successive sets of composite samples analyzed during Phase 1 meet the GAC content requirements, then the sampling frequency will be decreased. Using the four *in situ* samples collected per acre for layer thickness verification, two composite samples will be prepared and tested for GAC content thereafter.

If there are significant changes to the GAC application process, such as changes to the supply or placement equipment, use of different chemical isolation layer material such as in RA E, or significant changes to the GAC dosage, additional *in situ* GAC analysis will be implemented based on consultation with and approval of the scope by NYSDEC.

Visual observation of the vertical distribution of the GAC in the cores collected from the catch pans will be recorded (photographs) prior to compositing samples for GAC content. Based on the results from the capping field demonstration, GAC will be visible within the sand/GAC layer at an application rate of 0.25 pounds/square foot. In areas where the GAC application rate is less than this (cap model areas C2, ILWD SMU-2, E3, and WBB-East) and thus vertical distribution cannot be visually verified, the minimum GAC overdosing rate will be 100%. This will be more than sufficient to offset any minor performance degradation that would result if the GAC was not vertically distributed within the chemical isolation layer.

Analysis of the collected samples will be performed utilizing a thermal process to measure the GAC composition of each sample. The thermal method developed for the GAC removal relies on exposing the sample to heat that will burn off the GAC without burning off the sand. Full composited capping catch pan samples will be placed in containers for analysis at the lab. The samples will be sieved to remove particle sizes larger and smaller than the expected GAC particles. This sieve step reduces the sample size to be dried and heated. Following the sieve step, the samples will be placed in an oven and heated to 110 degrees Celsius (°C) to remove the water from the sample. Once the water has been removed the sample will be weighted and placed in an oven and heated to approximately 500°C to burn off the GAC. The sample will be reweighed to determine the quantity of GAC in the sample. The weight of GAC removed from the sample will be used with the area of the catch pan sub-sample to determine the dose of the GAC in the layer (in pounds per square foot). Anchor QEA will periodically visit analytical laboratories being used for GAC analysis to witness test runs.

QA procedures associated with *in situ* siderite content will also be implemented. The grain size and particle density of siderite are relatively similar to sand; therefore, uniform horizontal distribution of siderite is anticipated. There are no commercially available methods for quantifying the relatively low levels of siderite within the placed sand/siderite layer. However, a chemical staining technique has been developed and demonstrated. The technique will provide a qualitative field visual method for verifying the presence of siderite within the sand/siderite mixture. Two commonly used carbonate staining agents (Alizarin Red [A-Red] and potassium ferricyanide [K-ferricyanide]) will be used in solution at an A-Red to K-ferricyanide ratio of 3:2. A sample of sand/siderite material will be placed in a small container, and the staining solution will be added so as to completely saturate the sample. The reaction will be allowed to proceed for five minutes at room temperature, then the staining solution will be poured off and the sand/siderite will be rinsed thoroughly with tap water, air-dried, and visually inspected to verify the presence of siderite. This visualization will be completed on a subsample from approximately 25 to 50 percent of the samples collected for sand/siderite thickness verification.

In addition to aiding in the execution of the *in situ* analytical program, Anchor QEA will perform CQA activities during the calibration period as well as throughout all subsequent capping operations to ensure that the installation and composition of the amended materials is in compliance with the design requirements. As part of the CQA program, Anchor QEA will verify that the required layer thickness for the chemical isolation layer has been achieved through witnessing 10 to 15 percent of the contractor's collection of CQC measurements. In the event that, or during those periods when, Anchor QEA is unavailable to witness CQC sample collections, or if an additional verification is warranted in the field, Anchor QEA will collect independent CQA samples at an interval between 10 and 15 percent of the total of CQC samples utilizing catch pans or other suitable methods. To verify that the required GAC and/or siderite content and distribution have been achieved, Anchor QEA will perform the following tasks:

- Monitor land-based cap material mixing operations, instrument readings, and data summary reports for conformance with operation parameters
- Perform desktop reviews of laboratory results
- Periodically conduct visual observations of materials

Anchor QEA will also provide the CQA data to be incorporated into the annual construction summary reports prepared for NYSDEC.

5.3.2 Erosion Protection Layer and Habitat Layer Verification

As part of the CQC program, Parsons will confirm that the installation of the erosion protection and habitat layers of the engineered cap are in compliance with the design requirements. In some places, the habitat substrate meets the erosion protection requirements and, therefore, a separate erosion protection layer is not required. The erosion protection layer ranges in material type from sand or fine gravel in deeper water to coarse gravel or gravelly cobble in nearshore areas. After each complete erosion protection layer has been placed (i.e., not after individual lifts), the contractor will collect *in situ* catch pan samples to document that the required layer thickness has been achieved. Similar to the erosion protection layer, after each complete habitat layer has been placed (i.e., not after individual lifts), the contractor will collect *in situ* catch pan samples to document that the required layer thickness has been achieved. During full-scale operations, *in situ* samples will be collected for thickness verification for the erosion protection and habitat layers at the following frequency:

3. Phase 1: Eight *in situ* samples per acre will be collected for thickness verification.
4. Phase 2: If two successive sets of samples collected during Phase 1 meet thickness criteria requirements, then the sampling frequency thereafter will be maintained at four *in situ* samples per acre for thickness verification.

The above sampling will be implemented independently for each substrate layer. Phase 1 sampling will be initiated for each substrate type, i.e., topsoil, fine gravel, coarse gravel type A, coarse gravel type B, and gravely cobble. Phase 1 sampling for medium sand will be completed for the chemical isolation layer placement, therefore is not required for habitat/erosion protection layer placement.

Once the final habitat layer has been placed, post-cap verification bathymetric surveys will be performed by the contractor using the same surveying methods and spacing described in Section 4.2. The post-cap verification surveys will be used in conjunction with layer thickness measurements of the chemical isolation, erosion protection, and habitat layers to document that the cap has been installed in accordance with the Final Design. Details on how these tools will be used in various areas are provided in Section 5.3.3.

The CQA program will include activities that will verify the installation of the erosion protection and habitat layers of the cap. To verify the required layer thickness for the erosion protection layer has been achieved, Anchor QEA will perform the following tasks:

- Witness 10 to 15 percent of CQC catch pan samples collected
- Periodically collect random CQA samples and measurements for thickness verification purposes if deemed necessary
- Track placed material volumes

As part of the CQA program, Anchor QEA will periodically be aboard the contractor's survey boat to observe the post-capping CQC surveys. In addition, Anchor QEA will verify the CQC post-cap bathymetric surveys using the same CQA surveying methods and spacing described in Section 4.2. Anchor QEA will periodically collect random CQA samples and measurements for thickness verification purposes, if deemed necessary, and track placed material volumes for the habitat layer. Anchor QEA will also provide the CQA data to be incorporated into the annual construction summary reports prepared for NYSDEC.

5.3.3 Capping Completion Metrics

For the chemical isolation layer, achievement of specified thickness (as shown in Table 4.2 of the Final Design and Tables 2 through 8 of Appendix F of the Final Design) and amendment application rates will be demonstrated through precise control and monitoring of amendment application rates and the collection and analysis of catch pans (or other means) during full scale operations, as previously described. The chemical isolation layer will be considered complete within a given area (such as a CMU or cap layer) within the lake and adjacent wetlands when the following criteria are met:

- The sand/siderite layer minimum thickness has been met in at least 90 percent of the *in situ* thickness measurements, and the remaining measurements are 90 percent or greater of the design target thickness.
- The sand/GAC layer minimum thickness has been met in at least 90 percent of the *in situ* thickness measurements, and the remaining measurements are 90 percent or greater of the design target thickness.
- The GAC application dose(s) have been met in at least 90 percent of the measurements based on GAC mass application dose monitoring and analysis of catch pan samples, and the application doses within the remaining measurements are 90 percent or greater of the design target.
- The siderite application dose(s) have been met in at least 90 percent of the shore-based slurry measurements based on siderite mass application dose monitoring and the application rates within the remaining measurements are 90 percent or greater of the design target. In addition, a qualitative analysis indicates the presence of siderite in all samples.

In the event that the specified layer thickness or amendment content are not achieved within the tolerances specified above, additional material will be placed over the deficient areas that are not in compliance with the criteria.

For the erosion protection and habitat layers, achievement of specified design thicknesses will be demonstrated by verifying that thickness requirements are met by 90 percent of the physical samples taken within a CMU, with the following additional requirements:

- The remaining measurements are 90 percent or greater of the design target thickness (e.g., for a specified habitat layer thickness of 18 inches, each sample must achieve at least approximately 16.2 inches).
- Any contiguous area not meeting the minimum thickness cannot represent more than 5 percent of the CMU.

In addition, achievement of the specified final habitat elevation objectives will be demonstrated by surveying of the post-cap placement surface. The target post-capping elevation and allowable variances were developed in the Final Design based on the target habitat modules.

Achievement of lateral extent of capping will be demonstrated through pre- and post-placement bathymetric surveys.

The thickness of each layer of placed cap material will be verified (as described previously) in advance of placement of the subsequent layer. Once in full scale operations, the number of measurements for each layer will be at a frequency of four measurements per acre for layer thickness. Measurement locations will be randomly selected, constrained only by the lateral extent of the CMU and the position relative to other sample locations to avoid closely spaced intervals. The data collected will be used by the CQC and CQA teams to document and verify that the placed thicknesses comply with established design criteria.

As stated previously, once the final habitat layer has been placed, post-cap verification bathymetric surveys will be performed by the contractor using the same surveying methods and spacing described in Section 4.2. Capping will be considered complete within the lake and adjacent wetlands when surveys confirm required post-cap elevations have been met within the limitations specified below.

Areas within the lake with post-capping water depths less than 2 ft.

- Based on habitat and lake surface area considerations, the tolerance specified in the design around the target elevations for these shallow areas is +0 to -1 ft. Therefore, the cap design elevations will be met in these areas with a tolerance of +0 to -1 ft. in at least 90 percent of the area, and will be within +0 to -1.5 ft. in the remaining 10 percent of the area.

Areas within the lake with post-capping water depths between 2 and 7 ft.

- The tolerance specified in the design around the target elevations for these areas is +1 to -1 ft. Therefore, the cap design elevations will be met in these areas with a tolerance of +1 to -1 ft. in at least 90 percent of the area, and will be within +1 to -1.5 ft. in the remaining 10 percent of the area.

All other lake areas

- The tolerance specified in the design around the target elevations for these deepwater areas where final elevations are less critical based on habitat considerations is +1 to -1 ft. Therefore, the cap design elevations will be met in these areas with a tolerance of +1 to -1 ft. in at least 90 percent of the surface area, and will be within +2 to -2 ft. in the remaining 10 percent of the area.

Adjacent wetlands

- Based on habitat considerations, the tolerance specified in the design around the target elevations for these areas is +0.5 to -0.5 ft. Target elevations in these areas were developed with the expectation of some variability and micro-topography based on habitat considerations. Therefore, the cap design elevation will be met in these areas with a tolerance of +0.5 to -0.5 ft. in at least 90 percent of the area, and will be within +1 to -1 ft. in the remaining 10 percent of the area.

In water depths less than 7 ft., as well as in the connected wetlands, compliance with these elevation goals will be determined by comparing the design elevations to the bathymetry measurements described in Section 5.3.2. Pre-capping bathymetry will also be measured in capping-only portions of these areas to identify potential differences from the 2005 bathymetry survey that form the basis for the design. Significant differences in bathymetry that could impact post capping bathymetry will be evaluated in consultation with NYSDEC to determine whether revisions to predicted post-capping elevations are required, subject to NYSDEC approval. Compliance with final elevation criteria will be evaluated on a CMU or multiple CMUs basis. Evaluation based on consideration of multiple CMUs will be subject to NYSDEC approval.

In water depths greater than 7 ft., compliance will be evaluated primarily based on cap thickness measurements described in Sections 5.3.1 and 5.3.2 to verify that minimum cap layer thicknesses are achieved and that cap material over-placements are in general alignment with what was assumed in the design to estimate post-capping elevations in these areas. Post-capping bathymetry will also be measured and documented in these areas. Results will be reviewed as part of the QA/QC procedures to determine whether there are significant differences from the final cap elevations anticipated in the design. If significant differences are identified based on consideration of cap thickness measurements and final bathymetry measurements, the need for additional evaluation or actions will be evaluated in consultation with NYSDEC. Evaluation of final elevations and consistency with design expectations will be evaluated on a CMU or multiple CMUs basis. Evaluation based on consideration of multiple CMUs will be subject to NYSDEC approval.

Post capping bathymetry will be measured in all capped areas. Post-capping bathymetry surveys will be used to verify compliance with final cap elevation requirements per the design as detailed above. In addition, post-capping bathymetry measurements will be reviewed in consultation with NYSDEC as part of the QA/QC program to identify potential anomalies in the post-capping bathymetry, or areas where post-capping bathymetry is significantly deeper than anticipated, which may indicate that the cap thickness deviated from the minimum required thickness. If anomalies or suspect areas are identified, further evaluation such as reviewing cap placement records or collecting cores will be completed to allow further evaluation. Corrective measures will be implemented as appropriate in consultation with NYSDEC.

In the event that compliance of the appropriate layer thickness or amendment application dose is not verified, additional material will be placed or additional "step-out" sampling may be performed in the vicinity of discrete measurements that did not indicate adequate thickness. These step-out samples will only be possible for layers where a core or other alternative means can effectively collect a representative sample (i.e., sand and possibly fine gravel layers). The step-out sampling would consist of four additional measurements around the original location half the distance to the nearest sample location that is in compliance, or half the distance to the edge of the placed layer. The mathematical average of all five measurements would be compared to the required thickness, and compliance reevaluated with this average.

In the event that step-out sampling validates the original measurement, or in areas where step-out sampling is not feasible, additional material will be placed within the portion of the layer represented by the non-compliant measurement(s) as necessary to achieve compliance for the entire area. Additional measurements will be conducted within the area of re-work and will be compiled with the results of all other measurements within the area to reassess compliance according to the statistical procedure discussed above.

The CQC/CQA procedures for thin layer capping verification in SMU 8 will likely be limited to the use of catch pans, survey stakes, and/or push cores.

The duration between completion of dredging in an area and capping over the completed dredge area will vary depending on specific site conditions and geometry. The cap will be placed as close as practicable to active dredging areas, within the limitations of safety and the production rate of the equipment. The intent of the capping operations is to install the erosion protection over the chemical isolation in a timely manner. Honeywell will coordinate closely with NYSDEC during capping operations to document that the post-capping completion metrics for each layer have been achieved prior to initiating subsequent capping operations.

5.4 Habitat Verification

As part of the CQC program, compliance with the plant and structure design and specifications as detailed in the Habitat Addendum to the Final Design will be verified by inspection of vendor certificates, data sheets, and/or visual inspection upon delivery. Installation of plants and structures as per the design will be verified during oversight and routine on-site inspection by the contractor. As part of the CQA program, periodic inspections of the plant delivery and installation will be performed to verify that that the appropriate species have been placed within the correct location and properly installed.

6 DOCUMENTATION

This section describes the documentation that will be completed to demonstrate that the dredging and capping was completed in accordance with the Final Design.

6.1 Field Change Form

Changes to the approved Final Design will require approval by the Design Engineer, Owner, and Agency Representative. Changes will be documented by the Field Change Form. Appendix B presents an example Field Change Form that includes a description and reason for the field change, date, and signatures. Material substitutions (i.e., "or equals") and determinations associated with construction means and methods, not associated with determining achievement of dredge elevations, cap material thicknesses, GAC or siderite dosages, or post-capping water depth, are not considered a design change and will be approved by the Project Engineer as part of the technical submittal review process. Any determinations associated with construction means and methods associated with determining achievement of dredge elevations, cap material thicknesses, GAC or siderite dosages, or post-capping water depth must be discussed with NYSDEC's on-site representative and deemed acceptable prior to implementation.

6.2 Dredge Management Unit Completion Form

Certification of work completed within a DMU will be documented in a DMU Completion Form composed of a cover sheet with supporting data.

Appendix C presents an example DMU Completion Form cover sheet. Supporting documentation may include but not be limited to the following information not contained on the cover sheet:

- Vertical and horizontal limits and extents of dredging
- Final dredged elevations (displayed as a map)
- For non-ILWD areas, percentage of DMU where the final dredged elevation achieves or is below the required dredge depth (required to be 90 percent or greater)
- For ILWD areas, summary of average dredge depth relative to target removal depth

6.3 Cap Management Unit Completion Form

Certification of work completed within a CMU will be documented in a CMU Completion Form composed of a cover sheet with supporting documentation.

Appendix D presents an example CMU Completion Form cover sheet. Supporting documentation may include but not be limited to the following information not contained on the cover sheet:

- Designation of cap materials used by layer within the CMU
- Measurement locations and thicknesses of each individual cap layer
- Calculated volume of material placed
- Measured dosage and volume/mass of siderite (at shore) and GAC to sand placed
- Vertical and horizontal limits and extents of capping required by the Final Design were achieved
- Final cap elevations (displayed as a map)

6.4 Annual Construction Summary Report

Parsons and Anchor QEA will jointly prepare annual construction summary reports for NYSDEC review and approval to track cumulative dredging and capping volume progress as well as dredging and capping production and coverage. Honeywell will determine, on an annual basis, whether any significant modifications to the implementation of the remedy are needed to maintain, to the extent practicable, project schedule and design intent. Proposed modifications to the implementation of the remedy will be reviewed with NYSDEC prior to issuing the annual report.

6.5 Construction Completion Report and Record Drawings

A Construction Completion Report will be prepared jointly by Parsons and Anchor QEA for the Onondaga Lake project. The Construction Completion Report will meet the requirements as outlined in DER-10 and for an Interim Remedial Action Report in accordance with the Closeout Procedures for National Priorities List Sites (EPA 540-R-98-016, OSWER Directive 9320.2-09A-P, January 2000). The construction of the lake remediation work (i.e., dredging, capping, and habitat components) will be described in that document. Components of the lake remediation construction expected to be documented in the Onondaga Lake Construction Completion Report include the following:

- DMU Completion Forms
- CMU Completion Forms
- Habitat restoration-related completion documentation
- Post-capping surface as-built drawings
- Volumes of materials dredged
- Volumes of capping materials used
- A description of the restoration actions
- A description of any problems encountered and their resolution
- A description of changes to the design documents and a description as to why the changes were made

7 REFERENCES

Parsons and Anchor QEA, LLC, 2012. *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (Sediment Management Unit 8) Final Design*. Prepared for Honeywell International Inc. March 2012.

Parsons, 2012. *Draft Capping Field Demonstration Summary Report*. Prepared for Honeywell International Inc. February 2012.

United States District Court, Northern District of New York, 2007. State of New York and Denise M. Sheehan against Honeywell International Inc. Consent Decree Between the State of New York and Honeywell International Inc. Senior Judge Scullin. Dated October 11, 2006. Filed January 4, 2007.

APPENDIX A
BARRIER WALL MONITORING SOP

BARRIER WALL MONITORING

PROCEDURES:

Restrictions associated with dredging/excavating and capping in front of the Willis/Semet, West, and East Walls have been specified in several design documents as follows:

- Willis/Semet Wall - The loading restrictions are presented in Reference 1, and Section 4.4.5 and Figure 4.27 of Reference 2 (see Attachment 1).
- West Wall - The loading restrictions are presented in Drawings 4 through 8 of Reference 3 and Figure 1 from Reference 4 (see Attachment 2).
- East Wall – The sequential dredging/excavation and capping requirement are presented in Drawings 444184-100-C-003 through 006 of Reference 5 and Section 5.2.7 of Reference 2 (see Attachment 3).

In addition to these restrictions, instrumentation has been installed to monitor the walls during dredging/excavating and capping activities. This Standard Operating Procedure (SOP) specifies the monitoring frequencies for the piezometers, inclinometers, and survey monitoring points for each of these walls.

If the readings are considered to be acceptable, dredging/excavating and capping will proceed as planned. If the readings indicate movement or groundwater levels that are potentially an issue, the following contingency measures will be considered in consultation with the NYSDEC:

- Perform additional monitoring and further evaluate the situation.
- Ensure that all monitoring equipment is working properly and replace components if they are found to be defective.
- Visually inspect the ground for any signs of cracks or bulges in the vicinity of the sheet pile wall, CSX railroad, and pipelines, as applicable.
- Suspend outboard dredging/excavation, backfill the excavated area to the design grade, and/or reduce loads behind the sheet pile wall.
- Should excessive movement rate continue after the outboard area has been backfilled, implement additional measures (e.g., construction of a toe-buttress soil berm against outboard side of sheet pile), as needed.

FREQUENCY:

1) Before Dredging (to be completed as part of wall construction)
    a. Willis/Semet Walls (MRCE)
        i. Inclinometer and DMP (deformation monitoring points) – take two sets of readings after completion of tieback construction but prior to dredge support construction.
        ii. Piezometers – continue collecting data on a monthly basis.

b. East and West Walls (Geosyntec)

   i. Baseline

      1. Manual Inclinometers – take two readings one or two weeks apart.
      2. Five Dataloggers (for SAAs and Piezometers) – download data weekly for at least two weeks.
      3. Prepare summary of baseline readings.

   ii. Maintenance Monitoring and Inspection

      1. Manual Inclinometers – take readings on a quarterly basis.
      2. Five Dataloggers – download data bi-weekly.

   iii. Two Weeks Prior to Dredging (only applies to instruments that are within the zone that will be influenced by the dredging/capping within a two week period [i.e., areas where dredging/capping has started but has not been completed and areas within 20 ft of active dredging/capping])

      1. Manual Inclinometers – take one reading.
      2. Five Dataloggers – download once per week.
      3. Survey tops of inclinometer casings and the sheet pile wall to establish a baseline.
      4. Establish monitoring points every 30 ft along the top of the sheet pile wall, ignoring points that are within 5 ft of inclinometer casings.

2) During Dredging and Capping

a. Willis/Semet Walls (MRCE)

   i. Within 100 ft or more from the sheet pile wall

      1. DMPs and Inclinometers – read monthly for first three months of shoreline support activities and quarterly thereafter.
      2. Piezometers – read monthly.

   ii. Within 100 ft of the sheet pile wall

      1. DMPs and Inclinometers – read weekly.
      2. Piezometers – read weekly.
      3. Perform weekly visual inspections of sheet pile tilt, ground cracks, wale distress, etc.

b. West Wall (Geosyntec)

   i. Outboard excavation/dredging will start within 20 ft of an inclinometer location (i.e., 20 ft as measured along the wall alignment). The excavation will not be extended further away from the inclinometer until the monitoring results indicate the wall is stable, as directed by Geosyntec. Excavation in front of the wall shall be backfilled immediately if determined by the Engineer to be necessary based on monitoring results.

ii. Initially, monitor manual inclinometers and download dataloggers daily for the applicable instruments (i.e., instruments within the zone of influence of the dredging and capping). The data will be reviewed daily by Geosyntec. As appropriate based on an evaluation of the data, Geosyntec will adjust the monitoring frequency.

iii. Survey monitoring points and inclinometer casings within the zone of influence of the dredging and capping twice a week during the first week and then decrease to weekly. As appropriate based on an evaluation of the data, Geosyntec will adjust the surveying frequency.

iv. Perform visual inspections of sheet pile tilt, ground cracks, etc. when monitoring manual instruments.

c. East Wall (sequential dredging/capping in phases) (Geosyntec)

i. During capping and dredging in a given phase, monitor manual inclinometers and download dataloggers daily for the applicable instruments. The data will be reviewed daily by Geosyntec.

ii. After capping is complete in a given phase, monitor manual instruments twice a week and download dataloggers daily for the applicable instruments. Within two weeks of completion of capping in a given phase, the manual monitoring and downloading of dataloggers will decrease to weekly and twice a week, respectively. As appropriate based on a review of the data, Geosyntec will adjust the monitoring frequency.

iii. Survey monitoring points and inclinometer casings within the zone of influence of the dredging and capping twice a week until capping of the phase is complete. The frequency can then be decreased to once a week. As appropriate based on a review of the data, Geosyntec will adjust the surveying frequency.

iv. Perform visual inspections of sheet pile tilt, ground cracks, etc. when monitoring manual instruments.

3) After Capping

a. Willis/Semet Walls (MRCE)

i. DMPs, Inclinometers, and Piezometers –In deep water areas, perform a visual inspection at least once a year. In addition, perform at least one set of readings a year (i.e., piezometers, DMPs, and inclinometers) after no movement is detected. Thereafter, perform readings once every two years unless field observations indicate that more frequent readings are justified. In areas where naturalized shoreline currently exists, or is established during capping operations, post capping monitoring is not required.

b. East and West Walls – TBD by Geosyntec based on observations during dredging and capping.

SITE SPECIFIC REFERENCE DOCUMENTS:

Final Design Report for the Willis Ave./Semet Tar Beds Sites IRM prepared by O'Brien & Gere Engineers, Parsons, and Mueser Rutledge Consulting Engineers (MRCE) for Honeywell, May 2008.

Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (Sediment Management Unit 8) Final Design prepared by Parsons and Anchor QEA for Honeywell, March 2012.

West Wall Portion of the Wastebed B/Harbor Brook IRM Final Design Report prepared by O'Brien & Gere Engineers, Parsons, and Geosyntec for Honeywell, November 2009.

Memorandum titled "Re-Evaluation of the Stability of West Wall Section adjacent to the East Flume Area, Onondaga Lake WB-B/HB IRM, Syracuse and Geddes, NY" dated May 14, 2012.

East Wall Portion of the Wastebed B/Harbor Brook IRM Final Design Report prepared by O'Brien & Gere Engineers, Parsons, and Geosyntec for Honeywell, June 2011.

ATTACHMENT 1

WILLIS/SEMET WALL - THE LOADING RESTRICTIONS

ONONDAGA LAKE CAPPING, DREDGING, HABITAT AND PROFUNDAL ZONE (SEDIMENT MANAGEMENT UNIT 8) FINAL DESIGN

Prepared For:

Honeywell

301 Plainfield Road, Suite 330
Syracuse, New York 13212

Prepared By:

PARSONS

301 Plainfield Road, Suite 350
Syracuse, New York 13212
Phone: (315) 451-9560
Fax: (315) 451-9570

ANCHOR QEA

290 Elwood Davis Road, Suite 318
Liverpool, NY 13088

MARCH 2012

4.4.5 Shoreline Support

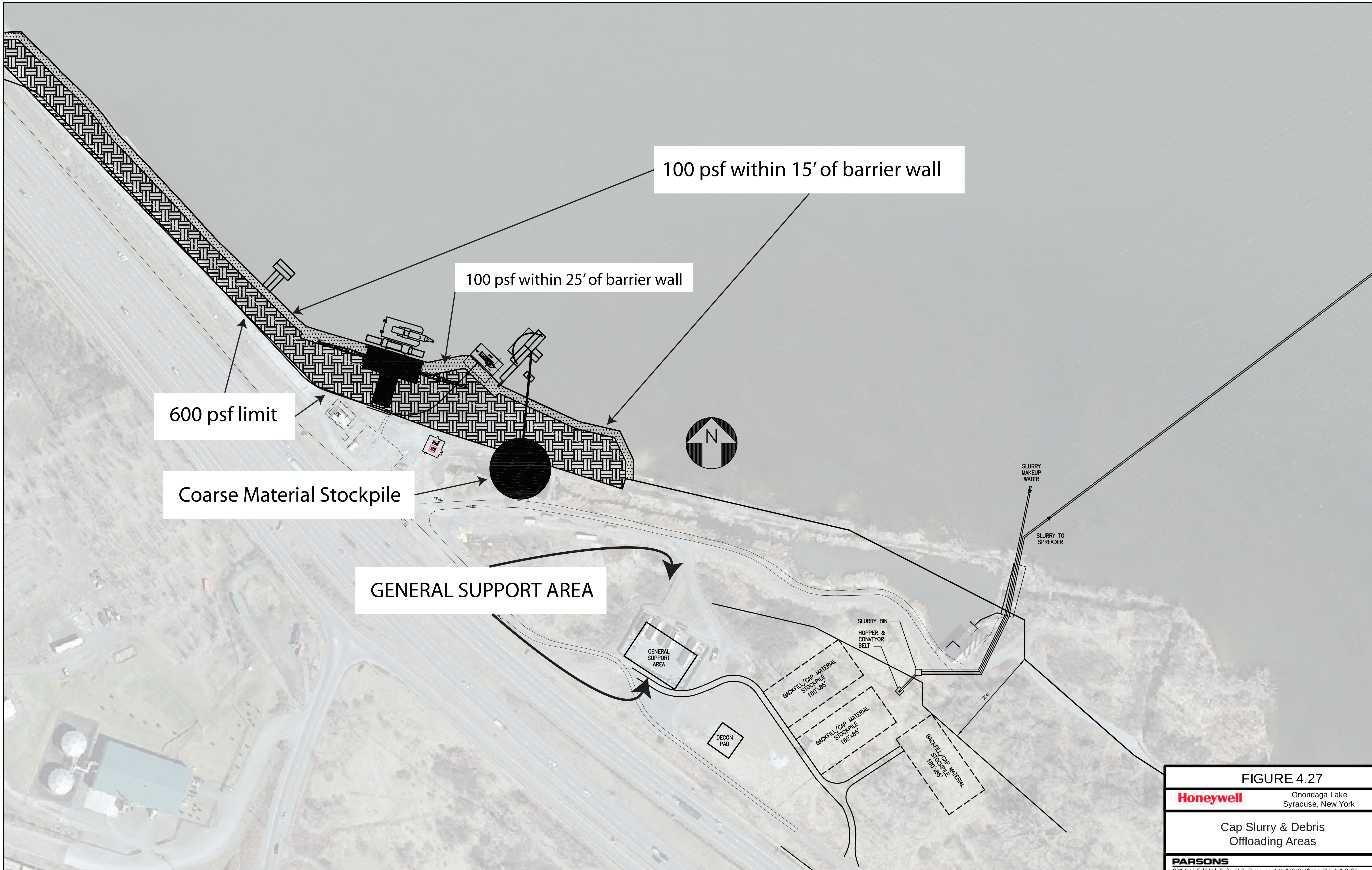
The capping activities for Onondaga Lake will require areas adjacent to the lake to support them. The areas include support for hydraulic capping, mechanical capping, debris management and personnel. The shoreline support layout for Onondaga Lake capping activities for Remediation Areas C, D, and E is presented in Figure 4.27. The shoreline support layout for Remediation Areas A and B, scheduled for remediation in 2014, will be located on Wastebeds 1-8 near the outlet of Ninemile Creek. Shoreline activities for these areas will have similar support requirements, and will be coordinated with shoreline remediation activities in this area as the work progresses.

The hydraulic capping activities to take place in the lake will require an area for equipment and materials on shore. The designed area for the hydraulic capping support in Remediation Areas C, D, E, and the Outboard Area are located on Wastebed B, east of the temporary office trailers for the IRM barrier wall construction. Granular earthen materials and amendments will be mixed with water and pumped as a slurry out to the capping barge(s) in this area. The equipment on the shore will consist of a makeup water pump, a sand feed system, an amendment feed system (s), a slurry mix tank and cap slurry mix pump, as detailed below in Section 4.5. During years when the required cap materials placement exceeds one hydraulic operation, a second shore system will be added to increase the amount of hydraulic cap that can be placed. Earthen material will be stockpiled around the feed system to ensure that capping operations have the required materials for the multiple layers of the cap.

The mechanical capping, and debris removal support area will be located along the Willis IRM barrier wall. The support area will include a pile supported concrete pad to support the equipment along the wall due to the limitations of the loadings on the wall. The barrier wall limitations are detailed in the Willis Portion of the Willis Avenue/Semet Tar Bed Sites IRM Remedial Action Work Plan (Parsons 2008a) and summarized on Figure 4.27. Details of the sheet pile anchorage and concrete work platform can be found in the Willis Ave./Semet Tar Beds IRM Sheet Pile Anchorage Final Design (Parsons 2011). The concrete pad will support loading operations for coarse-grained capping materials such as gravely cobble, as well as equipment to unload scows containing debris removed to facilitate capping and dredging operations. The concrete pad will be located along the wall where the current water depth is approximately 15 ft., and no dredging activities are proposed to take place. The equipment support pad adjacent to the wall will include a concrete platform attached on the land side that will allow for trucks to bring materials or remove debris. The hydraulic transport pipe that will be used to transport dredged materials will be buried in this area to facilitate the required trucking activities.

Due to the load limitations on the Willis sheetpile wall, the stockpile for the earthen material will be located away from the wall. A floating conveyor or alternative method will be used to load the required coarse-grained capping material supply barges with coarse cap materials when the loading platform described above is not available.

Personnel access for lake dredge and cap operations will be by a personnel dock located adjacent to barge loading and unloading operations along the wall. The dock will be constructed with floats in the water and will be sufficient to tie off work and crew watercraft.



100 psf within 15' of barrier wall
100 psf within 25' of barrier wall
600 psf limit
Coarse Material Stockpile
N
GENERAL SUPPORT AREA
SLURRY MAKEUP WATER
SLURRY TO SPREADER
SLURRY BIN
HOPPER & CONVEYOR BELT
GENERAL SUPPORT AREA
BACKFILL/CAP MATERIAL STOCKPILE 180'x85'
BACKFILL/CAP MATERIAL STOCKPILE 180'x85'
BACKFILL/CAP MATERIAL STOCKPILE 180'x85'
DECON PAD
200'
FIGURE 4.27
Honeywell
Onondaga Lake
Syracuse, New York
Cap Slurry & Debris
Offloading Areas
PARSONS
301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560

ATTACHMENT 2

WEST WALL - THE LOADING RESTRICTIONS

ONONDAGA LAKE WB-B/HB IRM WEST WALL FINAL DESIGN DRAWINGS
SYRACUSE AND GEDDES, NEW YORK
GJ4364.03.06
NOVEMBER 2009

PREPARED FOR:

Honeywell

5000 BRITTONFIELD PARKWAY
EAST SYRACUSE, NEW YORK 13057

DETAIL NUMBER
SHEET ON WHICH ABOVE DETAIL IS PRESENTED

DETAIL NUMBER — 4 — DETAIL TITLE OF DETAIL SCALE: 1"=2'
SHEET ON WHICH ABOVE DETAIL WAS FIRST REFERENCED — 3

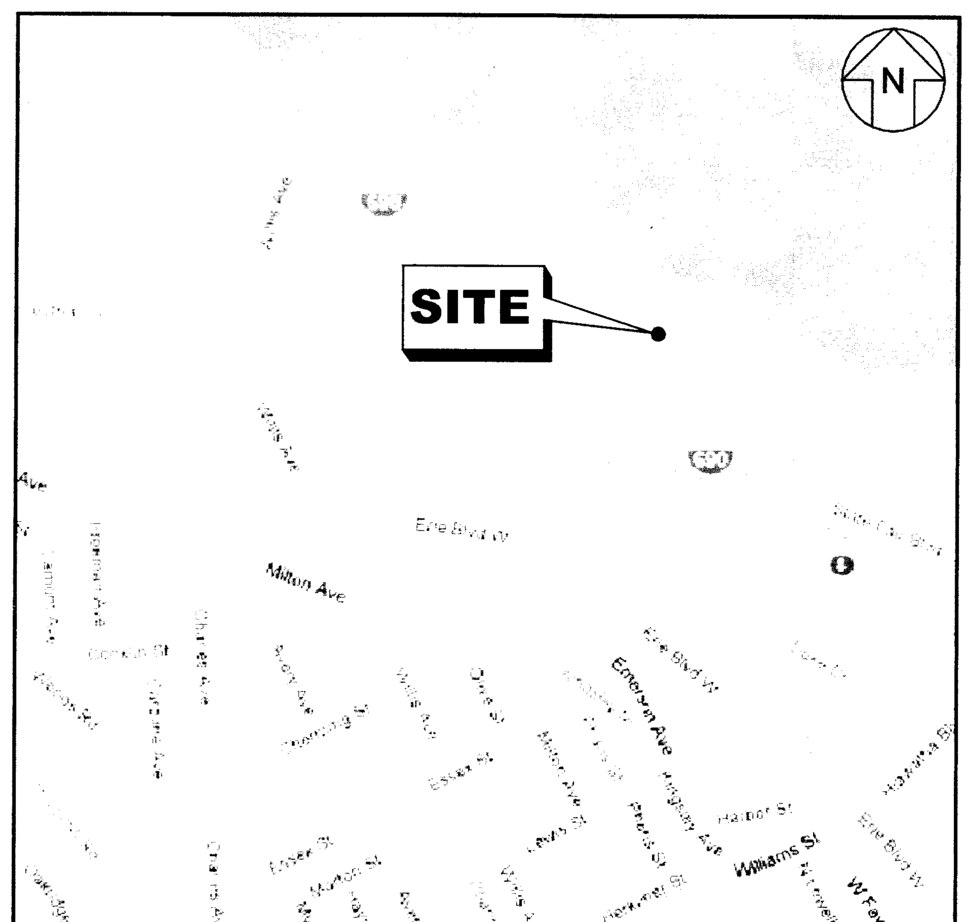
EXAMPLE: DETAIL NUMBER 4 PRESENTED ON SHEET NO. 6 WAS REFERENCED FOR THE FIRST TIME ON SHEET NO.3.

ABOVE SYSTEM ALSO APPLIES TO SECTION IDENTIFICATIONS.

DETAIL IDENTIFICATION LEGEND

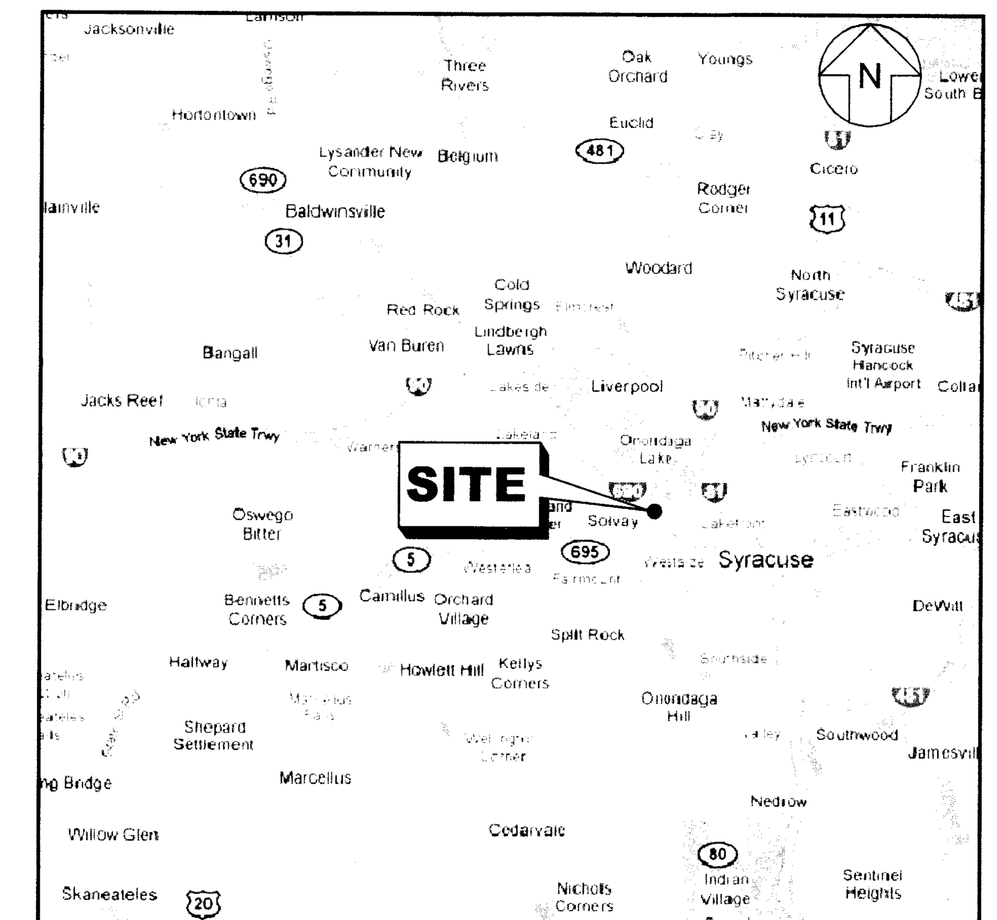
LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
1	COVER SHEET
2	EXISTING SITE CONDITIONS
3	GENERAL SITE REGRADING
4	DETAIL SITE REGRADING – I
5	DETAIL SITE REGRADING – II
6	DETAIL SITE REGRADING – III
7	DETAIL SITE REGRADING – IV
8	DETAIL SITE REGRADING – V
9	CROSS SECTION ALONG WALL ALIGNMENT – I
10	CROSS SECTION ALONG WALL ALIGNMENT – II
11	CROSS SECTION ALONG WALL ALIGNMENT – III
12	CROSS SECTION ALONG WALL ALIGNMENT – IV
13	CROSS SECTION ALONG WALL ALIGNMENT – V
14	CROSS SECTION ALONG WALL ALIGNMENT – VI
15	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – I
16	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – II
17	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – III
18	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – IV
19	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – V
20	SHEET PILE DETAILS
21	SHEET PILE WALL CONSTRUCTION SPECIFICATIONS
22	INSTRUMENTATION PLAN
23	INSTRUMENTATION DETAILS AND INSTALLATION GUIDANCE AND CATHODIC PROTECTION SYSTEM DETAILS
444184–C001	BARRIER WALL/COLLECTION TRENCH ALIGNMENT
444184–C002	MISCELLANEOUS SECTIONS & DETAILS
444184–C003	EROSION AND SEDIMENT CONTROL PLAN AND DETAIL
444184–C004	EAST FLUME DEMOLITION PLAN AND DETAILS
444184–M001	TYPICAL COLLECTION SUMP PLAN & DETAILS
444184–M002	COLLECTION SUMP DETAILS
444184–M003	GROUNDWATER PUMP STATION PIPING CONNECTIONS
444184–E001	GROUNDWATER PUMP STATION CONTROL ROOM LAYOUT & WIRING DIAGRAMS
444184–E002	PIEZOMETER SYSTEM SCHEMATIC AND COLLECTION SUMP WIRING DIAGRAM



SOURCE: GOOGLE MAP 2009

VICINITY MAP
NOT TO SCALE



SOURCE: GOOGLE MAP 2009

LOCATION MAP
NOT TO SCALE

PREPARED BY:

Geosyntec consultants
1255 ROBERTS BOULEVARD, NW, SUITE 200
KENNESAW, GEORGIA 30144–3694
TELEPHONE: 678.202.9500

PARSONS
301 PLAINFIELD ROAD, SUITE 350
SYRACUSE, NEW YORK 13212
TELEPHONE: 315.451.9560

REV	DATE	DESCRIPTION	DRN	APP
0	11/18/09	ISSUE FOR CONSTRUCTION	JHS	JFB

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TITLE: COVER SHEET

PROJECT: ONONDAGA LAKE WB–B/HB IRM WEST WALL FINAL DESIGN DRAWINGS

SITE: SYRACUSE AND GEDDES, NEW YORK

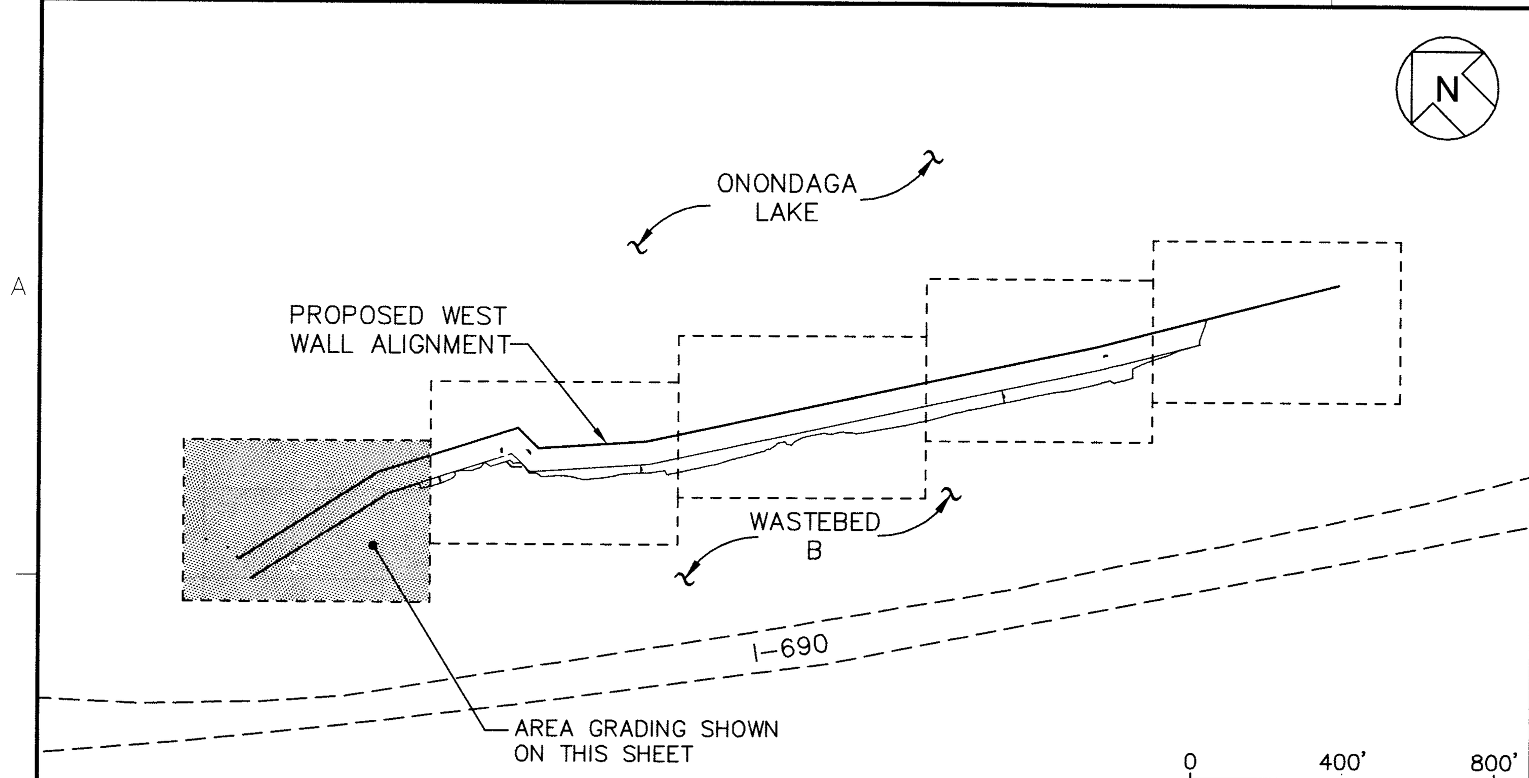
THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

18 Nov 2009
DATE

STATE OF NEW YORK · JOHN F. BEECH · LICENSED PROFESSIONAL ENGINEER

DESIGN BY:	MZ	DATE:	NOVEMBER 2009
DRAWN BY:	JHS	PROJECT NO.:	GJ4364.03.06
CHECKED BY:	MZ	FILE:	43640001
REVIEWED BY:	RK/JFB	DRAWING NO.:	
APPROVED BY:	JFB		1 OF 23



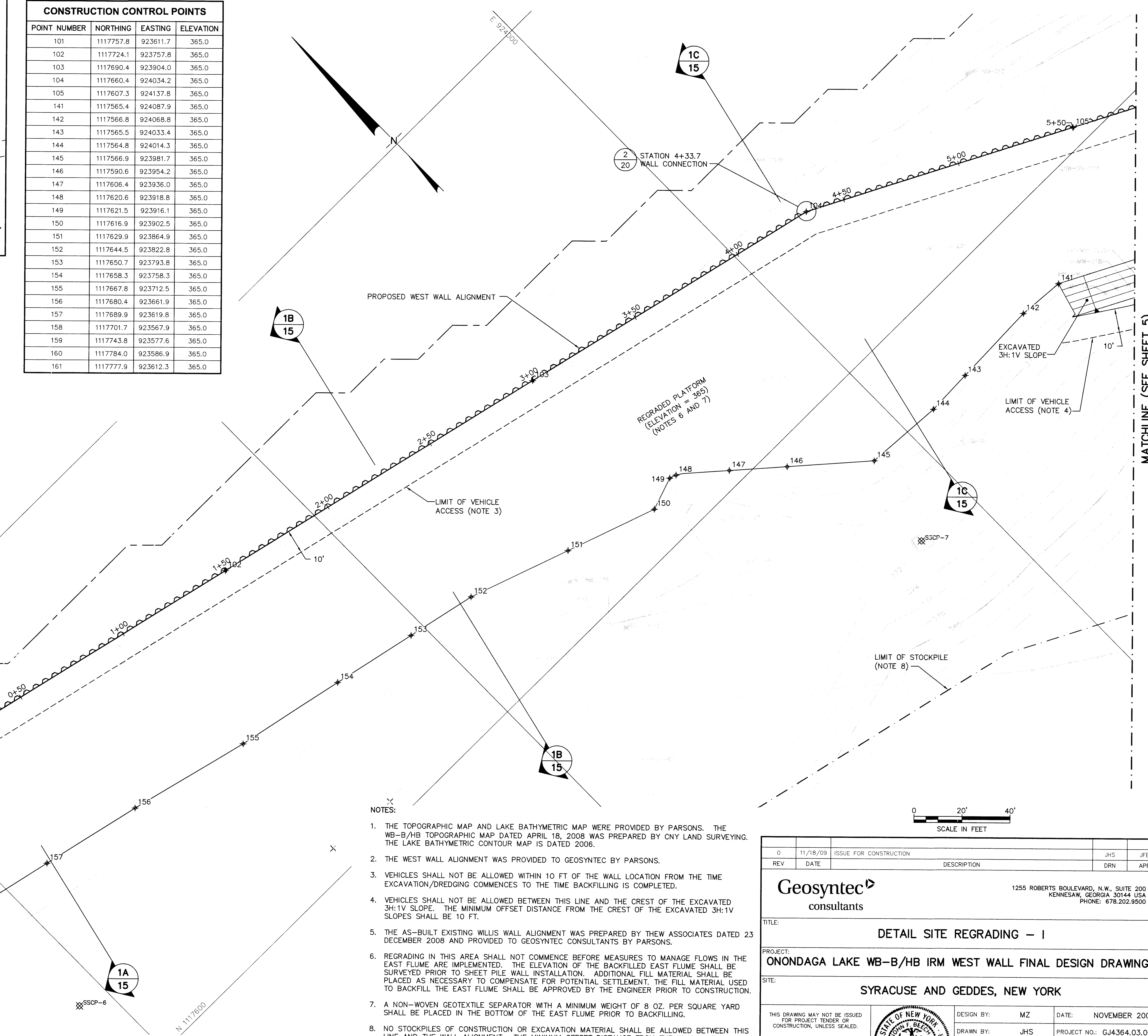
KEY MAP

CONSTRUCTION CONTROL POINTS

POINT NUMBER	NORTHING	EASTING	ELEVATION
101	1117757.8	923611.7	365.0
102	1117724.1	923757.8	365.0
103	1117690.4	923904.0	365.0
104	1117660.4	924034.2	365.0
105	1117607.3	924137.8	365.0
141	1117565.4	924087.9	365.0
142	1117566.8	924068.8	365.0
143	1117565.5	924033.4	365.0
144	1117564.8	924014.3	365.0
145	1117566.9	923981.7	365.0
146	1117590.6	923954.2	365.0
147	1117606.4	923936.0	365.0
148	1117620.6	923918.8	365.0
149	1117621.5	923916.1	365.0
150	1117616.9	923902.5	365.0
151	1117629.9	923864.9	365.0
152	1117644.5	923822.8	365.0
153	1117650.7	923793.8	365.0
154	1117658.3	923758.3	365.0
155	1117667.8	923712.5	365.0
156	1117680.4	923661.9	365.0
157	1117689.9	923619.8	365.0
158	1117701.7	923567.9	365.0
159	1117743.8	923577.6	365.0
160	1117784.0	923586.9	365.0
161	1117777.9	923612.3	365.0

LEGEND

- EXISTING GROUND ELEVATION (FEET) (NOTE 1)
- EXISTING SMU BOUNDARY
- EXISTING SHORELINE
- EXISTING WILLIS WALL ALIGNMENT (NOTE 5)
- 1+50 PROPOSED WEST WALL ALIGNMENT (NOTE 2)
- 365 PROPOSED REGRADED CONTOURS
- LIMIT OF VEHICLE ACCESS
- LIMIT OF STOCKPILE
- EXISTING BORINGS



NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006.
2. THE WEST WALL ALIGNMENT WAS PROVIDED TO GEOSYNTEC BY PARSONS.
3. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION FROM THE TIME EXCAVATION/DREDGING COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
4. VEHICLES SHALL NOT BE ALLOWED BETWEEN THIS LINE AND THE CREST OF THE EXCAVATED 3H:1V SLOPE. THE MINIMUM OFFSET DISTANCE FROM THE CREST OF THE EXCAVATED 3H:1V SLOPES SHALL BE 10 FT.
5. THE AS-BUILT EXISTING WILLIS WALL ALIGNMENT WAS PREPARED BY THEW ASSOCIATES DATED 23 DECEMBER 2008 AND PROVIDED TO GEOSYNTEC CONSULTANTS BY PARSONS.
6. REGRADING IN THIS AREA SHALL NOT COMMENCE BEFORE MEASURES TO MANAGE FLOWS IN THE EAST FLUME ARE IMPLEMENTED. THE ELEVATION OF THE BACKFILLED EAST FLUME SHALL BE SURVEYED PRIOR TO SHEET PILE WALL INSTALLATION. ADDITIONAL FILL MATERIAL SHALL BE PLACED AS NECESSARY TO COMPENSATE FOR POTENTIAL SETTLEMENT. THE FILL MATERIAL USED TO BACKFILL THE EAST FLUME SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
7. A NON-WOVEN GEOTEXTILE SEPARATOR WITH A MINIMUM WEIGHT OF 8 OZ. PER SQUARE YARD SHALL BE PLACED IN THE BOTTOM OF THE EAST FLUME PRIOR TO BACKFILLING.
8. NO STOCKPILES OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED BETWEEN THIS LINE AND THE WALL ALIGNMENT. THE MINIMUM OFFSET DISTANCE FROM THE WALL ALIGNMENT SHALL BE 200 FT.

REV	DATE	DESCRIPTION	DRN	APP
0	11/18/09	ISSUE FOR CONSTRUCTION	JHS	JFB

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

TITLE: DETAIL SITE REGRADING – I

PROJECT: ONONDAGA LAKE WB-B/HB IRM WEST WALL FINAL DESIGN DRAWINGS

SITE: SYRACUSE AND GEDDES, NEW YORK

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

12/15/2009

DATE

STATE OF NEW YORK · JOHN F. BEECH · LICENSED PROFESSIONAL ENGINEER

DESIGN BY:	MZ	DATE:	NOVEMBER 2009
DRAWN BY:	JHS	PROJECT NO.:	GJ4364.03.06
CHECKED BY:	MZ	FILE:	43640005
REVIEWED BY:	RK/JFB	DRAWING NO.:	4 OF 23
APPROVED BY:	JFB		

L:\CAD\01\ONONDAGA LAKE\PERMIT\SHEET PILE WALL-WEST\FINAL DESIGN GJ4364.03.06\DRAWINGS\43640005

NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP INCLUDING THE LOCATIONS OF UTILITIES WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006.
2. THE WEST WALL ALIGNMENT WAS PROVIDED TO GEOSYNTEC BY PARSONS.
3. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION FROM THE TIME EXCAVATION / DREDGING COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
4. VEHICLES SHALL NOT BE ALLOWED BETWEEN THIS LINE AND THE CREST OF THE EXCAVATED 3H:1V SLOPE. THE MINIMUM OFFSET DISTANCE FROM THE CREST OF THE EXCAVATED 3H:1V SLOPE SHALL BE 10 FT.
5. REGRADING IN THIS AREA SHALL NOT COMMENCE BEFORE MEASURES TO MANAGE FLOWS IN THE EAST FLUME ARE IMPLEMENTED. THE ELEVATION OF THE BACKFILLED EAST FLUME SHALL BE SURVEYED PRIOR TO SHEET PILE WALL INSTALLATION. ADDITIONAL FILL MATERIAL SHALL BE PLACED AS NECESSARY TO COMPENSATE FOR POTENTIAL SETTLEMENT. THE FILL MATERIAL USED TO BACKFILL THE EAST FLUME SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. A NON-WOVEN GEOTEXTILE SEPARATOR WITH A MINIMUM WEIGHT OF 8 OZ. PER SQUARE YARD SHALL BE PLACED IN THE BOTTOM OF THE EAST FLUME PRIOR TO BACKFILLING.
6. THE PUMP STATION BUILDING IS SUPPORTED ON PILE FOUNDATION AS SHOWN ON THE DRAWING PREPARED BY PAULUS & SOKOLOWSKI CONSULTING ENGINEERS AND LAWLER, MATUSKY & SKELLY ENGINEERS FOR ALLIED CHEMICAL DATED 2/10/77.
7. THE SPILLWAY AT THE END OF EAST FLUME SHALL BE DEMOLISHED AS NECESSARY TO FACILITATE SHEET PILE INSTALLATION.
8. SEE DRAWING 444184-C004 FOR THE INFORMATION ABOUT THE REGRADING IN THE EAST FLUME, AND THE DEMOLITION OF THE EAST FLUME SPILLWAY AND THE DIFFUSER PIPE NEAR THE EXISTING PUMP STATION BUILDING.

CONSTRUCTION CONTROL POINTS

POINT NUMBER	NORTHING	EASTING	ELEVATION
106	1117538.8	924271.2	365.0
107	1117484.6	924377.0	365.0
108	1117427.9	924377.1	365.0
109	1117412.9	924377.2	370.0
110	1117407.9	924377.2	370.0
111	1117305.9	924493.2	370.0
112	1117220.2	924590.6	370.0
132	1117448.3	924302.1	370.0
133	1117455.9	924309.4	370.0
134	1117476.4	924288.4	370.0
135	1117486.1	924271.6	370.0
136	1117455.3	924220.8	365.0
137	1117475.7	924206.4	365.0
138	1117498.6	924194.1	365.0
139	1117509.7	924187.7	365.0
140	1117519.7	924176.9	365.0

REV	DATE	DESCRIPTION	DRN	APP
0	11/18/09	ISSUE FOR CONSTRUCTION	JHS	JFB

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

TITLE: DETAIL SITE REGRADING – II

PROJECT: ONONDAGA LAKE WB-B/HB IRM WEST WALL FINAL DESIGN DRAWINGS

SITE: SYRACUSE AND GEDDES, NEW YORK

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

18 Nov 2009
DATE

STATE OF NEW YORK · JOHN F. BEECH · LICENSED PROFESSIONAL ENGINEER

DESIGN BY:	MZ	DATE:	NOVEMBER 2009
DRAWN BY:	JHS	PROJECT NO.:	GJ4364.03.06
CHECKED BY:	MZ	FILE:	43640005
REVIEWED BY:	RK/JFB	DRAWING NO.:	
APPROVED BY:	JFB		5 OF 23

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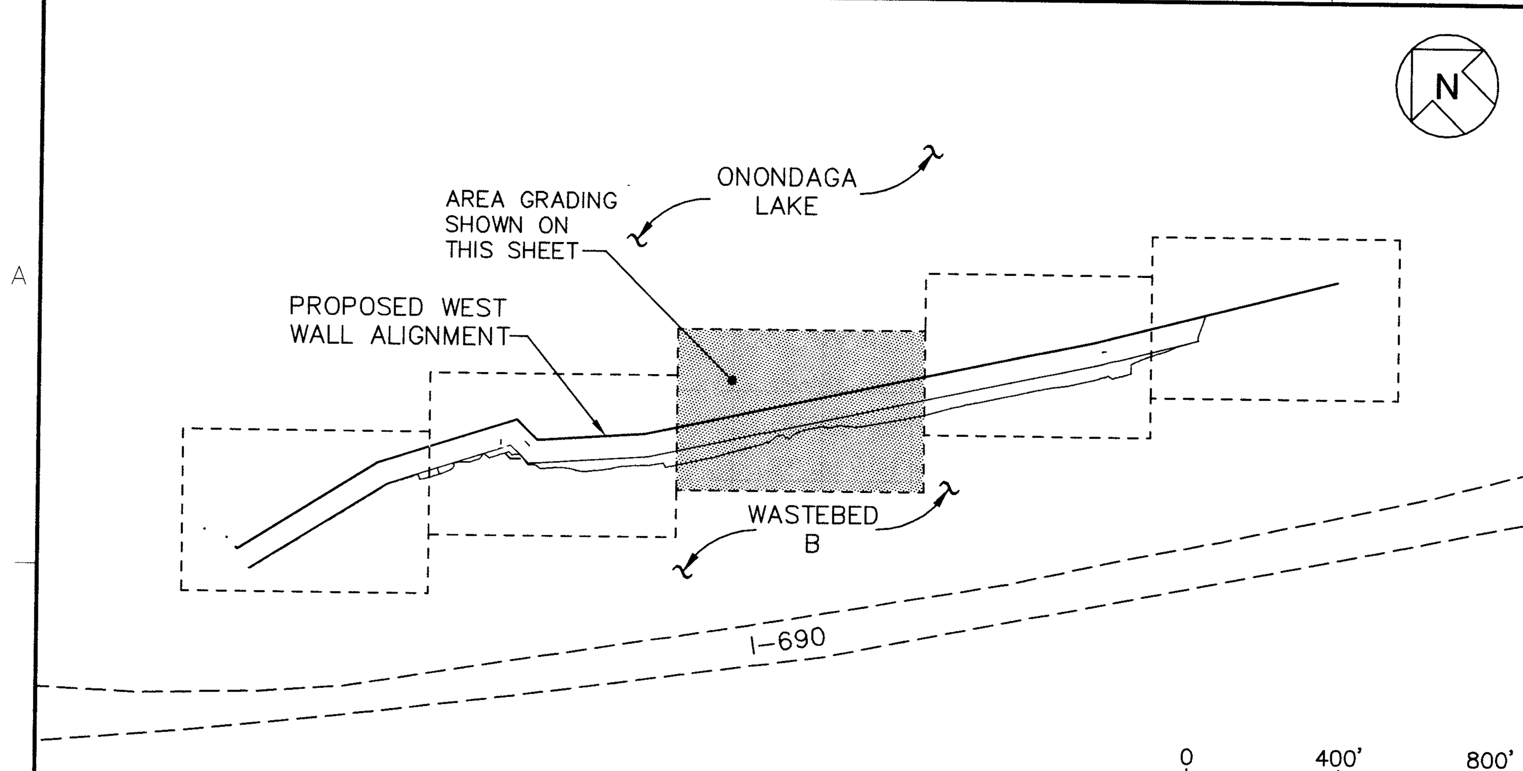
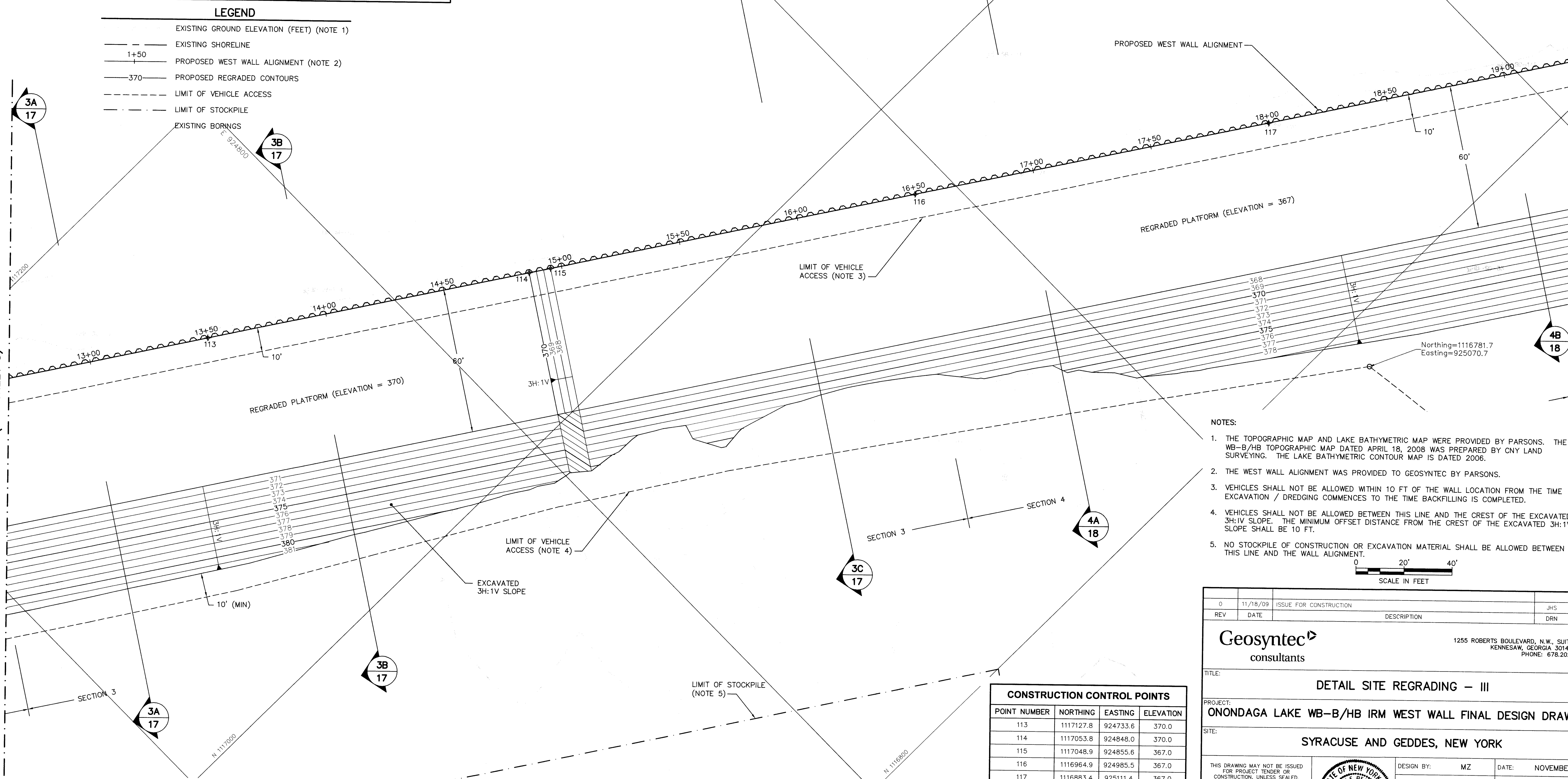


KEY MAP

LEGEND

- EXISTING GROUND ELEVATION (FEET) (NOTE 1)
- EXISTING SHORELINE
- 1+50 — PROPOSED WEST WALL ALIGNMENT (NOTE 2)
- 370 — PROPOSED REGRADED CONTOURS
- LIMIT OF VEHICLE ACCESS
- LIMIT OF STOCKPILE
- EXISTING BORINGS



NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006.
2. THE WEST WALL ALIGNMENT WAS PROVIDED TO GEOSYNTEC BY PARSONS.
3. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION FROM THE TIME EXCAVATION / DREDGING COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
4. VEHICLES SHALL NOT BE ALLOWED BETWEEN THIS LINE AND THE CREST OF THE EXCAVATED 3H:1V SLOPE. THE MINIMUM OFFSET DISTANCE FROM THE CREST OF THE EXCAVATED 3H:1V SLOPE SHALL BE 10 FT.
5. NO STOCKPILE OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED BETWEEN THIS LINE AND THE WALL ALIGNMENT.

0 20' 40'
SCALE IN FEET

CONSTRUCTION CONTROL POINTS

POINT NUMBER	NORTHING	EASTING	ELEVATION
113	1117127.8	924733.6	370.0
114	1117053.8	924848.0	370.0
115	1117048.9	924855.6	367.0
116	1116964.9	924985.5	367.0
117	1116883.4	925111.4	367.0

REV	DATE	DESCRIPTION	DRN	APP
0	11/18/09	ISSUE FOR CONSTRUCTION	JHS	JFB

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

TITLE:
DETAIL SITE REGRADING – III

PROJECT:
ONONDAGA LAKE WB-B/HB IRM WEST WALL FINAL DESIGN DRAWINGS

SITE:
SYRACUSE AND GEDDES, NEW YORK

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE
13 Nov 2009
DATE

STATE OF NEW YORK · JOHN F. BEECH · No. 066335 · LICENSED PROFESSIONAL ENGINEER

DESIGN BY:	MZ	DATE:	NOVEMBER 2009
DRAWN BY:	JHS	PROJECT NO.:	GJ4364.03.06
CHECKED BY:	MZ	FILE:	43640005
REVIEWED BY:	RK/JFB	DRAWING NO.:	
APPROVED BY:	JFB		6 OF 23

L:\CAD\GJ\ONONDAGA LAKE\PERMIT\SHEET PILE WALL-WEST\FINAL DESIGN GJ4364.03.06\DRAWINGS\43640005

LEGEND

- EXISTING GROUND ELEVATION (FEET) (NOTE 1)
- EXISTING SHORELINE
- GLM — EXISTING GAS LINES (NOTE 1)
- 1+50 — PROPOSED WEST WALL ALIGNMENT (NOTE 2)
- 367 — PROPOSED REGRADED CONTOURS
- LIMIT OF VEHICLE ACCESS
- EXISTING BORINGS
- LIMIT OF STOCKPILE

CONSTRUCTION CONTROL POINTS

POINT NUMBER	NORTHING	EASTING	ELEVATION
118	1116802.0	925237.4	367.0
119	1116693.4	925405.4	367.0
120	1116563.3	925606.6	367.0
121	1116556.4	925618.2	367.0
122	1116551.9	925626.0	364.0

NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP INCLUDING THE LOCATIONS OF UTILITIES WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006.
2. THE WEST WALL ALIGNMENT WAS PROVIDED TO GEOSYNTEC BY PARSONS.
3. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION FROM THE TIME EXCAVATION / DREDGING COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
4. VEHICLES SHALL NOT BE ALLOWED BETWEEN THIS LINE AND THE CREST OF THE EXCAVATED 3H:1V SLOPE. THE MINIMUM OFFSET DISTANCE FROM THE CREST OF THE EXCAVATED 3H:1V SLOPE SHALL BE 10 FT.
5. NO STOCKPILE OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED BETWEEN THIS LINE AND THE WALL ALIGNMENT.
6. SEE DRAWING 444184-C002 FOR SAFETY BERM DETAIL.

REV	DATE	DESCRIPTION	DRN	APP
0	11/18/09	ISSUE FOR CONSTRUCTION	JHS	JFB

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

TITLE: DETAIL SITE REGRADING – IV

PROJECT: ONONDAGA LAKE WB-B/HB IRM WEST WALL FINAL DESIGN DRAWINGS

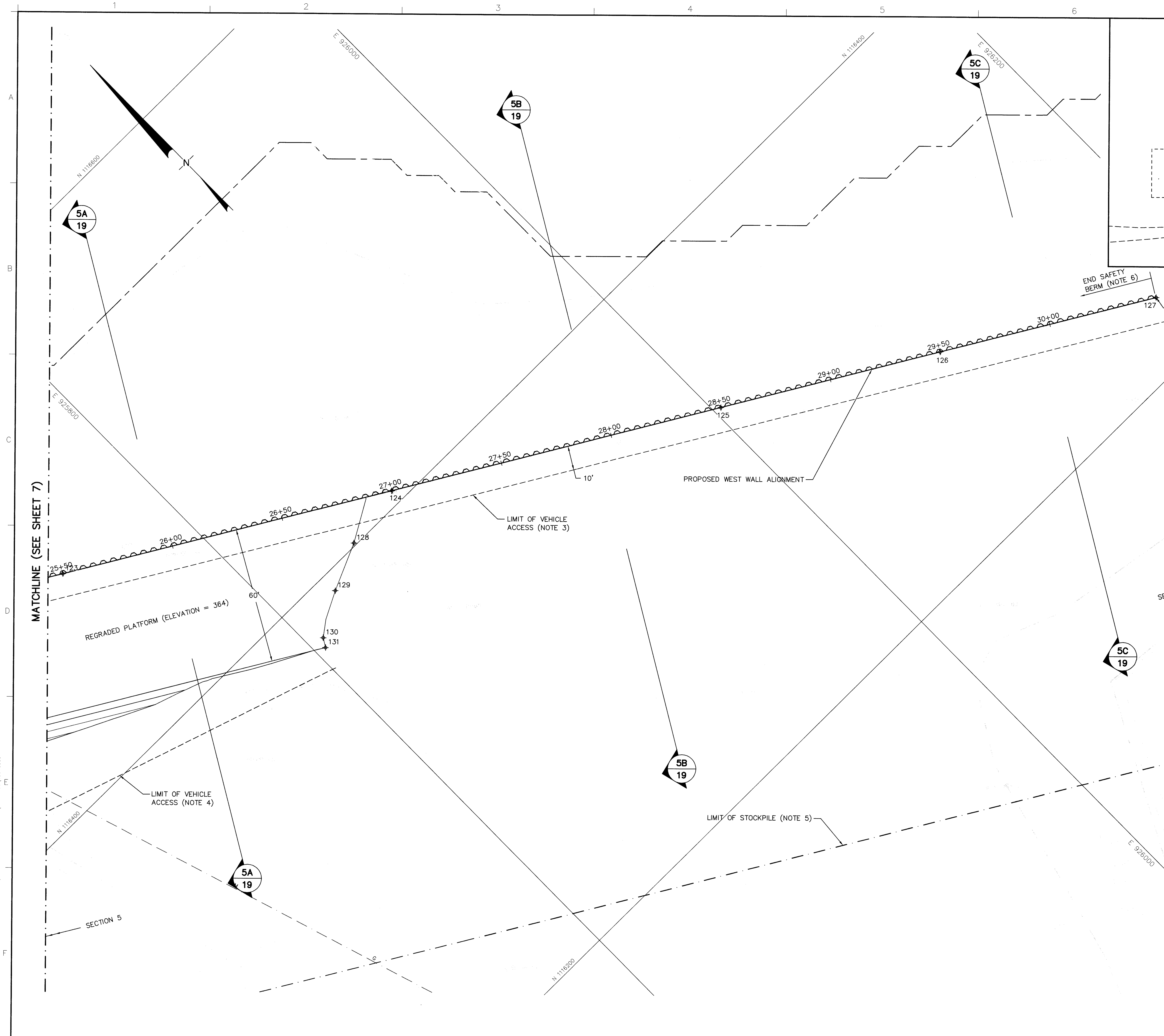
SITE: SYRACUSE AND GEDDES, NEW YORK

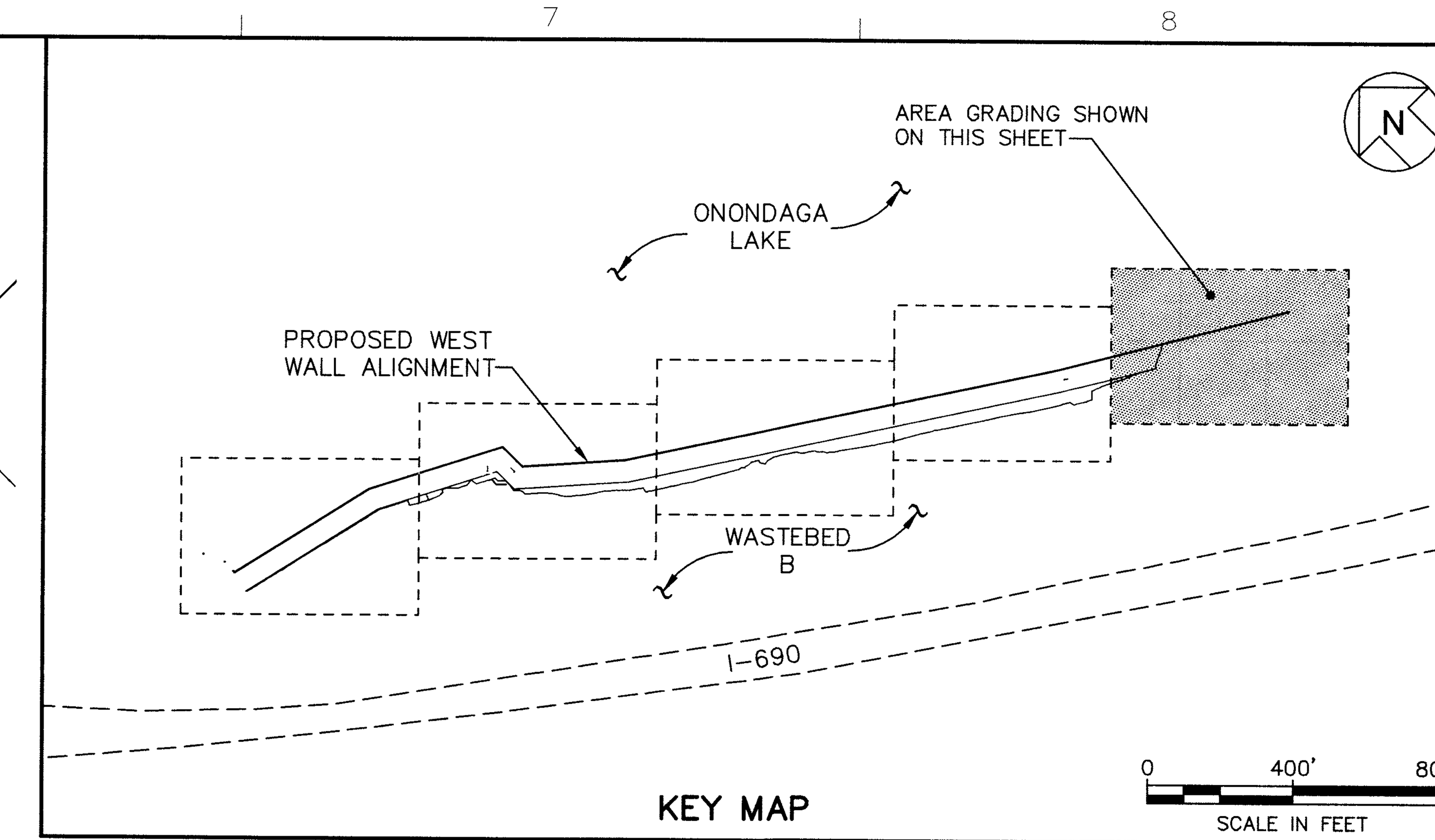
THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE
18 Feb 2009
DATE

STATE OF NEW YORK — LICENSED PROFESSIONAL ENGINEER

DESIGN BY:	MZ	DATE:	NOVEMBER 2009
DRAWN BY:	JHS	PROJECT NO.:	GJ4364.03.06
CHECKED BY:	MZ	FILE:	43640005
REVIEWED BY:	RK/JFB	DRAWING NO.:	7 OF 23
APPROVED BY:	JFB		





KEY MAP

LEGEND

- EXISTING GROUND ELEVATION (FEET) (NOTE 1)
- EXISTING SHORELINE
- G — EXISTING GAS LINES (NOTE 1)
- 28+50 — PROPOSED WEST WALL ALIGNMENT (NOTE 2)
- 364 — PROPOSED REGRADED CONTOURS
- LIMIT OF VEHICLE ACCESS
- LIMIT OF STOCKPILE
- EXISTING BORINGS

CONSTRUCTION CONTROL POINTS			
POINT NUMBER	NORTHING	EASTING	ELEVATION
123	1116481.9	925744.8	364.0
124	1116405.8	925874.0	364.0
125	1116329.7	926003.3	364.0
126	1116279.0	926089.5	364.0
127	1116229.0	926174.3	364.0
128	1116401.1	925845.9	364.0
129	1116391.9	925825.3	364.0
130	1116380.9	925806.9	364.0
131	1116377.1	925804.6	364.0

NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP INCLUDING LOCATIONS OF UTILITIES WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006.
2. THE WEST WALL ALIGNMENT WAS PROVIDED TO GEOSYNTEC BY PARSONS.
3. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION FROM THE TIME EXCAVATION / DREDGING COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
4. VEHICLES SHALL NOT BE ALLOWED BETWEEN THIS LINE AND THE CREST OF THE EXCAVATED 3H:1V SLOPE. THE MINIMUM OFFSET DISTANCE FROM THE CREST OF THE EXCAVATED 3H:1V SLOPE SHALL BE 10 FT.
5. NO STOCKPILE OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED BETWEEN THIS LINE AND THE WALL ALIGNMENT.
6. SEE DRAWING 444184-C002 FOR SAFETY BERM DETAIL.

0 20' 40'
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
0	11/18/09	ISSUE FOR CONSTRUCTION	JHS	JFB

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

TITLE: DETAIL SITE REGRADING – V

PROJECT: ONONDAGA LAKE WB-B/HB IRM WEST WALL FINAL DESIGN DRAWINGS

SITE: SYRACUSE AND GEDDES, NEW YORK

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

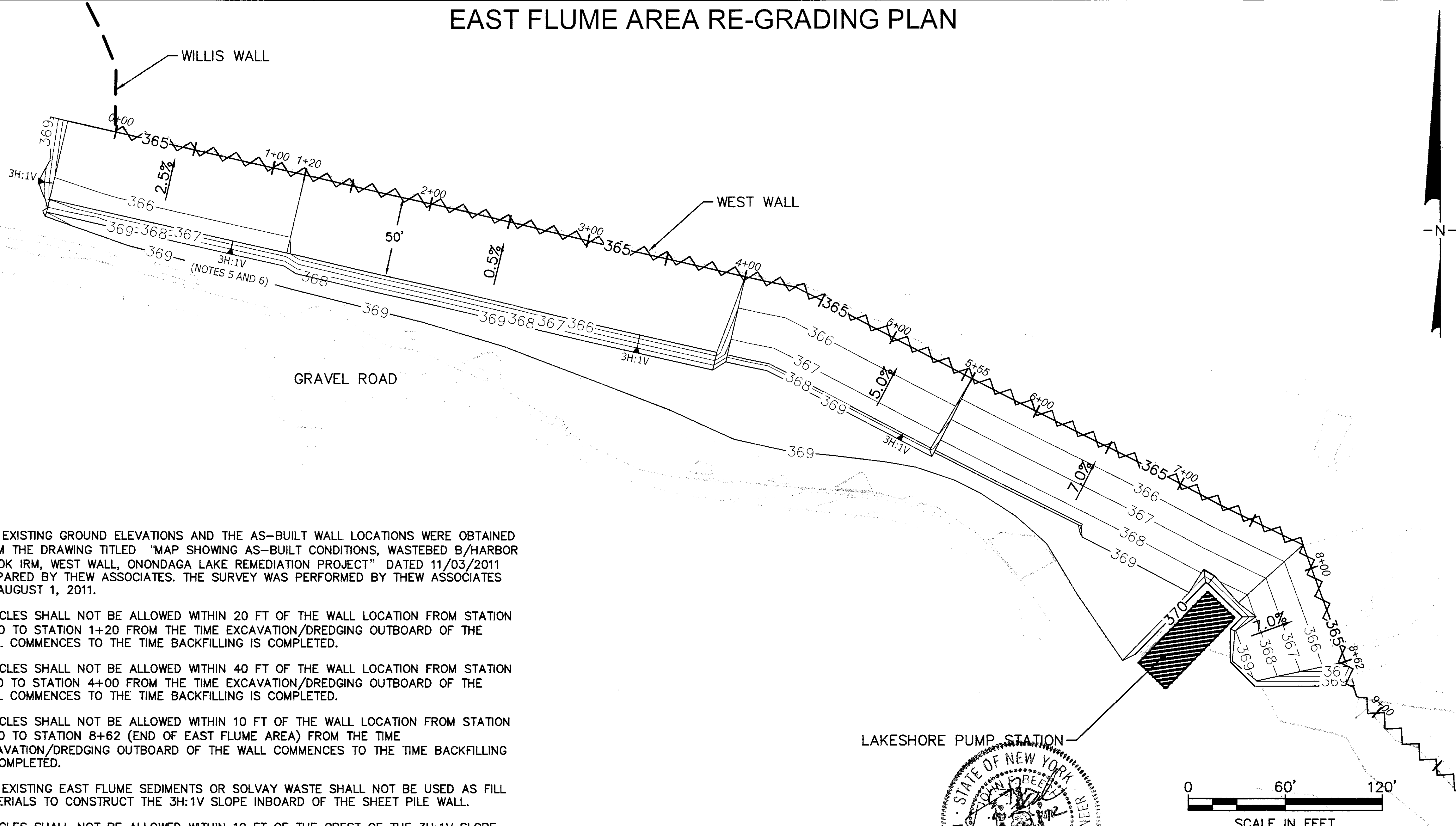
SIGNATURE

18 Nov 2009
DATE

STATE OF NEW YORK · JOHN F. BEECH · LICENSED PROFESSIONAL ENGINEER

DESIGN BY:	MZ	DATE:	NOVEMBER 2009
DRAWN BY:	JHS	PROJECT NO.:	GJ4364.03.06
CHECKED BY:	MZ	FILE:	43640005
REVIEWED BY:	RK/JFB	DRAWING NO.:	
APPROVED BY:	JFB	8 OF 23	

EAST FLUME AREA RE-GRADING PLAN



NOTES:

1. THE EXISTING GROUND ELEVATIONS AND THE AS-BUILT WALL LOCATIONS WERE OBTAINED FROM THE DRAWING TITLED "MAP SHOWING AS-BUILT CONDITIONS, WASTEBED B/HARBOR BROOK IRM, WEST WALL, ONONDAGA LAKE REMEDIATION PROJECT" DATED 11/03/2011 PREPARED BY THEW ASSOCIATES. THE SURVEY WAS PERFORMED BY THEW ASSOCIATES ON AUGUST 1, 2011.
2. VEHICLES SHALL NOT BE ALLOWED WITHIN 20 FT OF THE WALL LOCATION FROM STATION 0+00 TO STATION 1+20 FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
3. VEHICLES SHALL NOT BE ALLOWED WITHIN 40 FT OF THE WALL LOCATION FROM STATION 1+20 TO STATION 4+00 FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
4. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION FROM STATION 4+00 TO STATION 8+62 (END OF EAST FLUME AREA) FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
5. THE EXISTING EAST FLUME SEDIMENTS OR SOLVAY WASTE SHALL NOT BE USED AS FILL MATERIALS TO CONSTRUCT THE 3H:1V SLOPE INBOARD OF THE SHEET PILE WALL.
6. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE CREST OF THE 3H:1V SLOPE AT ANY TIME DURING CONSTRUCTION.
7. SEE DRAWING 4 OF 23, NOTE 7 PREPARED BY GEOSYNTEC AND DRAWING 444184-C004, REV 2 PREPARED BY PARSONS IN THE WEST WALL FINAL DESIGN DRAWINGS FOR INFORMATION ABOUT THE GEOTEXTILE SEPARATOR PLACED IN EAST FLUME.
8. SEE DRAWING 3 OF 23 PREPARED BY GEOSYNTEC AND DRAWING 444184-C003 PREPARED BY PARSONS IN THE WEST WALL FINAL DESIGN DRAWINGS FOR INFORMATION ABOUT THE LIMIT OF STOCKPILE AREAS IN WASTEBED B.

STATE OF NEW YORK · JOHN F. BEECH · No. 066337 · LICENSED PROFESSIONAL ENGINEER

LEGEND

370	EXISTING GROUND ELEVATION (FEET) (NOTE 1)
367	PROPOSED FINISHED GRADE (FEET)
/\/\/\/\	SHEET PILE WALL (AS-BUILT) (NOTE 1)

Geosyntec consultants

KENNESAW, GA

DATE:	May–12	SCALE:	AS SHOWN
PROJECT NO.	GJ4674	FILE NO.	4364x003
DOCUMENT NO.	–	FIGURE NO.	1

L:\CADD\O\ONONDAGA LAKE\PERMIT\SHEET PILE WALL-WEST\FINAL DESIGN GJ4364.03.06\DRAWINGS\4364X003_PLAN VIEW_REVISED GRADES

ATTACHMENT 3

EAST WALL – THE SEQUENTIAL DREDGING/EXCAVATION AND CAPPING REQUIREMENT

ONONDAGA LAKE WB-B/HB IRM EAST WALL FINAL DESIGN DRAWINGS

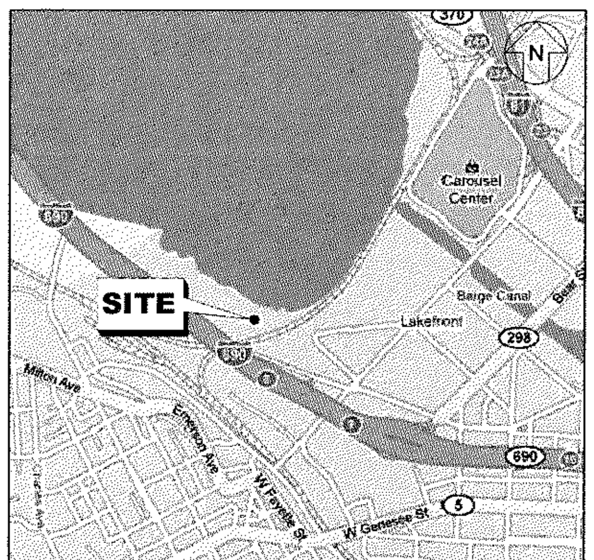
SYRACUSE AND GEDDES, NEW YORK

GJ4387.03.10

MAY 2011

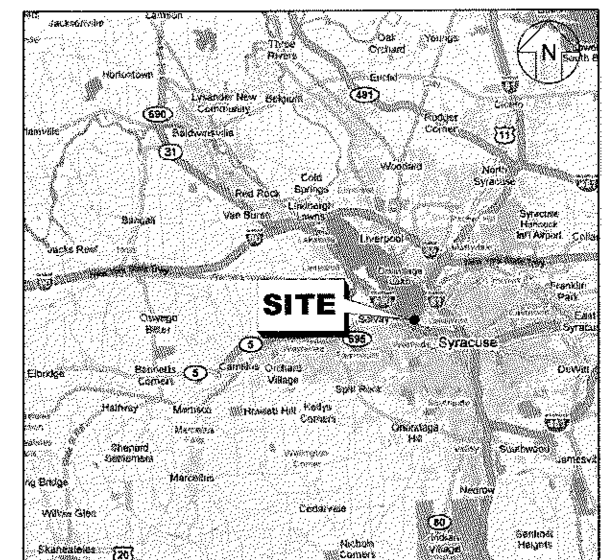
LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
444184-100-G-001	COVER SHEET
444184-100-C-001	GENERAL SITE PLAN
444184-100-C-002	EROSION AND SEDIMENT CONTROL PLAN
444184-100-C-003	DETAIL SITE PLAN – I
444184-100-C-004	DETAIL SITE PLAN – II
444184-100-C-005	DETAIL SITE PLAN – III
444184-100-C-006	DETAIL SITE PLAN – IV
444184-100-C-007	CROSS SECTION ALONG WALL ALIGNMENT – I
444184-100-C-008	CROSS SECTION ALONG WALL ALIGNMENT – II
444184-100-C-009	CROSS SECTION ALONG WALL ALIGNMENT – III
444184-100-C-010	CROSS SECTION ALONG WALL ALIGNMENT – IV
444184-100-C-011	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – I
444184-100-C-012	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – II
444184-100-C-013	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – III
444184-100-C-014	CROSS SECTION PERPENDICULAR TO WALL ALIGNMENT – IV
444184-100-C-015	SHEET PILE DETAILS
444184-100-C-016	SHEET PILE WALL CONSTRUCTION SPECIFICATIONS
444184-100-C-017	GEOTECHNICAL INSTRUMENTATION PLAN
444184-100-C-018	INSTRUMENTATION INSTALLATION GUIDANCE AND INSTRUMENTATION DETAILS – I
444184-100-C-019	INSTRUMENTATION DETAILS – II
444184-100-C-019A	CULVERT AND SHEET PILE WALL PENETRATION DETAILS
444184-100-C-020	EXISTING SITE CONDITIONS
444184-100-C-021	PROPOSED CULVERT PLAN AND SECTIONS
444184-100-C-022	EXISTING HARBOR BROOK ALIGNMENT AND SECTIONS
444184-100-C-023	HARBOR BROOK DIVERSION PLAN
444184-100-C-024	HARBOR BROOK ALIGNMENT AND SECTIONS
444184-100-C-025	CULVERT PLAN AND DETAILS
444184-100-C-026	COLLECTION SYSTEM ALIGNMENT
444184-100-C-027	TYPICAL COLLECTION SUMP PLAN AND DETAILS
444184-100-C-028	COLLECTION SYSTEM DETAILS
444184-100-C-029	MISCELLANEOUS DETAILS
444184-100-C-030	STOCKPILE LOCATION PLAN
444184-100-E-001	GROUNDWATER PUMP STATION CONTROL ROOM LAYOUT AND WIRING DIAGRAMS
444184-100-E-002	PIEZOMETER SYSTEM SCHEMATIC AND COLLECTION SUMP WIRING DIAGRAM
444184-100-E-003	ELECTRICAL SITE DIAGRAM AND DETAILS



SOURCE: GOOGLE MAP 2009

VICINITY MAP
NOT TO SCALE



SOURCE: GOOGLE MAP 2009

LOCATION MAP
NOT TO SCALE

PREPARED FOR:

Honeywell

301 PLAINFIELD ROAD, SUITE 330
SYRACUSE, NY 13212

DETAIL IDENTIFICATION LEGEND

- DETAIL NUMBER (4)
- SHEET ON WHICH ABOVE DETAIL IS PRESENTED (6)
- DETAIL NUMBER (4) — DETAIL TITLE OF DETAIL, SCALE: 1"=2'
- SHEET ON WHICH ABOVE DETAIL WAS FIRST REFERENCED (3)

EXAMPLE: DETAIL NUMBER 4 PRESENTED ON SHEET NO. 6 WAS REFERENCED FOR THE FIRST TIME ON SHEET NO.3.

ABOVE SYSTEM ALSO APPLIES TO SECTION IDENTIFICATIONS.

PREPARED BY:

Geosyntec consultants
1255 ROBERTS BOULEVARD, NW, SUITE 200
KENNESAW, GEORGIA 30144-3694
TELEPHONE: 678.202.9500

PARSONS
301 PLAINFIELD ROAD, SUITE 350
SYRACUSE, NEW YORK 13212
TELEPHONE: 315.451.9560

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

NO.	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	5/17/11

DRAWN BY / CHECKED BY / APPROVED BY / PROJECT MGR.

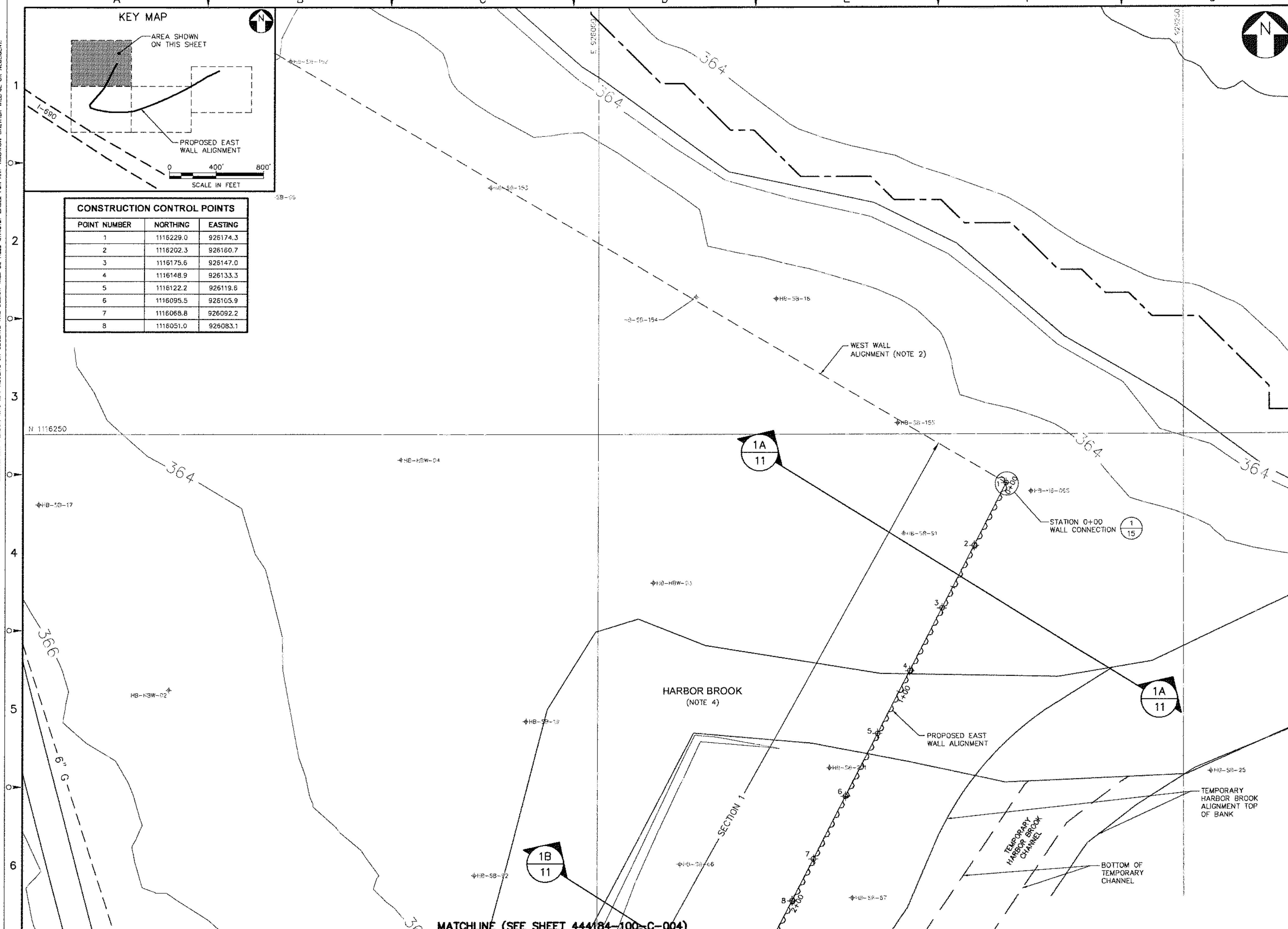
PARSONS COMMERCIAL TECHNOLOGY GROUP
301 PLAINFIELD ROAD
SYRACUSE, NY 13212
(315) 451-9560
JOB 444184

PROJECT TITLE: Honeywell
ONONDAGA LAKE WB-B/HB IRM EAST WALL FINAL DESIGN DRAWINGS

DRAWING TITLE: COVER SHEET

SCALE: NOT TO SCALE (IF PRINTED ON 22x34 SHEET)

DRAWING NO. 444184-100-G-001 REV. 0



CONSTRUCTION CONTROL POINTS		
POINT NUMBER	NORTHING	EASTING
1	1116229.0	926174.3
2	1116202.3	926160.7
3	1116175.6	926147.0
4	1116148.9	926133.3
5	1116122.2	926119.6
6	1116095.5	926105.9
7	1116068.8	926092.2
8	1116051.0	926083.1

NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006. THE ELEVATIONS SHOWN (IN FEET) ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). COORDINATES SHOWN HEREIN ARE EXPRESSED IN U.S. SURVEY FEET AND REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83)-NEW YORK STATE PLAN GRID, ZONE CENTRAL.
2. THE WEST WALL ALIGNMENT WAS OBTAINED FROM THE DESIGN DRAWINGS TITLED "ONONDAGA LAKE WB-B/HB IRM WEST WALL FINAL DESIGN DRAWINGS" PREPARED BY GEOSYNTEC DATED NOVEMBER, 2009.
3. BORING LOGS AND CORRESPONDING GEOTECHNICAL TEST DATA ARE AVAILABLE FOR REVIEW BY THE CONTRACTOR.
4. THE EXISTING HARBOR BROOK SHALL BE BACKFILLED BEFORE WALL INSTALLATION.
5. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION IN SECTION 1 FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
6. NO STOCKPILES OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED WITHIN 200 FT OF THE WALL LOCATION IN SECTION 1.
7. EXCAVATION/DREDGING OUTBOARD OF THE SHEET PILE WALL (I.E., ON THE LAKE SIDE) IS NOT SHOWN IN THIS DRAWING. EXCAVATION/DREDGING DEPTHS WILL BE ESTABLISHED IN THE OUTBOARD AREA DESIGN.

LEGEND

- 366 — EXISTING GROUND ELEVATION (FEET) (NOTE 1)
- EXISTING SHORELINE
- EXISTING BORINGS (NOTE 3)
- 6"G — EXISTING GAS LINES
- WEST WALL ALIGNMENT (NOTE 2)
- 2+00 — PROPOSED EAST WALL ALIGNMENT
- 8 — CONTROL POINT

0 20' 40' SCALE IN FEET

Geosyntec consultants
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PHONE: 678.202.9500

0 ISSUED FOR CONSTRUCTION

PARSONS
COMMERCIAL TECHNOLOGY GROUP

301 PLAINFIELD ROAD
SYRACUSE, NY 13212
(315) 451-9560

JOB 444184

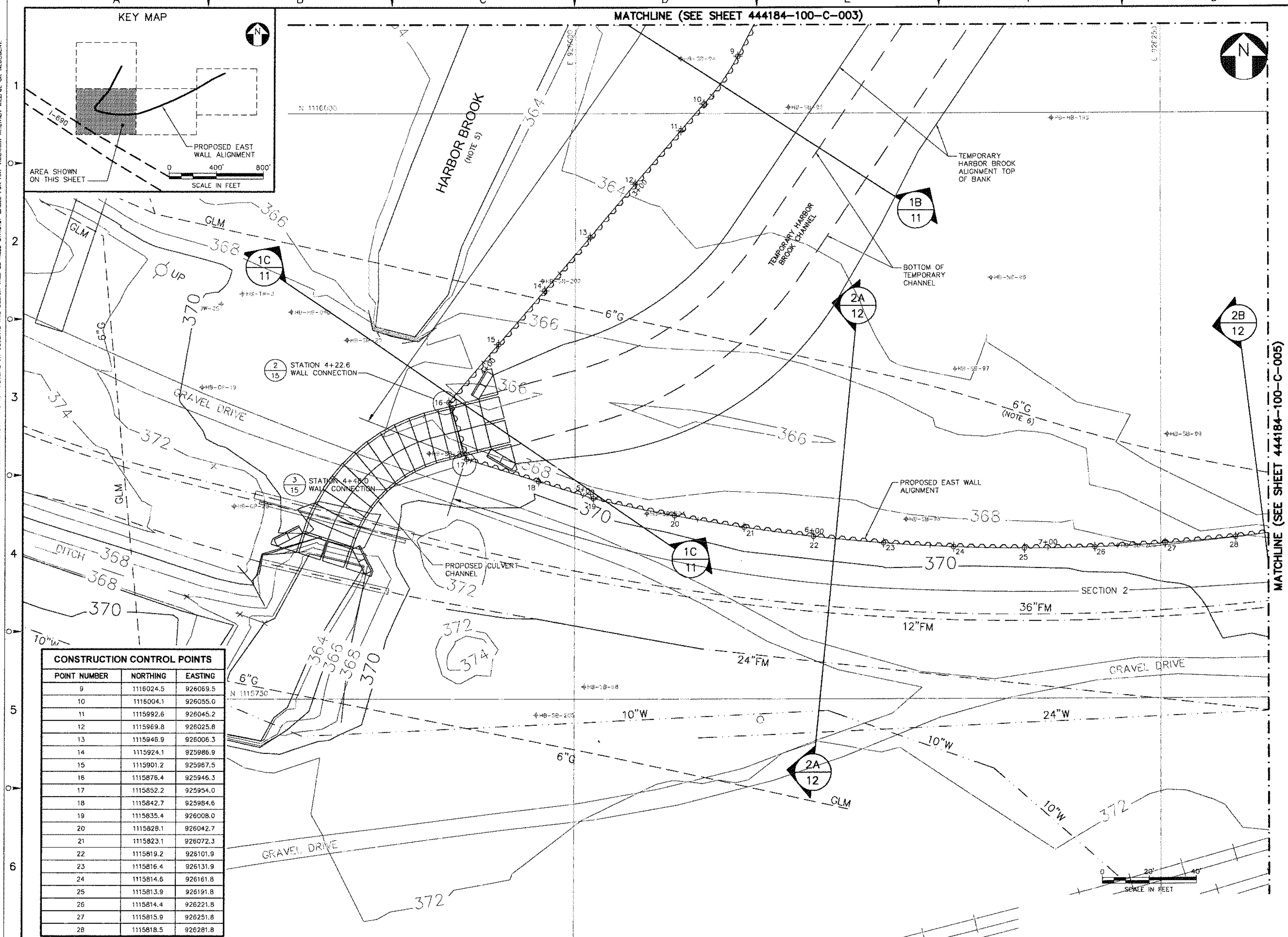
Honeywell

ONONDAGA LAKE WB-B/HB IRM EAST WALL FINAL DESIGN DRAWINGS

DETAIL SITE PLAN - I

SCALE: 1" = 20' (IF PRINTED ON 22x34 SHEET)

DRAWING NO. 444184-100-C-003 REV. 0



CONSTRUCTION CONTROL POINTS		
POINT NUMBER	NORTHING	EASTING
9	1116024.5	926069.5
10	1116004.1	926055.0
11	1115992.6	926045.2
12	1115969.8	926025.8
13	1115946.9	926006.3
14	1115924.1	925986.9
15	1115901.2	925967.5
16	1115876.4	925946.3
17	1115852.2	925954.0
18	1115842.7	925984.6
19	1115835.4	926008.0
20	1115828.1	926042.7
21	1115823.1	926072.3
22	1115819.2	926101.9
23	1115816.4	926131.9
24	1115814.6	926161.8
25	1115813.9	926191.8
26	1115814.4	926221.8
27	1115815.9	926251.8
28	1115818.5	926281.8

NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006. THE ELEVATIONS SHOWN (IN FEET) ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). COORDINATES SHOWN HEREIN ARE EXPRESSED IN U.S. SURVEY FEET AND REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83)-NEW YORK STATE PLAN GRID, ZONE CENTRAL.
2. VEHICLES SHALL NOT BE ALLOWED WITHIN 10 FT OF THE WALL LOCATION IN SECTION 1 FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
3. VEHICLES SHALL NOT BE ALLOWED INBOARD OF THE WALL IN SECTION 2 FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
4. BORING LOGS AND CORRESPONDING GEOTECHNICAL TEST DATA ARE AVAILABLE FOR REVIEW BY THE CONTRACTOR.
5. THE EXISTING HARBOR BROOK SHALL BE BACKFILLED BEFORE WALL INSTALLATION.
6. EXISTING ABANDONED GAS LINE INTERSECTS PROPOSED WALL ALIGNMENT. COORDINATE WITH UTILITY OWNER FOR MODIFICATION AND CAPPING. PIPELINE TO REMAIN IN PLACE.
7. NO STOCKPILES OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED WITHIN 200 FT OF THE WALL LOCATION IN SECTION 1.
8. NO STOCKPILES OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED INBOARD OF THE WALL IN SECTION 2 FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
9. EXCAVATION/DREDGING OUTBOARD OF THE SHEET PILE WALL (I.E., ON THE LAKE SIDE) IS NOT SHOWN IN THIS DRAWING. EXCAVATION/DREDGING DEPTHS WILL BE ESTABLISHED IN THE OUTBOARD AREA DESIGN.

LEGEND

—370—	EXISTING GROUND ELEVATION (FEET) (NOTE 1)
GRAVEL DRIVE	EXISTING ROAD
HB-SB-95	EXISTING BORINGS (NOTE 4)
6"G	EXISTING GAS LINES
12"FM	EXISTING SANITARY SEWER LINES
24"W	EXISTING WATER LINES
	EXISTING RAILROAD
7+00	PROPOSED EAST WALL ALIGNMENT
28	CONTROL POINT

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

NO.	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	5/13/11

DRAWN BY / CHECKED BY / APPROVED BY / PROJECT MGR.

PARSONS
COMMERCIAL TECHNOLOGY GROUP

OFFICE: 301 PLAINFIELD ROAD, SYRACUSE, NY 13212, (315) 451-9560
JOB: 444184

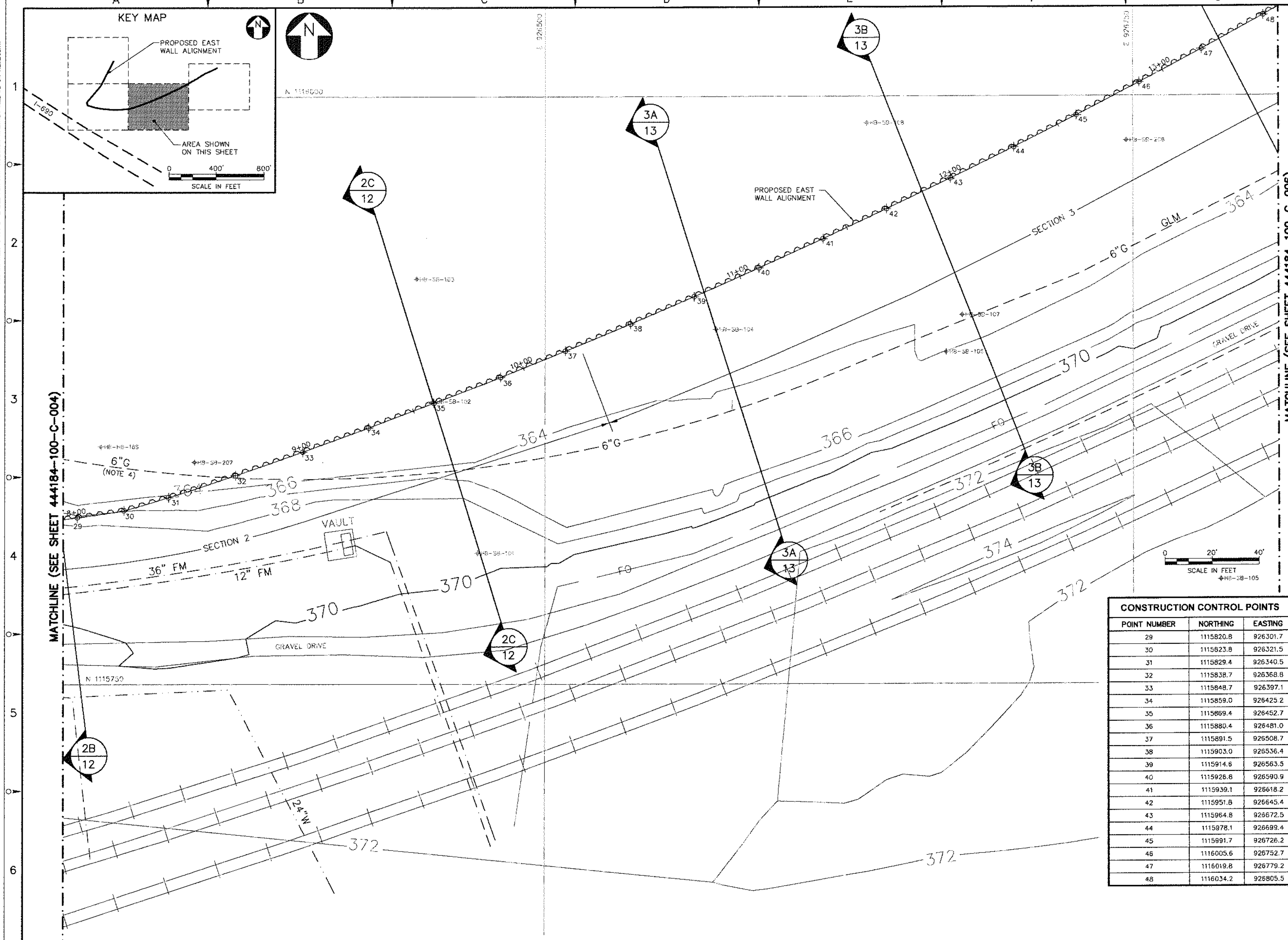
PROJECT TITLE:
Honeywell
ONONDAGA LAKE WB-B/HB IRM EAST WALL FINAL DESIGN DRAWINGS

DRAWING TITLE: DETAIL SITE PLAN – II

SCALE: 1" = 20' (IF PRINTED ON 22x34 SHEET)

DRAWING NO. 444184-100-C-004 REV. 0

FILE NAME: C:\CADD\D\ONONDAGA LAKE\PERMIT\SHEET PILE WALL-EAST\FINAL DESIGN DRAWINGS MAY 2011\DRAWINGS\4387-004.DWG
PLOT DATE: 8/12/2010 PLOTTED BY: JONATHAN SPEED



CONSTRUCTION CONTROL POINTS

POINT NUMBER	NORTHING	EASTING
29	1115820.8	926301.7
30	1115823.8	926321.5
31	1115829.4	926340.5
32	1115838.7	926368.8
33	1115848.7	926397.1
34	1115859.0	926425.2
35	1115869.4	926452.7
36	1115880.4	926481.0
37	1115891.5	926508.7
38	1115903.0	926536.4
39	1115914.6	926563.5
40	1115926.8	926590.9
41	1115939.1	926618.2
42	1115951.8	926645.4
43	1115964.8	926672.5
44	1115978.1	926699.4
45	1115991.7	926726.2
46	1116005.6	926752.7
47	1116019.8	926779.2
48	1116034.2	926805.5

NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006. THE ELEVATIONS SHOWN (IN FEET) ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). COORDINATES SHOWN HEREIN ARE EXPRESSED IN U.S. SURVEY FEET AND REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83)–NEW YORK STATE PLAN GRID, ZONE CENTRAL.
2. VEHICLES SHALL NOT BE ALLOWED INBOARD OF THE WALL IN SECTIONS 2 AND 3 BETWEEN THE WALL AND RAILROAD FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
3. BORING LOGS AND CORRESPONDING GEOTECHNICAL TEST DATA ARE AVAILABLE FOR REVIEW BY THE CONTRACTOR.
4. EXISTING ABANDONED GAS LINE INTERSECTS PROPOSED WALL ALIGNMENT. COORDINATE WITH UTILITY OWNER FOR MODIFICATION AND CAPPING. PIPELINE TO REMAIN IN PLACE.
5. NO STOCKPILES OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED INBOARD OF THE WALL IN SECTIONS 2 AND 3.
6. EXCAVATION/DREDGING OUTBOARD OF THE SHEET PILE WALL (I.E., ON THE LAKE SIDE) IS NOT SHOWN IN THIS DRAWING. EXCAVATION/DREDGING DEPTHS WILL BE ESTABLISHED IN THE OUTBOARD AREA DESIGN.

LEGEND

—370—	EXISTING GROUND ELEVATION (FEET) (NOTE 1)
GRAVEL DRIVE	EXISTING ROAD
HB-SB-108	EXISTING BORINGS (NOTE 3)
6"G	EXISTING GAS LINES
12"FM	EXISTING SANITARY SEWER LINES
24"W	EXISTING WATER LINES
	EXISTING RAILROAD
13+00	PROPOSED EAST WALL ALIGNMENT
48	CONTROL POINT

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

NO.	DESCRIPTION	DATE	DRAWN	CHK'D	APP'D
0	ISSUED FOR CONSTRUCTION				

DRAWN BY / CHECKED BY / APPROVED BY / PROJECT MGR.

STATE OF NEW YORK · JOHN F. BECK · LICENSED PROFESSIONAL ENGINEER

PARSONS
COMMERCIAL TECHNOLOGY GROUP

OFFICE: 301 PLAINFIELD ROAD
SYRACUSE, NY 13212
(315) 451-9560

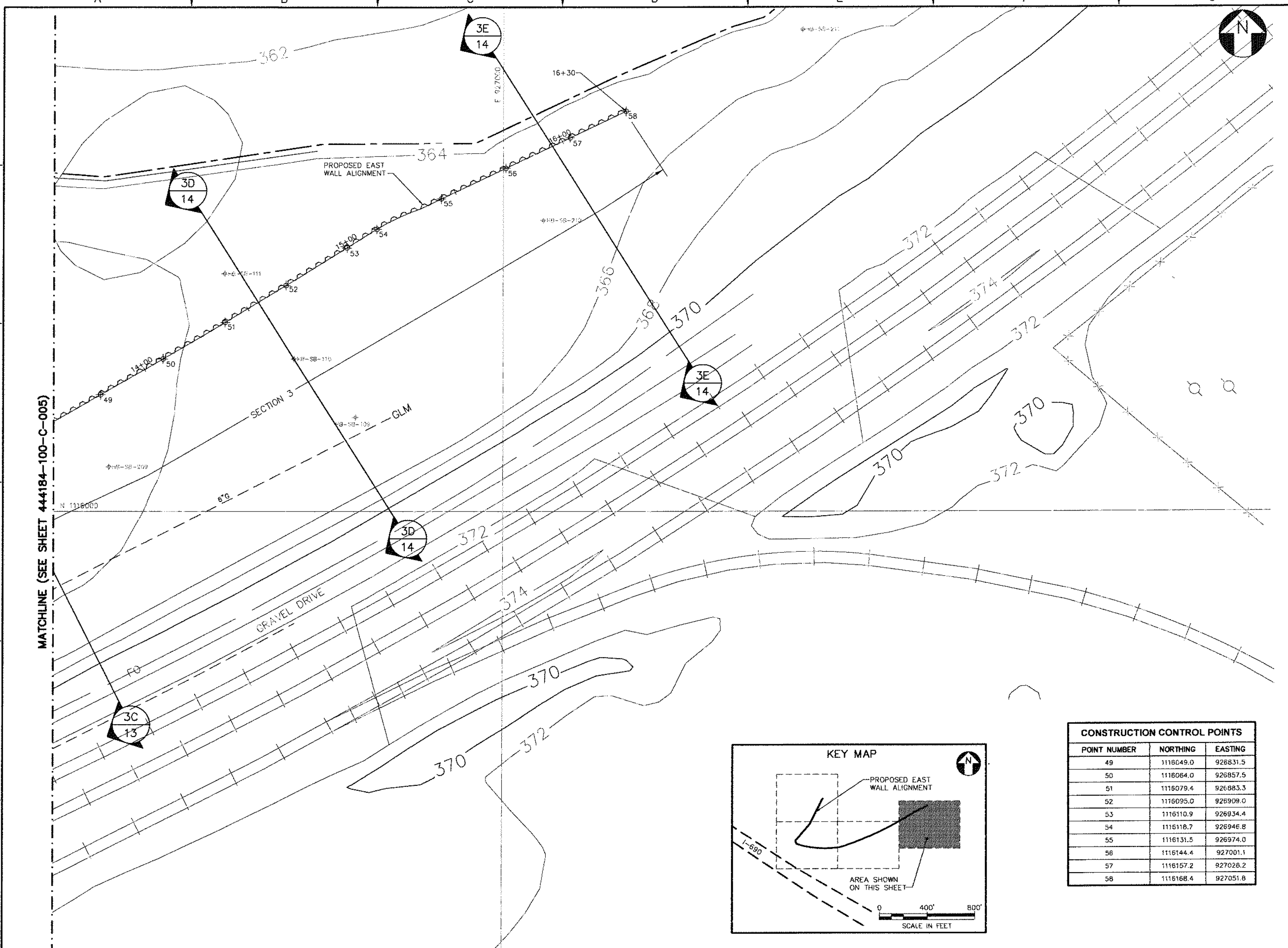
JOB: 444184

PROJECT TITLE:
Honeywell
ONONDAGA LAKE WB-B/HB IRM EAST WALL FINAL DESIGN DRAWINGS

DRAWING TITLE: DETAIL SITE PLAN – III

SCALE: 1" = 20' (IF PRINTED ON 22x34 SHEET)

DRAWING NO.: 444184-100-C-005 REV.: 0



CONSTRUCTION CONTROL POINTS		
POINT NUMBER	NORTHING	EASTING
49	1116049.0	926831.5
50	1116064.0	926857.5
51	1116079.4	926883.3
52	1116095.0	926909.0
53	1116110.9	926934.4
54	1116118.7	926946.8
55	1116131.5	926974.0
56	1116144.4	927001.1
57	1116157.2	927028.2
58	1116168.4	927051.8

NOTES:

1. THE TOPOGRAPHIC MAP AND LAKE BATHYMETRIC MAP WERE PROVIDED BY PARSONS. THE WB-B/HB TOPOGRAPHIC MAP DATED APRIL 18, 2008 WAS PREPARED BY CNY LAND SURVEYING. THE LAKE BATHYMETRIC CONTOUR MAP IS DATED 2006. THE ELEVATIONS SHOWN (IN FEET) ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). COORDINATES SHOWN HEREIN ARE EXPRESSED IN U.S. SURVEY FEET AND REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83)-NEW YORK STATE PLAN GRID, ZONE CENTRAL.
2. VEHICLES SHALL NOT BE ALLOWED INBOARD OF THE WALL IN SECTION 3 FROM THE TIME EXCAVATION/DREDGING OUTBOARD OF THE WALL COMMENCES TO THE TIME BACKFILLING IS COMPLETED.
3. BORING LOGS AND CORRESPONDING GEOTECHNICAL TEST DATA ARE AVAILABLE FOR REVIEW BY THE CONTRACTOR.
4. NO STOCKPILES OF CONSTRUCTION OR EXCAVATION MATERIAL SHALL BE ALLOWED INBOARD OF THE WALL IN SECTION 3.
5. EXCAVATION/DREDGING OUTBOARD OF THE SHEET PILE WALL (I.E., ON THE LAKE SIDE) IS NOT SHOWN IN THIS DRAWING. EXCAVATION/DREDGING DEPTHS WILL BE ESTABLISHED IN THE OUTBOARD AREA DESIGN.

LEGEND

370	EXISTING GROUND ELEVATION (FEET) (NOTE 1)
	EXISTING SHORELINE
GRAVEL DRIVE	EXISTING ROAD
	EXISTING BORINGS (NOTE 3)
6"G	EXISTING GAS LINES
	EXISTING RAILROAD
14+00	PROPOSED EAST WALL ALIGNMENT
52	CONTROL POINT

0 20' 40'
SCALE IN FEET

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

NO.	DESCRIPTION	DATE	DRAWN	CHK'D	APPR'D
0	ISSUED FOR CONSTRUCTION	5/17/11	JHS	MZ	JFB

DRAWN BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
PROJECT MGR.	DATE

SEAL: STATE OF NEW YORK · JOHN F. BEECH · LICENSED PROFESSIONAL ENGINEER · 17 May 2011

PARSONS
COMMERCIAL TECHNOLOGY GROUP
OFFICE
301 PLAINFIELD ROAD
SYRACUSE, NY 13212
(315) 451-9560

JOB 444184
WBS

PROJECT TITLE
Honeywell
ONONDAGA LAKE WB-B/HB
IRM EAST WALL FINAL
DESIGN DRAWINGS

DRAWING TITLE
DETAIL SITE PLAN - IV

SCALE
SCALE: 1" = 20'
(IF PRINTED ON 22x34 SHEET)

DRAWING NO. 444184-100-C-006 REV. 0

ONONDAGA LAKE CAPPING, DREDGING, HABITAT AND PROFUNDAL ZONE (SEDIMENT MANAGEMENT UNIT 8) FINAL DESIGN

Prepared For:

Honeywell

301 Plainfield Road, Suite 330
Syracuse, New York 13212

Prepared By:

PARSONS

301 Plainfield Road, Suite 350
Syracuse, New York 13212
Phone: (315) 451-9560
Fax: (315) 451-9570

ANCHOR QEA

290 Elwood Davis Road, Suite 318
Liverpool, NY 13088

MARCH 2012

Geotechnical stability evaluations were completed to evaluate seismic stability of the ILWD, as detailed in Appendix H. In addition to seismic stability, the stability evaluations also included evaluations of static stability during dredging/capping as required in the ROD and Statement of Work. These stability evaluations concluded that the ILWD is stable following the removal described above and no additional removal is required to meet static or seismic stability goals listed in Section 5.1.

5.2.5 Remediation Area E

Dredging to a target elevation to achieve post-cap water bathymetry for designed habitat modules and navigational considerations will be completed along the shoreline areas in Remediation Area E, as shown in Figures 4.22 through 4.24. Sufficient dredging will be completed up to the shoreline in the northern portion of Remediation Area E to ensure placement of the full-thickness cap all the way to the shoreline. As a result, the removal prism will extend inland of the shoreline in order to accommodate suitable dredge cut slopes.

In the area south and immediately north of Onondaga Creek, three active rail lines are located immediately adjacent to the shoreline. Two of these lines are operated by CSX, while the third is operated by Susquehanna. Geotechnical analysis indicates that dredging within approximately 150 ft. of the shoreline could result in an unacceptable factor of safety for the shoreline and rail line stability. Therefore, detailed dredging and capping prisms have not been developed for the area within 150 ft. from shoreline along this portion of Remediation Area E. An appropriate approach for this area that is environmentally protective and does not negatively impact the stability of the rail lines will be developed as an addendum to the final design. Table 5.1 includes a maximum estimated dredging volume from this area to ensure that the total dredge volume is not underestimated.

The channel depth at the mouth of Onondaga Creek must be sufficient to accommodate commercial boat traffic that uses Onondaga Creek and the Inner Harbor. Therefore, the proposed approach in this area is to dredge to a sufficient depth to allow cap placement while maintaining minimum required navigational depths as provided by the NYSCC.

5.2.6 Remediation Area F

The area requiring remediation in Remediation Area F consists of two small areas totaling less than one acre. The water depth is sufficient in these areas such that dredging prior to capping is not required.

5.2.7 Wastebed B/Harbor Brook Outboard Area

The minimum area and depth of material requiring removal in the WBB/HB Outboard Area in order to achieve the desired habitat was developed in Section 4.3.5.3. In addition, hot spot dredging will be completed in the Outboard Area. The hot spot criteria and method for developing the hot spot dredging areas and volumes is consistent with the hot spot methodology described above for Remediation Area D.

The Outboard Area consists of vegetated wetland and upland soils. As discussed in Section 5.2.1, the vegetation within the wetland and the upland soils present a challenge for hydraulic dredging and sediment management. Upland soils present a challenge for a hydraulic dredge due to the potential for dredge pump cavitating when the pump does not have enough water to mix with the soils. Therefore, a portion of the vegetation and upland soils will be removed prior to hydraulic dredging and managed on the WBB/HB site. It is estimated that approximately 35,000 CY of vegetative material and upland soils may be removed to facilitate conditions for the proposed hydraulic removal. Removed upland soils from the Wastebed B Outboard Area will be managed consistent with the comprehensive site management plan being developed for Wastebed B.

The East Wall IRM sheetpile east of Harbor Brook has a limitation due to potential stability concerns with dredging adjacent to the steel sheet pile. Geotechnical evaluations indicate that in the zone that is within 100 ft. outboard of the sheets, the work needs to be done in smaller increments in order to maintain stability along the sheets, as documented in the East Wall Portion of the Wastebed B/Harbor Brook IRM Design Report (Parsons, Geosyntec and OBG, June 2011). Therefore, the dredging and capping will be sequenced such that than no more than 80 linear ft. of sheeting will be exposed at any one time during dredging and capping. The 80 ft. is measured at the bottom of the dredge cut, with side slopes of 5h:1v or steeper. The sequential dredge sequence and cross sections are shown on Figure 5.3. The sequential dredge design will allow the hydraulic dredge to work its way from the Outboard Area into the 100 ft. restricted zone while dredging a path 80 ft. wide or less. Once the dredge width has been completed from the Outboard Area to the sheets, the cap will be constructed, and the dredging and capping operation will move into the next adjacent area. This sequence of dredge and then cap will progress along the restricted area.

The area outboard of the 100-ft. restricted zone will be dredged in coordination with the sequential excavation, but does not have any dredge restrictions. The final sequencing will be determined during construction and will take into consideration the Harbor Brook reconstruction. Flows in Harbor Brook may be diverted around the dredge cut through the new cap area, or may be bypass-pumped around the channel area.

Excavations outboard of both the West Wall and East Wall will require monitoring of the barrier wall as specified in the final design reports for the West Wall and East Wall. As noted in the West Wall design, excavation outboard of the sheet pile wall would start within 20 ft. from the locations of inclinometers and would not be extended farther away from the inclinometers until the monitoring results indicate the wall is stable, as directed by Geosyntec. The excavation in front of the wall would be backfilled immediately if the monitoring results indicate that the performance of the wall is not as predicted. As indicated in the East Wall Design, the excavation in front of the wall will be done sequentially (i.e., a defined area will be dredged and backfilled prior to proceeding to the next defined area). Therefore, the 20-ft. restriction described for the West Wall is not applicable to the East Wall. Additional details regarding the required wall monitoring during implementation of the lake remedy will be provided in the CQAP.

5.3 DREDGING OPERATIONS AND EQUIPMENT

This section provides an overview of anticipated dredging equipment and operations, which have been developed taking into consideration input from the selected dredge contractor (Sevenson Environmental). This section also summarizes the anticipated dredging production rates, interaction with shoreline remediation, emissions monitoring and management, and quality control measures. Details regarding the silt curtains that will be used during dredging are provided in Section 8.

APPENDIX B
FIELD CHANGE FORM

Honeywell

Onondaga Lake
Field Change Form

Field Change Form Number: Click here to enter text.

Originator: Click here to enter text.
Date: Click here to enter a date.

Field Design Change:

Work Element: Click here to enter text.

Construction Manager: Click here to enter text.

Contractor: Click here to enter text.

You are hereby authorized and instructed to complete the following modifications to the approved Final Design:

Approval/Acceptance:

Design Engineer (Parsons): Name: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

Owner (Honeywell): Name: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

Agency Representative (NYSDEC): Name: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

Distribution:
(list recipients here)

APPENDIX C
DMU COMPLETION FORM

Honeywell

Onondaga Lake
Dredge Management Unit (DMU) Completion Form

DMU Completion Form Number: Click here to enter text.
DMU Designation: Click here to enter text.
Originator: Click here to enter text.
Date: Click here to enter a date.

General DMU Information:

Remediation Area (RA): Click here to enter text.

Size of DMU (acres): Click here to enter text.

Date dredging was initiated: Click here to enter a date.

Date dredging was completed: Click here to enter a date.

Comments:

Attachments:

Approval/Acceptance:

Project Engineer (Parsons): Name: ____________________ Signature: ____________________

Date: ____________________ Time: ____________________

CQA Manager (Anchor QEA): Name: ____________________ Signature: ____________________

Date: ____________________ Time: ____________________

Lake Program Manager (Honeywell): Name: ____________________ Signature: ____________________

Date: ____________________ Time: ____________________

Agency Field Representative (NYSDEC): Name: ____________________ Signature: ____________________

Date: ____________________ Time: ____________________

Distribution:
(list recipients here)

APPENDIX D
CMU COMPLETION FORM

Honeywell

Onondaga Lake
Cap Management Unit (CMU) Completion Form

CMU Completion Form Number: Click here to enter text. **Originator:** Click here to enter text.
CMU Designation: Click here to enter text. **Date:** Click here to enter a date.

General CMU Information:

Remediation Area (RA): Click here to enter text.

Size of CMU (acres): Click here to enter text.

Date capping was initiated: Click here to enter a date.

Date capping was completed: Click here to enter a date.

Comments:

Attachments:

Approval/Acceptance:

Project Engineer (Parsons): Name: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

CQA Manager (Anchor QEA): Name: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

Lake Program Manager (Honeywell): Name: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

Agency Field Representative (NYSDEC): Name: ______________________ Signature: ______________________

Date: ______________________ Time: ______________________

Distribution:
(list recipients here)