GE
159 Plastics Avenue
Pittsfield, MA 01201
USA

Transmitted via Overnight Delivery

July 3, 2008

Ms. Susan Svirsky
U.S. Environmental Protection Agency
c/o Weston Solutions
10 Lyman Street
Pittsfield, MA 01201

Re: GE-Pittsfield/Housatonic River Site
Silver Lake Area (GECD600)
Conceptual Removal Design/Removal Action Work Plan for Silver Lake Sediments

Dear Ms. Svirsky:

Enclosed for your review, please find the General Electric Company's *Conceptual Removal Design/ Removal Action Work Plan for Silver Lake Sediments*.

Please call me if you have any questions.

Sincerely,

/for

Andrew T. Silfer, P.E.
GE Project Coordinator

Enclosure
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cc:
Susan Steenstrup, MDEP
Jane Rothchild, MDEP*
Anna Symington, MDEP*
Dean Tagliaferro, USEPA
Holly Inglis, USEPA
Tim Conway, USEPA
Rose Howell, USEPA
Thomas Fredette, USACE
Michael Palermo, Mike Palermo Consulting
Kenneth Munney, USFWS
Dale Young MA EOEA
Nancy Harper, MA AG*
Linda Palmieri, Weston Solutions
Scott Campbell, Weston Solutions
Mayor James Ruberto, City of Pittsfield
Michael Carroll, GE*
Rod McLaren, GE*
Kevin Mooney, GE
Stuart Messur, ARCADIS
Mark Gravelding, ARCADIS
James Bieke, Goodwin Procter
Public Information Repositories
GE Internal Repositories

* *w/o attachment*

ARCADIS
Infrastructure, environment, facilities

General Electric Company

Conceptual Removal Design/ Removal Action Work Plan for Silver Lake Sediments

July 2008

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Conceptual Removal Design/ Removal Action Work Plan for Silver Lake Sediments

Prepared for:

General Electric Company

Prepared by:

ARCADIS

6723 Towpath Road

Syracuse

New York 13214-0066

Tel 315.446.9120

Fax 315.449.0017

Our Ref.:

B0041052.0000.0050

Date:

July 2008

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Appendices

1. Introduction

1.1 General

On October 27, 2000, a Consent Decree (CD) executed in 1999 by the General Electric Company (GE), the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (MDEP), and several other government agencies was entered by the United States District Court for the District of Massachusetts. The CD requires (among other things) the performance of Removal Actions to address polychlorinated biphenyls (PCBs) and other hazardous constituents present in soil, sediment, and groundwater in several Removal Action Areas (RAAs) located in or near Pittsfield, Massachusetts, which are part of the GE-Pittsfield/Housatonic River Site (see Figure 1-1). One of these RAAs is the Silver Lake Area, which includes both the lake itself and certain areas adjacent to the lake. This report addresses the sediments within Silver Lake.

The CD and accompanying *Statement of Work for Removal Actions Outside the River* (SOW) (Blasland, Bouck & Lee, Inc. [BBL], 1999) establish Performance Standards that must be achieved, as well as specific work plans and other documents that must be prepared to support the response actions for each RAA. For most of the Removal Actions, these work plans/documents generally include the following: Pre-Design Investigation Work Plan, Pre-Design Investigation Report, Conceptual Removal Design/Removal Action (RD/RA) Work Plan, and Final RD/RA Work Plan (Final Work Plan). These include the Silver Lake Area Removal Action, which includes removal and capping activities for the sediments within the Lake and remediation of the soils in certain areas on or adjacent to the banks of the Lake. This document constitutes GE's Conceptual RD/RA Work Plan for the Silver Lake sediments.

As set forth in the SOW and subsequent decisions by EPA, the Performance Standards for Silver Lake sediment remediation are briefly summarized below:

- GE shall remove a maximum of 400 in-situ cubic yards (cy) of sediments from an area in the general vicinity of existing outfall 01A, replace the removed sediments, and restore and vegetate that portion of the affected area that is not underwater in coordination with the installation of the sediment cap, and perform natural resource restoration/enhancement activities.

- GE shall install a cap over the entire bottom of the lake to achieve the design standards set forth in Attachment K to the SOW, including an isolation layer consisting of silty sand with a presumptive thickness[1] of 12 inches if geotextile is placed between the sediments and the cap or 14 inches without a geotextile, a total organic carbon (TOC) content of 0.5%, and concentrations of PCBs at non-detectable levels and other constituents at background levels.

- The capping system shall include an overlaying armor layer of stone incorporated along the shoreline as necessary to prevent potential erosion of the isolation layer due to wind-induced wave action.

- GE shall construct a shallow-water shelf along the shorelines of the lake to provide an improved habitat for aquatic species. This shallow-water shelf shall consist of an armoring layer of stone to be placed around the shoreline as part of the capping system. GE shall place a three-inch layer of gravel and sand over the armoring stone to facilitate fish usage on the shelf.

The CD and SOW also require GE to conduct natural resource restoration and enhancement activities at the Silver Lake Area. The Performance Standards for those activities are described below in Section 3.9.

This Conceptual Work Plan proposes the scope of response actions to achieve the Performance Standards for sediments within Silver Lake as set forth in the CD and SOW. As such, the pre-design and proposed RD/RA activities summarized in this report pertain to sediments only. It should be noted that activities relating to Silver Lake bank soils are being or have been addressed in separate submittals to EPA, and that although integration with the remedial actions related to bank soils adjacent to Silver Lake is discussed in this document, the overall scope of Removal Actions with respect to bank soils is not addressed herein. A plan for the combined remedial activities addressing both the bank soils adjacent to and the sediments within Silver Lake will be submitted in a forthcoming document, following EPA's approval of this Conceptual Work Plan, as well as the *Conceptual Removal Design/Removal Action Work Plan for Bank Soils Adjacent to Silver Lake* (Conceptual Work Plan for Soils, submitted to EPA in July 2007) and any addenda or supplements to or

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[1] Pursuant to EPA's letter dated August 17, 2004 conditionally approving GE's *Pre-Design Investigation Report for Silver Lake Sediments* (Sediments PDI Report) (BBL, 2004), the indicated thicknesses were increased by 2 inches from the presumptive thicknesses of 10 inches with geotextile and 12 inches without geotextile specified in the SOW. .

revised/resubmitted versions of that plan. Activities concerning groundwater associated with the Silver Lake Area are being addressed separately as part of the Plant Site 1 Groundwater Management Area (GMA 1) monitoring program.

GE has previously submitted the following documents relating to the sediments within Silver Lake:

- *Pre-Design Investigation Work Plan for the Silver Lake Removal Action Area* (PDI Work Plan), submitted in January 2003 and conditionally approved by EPA in a letter of February 11, 2003;

- *Pre-Design Investigation Report for Silver Lake Sediments* (Sediments PDI Report), initially submitted in February 2004 and conditionally approved by EPA by letter dated August 17, 2004;

- *Supplemental Pre-Design Investigation for Silver Lake Sediments* (Supplemental Sediments PDI), submitted in April 2005 and conditionally approved by EPA in a letter dated May 15, 2005;

- *Bench-Scale Study Work Plan for Silver Lake Sediments* (Bench Scale Work Plan) submitted in January 2005, and conditionally approved by EPA in a letter dated February 25, 2005;

- *Bench-Scale Study Report for Silver Lake Sediments* (Bench Scale Report) submitted in March 2006, conditionally approved by EPA in a letter dated May 2, 2006, revised and resubmitted in May 2006, and approved by EPA as revised in a letter dated June 19, 2006;

- *Pilot Study Work Plan for Silver Lake Sediments* (Pilot Study Work Plan) initially submitted in June 2006, conditionally approved by EPA in a letter dated July 18, 2006; revised and resubmitted in August 2006, and approved by EPA as revised in a letter dated August 30, 2006; and

- *Pilot Study Report for Silver Lake Sediments* (Pilot Study Report) initially submitted in September 2007, conditionally approved by the EPA in a letter dated December 10, 2007; revised and resubmitted in January 2008, and conditionally approved by EPA as revised in a letter dated April 7, 2008.

The above-referenced documents include descriptions of the field investigation and sample collection and analysis activities performed during the investigation of the sediments and related environmental characteristics comprising the Silver Lake Area. This Conceptual Work Plan builds upon the results of these prior activities conducted by GE, and based on the results of the investigations described in the reports listed above, presents: (1) a summary of the results of the pre-design investigation, bench- and field-scale study activities; (2) a proposal for conceptual sediment-related remediation activities, including natural resource restoration and enhancement activities; and (3) a discussion of the proposed construction related and long-term environmental and performance monitoring programs.

1.2 Site Description

Silver Lake is located in Pittsfield, Massachusetts (Figure 1-1). The lake is bordered to the north by Silver Lake Boulevard and to the west and south by several commercial and residential properties. Silver Lake has a surface area of approximately 26 acres and a maximum water depth of approximately 30 feet (Figure 1-2). The lake receives stormwater discharges from several municipal stormwater outfalls, as well as several adjacent residential and commercial/industrial properties. Silver Lake discharges to the East Branch of the Housatonic River through a 48-inch-diameter concrete pipe located in the southwest portion of the lake. This pipe conveys surface water from Silver Lake as well as stormwater runoff from Fenn and East Streets to the Housatonic River.

It should be noted that, at the time of the SOW, it was believed that the recreational areas along the banks on the northern and eastern sides of the lake were publicly owned and/or GE owned. However, as noted by GE in the Conceptual Work Plan for Soils, more recent preliminary information, based on historical research into deed records, indicates that portions of these areas may be in private ownership. These properties are locatedadjacent to Silver Lake Boulevard and Fourth Street. As noted in the Conceptual Work Plan for Soils, GE is investigating these issues further and will provide updated ownership information in future submissions.

Further, as required by EPA's April 7, 2008 Conditional Approval letter associated with the Pilot Study Report, GE has performed supplemental bank and near shore survey activities at additional locations around the banks of the lake. The survey information was collected by Hill Engineers of Pittsfield, MA, and was combined with the existing topographic and bathymetric data to provide additional details in the transition area between the banks and the sediment. Figure 1-2 illustrates the results of these activities.

1.3 Scope and Format of Work Plan

The remainder of this Conceptual Work Plan is presented in four sections. A brief overview of each section is presented below:

Section 2 – Summary of Pre-Design Activities, provides a brief summary of the pre-design investigations conducted by GE related to sediments within the Silver Lake.

Section 3 – Conceptual Design Information, provides a description of the methods and materials proposed for conducting the sediment-related response actions, including construction of the cap and implementation of the natural resource restoration and enhancement activities.

Section 4 – Monitoring Program, provides a description of the environmental and performance monitoring program proposed for implementation during and after performance of the construction activities proposed in this Conceptual Work Plan.

Section 5 – Future Design-Related Activities, summarizes any remaining actions necessary to prepare for remediation activities. In addition, this section discusses the integration of the sediment- and bank soil-related response action, and proposes the contents of a Final Work Plan. As discussed below, to ensure integration of the work regarding soils and sediments in the Silver Lake Area, GE proposes to submit a single Final Work Plan addressing both soils and sediments.

Section 6 – Schedule, discusses future activities and provides a schedule for completion of the response action.

2. Summary of Pre-Design Activities

2.1 General

The CD and SOW require the characterization of sediments within the Silver Lake Area and the collection of other relevant site information prior to submittal of the Conceptual Work Plan for the Silver Lake sediments. These investigative activities, collectively referred to as pre-design activities, serve as the basis for the subsequent technical RD/RA submittals. This section provides a brief description of pre-design investigation activities performed by GE as well as a summary of the entire pre-design program related to Silver Lake sediments. These activities have primarily involved the performance of sediment sampling and analyses, a bench-scale study, and a field-scale pilot study. Such activities have been previously summarized in a number of documents previously submitted to and approved by EPA, as listed in Section 1.1.

In addition, GE has recently conducted other pre-design activities to supplement the sediment characterization program and to support the conceptual design presented herein. These additional activities include the performance of a supplemental detailed bank topographic survey and a further evaluation of outfalls to the lake. A brief summary of pre-design activities is provided below.

2.2 Summary of Pre-Design Activities

2.2.1 Summary of Pre-Design Sediment Investigations

As discussed above, prior investigative activities for the Silver Lake sediments (performed by GE, EPA, and others) have included significant sediment collection and analysis activities, and the performance of bench and field-scale studies. The results of these pre-design investigative activities support the proposed remedial activities for Silver Lake sediments.

2.2.1.1 Pre-design Sediment Sample Collection and Analysis

In 2003, a pre-design investigation (PDI) was performed in and around Silver Lake to support the detailed design of a sediment removal action and sediment cap, and to verify a number of key design parameters and assumptions documented in Attachment K of the SOW (BBL, 1999). As part of these activities, geophysical and chemical analyses were conducted, as well as water budget calculations.

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Geophysical analysis of Silver Lake indicates the sediments are generally characterized by three distinct layers: a surface layer consisting of soft black silt with a sludge-like consistency, an intermediate layer consisting of soft silt and marl of an olive or brown color, and a bottom layer consisting of sand and silt. Generally, the three layers have relatively low strength characteristics for their respective classifications.

Sediment sampling for PCBs has been performed on several occasions in Silver Lake, resulting in the collection of more than 200 samples. In general, the results of these analyses indicate that PCB concentrations are greater in the sub-surface samples than in surface samples and generally greater in the eastern portion of the lake.

Pre-design investigation activities also were performed to evaluate the velocity of groundwater flowing into and out of Silver Lake. To quantify groundwater seepage, groundwater gradient measurements and data from seepage meters and piezometers were evaluated to develop a water budget. The rate of potential groundwater seepage that was estimated using the available data was low and was significantly below the seepage rate assumed in the conceptual design. As a result, to be very conservative, the value assumed in the conceptual design of 2.74 liters per square meter per day ($L/m^2/day$) was selected for use in the design.

A complete discussion of the results of the pre-design investigative activities can be found in the Sediments PDI Report (BBL, 2004).

2.2.2 Summary of Bench-Scale Study Activities

The primary objective of the bench-scale study was to evaluate the physical and chemical responses of Silver Lake sediments to the placement of cap materials. Specific objectives of the bench-scale study included the evaluation of the potential for mixing and consolidation of sediments and cap materials during and after cap placement, the potential for PCB mobility during and after cap placement, and investigation of the potential for groundwater flux or gas-induced PCB transport in sediments and cap materials.

In general, the study consisted of an evaluation of total consolidation of sediments following cap material placement, as well as an investigation of potential PCB transport as a result of cap placement. Performance of the bench-scale study involved the collection and maintenance of sediment cores in Lexan tubes in approximate in-situ conditions. Within each tube, representative cap materials were placed in thin lifts over the native sediments to investigate the potential physical and chemical responses to placement of a cap.

The results of the bench-scale study showed no discernible indication of consolidation-based or gas-enhanced PCB mobility, which led to the following overall conclusions:

- The cap materials and configurations used in the bench-scale study provided an effective physical and chemical barrier in isolating sediment PCBs from the overlying cap materials.

- Study data and analyses did not show a correlation between the presence of either gas generation or TPH and PCB mobility.

- There are no indications that modifications to the conceptual cap design (as described in the SOW) or the approach to the pilot study are warranted.

A detailed discussion of the design, performance, and results of the bench-scale study is presented in the Bench-Scale Report (BBL, 2006).

2.2.3 Summary of Field-Scale Pilot Study Activities

The Pilot Study was designed and performed to confirm the conclusions derived from the bench-scale study and to support the design of response actions necessary to achieve the applicable performance standards for the Silver Lake Sediments. To adequately identify potential constructability issues that might arise during the construction of the full-scale engineered capping system, the Pilot Study was performed on the east shore of the lake, to include areas of relatively steep slopes, sediments that are relatively low in strength, and sediments containing elevated PCB concentrations.

Performance of the Pilot Study included construction of a sediment cap over a continuous one-acre area with three different cap configurations for comparative purposes. Placement of the cap was performed using construction methods anticipated for use in the full-scale construction, and was monitored throughout to investigate potential responses of the sediment to cap placement and to evaluate the relative ability of the sediment to support the weight of the cap.

The Pilot Study led to the following overall conclusions:

- A granular sand cap can be installed in thin lifts over the sediments of Silver Lake with minimal disturbance to the underlying sediments. Observations obtained during construction of the Pilot Study indicated that isolation layer materials could be placed in either 1- or 2-inch lifts, and that a barge-mounted spreader box assembly has the ability to place these lifts sufficiently thin to minimize mixing and avoid deleterious settlement and/or slope failure.

- There is not a significant benefit to cap construction from the use of geosynthetic materials as a capping component.

- Observations of mixing of the sediment and isolation layer materials were minimal, and where observed, were limited to the bottom 0- to 2-inch layer of isolation layer material.

- There did not appear to be any indications of significant movement of the underlying sediments, or failure (e.g., shear, rotational) in those sediments receiving cap materials in thin lifts via the spreader box.

- Based on the available data, it appears that the cap constructed during the Pilot Study provides an effective barrier to the PCBs present in the underlying sediments.

- No observations made or analytical results obtained suggest that modifications to the conceptual cap design are warranted.

A detailed discussion of the design, implementation, and results of the Pilot Study is presented in the Pilot Study Work Plan (ARCADIS BBL, 2007) and the Pilot Study Report (ARCADIS BBL, 2008).

3. Conceptual Design Information

3.1 General

This section presents the general approach and conceptual design information for the proposed remediation activities and discusses Applicable or Relevant and Appropriate Requirements (ARARs) for the remediation and associated actions to be conducted for Silver Lake sediments. In general, the remediation activities for Silver Lake sediments will be implemented in accordance with GE's *Construction Quality Assurance Plan* (CQAP), which is part of GE's *Project Operations Plan* (POP; Latest revision – March 2007). The CQAP contains several technical specifications, which will serve as the basis for the performance of the proposed remedial activities, with appropriate modifications and/or supplements as necessary. Potential sources of backfill, soil cover, and cap material will be identified and characterized in accordance with GE's Soil Cover/Backfill Characterization Plan, which is also part of the POP.

3.2 Identification of ARARs

The remediation and associated activities to be conducted for Silver Lake sediments will be subject to several ARARs. Attachment B to the SOW (BBL, 1999) identifies the chemical-, action-, and location-specific ARARs for the Removal Actions Outside the River. As noted above, the remediation activities for Silver Lake sediments will involve removal of some sediments and placement of a cap over the entire Lake. In addition, certain natural resource restoration/enhancement activities will be conducted. The remediation and restoration activities for Silver Lake sediments will be subject to the following ARARs identified in Attachment B to the SOW, to the extent pertinent to the remediation, restoration, and associated activities to be conducted for Silver Lake sediments:

- The action-specific ARARs identified in Table 2**,** subsection E ("Sediment and Bank Soil Removal at Silver Lake"), subsection F ("Capping of Silver Lake Sediments"), subsection G ("Natural Resource Restoration/Enhancement Activities"), and potentially subsection K ("Other"); and

- The location-specific ARARs identified in Table 3, subsection A ("Rivers, Streams, and Lakes") and subsection B ("Floodplains, Wetlands, and Banks").

Further, to the extent that remediation activities involve the removal and on-site storage (at the GE Plant Area) of free product, intact drums, and/or other materials that will be subsequently disposed of off-site, such storage will be subject to the action-specific ARARs identified in Table 2 of Attachment B, subsection H ("Temporary On-Site Storage of Free

Product, Drums, and Equipment That Will Be Disposed of Off-Site"). Similarly, any remediation activities that may involve the disposal of materials in the Hill 78 On Plant Consolidation Area will be subject to the action-specific ARARs identified in Table 2 of Attachment B, subsection I ("Permanent Consolidation of Non-TSCA Non-RCRA Soils at Hill 78 Consolidation Area").

These ARARs will be considered and incorporated in the final design of the Silver Lake Area Removal Action and associated natural resource restoration/enhancement activities.

3.3 Site Preparation and Controls

Various site preparation activities and site controls and security measures will be implemented during removal and capping operations to limit potential construction impacts on the surrounding areas. These include set-up of appropriate material and equipment staging areas, installation of erosion and stormwater control measures, and establishing site security and traffic control. Each of these is discussed in more detail below.

3.3.1 Staging and Dewatering Areas

Three areas to the north shore of the lake have been identified as suitable for potential use as staging areas to facilitate removal and capping activities: (1) the available space along the north shore of the lake, (2) Silver Lake Boulevard, and (3) a portion of an industrial property north of Silver Lake Boulevard. It is anticipated that these three areas will all be used as staging areas for various activities (e.g., materials staging and preparation, water access, site facilities) during cap construction, subject to GE's ability to obtain permission to access these areas.

During the Pilot Study the strip of land between the lake and Silver Lake Boulevard was used for materials preparation and provided access to the water's edge for delivery of material, machinery, and labor. During cap construction, it is anticipated that, as necessary, a boat launch and/or a temporary bulkhead may be constructed in this area to facilitate the transfer of construction materials and equipment from the shore to construction vessels (i.e., barges, boats).

It is currently anticipated that a portion of Silver Lake Boulevard adjacent to the area described above will be closed to public traffic during construction to allow for one contiguous staging area extending north and east from the lake. GE has preliminarily discussed the closure of Silver Lake Boulevard with the City of Pittsfield. The potential road closure would extend from the intersection of Silver Lake Boulevard and Fourth Street to the approximate location of the proposed PEDA outfall. This proposed area is anticipated to be large enough for the staging of heavy equipment and clean construction materials necessary for the performance of combined removal and capping activities.

Additionally, a portion of property adjacent to Silver Lake Boulevard owned by the Western Massachusetts Electric Company (WMECO) and/or another entity is also being considered for use as a supporting staging area. A portion of this area was used during implementation of the Pilot Study, and, subject to access permission, would likely be used for staging construction equipment and associated support facilities (e.g., trailer, construction worker parking). The proposed staging area locations are depicted on Figure 3-1.

Temporary staging of materials removed from the lake or the adjacent banks is anticipated to be limited to within actual construction areas (e.g., bank removal areas, scrub-shrub island) that will be subject to remediation/restoration, and within GE's Building 65, as discussed in Section 3.5.

3.3.2 Erosion and Sedimentation Controls

3.3.2.1 Erosion Protection

Throughout construction activities, appropriate erosion control measures will be implemented. Erosion controls (e.g., silt fencing, hay bales, catch basin protection) will be installed to limit the potential for the erosion of disturbed areas and/or staged materials and related storm-water runoff. Such erosion and sediment control practices will be in place during construction activities and will remain in place until such time that they are no longer necessary. During construction activities, erosion and sedimentation control devices will be inspected each work day and maintained and/or adjusted as necessary, based on site conditions and site activities.

3.3.2.2 Stormwater Outfalls/Structures

As part of the PDI activities, a comprehensive survey and physical inspection has been conducted of the banks and shoreline of Silver Lake related to the presence of stormwater or other discharge pipes. During this evaluation outfall pipes (e.g., drain tiles, municipal culverts) and structures were mapped and photographed. Additional information related to the presence of pipes, culverts and/or other structures located on the banks of Silver Lake was obtained from previous bank surveys/inspections, recent and historic GE Facility information, and available municipal mapping received from the City of Pittsfield. The locations of such identified outfalls and other structures are shown on Figure 1-2.

For those pipes that are considered active, protective measures (e.g., outfall aprons) will be implemented during capping activities to mitigate the potential erosion of cap materials. The invert elevation of active pipes will be considered prior to armor stone placement, and as necessary, some pipes may be extended to facilitate the flow of discharge water. For any pipes/culverts and/or bank structures that are determined to be inactive or abandoned, removal is proposed. Pipes and bank structures that are determined to no longer be active will either be cut-off and plugged with hydraulic cement, or demolished and removed from the bank. In either event, every location will be removed to such an extent that the terminus of the pipe/structure does not interfere with the successful construction of the cap and armor layer. Table 3-1 summarizes the list of the outfalls that have been identified around the perimeter of the lake, and presents the proposed action for each location. Details associated with the plan for the removal and/or maintenance of specific outfalls will be included in the forthcoming Final Work Plan.

Note that certain outfall locations identified in this Work Plan may also require removal or relocation due to remedial activities associated with the bank soils adjacent to Silver Lake. The description of such potential activities and the coordination of the sediment and bank soil remedial activities will be presented in the Final Work Plan.

3.3.2.3 Turbidity Controls

Prior to the initiation of construction-related activities, turbidity control measures will be installed at or in the vicinity of the Silver Lake outfall to the Housatonic River. Such measures will be installed prior to the initiation of construction-related activities to minimize the potential for transport of solids suspended in the water column from Silver Lake to the Housatonic River. Similar to the control measures utilized during the Pilot Study, full-depth silt curtains will be deployed in the outfall channel such that three curtains are used one behind the other. This design will allow for progressive settling and retention of suspended materials as the water approaches the outfall to the river. In addition, between the first and second curtains a sheetpile rectangular weir, outfitted with stop-logs, will be installed to enhance the ability to maintain the water surface elevation within the lake. Both the silt curtains and weir will be visually inspected on a daily basis and maintained throughout the construction period to maximize their effectiveness. A conceptual layout and cross section of the turbidity control measures to be installed in the outfall are illustrated on Figure 3-2.

As discussed in Section 4, turbidity monitoring will be performed throughout construction activities. If the results of such monitoring indicates the need for modifications to the existing turbidity controls, additional turbidity control measures will be considered for implementation in the channel before the outfall to the Housatonic River. Additionally, the stop-log configuration may be used to temporarily limit flow out of Silver Lake if conditions should indicate such control measures are necessary.

In addition to the control measures to be installed at the outfall channel, full depth silt curtains will be installed within the lake boundaries around all areas associated with the performance of sediment removal or scrub-shrub island restoration activities, as discussed below, to contain solids potentially suspended during these activities.

During all construction activities, any visual observations of sheens will be noted, and appropriate measures (e.g., booms) will be available to contain and recover surface sheens.

3.3.3 Site Security and Traffic Control

Appropriate temporary fencing will be installed to restrict site access and protect monitoring and construction equipment. A visitor sign-in and sign-out protocol will be implemented to monitor all non-worker traffic within the work area, and if necessary, security guards will be retained to monitor the site during non-working hours. In addition traffic control will be provided as necessary, since construction activities may interfere with normal vehicle or pedestrian traffic in the vicinity of the work area.

3.4 Sediment and Debris Removal

As required in the SOW, prior to capping activities, a maximum of 400 cy of sediment in the northeast corner of the lake will be removed. Removal of soil will also be required within the scrub/shrub island area to facilitate cap placement and the prescribed restoration. In addition, previous investigations have indicated the presence of certain debris that must be removed to facilitate cap placement. This section presents a summary of available data to support the removal of certain debris and sediment from Silver Lake, along with a discussion of conceptual methods anticipated to be employed during performance of these removal activities.

3.4.1 Debris Removal

As fully discussed in the Sediments PDI Report, a side-scan sonar survey was conducted within Silver Lake to identify specific features of the lake bottom that may interfere with cap placement. This section presents the results of the side-scan sonar survey, as well as potential methods to be used to remove certain debris.

3.4.1.1 Side-Scan Sonar Survey

A side-scan sonar survey was performed to provide a graphical representation of the debris present on the lake bottom. The mosaic generated as a result of this survey is illustrated on Figure 3-3. A discussion of the side-scan sonar survey is presented in the PDI Report.

As presented on Figure 3-3, a total of 48 submerged targets were identified during the survey. These objects generally consist of several automobiles, discarded tires, woody debris, etc. in varying sizes, as summarized on Table 3-2. Additional features such as pilings and concrete structures have been observed and noted by field personnel during various investigative activities associated with Silver Lake and/or by divers utilized during performance of the Pilot Study. The locations of these additional debris areas (e.g., pilings, flumes) are also illustrated on Figure 3-3, and included on Table 3-2.

Certain targets could potentially interfere with construction activities, and/or the performance of the cap and these objects are proposed for removal as presented in Table 3-2. With the exception of pilings, debris that appear to protrude more than 1 foot in height above the sediment surface, as identified by the side-scan sonar, will be removed. In addition, certain submerged pilings that could potentially interfere with the mobility of barges and/or water-borne construction equipment will also be removed. Presently, a total of 9 side-scan sonar targets, as well as approximately three areas of piling clusters (see Figure 3-3 and Table 3-2) have been identified for removal.

3.4.1.2 Methods

At this time, it is anticipated that a barge-mounted crane, equipped with a clamshell bucket will be used to remove debris from the majority of the locations identified on Figure 3-3. However, certain larger items, such as automobiles, may require a grapple to facilitate removal. As necessary, larger items (i.e., automobiles) may, with the assistance of divers, be floated to the surface and guided to the shore for removal. Details related to the performance of debris removal will be determined in consultation with the selected remediation contractor.

Following any initial gravity dewatering within the work area, it is anticipated that removed materials will be transported in lined trucks to Building 65, for stockpiling and appropriate management (e.g., dewatering, cutting into smaller size). As discussed in Section 3.1.3, while staged, materials removed from the lake will be placed on and covered with polyethylene sheeting. Any water collected at the staging areas will be tankered and transported to Building 64G for treatment and discharge. To the extent practicable, samples will be collected from the debris for appropriate waste characterization prior to transportation for off-site disposal.

3.4.2 Sediment Removal

As discussed above, the SOW calls for the removal of certain sediments with elevated concentrations of PCBs. This section presents a summary of available data to support the proposed sediment removal, as well as the methods anticipated to be used during performance of the removal activities.

3.4.2.1 Sediment Data

Sediment sampling for PCBs has been performed on several occasions in Silver Lake, resulting in the collection of more than 200 samples. Sediment sampling efforts in 1992 identified a location with some of the highest PCB levels in surface sediments (top foot) in the northeast corner of Silver Lake. Performance standards detailed in the SOW require delineation and removal of a maximum of 400 in-situ cy of Silver Lake sediment from an area in the general vicinity of existing Outfall 01A to address the presence of elevated PCBs (BBL, 1999).

Sediment sampling was performed in 2003 to better define the vertical and horizontal extent of PCBs in this area, to assist in determining the limits of sediment removal. Sediment sampling were conducted at seven locations around the perimeter of location N02(92) and from the location itself (see Figure 3-4). Samples were collected from the 0- to 1 and 1- to 3-foot depth increment at each location and analyzed for PCBs. Additional details on the PDI are included in the Sediments PDI Report.

A summary of the sediment PCB data collected in the northeast corner of the lake is presented on Figure 3-4. Based on this information, and consistent with the preliminary removal areas discussed in the SOW, a conceptual removal area has been selected as illustrated on Figure 3-4. Consistent with the area proposed in the EPA-approved Sediments PDI Report, sediments within this area will be removed to a depth of approximately 3 feet in order to achieve the removal of the 400 cy of sediment discussed in the SOW.

3.4.2.2 Methods

It is anticipated that the sediment removal approach will involve mechanical removal "in the wet" from shore using conventional equipment (e.g. long reach excavator with clam-shell). However, the actual removal methods may be modified in consultation with the selected remediation contractor.

Sediment materials subject to excavation have been identified as containing PCBs in excess of 50 ppm. Therefore, these materials will be excavated, handled, and disposed of in accordance with the Toxic Substances Control Act (TSCA).

To the extent practicable, excavated materials will be direct loaded into lined vehicles for transport to Building 65 for temporary staging. However, it is anticipated that certain removed materials may require dewatering before transport. Any excavated materials that may not be direct loaded, will be gravity dewatered within the work area to allow for the drainage of free liquids. If necessary, drying agents (e.g., Portland cement dust, lime-kiln dust, or other inert materials) will be added to the removed materials for off-site transport. Following sufficient dewatering and/or stabilization, excavated materials will be transported to Building 65 for further dewatering, if necessary, and storage. Materials that have been staged and prepared for transport to Building 65 will be loaded into lined over-the-road vehicles for transport to an approved off-site disposal facility.

Following completion of removal activities, clean granular backfill (e.g., silts and sands) will be placed over the excavated area such that the lake bottom is restored to the approximate pre-removal elevation. As discussed further in Section 3.7, the entire lake bottom (including this removal area) will be covered with a continuous cap following completion of removal activities.

3.4.2.3 Verification of Removal

Sediment will be removed from an area illustrated on Figure 3-4 to a maximum depth of 3 feet, resulting in the removal of approximately 400 in-situ cy of sediment. In consultation with EPA, removal volume verification will be measured in the adjacent temporary staging area as sediments are removed from Silver Lake.

3.4.3 Shrub-Scrub Island Removal

This section presents a summary of the Performance Standards applicable to the Scrub-Shrub Island area, the available information to support the soil removal and capping activities in this area, and anticipated methods to be used to remove the targeted soil.

3.4.3.1 Removal Extent

A sediment "island," which consists of two peninsulas a total of approximately 30 yards wide, is located in the northeastern corner of the lake, as shown on Figure 3-5. SOW Performance Standards for this area require capping as described in Section 3.7 below as well as planting of appropriate wetlands vegetative species on the surface of the cap following installation. , Similar to the sub-aqueous cap to be placed over the sediments, the cap placed within this area will be approximately 14 inches thick. As required in the SOW, following cap placement, an additional eight inches of topsoil will be placed over the top of this capped area for a total thickness of 22 inches, as shown (not to scale) on Figure 3-6. The finished surface will be graded such that the top of the island remains approximately one foot above the mean water surface elevation (i.e., 975.9 ft). To accommodate the placement of cap and topsoil materials in the shrub-scrub area, existing materials in this area will be removed to an elevation of 975.1 ft (approximately 10 inches below the mean water surface elevation).

The scrub/shrub island is separated into two peninsulas split by a channel conveying discharge waters from Outfall 01A. The SOW discusses capping the entire shrub-scrub "island" area such that the area is transformed into one contiguous peninsula, and required GE to evaluate extending the existing discharge pipe so that the discharge occurs outside the "island" area. GE has considered extending the discharge pipe. In light of the relative elevations and hydraulic gradients, however, GE believes that extending the outfall pipe would not be advisable. Specifically, because of the large diameter (48 inches) and existing invert elevation (977.1 ft) of the outfall pipe, extending the discharge through the center of the "island" area would create a "mounded" area well above the anticipated finished grade of the scrub-shrub area. Additionally, previous investigations in this area indicate that the soft sediment in this area would not likely be able to support the overburden associated with such a large outfall pipe, which may lead to increased consolidation in this area and/or pipe failure. In addition, filling in the gap between the two peninsulas would raise issues concerning flood storage compensation. Therefore, during restoration of this area, GE proposes to restore the current channel between the two existing peninsulas, maintaining the opportunity for periodic natural flooding of this area to enhance the anticipated biologic communities. As with the remainder of the scrub-shrub island, the existing channel will be excavated to sufficient elevations to facilitate cap and armor stone placement within the channel to restore the channel to existing grades and maintain conveyance of discharge from Outfall 01A.

3.4.3.2 Methods

Due to the proximity of the shrub-scrub "island" to the sediment removal area discussed above, removal activities for the two areas will likely be coordinated and conducted at the same time. It is anticipated that the general removal approach will involve mechanical excavation from shore using conventional equipment.

Following removal and capping activities, GE shall place eight inches of topsoil over the top of the capped area such that the top of the island remains approximately one foot above mean water surface elevation (i.e., 976.9 ft). As described in further detail below in Section 3.9, GE shall then plant appropriate vegetative species at the spacing and planting density indicated in the SOW.

3.5 Sediment Capping

Following the completion of the removal activities described above, a sediment cap will be placed over the entire lake bottom. This section describes the composition of the cap as well as the conceptual activities associated with the construction methods anticipated to be employed during implementation.

3.5.1 Cap Composition

As prescribed in the SOW and revised by EPA's August 17, 2004 conditional approval letter for the Sediments PDI Report, the sediment cap will consist of a 14-inch thick cover. This cap will be composed of three layers: a 2-inch "mixing" zone, a 6-inch isolation layer, and a 6-inch bioturbation zone, as shown on Figure 3-7. The cap material will consist of granular materials with a minimum total organic carbon (TOC) of 0.5% in the isolation layer, as prescribed in the SOW.

3.5.2 Sand and Total Organic Carbon Source

During performance of the Pilot Study, a blended topsoil was ultimately selected as the granular cap material. As confirmed by pre-placement sample collection and analysis, the blended topsoil used in that Pilot Study had TOC levels of approximately 1.0%. As described in the Pilot Study, the blended topsoil, is a well-graded silty sand, that comes from the supplier relatively free of trash, woody-debris, or other obstructions that may create potential difficulties during placement. Materials specifications associated with the blended topsoil used during performance of the Pilot Study are included with this document as Appendix A. GE anticipates using a similar material in the construction of the full scale cap.

During performance of the Pilot Study, the cap was installed in a series of thin (i.e., 1- to 2-inch) lifts. This method of placement was successful in minimizing the mixing of the cap and underlying sediments and enabled placement of the weight associated with the cap over an extended period of time. Prior to and throughout placement activities, the cap materials will be sampled for pre-characterization and approval for use in the lake. Specifically, dry cap materials will be sampled at an approximate frequency of one sample per 500 cubic yards (cy) for analysis of TOC content, one sample per 2,000 cy for analysis of PCBs, and one sample per 5,000 cy for analysis of Appendix IX + 3. Analytical results will be presented to EPA for pre-approval for use in the dry cap materials mix.

As further discussed in Section 4, cap material sample collection is anticipated to be performed after the first 4- to 6-inches of cap material has been placed. At that time, samples of the isolation layer will be collected and submitted for analysis of TOC content. If laboratory results indicate that the TOC content is not meeting the required minimum standard, GE will consider the addition of supplemental materials to the dry cap material mix to enhance the TOC content of the remaining portion of the isolation layer. It is anticipated that topsoil (naturally rich in organic content) could be added as a supplemental material. As an alternative, GE may consider the use of an engineered material (e.g., organo-clay) that, aside from providing sufficient TOC, would be similar to coarse granular materials, falling rapidly through the water column for deposition with each lift. GE will discuss any such modifications with EPA prior to implementation.

3.5.3 Use of Geotextile

One particular objective of the Pilot Study was an evaluation of the effectiveness of incorporating geotextile materials into the cap design to enhance the integrity and stability of the cap. Based on a review of the visual, geotechnical, and analytical data collected both during and following cap placement, the use of geosynthetic materials leads to little apparent difference in the integrity or stability of the cap. Further, as fully discussed in the Pilot Study Report, installation of geotextile layers prior to cap placement proved relatively difficult to accomplish. Based on these results, a geotextile layer will not be included in the final remedial design related to capping the Silver Lake sediments.

3.5.4 Cap Placement Method

In general, cap materials are anticipated to be slurried and placed in thin lifts by broadcasting materials to the water surface, as described below. It is anticipated that each lift would be placed across the entire lake bottom and allowed to settle to the sediment surface before successive lifts are added thus minimizing the potential for bottom disturbance.

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3.5.4.1 Open Water Areas

Similar to the approach used in the Pilot Study, it is anticipated that a slurry of cap materials will be broadcast to the water surface over the vast majority of Silver Lake. Dry cap materials will be staged and mixed, if necessary, onsite in the staging areas discussed above. Once prepared and approved for placement, dry cap materials will be placed into a slurry with water drawn from the lake and conveyed to a barge via a reverse dredge head and a flexible pipeline. From the barge, the slurry will be broadcast to the water surface via a barge-mounted spreader assembly (spreader box) similar to the one fabricated for the Pilot Study. Upon entering the spreader assembly, the cap material slurry will move through a perforated diffuser pipe across the top of the spreader box. The spreader box and diffuser pipe will be designed to optimally dissipate the energy potentially associated with the pressurized flow.

To minimize the potential for disturbance of underlying sediment during placement of the cap, the cap materials will be placed in thin lifts by broadcasting a slurry of uniform consistency to the water surface to achieve a lift thickness of approximately 1-inch. As in the Pilot Study, and in consultation with EPA, after the first 8-inches of the cap have been installed it is anticipated that the rate of cap material delivery will be modified such that the remainder of the cap will be placed in approximate 2-inch lifts.

It is anticipated that a system of anchor and travel cables will be used to move the barge across Silver Lake. The barge will be pulled along the cable at the desired speed to maintain relatively constant distribution during each pass. Upon completion of a pass, the travel cable would then be moved, the barge turned around, and the process repeated (in the opposite direction) in an immediately adjacent path. In this way, the spreader box would progress across the lake until one complete lift has been placed over the lake bottom, at which time the barge will be returned to the starting point to begin a subsequent lift. A conceptual barge and spreader box layout is illustrated on Figure 3-8.

Note that final design considerations related to the actual spreader assembly and conveyance of slurried materials will be made in consultation with the selected remedial contractor. Similarly, methods of propulsion and control of the barge will be determined in consultation with the selected contractor, and may be modified from the conceptual approach described herein.

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3.5.4.2 Near Shore Areas

As discussed above, the majority of the Silver Lake sediment cap is anticipated to be broadcast in a slurry to the water surface via a barge mounted spreader box. However, alternative methods may be necessary in certain near shore areas due to shallow water depths. Two alternative placement methods will be considered. One technique would be, slurry placement by using a diffuser pipe mounted on the side of the barge which would extend from the side of the barge towards shore and over the shallow areas, broadcasting the slurry to the water surface adjacent to or in front of the barge. Alternatively, a rotatable broadcast nozzle could be mounted on the end of the barge, spraying the slurry to the water surface in a sweeping arc. Any such slurry conveyance performed in this manner would be operated only while needed in near shore areas.

Another potential method for placement of the cap over shallow water near-shore areas is to place dry isolation layer material mechanically using an on-shore excavator. In this instance, the excavator will access the near shore area from an adjacent parcel, and will place dry materials that are staged in a nearby dump truck. The excavator operator will lower the bucket to near the water surface, and will slowly tip the bucket to place thin lifts, feathered along the extent of the bucket arm’s reach. Based on observations during the Pilot Study, it is important to monitor the rate at which the dry materials are placed and to ensure that sufficient control and supervision are utilized to maintain the ability to place cap materials in thin lifts.

As previously discussed, this Work Plan presents the anticipated methods for cap placement. Final determination of the selected methods will be made in consultation with the selected remedial contractor. Significant departure from the methods presented in this Work Plan or any final design documents will be discussed with EPA prior to implementation.

3.6 Shoreline Armoring

As prescribed in the SOW, to maintain the integrity of the installed sediment cap and protect the cap from naturally occurring erosive forces, the cap design includes location-specific shoreline erosion protection measures that will be installed around the perimeter of the lake. This section describes the proposed methods to place armor stone in specific locations around the shoreline of Silver Lake, and to create an underwater gravel habitat layer.

3.6.1 Bank Grading and Preparation

Prior to construction of the shoreline protection system, the bank area will be cleared of vegetation, and soil removal, as necessary for armor stone placement, will be completed. At this time, similar to the Pilot Study, it is not anticipated to be necessary to remove sub-surface vegetation (i.e., roots and stumps) that do not interfere with armor stone placement. Any removed materials or cleared vegetation will be handled in accordance with appropriate material removal procedures discussed in Section 3.6.

It is anticipated that certain activities described in the Conceptual Work Plan for Soils may overlap with the installation of the shoreline armoring system described in this section. The Conceptual Work Plan for Bank Soils indicates that certain areas of the banks around the lake will require material removal to meet applicable Performance Standards. Included in these proposed removal areas are certain areas immediately adjacent to the approximate mean water surface elevation. In these instances, it is anticipated that bank soil removal activities will be completed prior to armor stone installation. In those areas where armor stone placement coincides with proposed removal related to the Bank Soils Area, backfill of the removal area would be completed to location specific grades, such that the ensuing placement of the cap and armor stone layers would return each area to its pre-existing elevations.

As discussed in a March 19, 2007 letter associated with performance of soil removal associated with the Pilot Study, stained materials were encountered during excavation activities. Similar staining has been observed at several locations around the perimeter of the lake during the performance of bank soil investigations. In performing soil removal, appropriate control measures (e.g., booms, sorbent pads) will be implemented. Should NAPL or other free petroleum based products be observed, GE will discuss with EPA appropriate measures to be implemented on a location-specific basis.

Completion of the removal/restoration activities related to the bank soils and activities associated with armor stone placement will be performed such that there is no net loss of floodplain storage. Complete discussion of the performance of the combined bank soils and sediment remediation activities will be presented in a forthcoming Final Work Plan.

3.6.2 Geotextile Layer

Following removal activities described above, a geotextile layer will be installed prior to armor stone placement. As in the Pilot Study, a woven geotextile will be anchored to shore and placed over the extent of the area to be armored to enhance slope stability and provide a suitable surface for armor stone installation, as well as to act as a filter material between the armor layer and the underlying cap materials. An illustration of the armor system is detailed in Figure 3-9.

3.6.3 Armor Stone Layer

At this time it is anticipated that the armor layer will be implemented using conventional equipment (e.g., excavator) located on the shore. The armor stone will be placed over the woven geotextile, as described above. A cross-section of the proposed armoring configuration is illustrated on Figure 3-9. The stone size, layer thickness, and placement extent of the armor stone layer will be based on previous design information presented in the Sediments PDI Report and the SOW.

The armor layer has been designed using the United States Army Corps of Engineers (USACE) Shore Protection Manual (SPM; USACE, 1984) and the United States Department of Agriculture (USDA) Technical Release No. 69 (TR 69; USDA 1983). As described in the Sediments PDI Report, the predominant cause of erosion in Silver Lake is wind-driven wave action. Therefore, the armor system has been designed and will be constructed so as to protect the cap, above and below the mean water surface elevation, from potential erosion caused by wind driven waves. Complete material specifications for anticipated components of the armor system are included in Appendix A.

Using the design references listed above, the armor system has been conservatively designed to protect the cap from wind-driven waves associated with a 100-year wind event. Note that because predominant winds on Silver Lake are from the west/northwest, two armor layer design dimensions have been prepared; one for areas subject to the predominant winds (i.e., the east and south shore) and a separate design for the areas that do not face the predominant winds (i.e., the west and north shore). Figure 3-10 illustrates the conceptual layout of the two armor stone configurations.

The armor stone layer for the eastern and southern shore will be similar to that of the Pilot Study, and will consist of a 12-inch thick layer of well-graded rip rap, with a median diameter (i.e., D_{50}) of 5- to 6-inches. However, on the western and northern shore where there is less wind-driven wave action, smaller stone will be required. To determine the armor stone layer design specifications for the western shore of Silver Lake, the wind data analysis focused on the fastest mile wind speeds from 100-year return period storms for the easterly wind data, thereby assuming worst case scenarios. Specifically, the maximum fastest mile easterly wind speed of 37 miles per hour (mph), as projected for the Albany airport, was selected for use in design calculations for the armor layer on the western shore. The armor stone design for the western shore will consist of a 6-inch thick layer of graded rip rap, with a D_{50} of 3- to 4-inches. For all design considerations, stone placement is anticipated to proceed from the lake toward the land portion so that each subsequent armor stone placed at higher elevations are supported by those placed below. Complete material specifications for anticipated components of the armor system are included in Appendix A.

The mean water surface elevation at Silver Lake is 975.9 feet. Based on the specific design required for a given location, the armor layer will be constructed to extend between certain elevations above and below this mean water surface elevation. For the eastern shore, armor stone shall be placed approximately 2-feet above and below the mean surface (i.e., between 977.9 and 973.9). For the western shore, armor stone shall be placed approximately 1-foot above and below the mean water surface (i.e., between 978.9 and 974.9). A complete description of the armor system design process and related calculations is included in Appendix B.

3.6.4 Gravel Habitat Layer

A gravel habitat layer will be placed over the underwater extent of the armor stone as described in the SOW. Per the SOW, a 3-inch layer of gravel and sand will be placed over the armoring stone to facilitate fish usage in shallow-water areas. The 3-inch layer will consist of processed sand and gravel with a material diameter of 3 inches or less, and will be placed from shore via conventional equipment (i.e. an excavator bucket).

3.7 Natural Resource Restoration/Enhancement Activities

In addition to sediment remediation to meet the specified Performance Standards, the CD and SOW require implementation of a number of natural resource restoration/enhancement activities in and around Silver Lake. These are described in detail in Attachment I to the SOW, as modified by the Eighth Modification of Consent Decree approved by the Court on June 23, 2008. The Performance Standards for natural resource restoration and enhancement generally require the following:

- Creation of a shallow-water shelf along the shorelines of the lake to provide an improved habitat for aquatic species, with this shelf to consist of a stone armoring layer with a three-inch layer of gravel and sand over the armoring stone to facilitate fish usage;

- Funding of activities in the amount of $75,000 to be performed by the Natural Resource Trustees for restoration work related to fish removal in Silver Lake;

- Capping the scrub-shrub "island" or peninsulas near the discharge outfall and, following installation of the cap, planting of appropriate wetlands vegetative species on the surface of the cap;

- Planting of a line of trees along the recreational portions of the eastern and northern banks (non-privately owned areas), approximately 8 feet apart, with an understory community of shrubs in patches approximately 50 feet apart, and planting of herbaceous species on the remaining banks where response actions are conducted; and

- Construction of a walking path along the eastern and northern sides of the lake (non-privately owned areas) and two picnic areas on these sides of the lake.

GE will undertake (or has undertaken) the following measures to satisfy these Performance Standards:

Shallow-Water Shoreline Shelf

As discussed in Section 3.8.4, a 3-inch layer of gravel and sand will be placed over the armor stone in near-shore areas to create a shallow-water shelf to facilitate fish usage.

Payment to Natural Resource Trustees

GE has previously paid the required $75,000 to the Natural Resource Trustees.

Scrub-Shrub Island

As discussed in Section 3.6.3, following the removal and capping activities, eight inches of topsoil will be placed over the scrub-shrub island, and the soil will be graded such that the top of the island remains approximately one foot above the mean water surface elevation (i.e., 976.9 ft). When the island is appropriately graded, the appropriate wetlands vegetative species will be planted to increase the diversity of the plant community on the island, as well as the wildlife usage.

At this time it is anticipated that the current channel between the two existing peninsulas will be maintained to preserve the existing natural habitat of the scrub-shrub area. The center of each peninsula will be planted with a mixture of red-osier dogwood and buttonbush on four-foot centers to allow for the development of cover for shore birds and waterfowl. The red-osier dogwood will be planted more toward the drier area of the island (i.e., area with higher elevation, likely toward the center), while the buttonbush will be planted towards the edges of the island (i.e., the more wet areas). These shrubs will be approximately two to three feet in size (subject to commercial availability) and will be container grown.

To form an understory for the planted shrubs, a wetlands mixture of herbaceous species will be planted in the section of the “island” on which the shrubs are planted. The mixture will likely include species such as Canada manna grass, fringed sedge, bearded sedge, lurid sedge, joe-pye-weed, green bulrush, hop sedge, boneset, woolgrass, chufa, blue vervian, and red-top panic grass, but will be subject to commercial availability. The wetlands mixture of herbaceous species will be seeded at a rate of one pound per 2,500 square feet.

Above the armoring layer, the periphery of the island will be planted with an emergent mixture of soft-stem bulrush, cattail, soft rush, and blue-flag iris. These species will be two-inch peat pot plants, and will be installed on two-foot centers.

Walking Path and Picnic Areas

Following the performance of bank soil removal activities and the associated restoration of the banks, a walking path will be built around the eastern and northern sides of the lake, as shown on Figure 3-11, in publicly owned and GE-owned areas and, subject to obtaining access permission, in the areas owned by private parties other than GE. The walking path is anticipated to be approximately 5 feet wide, and will have a final cover of crushed stone. To the extent practicable, the walking path will be smooth graded, and will generally follow the path and elevation of the adjacent Silver Lake Boulevard. In certain areas, cut and fill activities may be necessary to construct a stable bank and provide sufficient space for the walking path between the top of bank and Silver Lake Boulevard, in these instances, these removal/fill activities would be performed in conjunction with any co-located or adjacent bank soil removal activities required for installation of the cap and/or to meet the relevant Performance Standards for the bank soils.

In addition, GE is planning to construct two picnic areas on the northern and eastern sides of the lake. Each picnic area will include 3 wooden picnic tables, and will be located where there is adequate room for placement along the walking path. As illustrated on Figure 3-11, these picnic areas are anticipated to be constructed adjacent to the lake near the intersection of Silver Lake Boulevard and Fourth Street (subject to obtaining access permission from the private non-GE owner of the bank in this area) and near the intersection of Silver Lake Boulevard and East Street (on land owned by GE).

Bank Plantings

GE will plant trees and shrubs along the eastern and northern sides of the lake as required by Attachment I to the SOW (subject to obtaining the necessary access permission in private non-GE-owned areas), and will plant herbaceous species on the remaining banks where remediation is conducted.

General

In addition to the information presented above, further implementation details on these natural resource restoration/enhancement measures will be provided in the Final RD/RA Work Plan addressing both sediments and soils.

4. Monitoring Program

4.1 General

This section presents the proposed construction and long-term monitoring activities to be performed before, during and/or after construction activities. A summary and general schedule for the performance and duration of the various components of the monitoring program is included in Figure 4-1. All sample collection, processing, and analyses described herein will be performed in a manner consistent with the requirements of the *Field Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP; BBL 2002b).

4.2 Pre-Construction Monitoring

This section presents site assessment or monitoring activities to be completed prior to the initiation of RD/RA construction.

4.2.1 Pre-Placement Total Organic Carbon Analysis

As discussed in Section 3, the cap material is anticipated to be comprised of blended sand and topsoil available from local suppliers. Similar to the materials used during the Pilot Study, the blended topsoil will have a target TOC of 1.0%; approximately twice the minimum TOC of 0.5% required by the SOW. It is anticipated that during placement activities, the dry cap materials will be sampled at the supplier's stockpile for pre-characterization prior to mobilization to the site. The dry cap materials will be sampled approximately one sample per 500 cubic yards (cy) for analysis of TOC content, one sample per 2,000 cy for analysis of PCBs, and one sample per 5,000 cy for analysis of Appendix IX + 3 If any of the related results indicate that the candidate cap materials are not appropriate for use in the lake (e.g., insufficient TOC, PCB detections), the stockpiled materials will be set aside and not used in the lake until further determinations can be made in consultation with EPA.

4.2.2 Water Quality Monitoring

Since June 2006, water quality samples have been collected at the outfall to the Housatonic River for analysis of PCBs and total suspended solids (TSS) as part of GE's Housatonic River monthly water column monitoring program. It is anticipated that this program will continue for the foreseeable future. These data will be used to provide baseline information for comparison to similar samples collected during construction activities (as discussed below).

Real-time measurements of lake water turbidity will be initiated starting two weeks prior to initiation of construction activities to provide baseline information for comparison to similar data collected during construction. As part of this monitoring program, continuous turbidity measurements will be recorded at two locations; one location upstream of the proposed turbidity control system (MON-1), and an interim location within the proposed turbidity control system (MON-2), as shown on Figure 4-2. Continuous turbidity measurements will be made and recorded using a turbidity probe and submersible battery powered data logger suspended at the approximate mid-depth elevation.

4.3 During-Construction Monitoring

Monitoring performed during construction activities will allow for assessment of any construction related impacts to water column conditions within the lake water, ongoing evaluation of the overall interim cap thickness, and adjustment to the soil cap construction process to ensure that the constructed cap meets design requirements.

4.3.1 Water Quality Monitoring

4.3.1.1 Water Column Sample Collection

Water column monitoring performed during the Pilot Study indicated that during capping activities, PCB concentrations in the water column decreased to levels that were lower than the lake's pre-capping baseline concentrations. During the implementation of the full-scale cap, weekly water samples will be collected from MON-2 (near the outfall to the Housatonic River, Figure 4-2) for analysis of PCBs and TSS. Analytical results from these during-construction samples will be compared to pre-construction data to provide information on changes that may be occurring in the lake water as a result of construction activities.

4.3.1.2 Turbidity Monitoring

As with the pre-construction turbidity monitoring, real-time measurements of lake water turbidity during construction activities will be evaluated to assess the effectiveness of the turbidity control system located at the outfall.

Continuous turbidity measurements will be made and recorded using the same method described above for the pre-construction turbidity monitoring program. During construction activities, the continuous turbidity readings will be reviewed and evaluated at least once per day. Continuous turbidity readings at the outfall, recorded downstream of the turbidity controls implemented during performance of the Pilot Study, were generally below 30 to 35 nephelometric turbidity units (NTUs), and exceeded 50 NTUs on very few occasions.

During performance of the construction activities described in this Work Plan, should data recorded at MON-2 indicate turbidity levels greater than 50 NTUs, GE will evaluate the changes in the turbidity data, inspect the turbidity control measures installed at the outfall (discussed in Section 3.5), and, in consultation with EPA, consider modifications to the cap placement procedures and associated turbidity controls.

Note that during the Pilot Study, water column samples were collected for PCB and TSS analysis if and when turbidity levels near the outfall exceeded 50 NTUs. In general, the results of these analyses showed that although TSS levels increased with turbidity, there was no correlation between elevated turbidity and increases in surface water PCB concentrations. Further, the PCB levels in surface water samples collected during construction were generally less than those associated with pre-construction data.

4.3.2 Cap Uniformity and Thickness Monitoring

During cap placement activities, an interim assessment of the characteristics and composition of the isolation layer will be made to evaluate interim overall cap thickness. The results of the during-construction sample collection will provide a comparison and assessment of any potential changes in the chemical characteristics of the isolation layer since placement, and will be available for comparison to similar post-construction analysis. Several assessment methods were utilized during implementation of the Pilot Study, and based on the effectiveness and applicability of the respective techniques, a refined approach, including core collection, is proposed for performance during implementation of the Silver Lake sediment cap.

4.3.2.1 Sediment Collection Pans

During placement of the capping material, sediment collection pans will be deployed by the Contractor on a daily basis to provide a field check of individual lift thickness. The pans (approximately 2-ft square) will be placed on the sediment surface directly in the path of the placement barge. As such the pans will provide a reasonable representation of the cap material as it is deposited on the lake bottom. Similar collection pans were used during the Pilot Study and provided insight into the approximate thickness of each lift being placed. Initially, the collection pans will be collected on a daily basis and the accumulated thickness measured to provide a direct indication of lift thickness. Once the daily assessment of the collection pans indicates that cap materials are being placed relatively uniformly and at the anticipated thickness, in consultation with EPA, the frequency of sediment trap collection will be reduced or use of the traps may be discontinued.

4.3.2.2 Cap Materials Core Collection

During-construction cores of the cap material will be collected after approximately 5- to 6-inches of cap material have been placed. Representative cores will be collected by physically pushing 3-inch Lexan tubes to the apparent bottom of the cap and just into the native sediment such that sediment and cap materials are recovered at the same time. Cores will be collected at a total of 10 proposed locations, as shown on Figure 4-2. In general, the proposed collection locations have been selected to include areas of the lake that encompass various conditions related to water depth and side slope conditions. Note that all sample collection locations may be adjusted based on field conditions. In the event that significant departure from the proposed locations is necessary, GE will discuss such modifications with EPA.

Care will be taken to minimize material disturbance and/or loss during sediment and cap material collection activities. Although GE has collected many sediment cores from within Silver Lake, and will continue to employ the collection methods and practices as fully described in the Field Sampling Plan/Quality Assurance Project Plan (BBL, revised 2002), GE recognizes that the granular, less-cohesive nature of the saturated cap materials may possibly cause difficulties with standard sediment core collection techniques. As necessary, alternative methods of core collection or divers may be employed to facilitate core collection if conventional direct-push collection from the surface is infeasible. Should the need arise to use any modified collection procedures GE will discuss these modifications with EPA prior to implementation.

Recovered materials will also be measured for approximate recovery lengths to assess the interim overall cap thickness.

Following these visual assessments, during-construction cores will be processed by sectioning each core into two specific layers: the approximately 0- to 2-inch layer as measured relative to the apparent interface between the cap material and the underlying sediments, and the remaining materials (i.e., 2-inch to top of core), which represent the isolation layer. From each core, a bulk sample will be taken from the isolation layer materials (the 2-inch to top of core interval) and submitted for analysis of TOC, as illustrated on Figure 4-3. If the result of the TOC analysis indicates levels below 0.5% in any of the isolation layer materials, GE will consider modifications of the cap materials application method or the addition of supplemental materials to enhance the TOC content in the isolation layer. Any such modifications will be discussed with EPA prior to implementation.

4.4 Post-Construction Monitoring

Following the completion of cap placement activities, the monitoring program will include the collection of field data to confirm the post-construction success of the completed RD/RA construction.

4.4.1 Cap Uniformity and Thickness Monitoring

Similar to during-construction monitoring activities, a sediment coring program will be implemented to assess the characteristics and composition of the isolation layer to assess the thickness and homogeneity of the cap.

To avoid locations that may have been previously sampled, cap cores collected after construction will be located approximately 5-feet to the south of those collected during construction. Note that all sample collection locations may be adjusted based on field conditions; however, GE will discuss any significant departure from the proposed locations, with EPA. Once recovered, cores will be measured to verify the composite cap thickness of 14-inches.

4.4.2 Post-Placement Chemical Analysis

Cores of the cap material and underlying sediment will be collected post-construction, as discussed in Section 4.4.1 above. Based on the method utilized in the Pilot Study, cores will be processed by sectioning each core into layers as measured relative to the apparent interface between the cap material and the underlying sediment layer. Collected cores will be sectioned into three intervals, as measured relative to the apparent interface between the cap and the underlying sediment. These three intervals are the approximate 0- to 2-inch mixing zone, the top one inch (nominally the 13- to 14-inch increment, as measured up from the bottom of the isolation layer) (TOP layer), and the remaining materials (nominally the 2- to 13-inch increment) (REM layer), as illustrated on Figure 4-3. Processed samples from the REM layer from each of the ten locations will be analyzed for TOC, and samples from the TOP layer from each of the ten locations will be analyzed for TOC and PCBs. The results of the analytical testing from the TOP interval post-construction cores will provide a comparison and assessment of any potential changes in the chemical characteristics of the isolation layer, and will establish the concentration of PCBs, if any, present in the top layer of the cap.

4.5 Long-Term Monitoring

The Long-Term Monitoring program will be implemented to ensure that the cap system meets the design standards specified in the SOW (BBL, 1999). This section provides general description of monitoring activities for the isolation layer and shoreline armoring system. Details of the Long-Term Monitoring program will be provided in the Post-Removal Site Control Plan that will be submitted to EPA following approval of the Final Work Plan for Silver Lake.

4.5.1 Isolation Layer Monitoring

As described above, the post-construction coring program will be utilized to assess cap thickness and integrity. Additionally, the analysis of isolation layer samples from these locations will be used to assess PCB migration, if any, from the underlying sediment.

For the first five years after the cap system is installed, annual monitoring and inspections will be conducted to assess the cap thickness. These inspections will include a sediment core sampling program, similar to the post-construction sampling. To avoid locations that may have been previously sampled, cap cores collected during each long-term monitoring event will be located near those collected during construction (i.e., at a set distance, in a set direction, from the during-construction boring). Note that all sample collection locations may be adjusted based on field conditions, however, as necessary, GE will discuss any significant departure from the proposed locations with EPA. Once recovered, cores will be used to quantify the thickness of the in-place cap.

During the first-and fifth-year post-construction monitoring event, cap material samples collected for assessing cap thickness will also be analyzed for PCBs. During each of these events, collected cores will be sectioned into three intervals, as described in Section 4.4.2.

Processed samples from the REM and TOP layers from each of the ten locations will be analyzed for PCBs. The results of the analytical testing from these intervals will provide a comparison and assessment of any potential changes in the chemical characteristics of the isolation layer, if any, that may be related to migration and/or deposition.

If the results of this analysis indicate the presence of PCBs as a result of deposition on the surface of the cap, as opposed to the migration of PCBs through the cap from the underlying sediments, the source of the PCBs will be investigated. To the extent practical, attempts will be made to determine whether the PCBs are attributed to sources other than erosion or surface runoff from the banks or from currently known discharges of PCBs into the lake from NPDES-permitted or other outfalls. If the surface PCBs can be attributed to such other sources that are located within property owned by GE, potential source control measures shall be evaluated and a report on such evaluations and any recommendations shall be submitted to EPA.

In addition to sediment cores, GE will install sediment traps in five locations, as shown on Figure 4-4, to further assess the present and ongoing sedimentation rate in Silver Lake. The thickness of the sediment that settles in the traps will be measured annually for two years following cap construction. Although the thickness of sediment in the traps will be measured, no other analytical work will be performed.

Should routine monitoring indicate that the design standards have not been achieved and maintained, or that the isolation layer is not performing as generally predicted, GE will evaluate and propose to EPA appropriate corrective measures to achieve those design standards and will implement such measures upon approval by EPA. At the end of the fifth year monitoring event, GE shall propose to EPA an appropriate long-term monitoring program, as well as any other modifications to the monitoring program, and will implement that long-term monitoring program upon approval by EPA.

4.5.2 Shoreline Armoring Monitoring

For the first five years after the shoreline armoring system is installed, GE will conduct the inspections of the shoreline armoring system semi-annually. These erosion inspections will consist of inspections of the armoring system to assess the effects, if any, of shoreline wave action over time on the sediment cap along the shoreline. If erosion of the shoreline is observed (e.g., ruts, gullies, washouts or sloughing), GE will repair the eroded areas and evaluate whether there are eroded soils remaining in the lake.

4.5.3 Natural Resource Restoration/Enhancement Area Monitoring

After completion of Natural Resource Restoration/Enhancement Activities, GE will monitor and maintain the restored areas in accordance with the Performance Standards set forth in the SOW.

The long-term monitoring program will consist of two visits during each of the first three years after planting and one visit during both the fifth and seventh year after planting. In each of the first three years after planting, visits will be conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visit in the fifth year and seventh year will be conducted in the summer (July/August). In the event of a significant loss of plantings or growth failure, GE will restore that area, and restart the timing for monitoring and inspections of that area.

During each field visit, personnel conducting the inspection, supported by a certified arborist (if feasible, the arborist who observed the plant installation), will perform a stem count of planted trees and shrubs to determine survival rates estimate groundcover by herbaceous species, and/or the presence of invasive species. Indications of damage from trespassing or herbivory will be noted. Any dead trees or shrubs in excess of 20% of the original planting will be replaced to ensure an 80% survival rate, and any herbaceous planting area with less than 100% cover (outside the foliar coverage of the trees) will be supplemented with additional planting and seeding. Recommendations will also be made for supplemental activities such as additional fertilizing or watering, and implementation of measures to reduce herbivory.

GE will also inspect the picnic areas and walking path on a yearly basis for three years following installation. For the shallow-water shelf and engineered cap over the scrub-shrub "island" in Silver Lake, the post-implementation monitoring/inspection program specified above will be followed.

GE will prepare and submit event-specific reports on these inspections, monitoring, and maintenance activities, as well as an annual report summarizing such performance.

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5. Future Design Related Activities

This Conceptual Work Plan has preliminarily identified sediment areas and depths subject to remediation, as well as initial design considerations for installation of a sediment cap within and around the perimeter of Silver Lake. Based on this information, GE will proceed with detailed and final design activities to support the performance of these remediation actions. Note that final design plans will take into account and be coordinated with GE's plans for the removal of bank soils adjacent to Silver Lake, as discussed in the Conceptual Work Plan for Soils. At this time, it is anticipated that one Final Work Plan will be submitted associated with the combined bank soils and sediment remedial activities. As part of that document, GE will prepare technical drawings and specifications for such activities and develop ancillary information related to project implementation.

As discussed in Section 6, following EPA approval of this Conceptual Work Plan and the Conceptual Work Plan for Soils, GE will submit a Final Work Plan which will include a detailed description regarding design and implementation of the proposed remediation activities. At a minimum, the Final Work Plan will include the following information:

- Detailed design of the sediment removal, debris removal, scrub-shrub island restoration and capping activities, including the design-related information described in Section 3.

- Final bank soil removal limits and depths associated with either the installation of the armor stone layer or to achieve applicable bank soil Performance Standards.

- Plans for how the sediment remediation activities will be coordinated with the soil remediation activities, particularly with regard to the coordination of the bank soil removals necessary to facilitate installation of the sediment cap with armor stone on the lake banks.

- Details regarding the implementation of the natural resource restoration/ enhancement measures to be conducted both on the Silver Lake banks and within Silver Lake.

- Specific calculations regarding the impact of the bank stabilization activities on flood storage capacity (and any flood storage compensation required).

- Discussion of specific measures to be implemented during the course of the proposed removal activities to provide sedimentation and turbidity controls associated with the lake and the Housatonic River.

- Identification of the Removal Action team, including key personnel, roles and responsibilities, and lines of authority.

- Proposed implementation sequencing and schedule.

- Any necessary, updates or supplements to the CQAP.

- Post-Removal Site Control Plan or summary of anticipated Post-Removal Site Control activities following completion of the Removal Action.

6. Schedule

As noted above, to ensure coordination of the sediment and soil remediation activities, GE proposes to submit a single Final Work Plan addressing both sediments and soils. GE proposes to complete the remaining design-related activities and submit that Final Work Plan within 5 months of the later of: (a) EPA's approval of this Conceptual Work Plan; or (b) EPA's approval of the Conceptual Work Plan for Soils and any addendum or supplement thereto. Upon EPA's approval of the Final RD/RA Work Plan, GE will initiate final design activities and begin development of a Request for Proposal (RFP) that provides the Technical Drawings and Technical Specifications for performance of the remediation and restoration activities. GE will provide, in the Final RD/RA Work Plan, an anticipated schedule for selection of a Remediation Contractor and performance of the remediation work for both the sediments in Silver Lake and the soils in areas adjacent to the lake.

7. References

ARCADIS BBL. 2006. *Pilot Study Work Plan for Silver Lake Sediments.*

ARCADIS BBL. 2007. *Conceptual Removal Design/Removal Action Work Plan for Soils Adjacent to Silver Lake.*

ARCADIS BBL. 2008. *Pilot Study Report for Silver Lake Sediments.*

Blasland, Bouck and Lee (BBL). 1999. *Statement of Work for Removal Actions Outside the River.*

BBL. 2002. *Silver Lake Pre-Design Investigation Work Plan for the Silver Lake Area Removal Action.*

BBL. 2004. *Pre-Design Investigation Report for Silver Lake Sediments.*

BBL. 2006. *Bench-Scale Study Report for Silver Lake Sediments.*

United States Army Corps of Engineers. 1984. *Shore Protection Manual* (SPM).

United States Department of Agriculture. 1983. *Technical Release No. 69: Riprap for Slope Protection Against Wave Action.*

Tables

TABLE 3-1
OUTFALLS IDENTIFIED AROUND SILVER LAKE

CONCEPTUAL RD/RA WORK PLAN FOR SILVER LAKE SEDIMENTS
GENERAL ELECTRIC CORPORATION - PITTSFIELD, MASSACHUSETTS

Item #	Approximate Location	Description of outfall	Proposed Activities
1	Eastern end of the South shore	Silver Lake Outlet	Placement of turbidity controls within channel prior to construction activities.
3	Southeast corner north of Item 2A	12" RC Pipe	City Drain M2 - Drainage area includes areas along East St. east to Woodlawn Ave. Discuss potential maintenance with City of Pittsfield.
4	Center of East shore	12" steel pipe	NPDES 004 - Plugged. Proposed for removal.
5	Northern end of East shore	15" CMP	Possible catch basin drain. Location indicated on City of Pittsfield municipal storm drain map. Discuss potential maintenance with City of Pittsfield.
6	North of Item #5 on East shore	Concrete pad	Proposed for removal.
7	North of Item #6 on East shore	Concrete pad	Proposed for removal.
8	North of Item #7 on East shore	12" Steel pipe and weir	Possible catch basin drain. Location indicated on City of Pittsfield municipal storm drain map. Discuss potential maintenance with City of Pittsfield.
9	North of Item #8 on East shore	7" CI Pipe	Discuss potential removal with the City of Pittsfield.
10	North of Item #9 on East shore	6" CI Pipe	
11	North of Item #10 on East shore	9" CI Pipe	
12	North of Item #11 on East shore	8" CI Pipe	Possible catch basin drain. Location indicated on municipal storm drain map. Discuss potential maintenance with City of Pittsfield.
13	North of Item #12 on East shore	Concrete structure or pad	Proposed for removal.
14	Northeast corner	Outfall 001 Area	No visible pipe found during 2008 survey. Discuss potential mainenance with the City of Pittsfield.
15	Northeast corner, north of Item #14	48" Outfall pipe 01A and Area	NPDES 01A - 48" outfall pipe (not shown), drainage area includes areas near Building #1, Tyler St., and Building #33-E. Discuss potential maintenance with City of Pittsfield.
16	Eastern end of North shore	16" CMP Pipe	Location indicated on City of Pittsfield municipal storm drain map. Discuss potential removal with the City of Pittsfield.
17	North shore, West of Item #16	Indications of pipe	Discuss potential removal with the City of Pittsfield.
18	North shore, West of Item #17	16" CMP	Location indicated on City of Pittsfield municipal storm drain map. Discuss potential removal with the City of Pittsfield.
20	Northwest corner	42" Concrete inlet	Location indicated on City of Pittsfield municipal storm drain map. Discuss maintenance with the City of Pittsfield.
21	Northern end of West shore	12" terracotta clay pipe	Location indicated on City of Pittsfield municipal storm drain map. Discuss potential removal with the City of Pittsfield.
22	West shore, South of Item #21	Indications of underground pipe	Noted by EPA during 2008 survey. Possible drainage from 24" Cor. Iron pipe shown on City of Pittsfield municipal storm darin map. Discuss potential removal with the City of Pittsfield.
23	West shore, North of Item #24	12" CI Pipe	Submerged pipes; Hydraulic connections unknown. Discuss potential removal with the City of Pittsfield.
24	West shore, North of Item #25	8" CI Pipe	
25	West shore, North of Item #26	4" CI Pipe	
26	West shore, North of Item #21	8" CI Pipe	

Notes:
1. 2006 Survey performed on 9/26/06 by Hill Engineers.
2. 2008 Survey performed during March/April 2008 by ARCADIS, with EPA/Weston oversight.
3. Items summarized in this table are shown on Figure 1-2.

TABLE 3-2
DEBRIS/REMNANT STRUCTURES IDENTIFIED IN SILVER LAKE

CONCEPTUAL RD/RA WORK PLAN FOR SILVER LAKE SEDIMENTS
GENERAL ELECTRIC CORPORATION - PITTSFIELD, MASSACHUSETTS

OSI Target #	Approximate Height Above Sediment (ft)	Description of target	Proposed for Removal
1	7	Square structure with submerged pilings	Yes
2	1	Tire	No
3	<1	Area of 3 small objects	No
4	1	Round object	No
5	<1	Linear object	No
6	1	Tire	No
7	1	Tire	No
8	1	Tire	No
9	1	Tire	No
10	1	Tire	No
11	1	Tire	No
12	<1	Pipe or linear object	No
13	1	Tire	No
14	5	Automobile	Yes
15	1	Unknown object	No
16	<1	Tire	No
17	<1	Unknown object	No
18	1	Area of debris	No
19	3	Area of pilings and debris	Yes
20	3	Pilings	No
21	3	Piling	No
22	3	Area of debris	Yes
23	<1	Rectangular object	No
24	3	Pilings	No
25	3	Piling	No
26	2	Piling	No
27	1	Unknown object	No
28	1	Area of debris	No
29	3	Piling	No
30	1	Unknown object	No
31	1	Area of debris	No
32	1-3	Area of debris	Yes
33	5	Possible automobile	Yes
34	1	Area of debris - pipes	No
35	1	Area of debris - 1-4' blocks	No
36	1	Area of debris - 1-4' blocks	No
37	<1	Unknown object	No
38	1	Two linear objects in a "T" formation	No
39	1	Linear object - possible pipes	No
40	1-3	Area of debris - tires, pipes, unknown	Yes
41	4	Automobile	Yes
42	<1	Area of debris - tires, unknown	No
43	1	Area of debris - tires, unknown	No
44	2	Unknown object	Yes
45	<1	Unknown object	No
46	1	Unknown object	No
47	1-3	Area of submerged pilings	No
48	<1	Area of possible ropes or cables	No
--	NA	Group of pilings extending perpendicular to north shore	Yes
--	NA	Group of pilings on west shore	Yes
--	NA	Group of pilings extending perpendicular to east shore near cofferdam	Yes
--	NA	Cofferdam on east shore	Yes
--	NA	Cofferdam on shore at southeast corner	Yes

Notes:
1. Survey performed by Ocean Surveys, Inc. on June 10-13 2003.
2. Details of items summarized in this table are shown on Figure 3-3.
3. NA - Information Not Available

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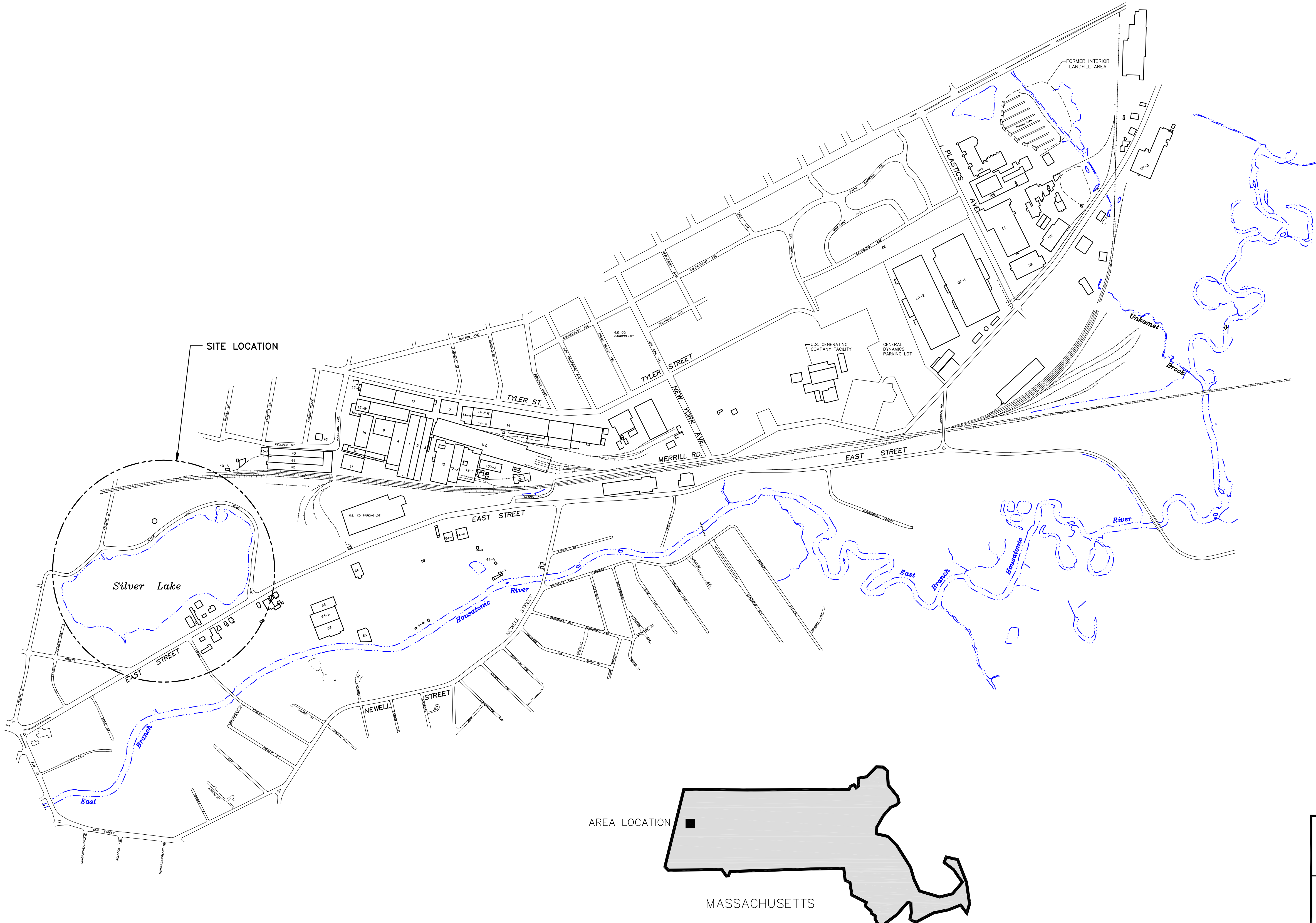
Figures



LEGEND

- - - - APPROXIMATE WATER SURFACE

NOTES:

1. MAPPING IS BASED ON AERIAL PHOTOGRAPHS AND PHOTOGRAMMETRIC MAPPING BY LOCKWOOD MAPPING, INC. – FLOWN IN APRIL 1990; DATA PROVIDED BY GENERAL ELECTRIC COMPANY; AND BLASLAND & BOUCK ENGINEERS, P.C. CONSTRUCTION PLANS.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES/LIMITS ARE APPROXIMATE.

0 500' 1000'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

LOCATION MAP

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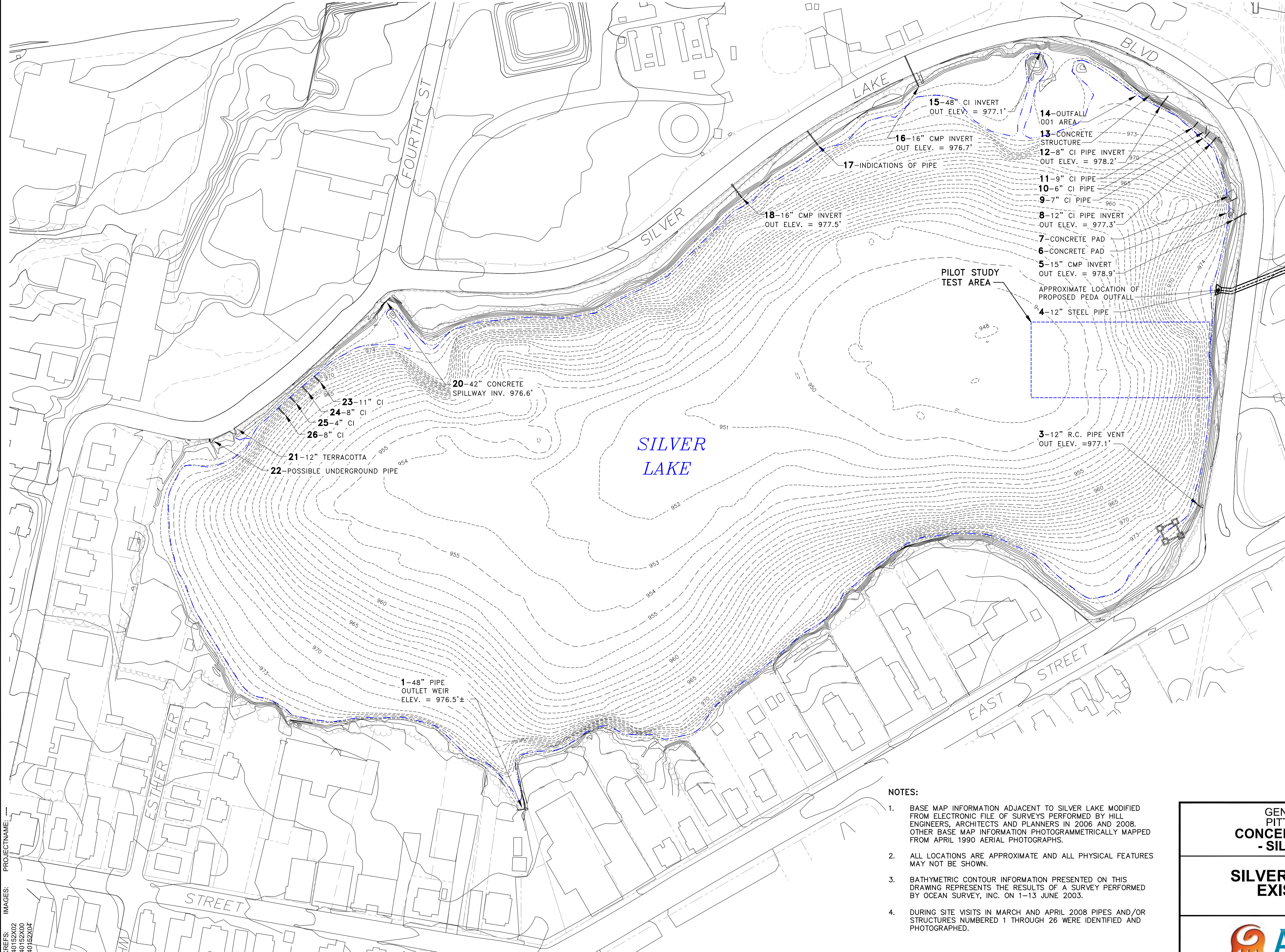
FIGURE
1-1



LEGEND:

- MEAN WATER ELEVATION (975.9) (APPROX.)
- PAVED ROADWAY
- RAILROAD
- VEGETATION
- FENCELINE
- GUARDRAIL
- ELEVATION CONTOUR (HILL ENGINEERS)
- ELEVATION CONTOUR (BATHYMETRIC)
- PROPERTY BOUNDARY

NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL LOCATIONS ARE APPROXIMATE AND ALL PHYSICAL FEATURES MAY NOT BE SHOWN.
3. BATHYMETRIC CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEY, INC. ON 1–13 JUNE 2003.
4. DURING SITE VISITS IN MARCH AND APRIL 2008 PIPES AND/OR STRUCTURES NUMBERED 1 THROUGH 26 WERE IDENTIFIED AND PHOTOGRAPHED.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

SILVER LAKE SITE PLAN AND EXISTING CONDITIONS

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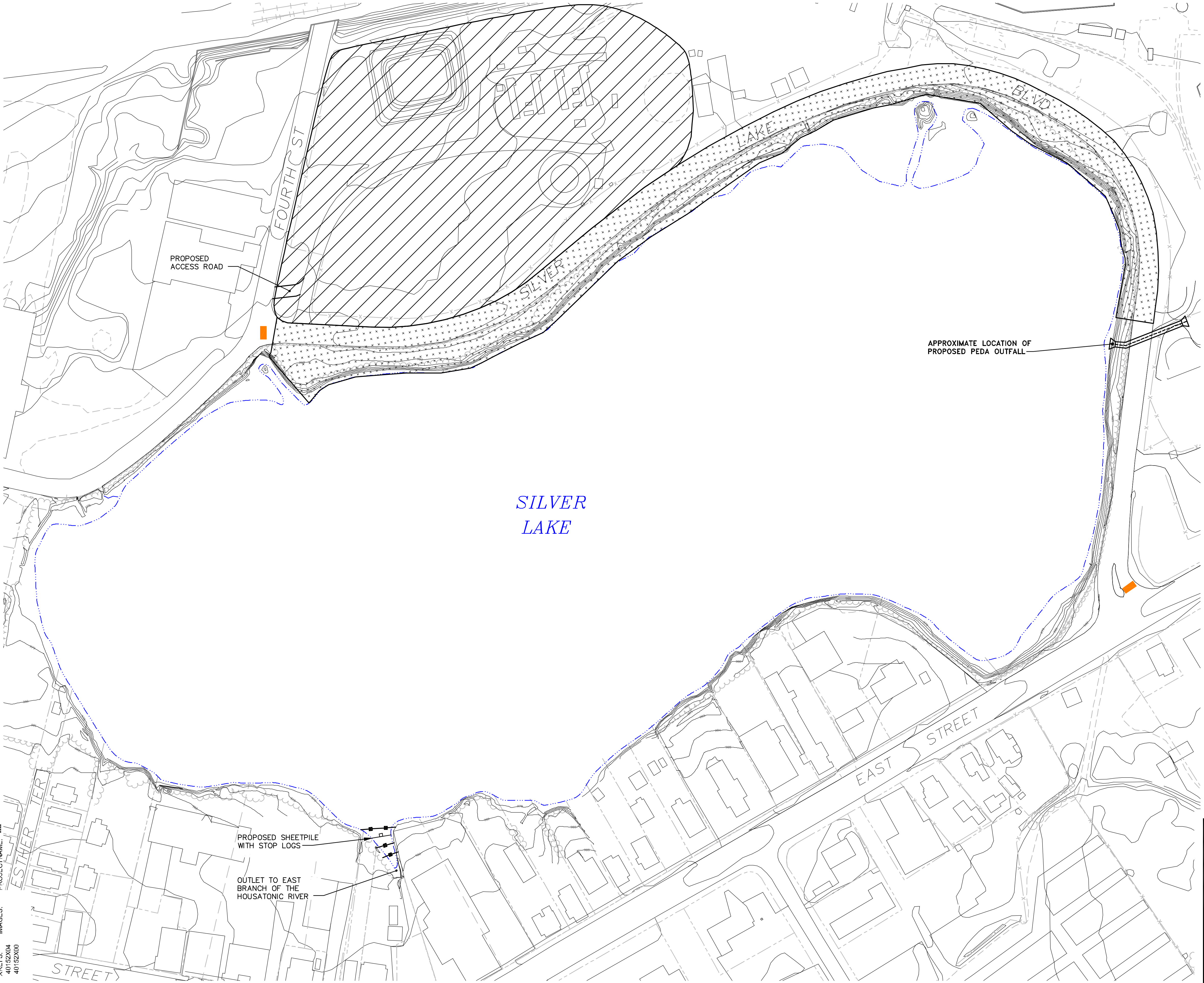
FIGURE **1-2**



LEGEND:

- MEAN WATER ELEVATION (975.9) (APPROX.)
- PAVED ROADWAY
- VEGETATION
- FENCELINE
- GUARDRAIL
- 985 ELEVATION CONTOUR (HILL ENGINEERS)
- SILT FENCE
- PROPOSED STAGING AREA
- POTENTIAL ADDITIONAL STAGING AREA
- ROAD CLOSED SIGN

NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL LOCATIONS ARE APPROXIMATE AND ALL PHYSICAL FEATURES MAY NOT BE SHOWN.

0 80' 160'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

PROPOSED STAGING AREA

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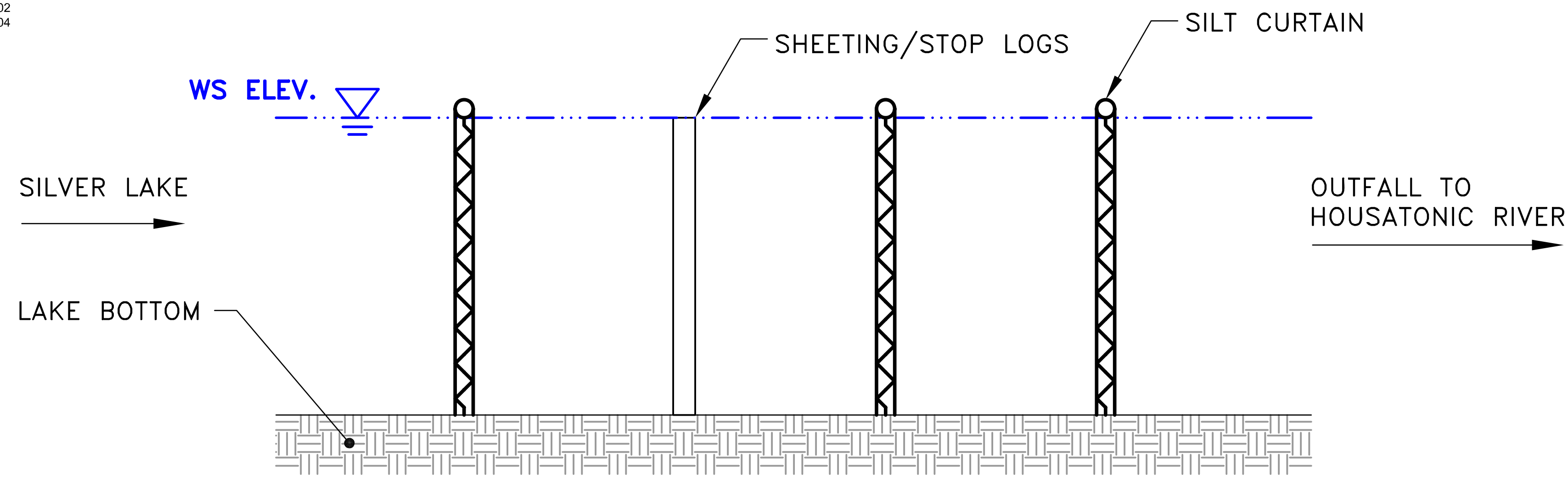
FIGURE
3-1

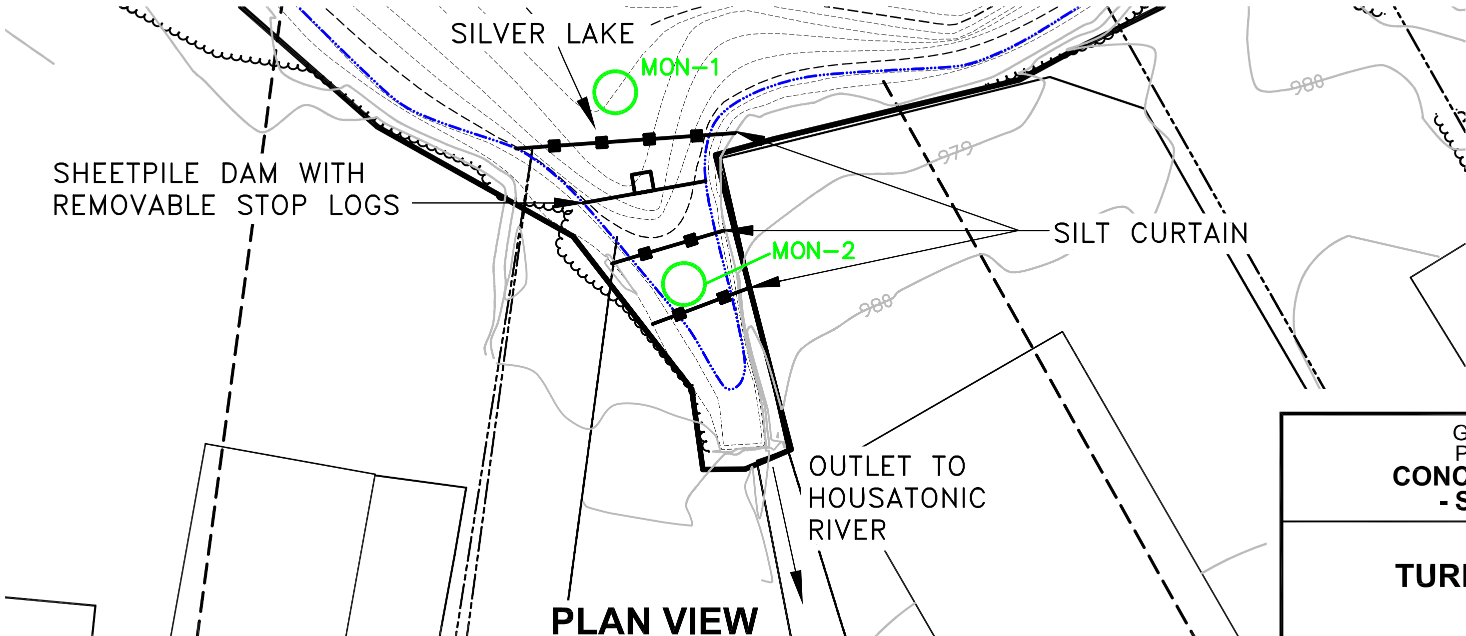
CITY: SYRACUSE DIV/GROUP: 141 DB: LAF GMS KFS LD: DMW PM: L. PUTNAM LYR: ON=*;OFF=*REF
G:\CAD\GE-CAD\N-ACT\B0040152\0000\00050\dwg\WORKPLAN\40152G17.dwg LAYOUT: 3-2 SAVED: 7/3/2008 2:48 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: C-LA-PDF-ADOBE PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 7/3/2008 2:52 PM BY: STOWELL, GARY

XREFS: 40152X02 40152X04 IMAGES: PROJECTNAME: ----



CROSS SECTION

NOT TO SCALE



PLAN VIEW

0 50' 100'

SCALE: 1"=50'

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

CONCEPTUAL TURBIDITY/SEDIMENTATION CONTROL PLAN

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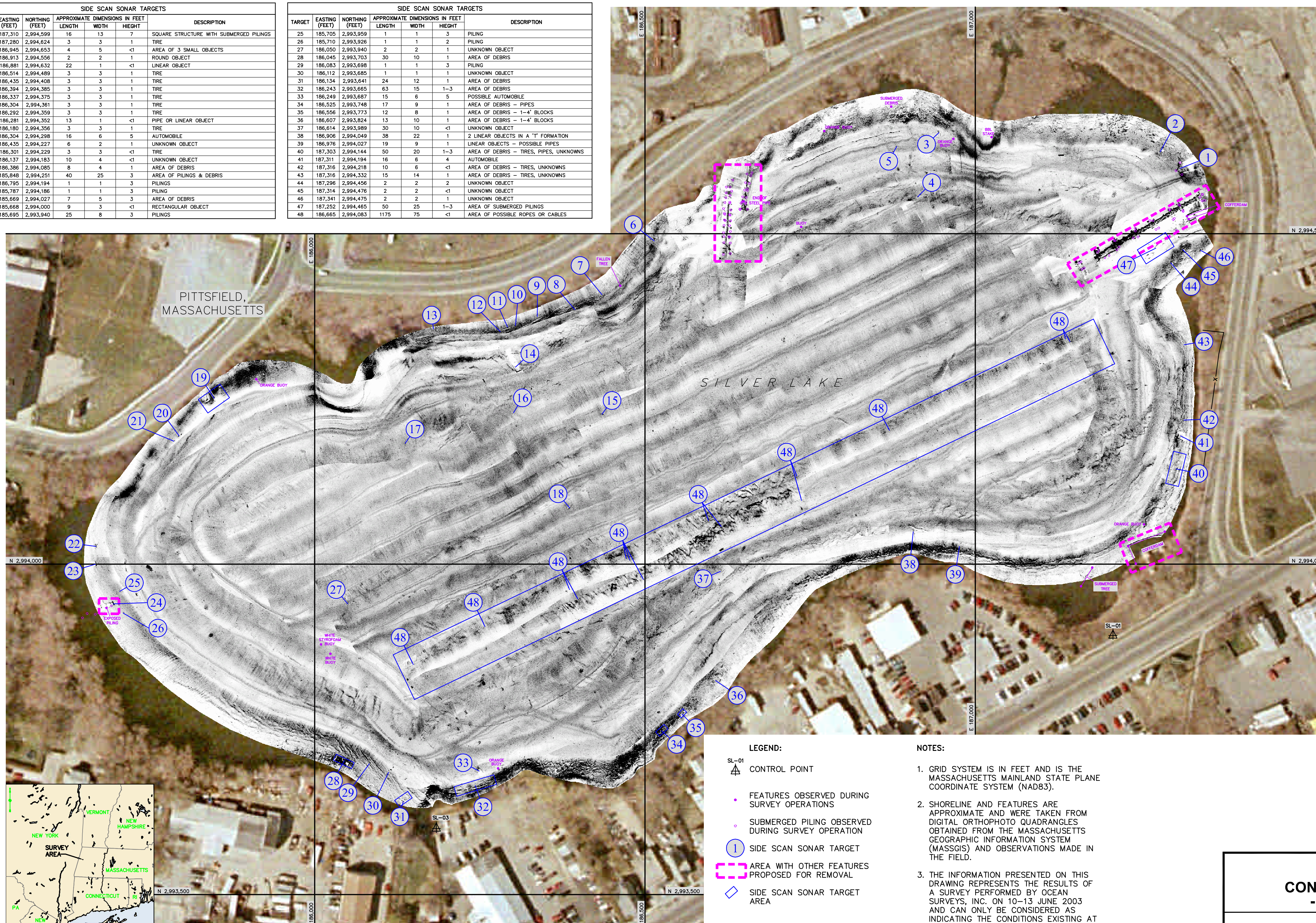
FIGURE

3-2

SIDE SCAN SONAR TARGETS						
TARGET	EASTING (FEET)	NORTHING (FEET)	APPROXIMATE DIMENSIONS IN FEET			DESCRIPTION
			LENGTH	WIDTH	HIEGHT	
1	187,310	2,994,599	16	13	7	SQUARE STRUCTURE WITH SUBMERGED PILINGS
2	187,280	2,994,624	3	3	1	TIRE
3	186,945	2,994,653	4	5	<1	AREA OF 3 SMALL OBJECTS
4	186,913	2,994,556	2	2	1	ROUND OBJECT
5	186,881	2,994,632	22	1	<1	LINEAR OBJECT
6	186,514	2,994,489	3	3	1	TIRE
7	186,435	2,994,408	3	3	1	TIRE
8	186,394	2,994,385	3	3	1	TIRE
9	186,337	2,994,375	3	3	1	TIRE
10	186,304	2,994,361	3	3	1	TIRE
11	186,292	2,994,359	3	3	1	TIRE
12	186,281	2,994,352	13	1	<1	PIPE OR LINEAR OBJECT
13	186,180	2,994,356	3	3	1	TIRE
14	186,304	2,994,298	16	6	5	AUTOMOBILE
15	186,435	2,994,227	6	2	1	UNKNOWN OBJECT
16	186,301	2,994,229	3	3	<1	TIRE
17	186,137	2,994,183	10	4	<1	UNKNOWN OBJECT
18	186,386	2,994,085	8	4	1	AREA OF DEBRIS
19	185,848	2,994,251	40	25	3	AREA OF PILINGS & DEBRIS
20	186,795	2,994,194	1	1	3	PILINGS
21	185,787	2,994,186	1	1	3	PILING
22	185,669	2,994,027	7	5	3	AREA OF DEBRIS
23	185,668	2,994,000	9	3	<1	RECTANGULAR OBJECT
24	185,695	2,993,940	25	8	3	PILINGS

SIDE SCAN SONAR TARGETS						
TARGET	EASTING (FEET)	NORTHING (FEET)	APPROXIMATE DIMENSIONS IN FEET			DESCRIPTION
			LENGTH	WIDTH	HIEGHT	
25	185,705	2,993,959	1	1	3	PILING
26	185,710	2,993,926	1	1	2	PILING
27	186,050	2,993,940	2	2	1	UNKNOWN OBJECT
28	186,045	2,993,703	30	10	1	AREA OF DEBRIS
29	186,083	2,993,698	1	1	3	PILING
30	186,112	2,993,685	1	1	1	UNKNOWN OBJECT
31	186,134	2,993,641	24	12	1	AREA OF DEBRIS
32	186,243	2,993,665	63	15	1–3	AREA OF DEBRIS
33	186,249	2,993,687	15	6	5	POSSIBLE AUTOMOBILE
34	186,525	2,993,748	17	9	1	AREA OF DEBRIS – PIPES
35	186,556	2,993,773	12	8	1	AREA OF DEBRIS – 1–4' BLOCKS
36	186,607	2,993,824	13	10	1	AREA OF DEBRIS – 1–4' BLOCKS
37	186,614	2,993,989	30	10	<1	UNKNOWN OBJECT
38	186,906	2,994,049	38	22	1	2 LINEAR OBJECTS IN A 'T' FORMATION
39	186,976	2,994,027	19	9	1	LINEAR OBJECTS – POSSIBLE PIPES
40	187,303	2,994,144	50	20	1–3	AREA OF DEBRIS – TIRES, PIPES, UNKNOWNS
41	187,311	2,994,194	16	6	4	AUTOMOBILE
42	187,316	2,994,218	10	6	<1	AREA OF DEBRIS – TIRES, UNKNOWNS
43	187,316	2,994,332	15	14	1	AREA OF DEBRIS – TIRES, UNKNOWNS
44	187,296	2,994,456	2	2	2	UNKNOWN OBJECT
45	187,314	2,994,476	2	2	<1	UNKNOWN OBJECT
46	187,341	2,994,475	2	2	1	UNKNOWN OBJECT
47	187,252	2,994,465	50	25	1–3	AREA OF SUBMERGED PILINGS
48	186,665	2,994,083	1175	75	<1	AREA OF POSSIBLE ROPES OR CABLES



LEGEND:

SL-01 CONTROL POINT

FEATURES OBSERVED DURING SURVEY OPERATIONS

SUBMERGED PILING OBSERVED DURING SURVEY OPERATION

(1) SIDE SCAN SONAR TARGET

AREA WITH OTHER FEATURES PROPOSED FOR REMOVAL

SIDE SCAN SONAR TARGET AREA

NOTES:

1. GRID SYSTEM IS IN FEET AND IS THE MASSACHUSETTS MAINLAND STATE PLANE COORDINATE SYSTEM (NAD83).
2. SHORELINE AND FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHOTO QUADRANGLES OBTAINED FROM THE MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM (MASSGIS) AND OBSERVATIONS MADE IN THE FIELD.
3. THE INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10–13 JUNE 2003 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

0 80' 160'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

SIDE SCAN SONAR MOSAIC

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FIGURE
3-3

CITY: SYRACUSE DIV/GROUP: 141 DB: LJP LAF KMD LD: DMW PIC: PM: L. PUTNAM TM: LYR: ON=*;OFF=*REF* ACADVER: 17.0S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 7/3/2008 3:17 PM BY: STEINBERGER, GEORGE
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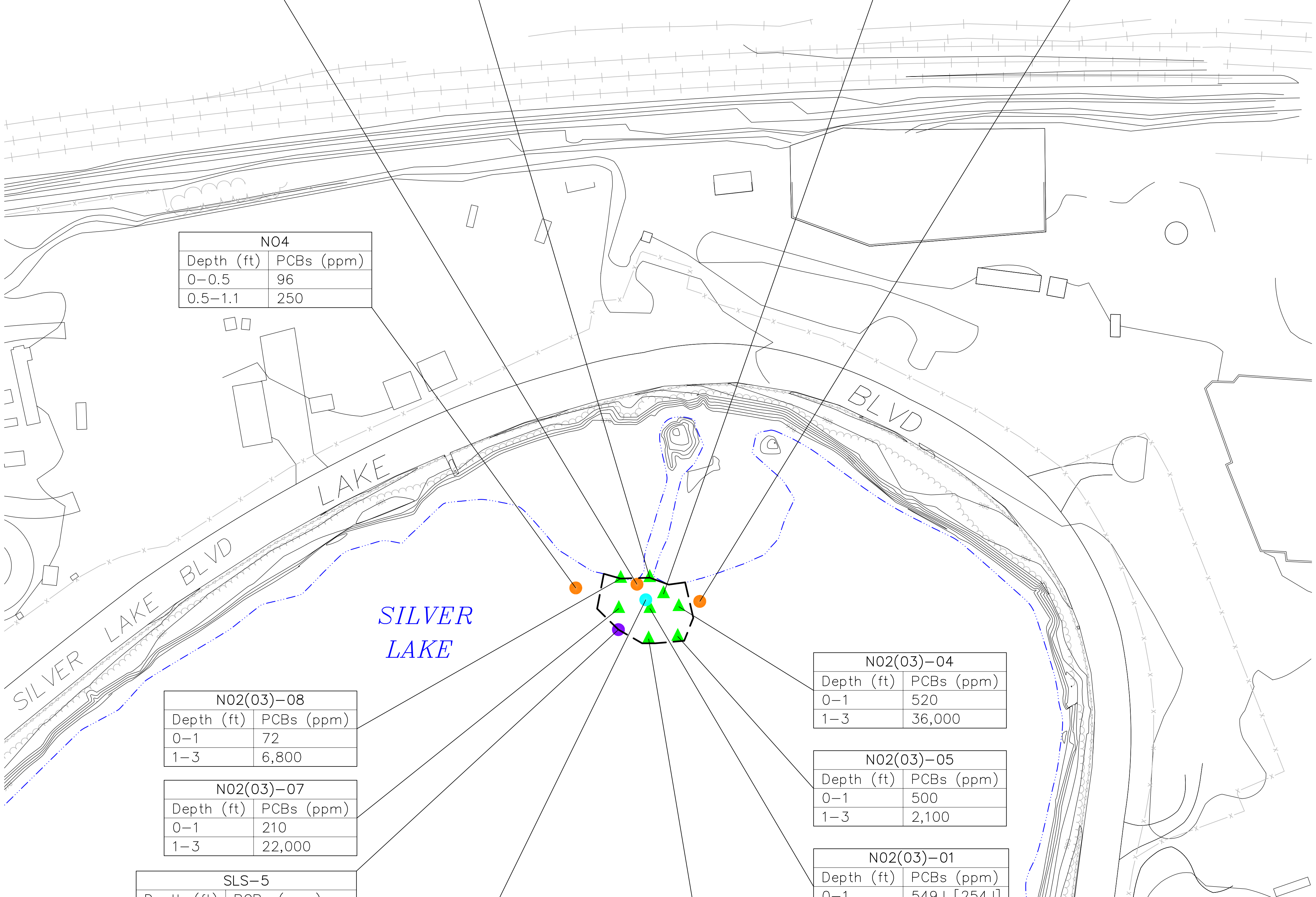
XREFS: 40152X00 IMAGES: 40152X01.PNG 40152X02.TIF 40152X03.TIF PROJECTNAME: ---



N02	
Depth (ft)	PCBs (ppm)
0–0.5	610
0.5–1.1	190

N02(03)–02	
Depth (ft)	PCBs (ppm)
0–1	625
1–3	17,000

N02(03)–03	
Depth (ft)	PCBs (ppm)
0–1	51
1–3	150

N03	
Depth (ft)	PCBs (ppm)
0–0.5	64
0.5–1.1	79

N04	
Depth (ft)	PCBs (ppm)
0–0.5	96
0.5–1.1	250

N02(03)–08	
Depth (ft)	PCBs (ppm)
0–1	72
1–3	6,800

N02(03)–07	
Depth (ft)	PCBs (ppm)
0–1	210
1–3	22,000

SLS–5	
Depth (ft)	PCBs (ppm)
0–1	350
1–2	300
2–3	420
3–4	640
4–5	290
5–6	11,000 [13,000]
6–6.67	18,000

N02(92)	
Depth (ft)	PCBs (ppm)
0–1	20,689

N02(03)–06	
Depth (ft)	PCBs (ppm)
0–1	197
1–3	360

N02(03)–04	
Depth (ft)	PCBs (ppm)
0–1	520
1–3	36,000

N02(03)–05	
Depth (ft)	PCBs (ppm)
0–1	500
1–3	2,100

N02(03)–01	
Depth (ft)	PCBs (ppm)
0–1	549J [254J]
1–3	103

LEGEND:

- STEWART LABORATORIES SAMPLING LOCATION (1982)
- MISCELLANEOUS GRAB SAMPLING LOCATION (1992)
- MCP/RFI SEDIMENT SAMPLING LOCATION (1995)
- PRE–DESIGN SEDIMENT SAMPLING LOCATION (2003)
- EDGE OF WATER
- PAVED ROADWAY
- RAILROAD
- VEGETATION
- FENCELINE
- GUARDRAIL
- ELEVATION CONTOUR (HILL ENGINEERS)
- APPROXIMATE SEDIMENT REMOVAL AREA

NOTES:

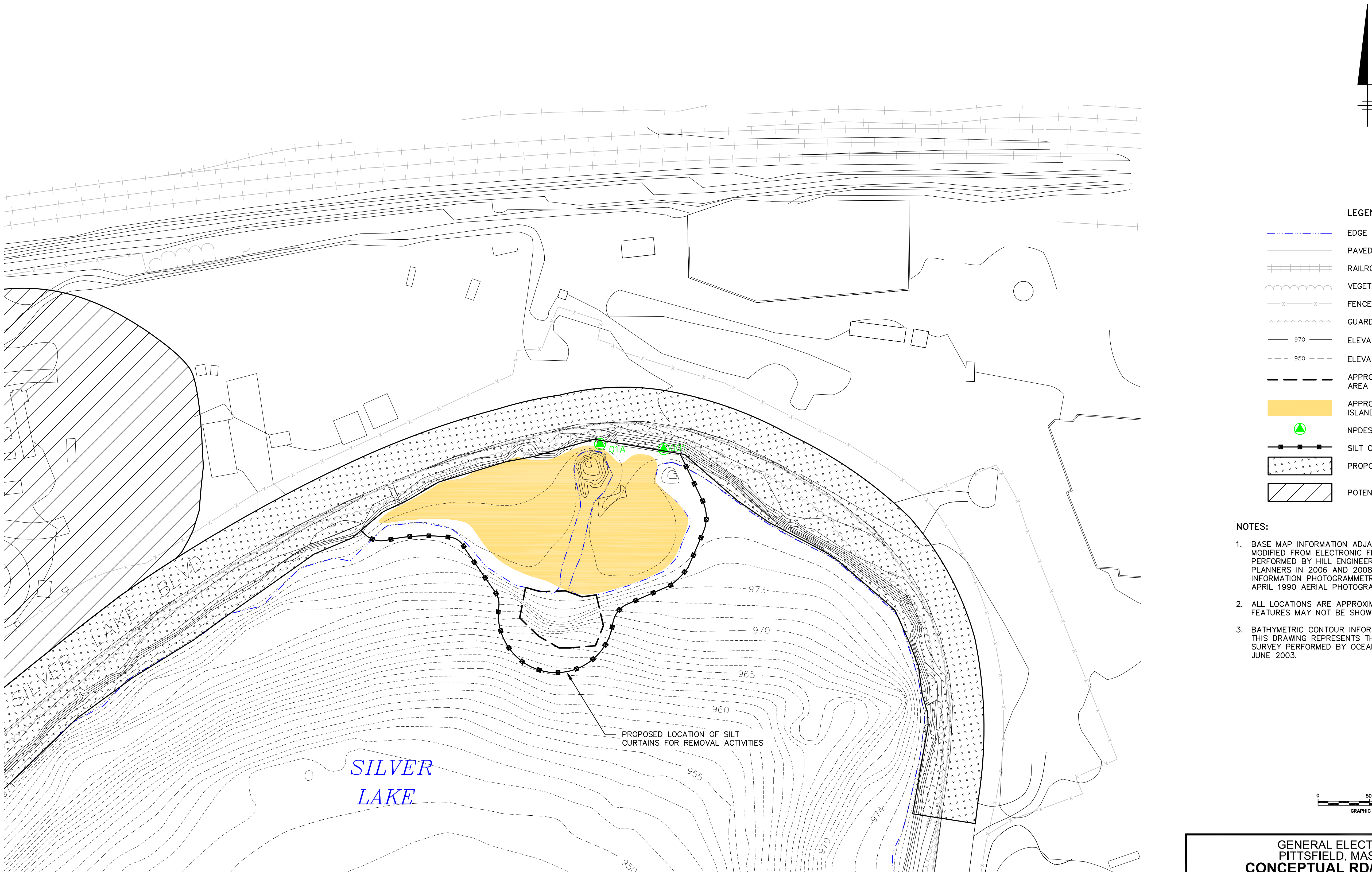
1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL SAMPLE LOCATIONS ARE APPROXIMATE. HOWEVER, LOCATIONS SAMPLED IN 1991, 1994, 1995 AND 2003 WERE SURVEYED BY BLASLAND, BOUCK & LEE, INC.
3. ALL SEDIMENT DATA ARE PRESENTED IN DRY WEIGHT – PARTS PER MILLION (ppm). DUPLICATE RESULTS ARE SHOWN IN BRACKETS.
4. J – ANALYTE WAS POSITIVELY IDENTIFIED BUT THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

SELECT SEDIMENT SAMPLING LOCATIONS AND APPROXIMATE REMOVAL AREA

ARCADIS

FIGURE **3-4**



LEGEND:

- EDGE OF WATER
- PAVED ROADWAY
- RAILROAD
- VEGETATION
- FENCELINE
- GUARDRAIL
- 970 ELEVATION CONTOUR (HILL ENGINEERS)
- 950 ELEVATION CONTOUR (BATHYMETRIC)
- APPROXIMATE SEDIMENT REMOVAL AREA
- APPROXIMATE AREA OF SCRUB-SHRUB ISLAND
- NPDES OUTFALL
- SILT CURTAIN
- PROPOSED STAGING AREA
- POTENTIAL ADDITIONAL STAGING AREA

NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL LOCATIONS ARE APPROXIMATE AND ALL PHYSICAL FEATURES MAY NOT BE SHOWN.
3. BATHYMETRIC CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEY, INC. ON 1–13 JUNE 2003.

0 50' 100'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

APPROXIMATE AREA OF SCRUB-SHRUB ISLAND AND REMOVAL AREA

ARCADIS

FIGURE
3-5

CITY: SYRACUSE GROUP: ENV-141 DB: L/P PGL KFS LD: DMW PM: T. CRIDGE TM: L. PUTNAM LYR: ON=*;OFF=REF
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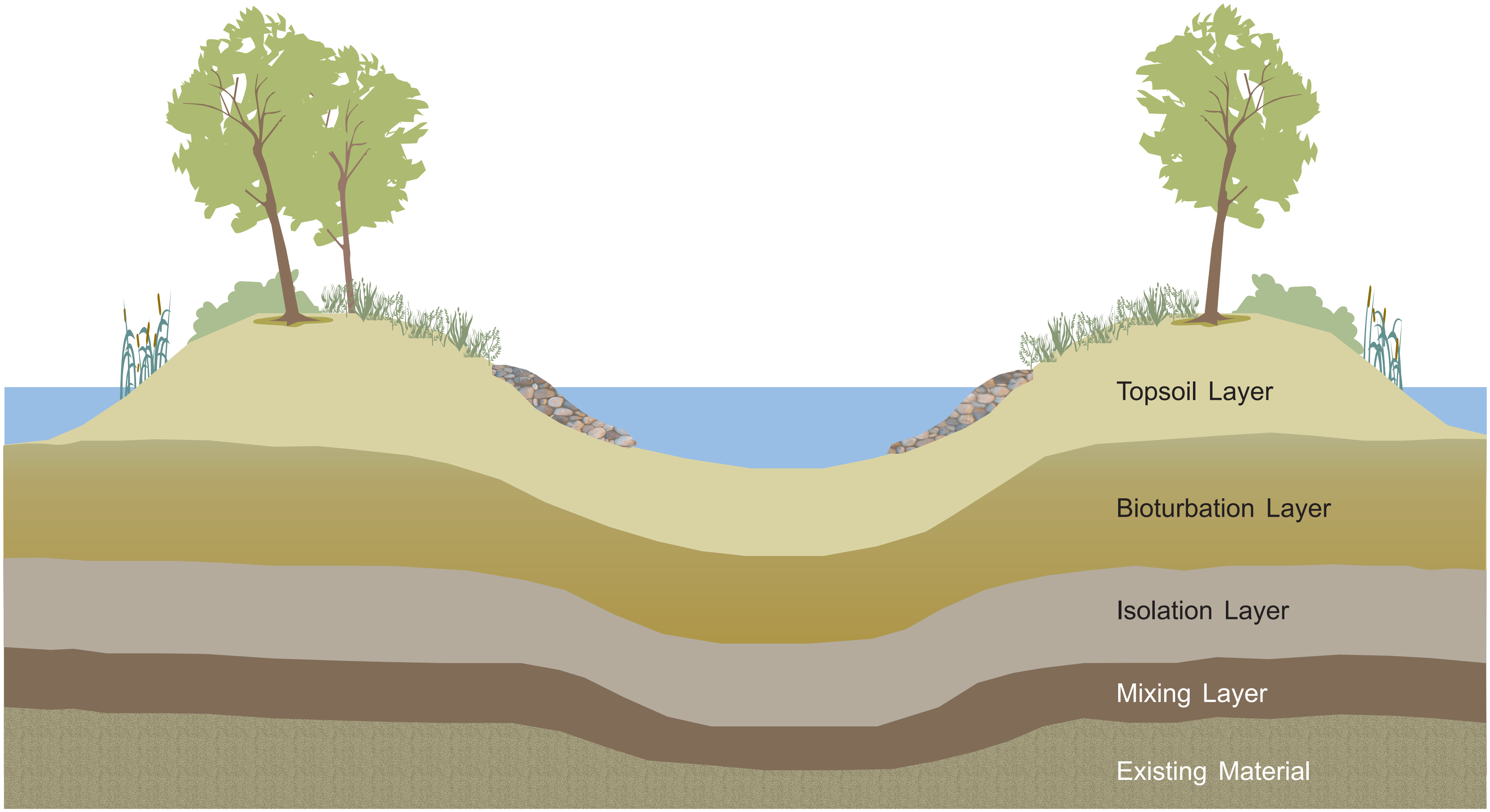
XREFS: IMAGES: PROJECTNAME: ---
40152X04
40152X00
40152X02

07/02/08 SYR-141-DJH
GE-CAD\C-ACT\B0040152\0000\00050\CDR\RDRA\40152G01.CDR



NOT TO SCALE

NOTE:
1. EXISTING SHRUB-SCRUB MATERIALS WILL BE REMOVED TO AN APPROXIMATE ELEVATION OF 975.1-FT. TO FACILITATE PLACEMENT OF CAP MATERIALS AND TOPSOIL SUCH THAT THE TOP OF THE ISLAND IS GENERALLY ONE FOOT ABOVE THE MEAN WATER SURFACE ELEVATION.

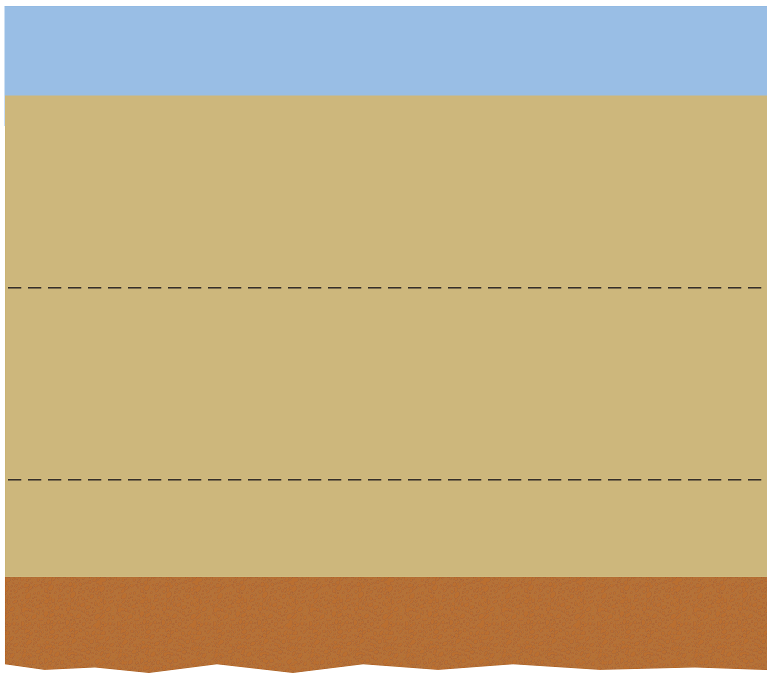
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

CONCEPTUAL SHRUB-SCRUB ISLAND CROSS-SECTION

ARCADIS

FIGURE
3-6



TYPICAL CAP CROSS-SECTION

NOT-TO-SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

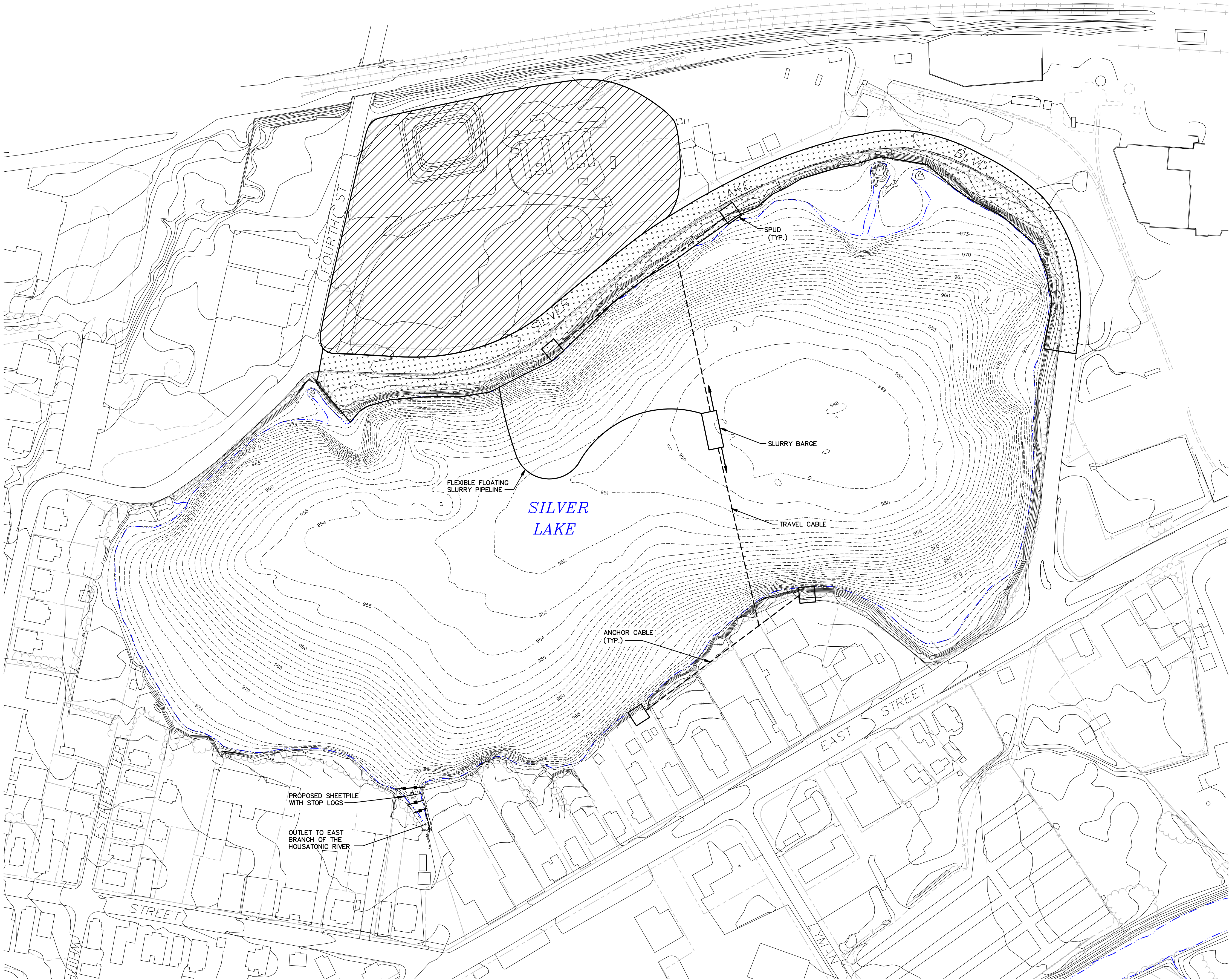
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

TYPICAL CAP CROSS-SECTION

ARCADIS

FIGURE **3-7**

06/30/08 SYR-141-LJP, KLS
GE-CAD\N-ACT\B0040152\0000\00050\CDR\40152V02.CDR



LEGEND:

- MEAN WATER ELEVATION (975.9) (APPROX.)
- PAVED ROADWAY
- RAILROAD
- VEGETATION
- FENCELINE
- GUARDRAIL
- ELEVATION CONTOUR (HILL ENGINEERS)
- ELEVATION CONTOUR (BATHYMETRIC)
- PROPERTY BOUNDARY
- PROPOSED STAGING AREA
- POTENTIAL ADDITIONAL STAGING AREA
- SILT CURTAIN

NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL LOCATIONS ARE APPROXIMATE AND ALL PHYSICAL FEATURES MAY NOT BE SHOWN.
3. BATHYMETRIC CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEY, INC. ON 1-13 JUNE 2003.

0 100' 200'
GRAPHIC SCALE

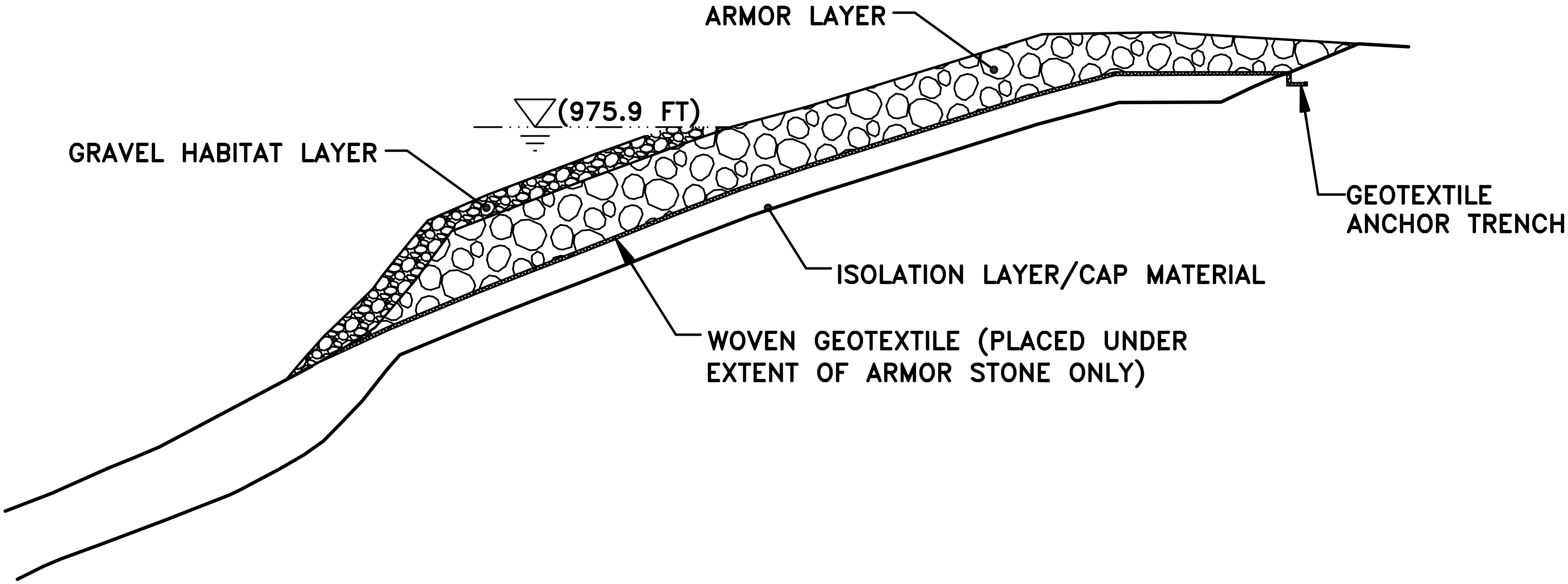
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

CONCEPTUAL CAP PLACEMENT

ARCADIS

FIGURE
3-8

CITY: SYRACUSE DIV/GROUP: 141 DB: KLS KMD KFS LD: DMW PIC: PM: L. PUTNAM TM: LYR: ON=*;OFF=*REF*
G:\CAD\GE-CAD\N-ACT\B0040152\0000\00050\dwg\WORKPLAN\40152G01.DWG LAYOUT: 3-9 SAVED: 7/2/2008 9:15 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: C-LA-PDF-ADOBE PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 7/3/2008 3:13 PM BY: STOWELL, GARY
XREFS: IMAGES: PROJECTNAME: ----



TYPICAL ARMOR LAYER CONFIGURATION

NOT TO SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

TYPICAL ARMOR LAYER CONFIGURATION

ARCADIS

FIGURE
3-9

LEGEND:

- MEAN WATER ELEVATION (975.9) (APPROX.)
- PAVED ROADWAY
- RAILROAD
- VEGETATION
- FENCELINE
- GUARDRAIL
- ELEVATION CONTOUR (HILL ENGINEERS)
- ELEVATION CONTOUR (BATHYMETRIC)
- PROPERTY BOUNDARY
- EAST SHORE ARMOR CONFIGURATION
- WEST SHORE ARMOR CONFIGURATION
- APPROXIMATE AREA OF SCRUB-SHRUB ISLAND

NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS..
2. ALL LOCATIONS ARE APPROXIMATE AND ALL PHYSICAL FEATURES MAY NOT BE SHOWN.
3. BATHYMETRIC CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-13 JUNE 2003.

0 100' 200'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

PROPOSED ARMOR LAYER LAYOUT

ARCADIS

FIGURE
3-10

CITY: SYRACUSE GROUP: ENV-141 DB: DMW LAF KFS LD: DMW PM: T. CRIDGE TM: L. PUTNAM LYR: ON=*;OFF=REF
G:\CAD\GE-CAD\N-ACT\B0040152\0000\00050\dwg\WORKPLAN\40152G15.dwg LAYOUT: 3-10 SAVED: 7/3/2008 3:14 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: C-LD2B-PDF-TABLOID PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 7/3/2008 3:15 PM BY: STOWELL, GARY
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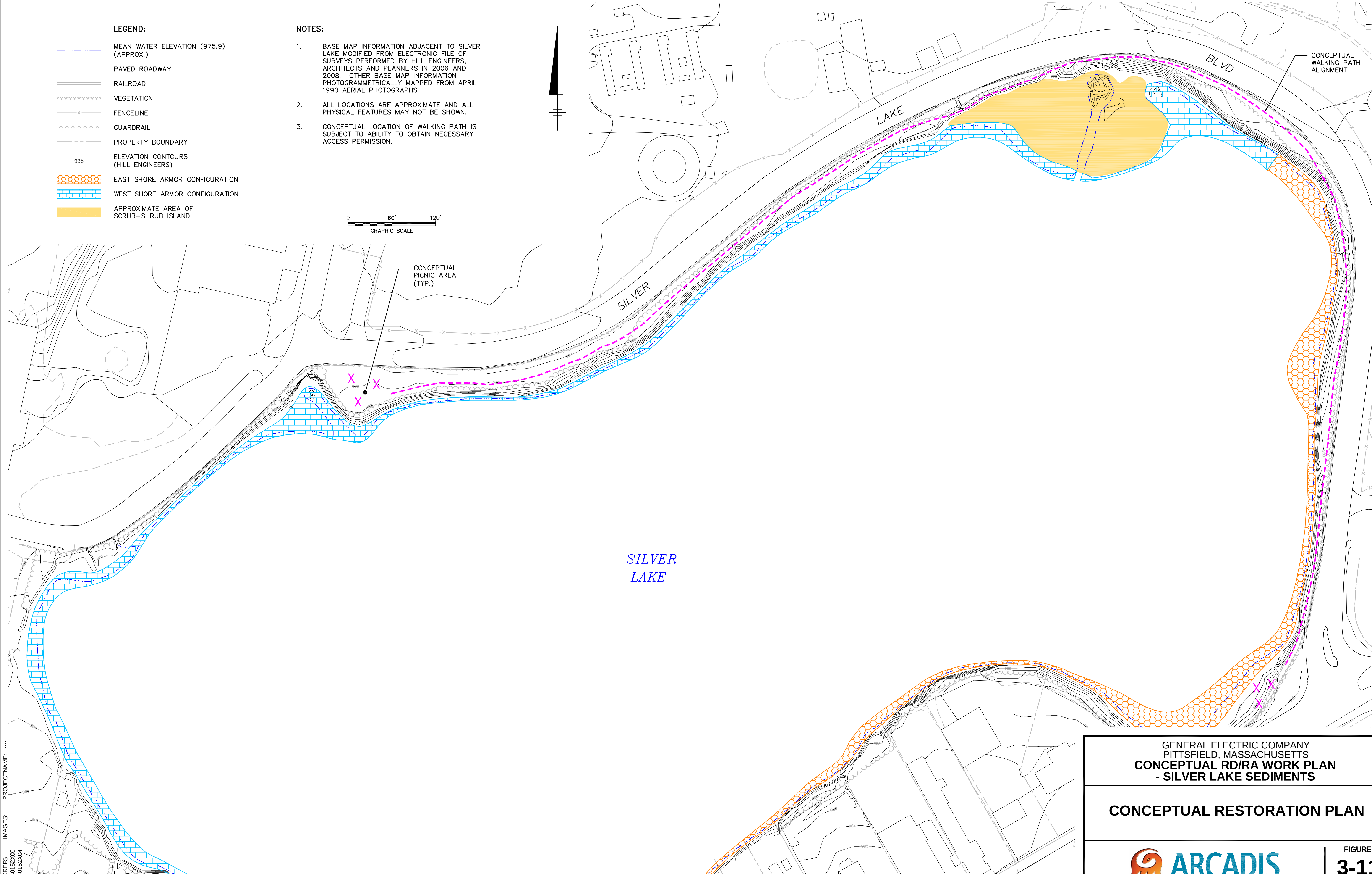


NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL LOCATIONS ARE APPROXIMATE AND ALL PHYSICAL FEATURES MAY NOT BE SHOWN.
3. CONCEPTUAL LOCATION OF WALKING PATH IS SUBJECT TO ABILITY TO OBTAIN NECESSARY ACCESS PERMISSION.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

CONCEPTUAL RESTORATION PLAN

ARCADIS

FIGURE
3-11

CITY: SYRACUSE DIV/GROUP: 141 DB: DMW KMD KFS LD: DMW PIC: PM: L. PUTNAM TM: LYR: ON=*;OFF=*REF* 17.0S (LMS TECH) PAGESETUP: ----PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 7/2/2008 10:05 AM BY: STINSON, KATE
G:\CAD\GE-CAD\N-ACT\B0040152\0000\00050\dwg\WORKPLAN\40152G18.DWG LAYOUT: 3-11SAVED: 7/2/2008 10:05 AM ACADVER:
XREFS: 40152X00 40152X04 IMAGES: PROJECTNAME: ----

Monitoring Event	Description	Time Relative to Construction Activities			
		Pre	During	Post	Long-term
Cap Material					
Cap Material Analysis	Sampling and analysis of cap materials for PCB and TOC	X	X		
Sediment/Cap Core Collection					
Sediment Collection Traps	Monitoring of individual lift thickness and sedimentation rate		X	X	X
During-construction Chemical/Physical Coring	During-construction collection of sediment/cap material samples for assessment of total cap thickness and TOC analysis		X		
Post-construction Chemical/Physical Coring	Post-construction collection of sediment/cap material samples for assessment of total cap thickness, and TOC and PCB analysis			X	
Surface Water Quality Monitoring					
Weekly Water Sampling	Montly sample collection from one location with analysis for PCB and TSS (conducted on a weekly basis during construction)	X	X	X	X
Continuous Turbidity	Continuous turbidity monitoring at two locations	X	X		
Cap Integrity and Armor System Inspection					
Cap Integrity	Annual collection of cores to assess cap thickness and integrity as well as analysis for TOC and/or PCBs				X
Erosion Inspection	Semi-annual erosion inspections to monitor the integrity of the armor system				X
Natural Resource Restoration/Enhancement Areas					
Vegetation	Two visits during each of the first three years after planting, and one visit each during both the fifth and seventh year after planting				X
Engineered Structures	Annually for three years to ensure structure integrity and ability to function				X

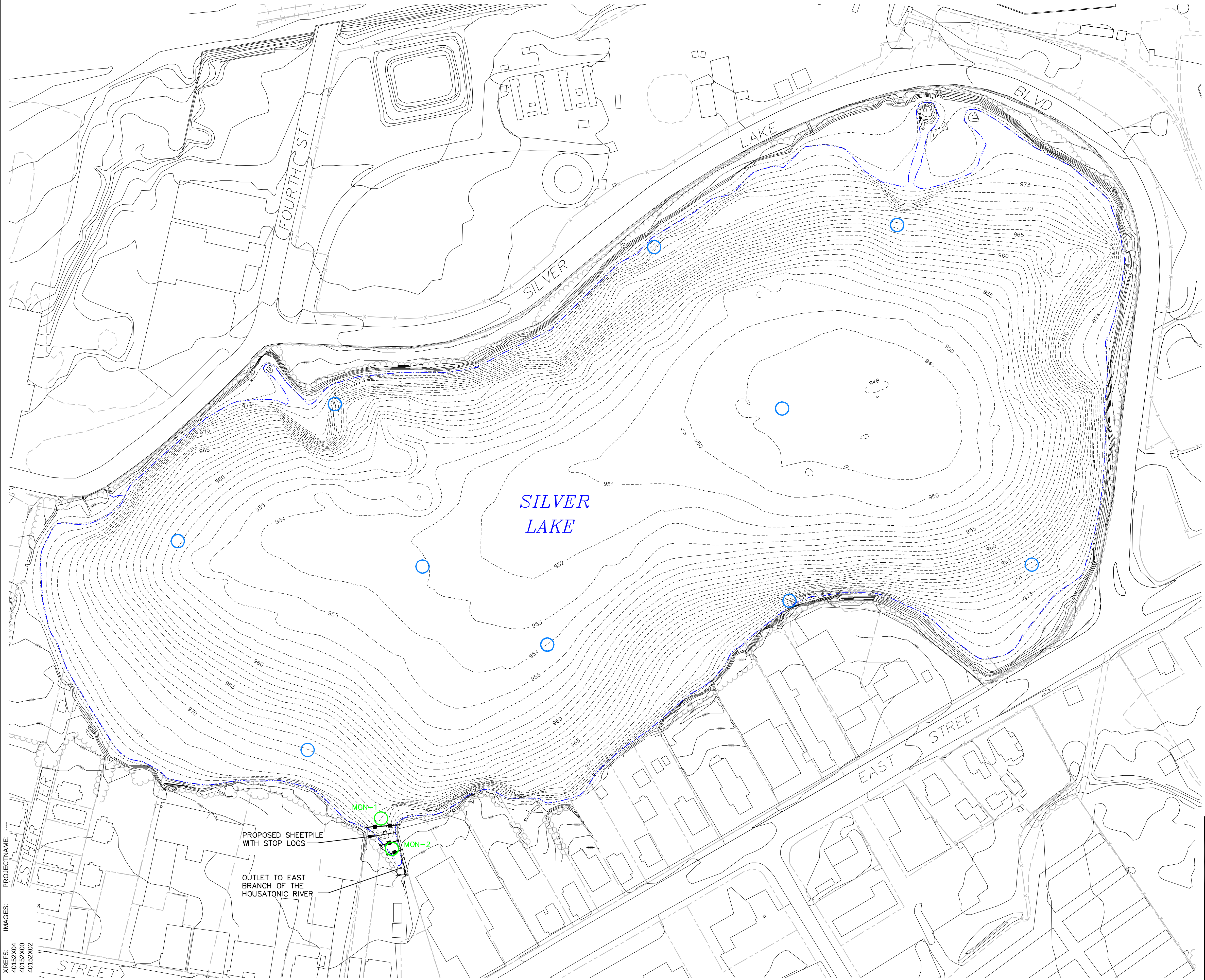
GENERAL ELECTRIC COMPANY
PITTSFIELD , MASSACHUSETTS

CONCEPTUAL RD/RA WORK PLAN -SILVER LAKE SEDIMENTS

PROPOSED MONITORING PROGRAM SCHEDULE

ARCADIS

FIGURE **4-1**



LEGEND:

- MEAN WATER ELEVATION (975.9) (APPROX.)
- PAVED ROADWAY
- VEGETATION
- FENCELINE
- GUARDRAIL
- ELEVATION CONTOUR (HILL ENGINEERS)
- SILVER LAKE ELEVATION CONTOUR
- SILT CURTAIN
- PROPOSED WATER MONITORING LOCATION
- PROPOSED CAP MATERIAL CORE LOCATION

NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL LOCATIONS ARE APPROXIMATE AND NOT ALL PHYSICAL FEATURES MY NOT BE SHOWN.
3. BATHYMETRIC CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-13 JUNE 2003.

0 80' 160'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

PROPOSED CONSTRUCTION AND LONG-TERM MONITORING LOCATIONS

ARCADIS

FIGURE **4-2**

CITY: SYRACUSE-NY GROUP: ENV-141 DB: LJP KFS KMD LD:DMW PM: T CRIDGE TM: L PUTNAM LYR: ON=*;OFF=*REF* [15-foot-green, [15-foot-offset, [BOUNDARY ---PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 7/2/2008 9:18 AM BY: STINSON, KATE
G:\CADIG-CAD\N-ACT\B0040152\0000\00050\dwg\WORKPLAN\40152G20.dwg LAYOUT: 4-2 SAVED: 7/2/2008 9:18 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: ----
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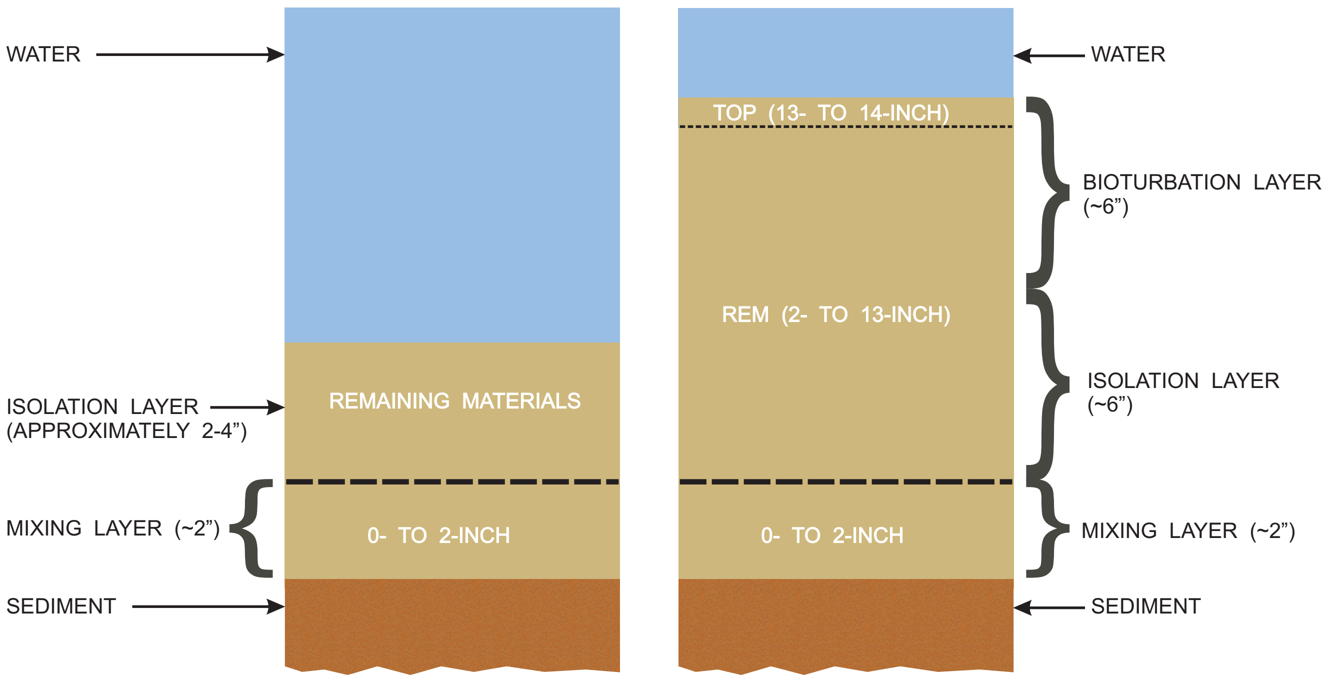


DURING CONSTRUCTION

NOT-TO-SCALE

POST-CONSTRUCTION

NOT-TO-SCALE

06/30/08 SYR-141-LJP, KLS
GE-CAD\N-ACT\B0040152\0000\00050\CDR\40152V03.CDR

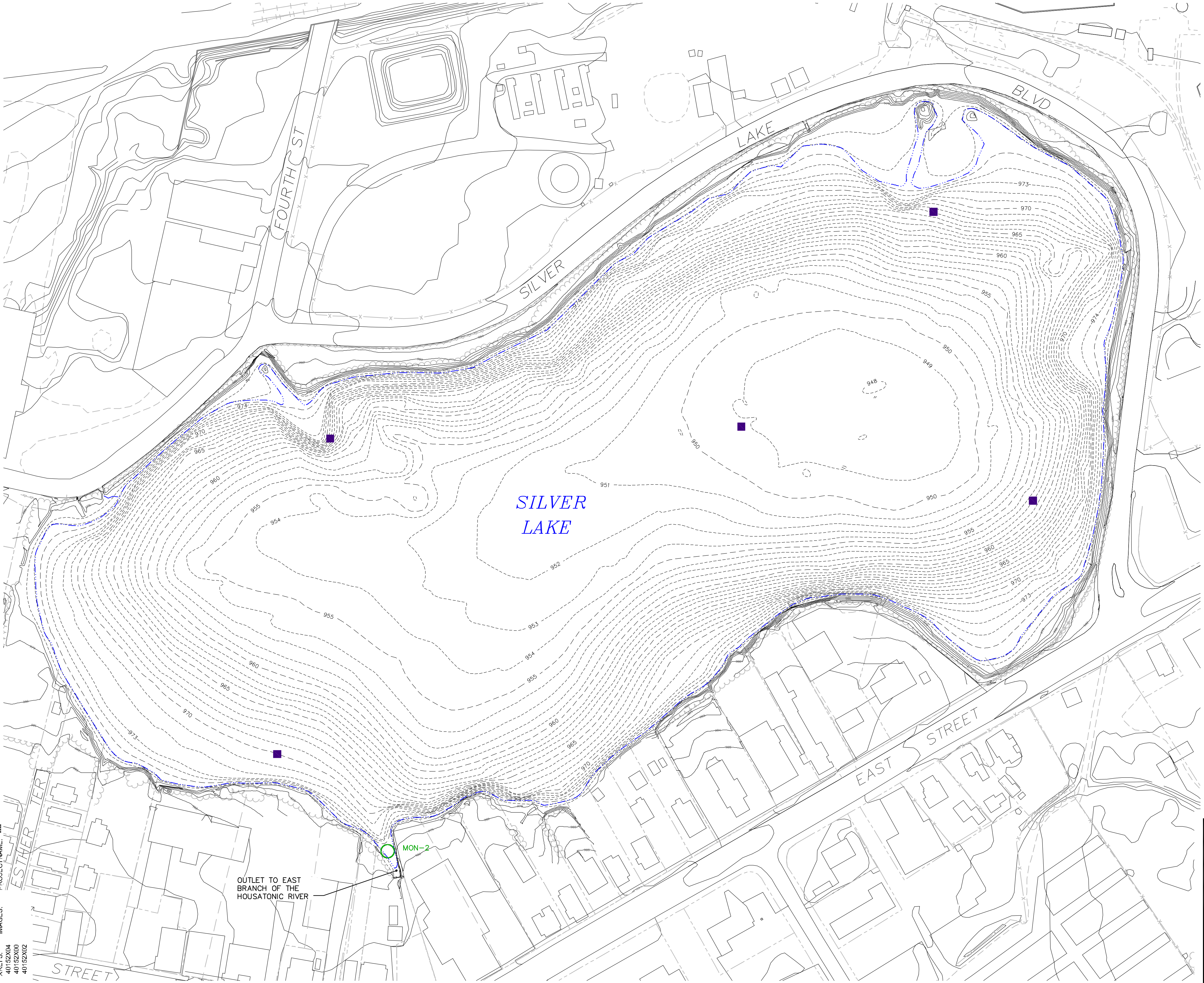
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

TYPICAL CORE SECTION

ARCADIS

FIGURE
4-3



LEGEND:

- MEAN WATER ELEVATION (975.9) (APPROX.)
- PAVED ROADWAY
- VEGETATION
- FENCELINE
- GUARDRAIL
- ELEVATION CONTOUR (HILL ENGINEERS)
- SILVER LAKE ELEVATION CONTOUR
- PROPOSED SEDIMENT TRAP LOCATION
- PROPOSED LONG-TERM WATER MONITORING LOCATION

NOTES:

1. BASE MAP INFORMATION ADJACENT TO SILVER LAKE MODIFIED FROM ELECTRONIC FILE OF SURVEYS PERFORMED BY HILL ENGINEERS, ARCHITECTS AND PLANNERS IN 2006 AND 2008. OTHER BASE MAP INFORMATION PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS.
2. ALL LOCATIONS ARE APPROXIMATE AND NOT ALL PHYSICAL FEATURES MY NOT BE SHOWN.
3. BATHYMETRIC CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10–13 JUNE 2003.

0 80' 160'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
CONCEPTUAL RD/RA WORK PLAN - SILVER LAKE SEDIMENTS

PROPOSED LONG-TERM MONITORING SEDIMENT TRAP LOCATIONS

ARCADIS

FIGURE
4-4

ARCADIS

Appendices

ARCADIS

Appendix A

Materials and Performance Specifications

Appendix A
Construction Materials and Specifications

Silver Lake Conceptual RD/RA Work Plan
Pittsfield, Massachusetts

1. Isolation Layer Materials

A. Granular Isolation Layer Material

- **Use** – Isolation layer, composed of a mixture of sand and topsoil, placed over sediment.
- **Specification**
  - – Approximate grain size distribution:
    - 5% Gravel; 75% Sand; 20% Silt/Clay.
  - – Average Minimum Total Organic Carbon (TOC):
    - 10,000 parts per million (ppm).
- **Testing Frequency**
  - – TOC:
    - Once every 500 cubic yards (cy) prior to placement.
  - – Polychlorinated Biphenyls (PCB) and grain size:
    - Once every 2,000 cy prior to placement.
  - – Appendix IX+3:
    - Once every 5,000 cy prior to placement.

2. Armor Layer Material

A. Armor Stone

- **Use** – Protective armor stone placed along shoreline in vicinity of water line.
- **Specification** – Angular poorly-graded rip rap:
    - East Shore: D_{50}: 6-inches, D_{100}: 8-inches.
    - West Shore: D_{50}: 3-inches, D_{100}: 5-inches.
- **Testing Frequency** – Particle Size :
    - Once.

B. Gravel and Sand

- **Use** – Habitat layer placed over underwater extent of armor stone.
- **Specification** – Well graded gravel and sand:
    - 3-inch minus.
- **Testing Frequency** – Particle Size:
    - Once.

C. Woven Geotextile

- **Use** – Installed between sediment/banks soils and armor layer.
- **Specification** – Mirafi 100-X or equivalent.
- **Testing Frequency** – None.

ARCADIS

Appendix B

Armor System Design Methodology

Appendix B
Armor System Design Methodology

Conceptual RD/RA Work Plan for Silver Lake Sediments
Pittsfield, Massachusetts

As described in the Pre-Design Investigation Report for Silver Lake Sediments (Sediments PDI Report; BBL, 2003), the predominant cause of bank erosion (if any) in Silver Lake appears to be wind-driven wave action. To maintain the integrity of the Silver Lake cap, measures will be incorporated to protect the cap from such naturally occurring erosive forces. This Appendix to the *Conceptual RD/RA Work Plan for Silver Lake Sediments* (Work Plan) presents the recommended armor layer configuration for installation on top of the sediment cap in the vicinity of the water line.

In general, the Silver Lake bank armoring system was designed using standard United States Army Corps of Engineers (USACE) guidance for the protection of river and lake banks, channel bottoms, and shorelines. Specifically, the Shore Protection Manual (SPM; USACE, 1984) presents a series of calculations incorporating site-specific environmental conditions, including (but not limited to) prevailing winds and wind speeds; to conservatively estimate the location adjusted wind stress factor. Additional site-specific environmental conditions including (but not limited to) bank slopes, predominant fetch, and water depth were assessed with Technical Release No. 69 (TR-69), published by the United States Department of Agriculture (USDA; USDA 1983), and used in conjunction with the wind stress factor calculated using the SPM. These combined methods result in a conservative estimate for median armor stone size and subsequent armor layer thicknesses for protection from erosion and material loss.

Using the design references listed above, the armor system has been conservatively designed to protect the cap from wind-driven waves associated with a 100-year wind event. Note that because predominant winds on Silver Lake are from the west/northwest, two armor layer design dimensions have been prepared. As shown on Figure 3-8 of the Work Plan, the lake has been divided into two sections labeled as the East Shore and West Shore Armor Configurations. The East Shore Armor Configuration encompasses the entire eastern shore of Silver Lake, and much of the southern shore. The West Shore Armor Configuration encompasses the entire western and northern shore of Silver Lake, as well as the remaining portion of the southern shore in the southwest corner of the lake. As presented in the Sediments PDI Report, the predominant wind is from the west/northwest, and longest length of Silver Lake is in the East/West direction, and as such a more robust armor system has been designed for the section of shore that routinely faces the predominant wind (East Shore Armor Configuration).

Wind Data Analysis

As part of the PDI, wind data was analyzed from three nearby locations:

- Albany International Airport;
- Hartford Bradley International Airport; and
- Pittsfield NOAA Wind Gauge.

All three data sets showed that the predominant winds are west/northwest with wind maximum observed speeds exceeding 40 miles per hour (mph). The Albany and Hartford records contained daily wind speed and direction records spanning 19 years (1965-1983) (NCDC, 2001a and 2001b). The Pittsfield record was relatively new and spanned only 4 years (1999-2003). Due to its proximity to Pittsfield and the robustness of the data set relative to the NOAA wind gauge, the Albany wind data was used in the calculations used to estimate armor system design.

To create a conservative armor system, wind data associated with the fastest mile wind speeds from 100-year return period storms was used, with analysis focused on the easterly and westerly wind data (i.e., along the longest length of the lake), thereby assuming worst case scenarios. Specifically, for design of the Silver Lake armor system, the maximum fastest mile easterly and westerly wind speeds of 37 and 59 miles per hour (mph), respectively, as projected for the Albany airport, were selected for use in design calculations for the armor layer on the western and eastern shores, respectively.

As discussed in the *Pilot Study Work Plan for Silver Lake Sediments* (PSWP; BBL, 2006), the methodology to determine the design wave and resultant armoring requirements considers several factors including fetch length and wind speed (as briefly discussed above), water depth, and wind duration. Wind Stress was determined using the SPM, a similar method to that which is described in detail in the PSWP. This information was then used to determine fetch, wave growth, and armor stone diameter based on the more detailed specifications set forth in TR- 69. Below is a summary of the calculations performed to determine the two armor stone configurations for the banks of Silver Lake.

Wind Stress Determination

Using fastest mile westerly wind data from the Albany Airport, wind stresses, and resultant wave heights were determined by applying a series of calculated adjustments to estimate maximum wind speeds for Silver Lake. The following steps detailed in the SPM were used to develop a site-specific wind stress parameter:

1) Elevation Adjustment

2) One-Hour Wind speed Adjustment

3) Stability Adjustment

4) Location Adjustment

5) Drag Adjustment

As detailed in the PSWP, the overall wind velocity (U_W) can be related to the overland wind velocity (U_L) using the following formula:

$$U_W = 0.589 \cdot \left(R_L \cdot R_T \cdot \frac{U_L}{1.29} \cdot \left(\frac{32.8}{z} \right)^{1/7} \right)^{1.23}$$

Where: U_L = selected fastest mile overland wind velocity

R_L = Ratio of Wind speed over water to wind speed over land (0.9; USACE, 1984)

R_T = Correction Factor for air-water temperature differences (1.1; USACE, 1984)

z = adjustment factor to represent Silver Lake conditions ~20 ft

Using 59 mph as the fastest mile overland westerly wind velocity for the design calculations for the eastern shore armor layer design produces U_W of 69.9 mph. An overall wind velocity for the western shore armor layer design can be calculated as 39.4 mph for U_W using 37 mph as the fastest mile overland easterly wind velocity. The design wind velocity (U_D) will be set equal to U_W for this Site.

Fetch Determination

Fetch is defined as the length of the unobstructed open water surface across which the wind can generate waves (National Oceanic and Atmospheric Administration [NOAA], 2001). As applied to the conceptual design of the cap, for an irregularly shaped body of water, an effective fetch (Fe) can be calculated through a technique outlined in TR-69. Using this technique, a central radial is drawn across the longest distance of open water in the average wind direction. Seven radials are then drawn on either side of this central radial at 6° intervals. The length of each of these 15 radials (X_i) is recorded and multiplied by the square of the cosine of the angle between the individual radial and the central radial ($\cos^2\alpha$). The effective fetch can then be calculated as

$$F_e = \frac{\sum (X_i \cdot \cos^2 \alpha)}{\sum \cos \alpha}$$

Using this method, the maximum fetch length determined for the eastern shore armor layer design was approximately 985 feet (0.19 miles). The maximum fetch length determined for the western shore armor layer design was approximately 816 feet (0.15 miles).

Wave Growth

Finally, a design wave height to be carried forward in armor stone calculations can be estimated as follows:

$$H = \frac{0.0026 \cdot (U_D)^2 \cdot \left(\frac{g \cdot F_e}{(U_D)^2} \right)^{0.47}}{g} \quad \text{(USDA, 1983)}$$

Where: g = gravitational acceleration (32.2 feet/s^2)

H = design wave height (feet)

U_D = wind speed/stress factor (feet/s)

F_e = fetch length (985 feet for eastern shore design, 816 feet for western shore design)

Solving for *H*, a design wave height of 1.4 feet will be carried forward for use in calculation of armor stone size and layer thickness for the eastern shore armor layer design, and a wave height of 0.7 feet will be carried forward for the western shore armor layer design.

Median Armor Stone Diameter (D_{50}) Determination

A design wave height was determined using methods described above. The corresponding armor stone size that is required to yield the level of protection necessary for the shoreline was calculated using the Hudson equation:

$$W_{50} = \frac{19.5 \cdot G_s \cdot H^3}{(G_s - 1)^3 \cdot \cot\phi} \quad \text{(USDA, 1983)}$$

Where: W_{50} = median weight of individual armor unit

γ_r = unit weight of armor material (165 lbs/ft^3)

γ_w = unit weight of water (62.4 lbs/ft^3)

$G_s = \gamma_r / \gamma_w$ = specific gravity of armor material

H = design wave height (1.4 feet for eastern shore design, 0.7 feet for western shore design)

$\cot\phi$ = angle between seaward structure slope and horizontal (3 for slope of 3H:1V)

Slope calculations were conducted for over 50 transects around Silver Lake, and on average the West shore area used for design calculations has a shallower slope than that of the East shore area. However, for the purpose of this design, a conservative estimate of 3 was used for the slope of the banks of Silver Lake in calculations for both the East and West shore armor stone systems. Solving the above equation for W_{50}, the median weight of an individual armor unit for the eastern shore is 11.3 lbs, and the median weight of an individual armor unit for the western shore is 1.4 lbs.

By using the unit weight of armor material, as noted above, the median stone volume (V_{50}) for the eastern shore is calculated to be 0.0025 cy, and for the western shore the stone volume is calculated to be 0.0003 cy. The median stone diameter (D_{50}) can be calculated by assuming a stone geometry. For conservative estimates, the stones are assumed to be spherical (D_{50s}) and then cubical (D_{50c}), as follows.

$$D_{50s} = \sqrt[3]{\frac{6 \cdot V_{50}}{\pi}} \quad , \quad D_{50c} = \sqrt[3]{V_{50}} \qquad \text{(USDA, 1983)}$$

From this, the median stoned diameter (D_{50}) can be calculated by averaging together the two values and rounding up to produce a design D_{50} of approximately 6 inches for the eastern shore and 3 inches for the western shores.

Finally the process outlined in TR-69 indicates that the extent of stone cover below the mean waterline is assumed to be 1.5 times the wave height (H), or approximately 2.1 feet for the eastern shore and 1.1 feet for the western shore. Additionally, the extent of stone cover above the mean waterline is the sum of two quantities: the wave run-up (R) and the wave set-up (S). S is assumed to be 0.1 times H. R can be calculated using Figures 11 and 12 in TR-69. By combining these two values, the extent of stone cover above the mean waterline is approximately 1.9 feet for the eastern shore, and 1.0 feet for the western shore, for a total of approximately 4 feet and 2 feet of stone cover respectively.

As outlined in TR-69, the rock riprap layer thickness is commonly approximated as two times the D_{50} size of rock, which yields a conservative thickness of approximately 12 inches for the eastern shore, and 6 inches for the western shore.

Summary Results

Following the steps detailed above, the following table summarizes the key assumptions of the calculations, as well as the median stone weight (W_{50}), diameter (D_{50}), layer thickness, and vertical extent of the armor layer above and below the mean surface elevation (MSE; 975.7 feet).

Summary of Calculation Results

Specification	East Shore Design	West Shore Design
Maximum Overland Wind Speed (mph)	59	37
Design Wave Height (ft)	1.4	0.7
W_{50} (lbs)	11.3	1.4
D_{50} (in)	6	3
Layer Thickness (in)	12	6
Extent Above/Below MSE (ft)	1.9/2.1	1.0/1.1

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