CONCEPTUAL DESIGN REPORT

ROCK RIVER CHANNEL WATERWAY IMPROVEMENT PROJECT

Prepared For:

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1.0 INTRODUCTION

1.1 EXECUTIVE SUMMARY

Stantec Consulting Services Inc. (Stantec) and Foth Infrastructure and Environment, LLC (Foth) have prepared this Conceptual Design Report (CDR) for the Rock River Channel Waterway Improvement Project on behalf of the Lake Sinissippi Improvement District (LSID). This report includes conceptual design elements associated with proposed waterway restoration and enhancement, stabilization of existing shoreline, and river channel navigation improvements within the study area. The study area includes the Rock River channel extending approximately 2 miles downstream from the County Trunk Highway (CTH) S Bridge to a point near the end of Lehman Cottages.

To supplement existing site information, this CDR presents additional data collected to guide the design concepts. Additional data includes: a review of historic aerial photography, bathymetric measurements, topographic survey, sediment sample collection and analysis, geomorphologic assessment, and hydraulic analysis of the study area.

This report is intended to build from previous Lake Sinissippi studies including the Engineering Alternatives Report prepared by the U.S. Army Corps of Engineers (USACE) in 2009. The USACE study identified multiple engineering approaches to address sedimentation accumulation and loss of aquatic habitats within the study area. The preferred alternative concept outlined by the USACE was approved by the LSID and is used as the basis for development of this CDR.

In collaboration with LSID, a conceptual design plan has been prepared with a focus on habitat enhancements, navigation dredging, shoreline stabilization and beneficial in-lake use of sediment for restoration and maintaining sediment transport. The proposed improvements outlined in this CDR will be constructed in phases focusing on the Lehman Cottages area (Phase 1). Phase 1 proposes navigational dredging and construction of a peninsula extension, two rock vane structures, and three islands. The purpose of Phase 1 is to focus activities in the area of greatest need and complete post-construction monitoring and adaptive management to guide future enhancements. Phase 2 will include construction of the remaining project features including additional dredging, island creation, habitat enhancements, and channel improvements.

The conceptual design elements have been developed in conjunction with the LSID and discussed with representatives from the Wisconsin Department of Natural Resources (WDNR) during meetings initiated by the LSID. Prior to construction of this project additional engineering design, grant funding, and permitting would be required.

1.2 PROJECT DESCRIPTION

Lake Sinissippi is a man-made impoundment of the Rock River located in Dodge County, Wisconsin (Figure 1.1). The lake was created in 1845 when a log dam was constructed. In 1939, a concrete dam replaced the wooden dam and raised the water levels 1.4 feet to its present elevation. The lake is approximately 3,000 acres and has a watershed of 500 square miles. Within the watershed land use is predominantly agriculture which contributes to water quality impairments from non-point source pollutants of sediment and nutrients. The watershed includes the cities of Horicon, Juneau and Mayville and several smaller communities, each of which has a municipal wastewater discharge. Lake Sinissippi and the Rock River are on the US EPA 303(d) list of impaired waters for high levels of sediment and phosphorus.

The ecology of the river channel and basin has changed since construction of the impoundment. Slowing of the river current has resulted in excessive sedimentation of the lake basin. A majority of the sediment load comes from the Rock River. The aggraded sediment layer ranges in thickness from 1 to 12 feet. Deep holes in the bottom of the river channel are 15 feet in depth but are now filled with 12+ feet of sediment.

Sedimentation has impacted recreational boating and navigation is restricted in the river channel due to shallow water depth. Sediment deposits in environmentally sensitive areas for fish spawning and submergent vegetation have destroyed wildlife and aquatic habitat.

Water depths to the top of the sediment layer range from 2 to 8 feet with the average depth at 4 to 4.5 feet. Higher water levels, shoreline erosion and periodic flood conditions have led to loss of wetland fringe and shoreland recession, especially in the study area of the river channel. Part of the left descending river bank and associated wetlands have eroded completely.

Flooding in 2004 and 2008 further degraded habitat within the study area. High water levels and flows dislodged large areas of emergent floating and shoreline vegetation. Non-native fish including carp have also contributed to a degraded ecosystem by removing rooted vegetation, increasing turbidity, and reducing radiant penetration which degrades habitat for native aquatic species.

Numerous Lake Sinissippi studies have been commissioned by the LSID including 2009 USACE Engineering Alternatives Report (Attachment A). Figure 1.2 shows the location of the study area evaluated by the USACE and this CDR. The USACE study identified multiple engineering approaches to address sediment accumulation and loss of aquatic habitats within the study area. The improvements developed in this CDR further define the preferred alternative developed by the USACE and approved by the LSID. The CDR describes several elements to this project including dredging, constructed dredge spoil islands, rock vanes, constructed peninsula, and floating islands. The project will be constructed in phases to include two rock vane structures, peninsula, and three islands. One island will be wildlife habitat, one will serve as a campsite, and one island will serve as a floating emergent wildlife habitat. Alternate improvements including land spreading dredge material were not selected because of increased handling and disposal.

1.3 PROJECT TEAM

The Stantec/Foth team collaborated with LSID throughout the CDR development process. LSID staff provided fiscal responsibility for this project, historic knowledge, and leadership during the conceptual design. The Stantec/Foth team provided technical staff with regional and national expertise in dredging, ecosystem restoration, and permitting. The following team is responsible for this project:

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2.0 DATA COLLECTION AND ANALYSIS

As part of this task the team reviewed existing publicly available information and historical data provided by the LSID. Additional information was also collected to support the CDR. A summary of existing Lake Sinissippi reports and documents are provided in Attachment A. This section describes the results of additional data collection and analysis task.

2.1 HISTORIC AERIAL PHOTOGRAPHY

Historic aerial photographs were analyzed as part of the improvement plan to evaluate physical changes within the study area from 1940-2010. Table 1 summarizes major changes in the lake and river ecosystem. Attachment B presents copies of the historic aerial photographs.

TABLE 1. AERIAL PHOTOGRAPH ANALYSIS OF ECOSYSTEM CHANGES WITHIN THE STUDY AREA

Photo Year	Description of Ecosystem Changes
1940	The Rock River has natural flow and much of the surrounding area is emergent marsh. The river has sinuosity and a large oxbow lake within the study area. A land mass forming a peninsula on the north side of the channel near Lehman Cottage area is visible. Appears there is not a culvert on CTH S (east of the bridge). This area appears as wetland with a channel.
1950	Water levels appear higher following construction of the dam. A land mass forming a peninsula on the north side of the channel near Lehman Cottage area is visible. Appears culvert has been installed on CTH S; wetland is becoming open water and downstream loss of wetland is evident. The river channel is wider and has sinuosity. Emergent vegetation is beginning to be lost in the oxbow lake.
1956	Water levels remain constant. The river channel is wider and has less sinuosity. A land mass forming a peninsula on the north side of the channel near Lehman Cottage area is visible. Loss of emergent vegetation is observed in the oxbow lake and downstream of the CTH S culvert. Shoreline development has started and is nearing the study area.
1964	Water levels remain constant and continued loss of emergent vegetation is observed. Emergent vegetation previously connected to shoreline in the oxbow lake form islands. Loss of emergent vegetation downstream of the CTH S culvert form islands. The river channel remains constant in width and sinuosity. However, the peninsula north of Lehman Cottage area is eroded.
1971	The lake appears to have higher than normal water levels and loss of emergent vegetation in the oxbow lake. Continued loss of emergent vegetation downstream of the CTH S culvert. The river is wider and has less sinuosity. The peninsula north of Lehman Cottage area is eroded.
1981	Water levels appear lower and similar to pre-1971 photo conditions. The river channel and sinuosity is also similar to pre-1971 photo conditions. Emergent vegetation is re-established and appears greater than pre-1971 conditions.
1986	Water levels remain constant. Emergent vegetation in the oxbow is not present. Continued loss of emergent vegetation downstream of the CTH S culvert and channel is wider. The river channel and sinuosity remains constant.
2005	Water levels remain constant with continued loss of emergent vegetation. The river channel and sinuosity is changed due to additional shoreline erosion of the peninsula north of Lehman Cottage area. Downstream from the culvert the channel has widened with shoreline loss of emergent vegetation.
2010	Water levels remain constant. Continued loss of emergent vegetation and shoreline erosion is evident on the peninsula and downstream of the CTH S culvert. Directly south of the CTH S culvert the channel has widened.

2.2 BATHYMETRY

Foth mobilized a field crew on June 12-13, 2013 to collect bathymetric data using a sampling vessel. Seven transects were completed within the study area to supplement the 2005 bathymetric data (Figure 2). The transect locations are included in Figure 3. Bathymetric data was recorded with a Trimble RTK-GPS capable of sub-meter accuracy. Additional sediment data was collected along each transect with a poling rod to estimate top depth of soft sediment and top depth of hard bottom. The acquired data was used to generate cross sections of soft and hard sediment depths along the transects. The cross sections along Transects A, B, C, D, E, F and G are presented in Figures 4.1, 4.2, and 4.3.

After comparing the data from the 2005 bathymetric survey to the data collected in June 2013, it appears that there were only minor changes in sediment thickness and water depths. Changes in sedimentation did not have any correlation between the data collection events where some areas showed increased sediment and other areas showed decrease sediment depth.

2.3 TOPOGRAPHY

Stantec mobilized a survey crew to collect elevation data referenced to benchmarks associated with the Hustisford Dam and CTH S bridge. The vertical datum referenced is NGVD 1929 MSL and the horizontal datum is located in Dodge County Wisconsin County Coordinates. This data was collected with GPS in coordination with WISCORS VRS and robotic total station equipment. Collected information was used to support hydraulic modeling files using elevation and dimensional data for the culvert and bridge located on the north study area limits along CTH S.

Figure 5.1 presents the topographic data on the north end of Lake Sinissippi at the Rock River bridge and the culvert along CTH S. The data indicates that the approximate elevation of the raised roadway over the culvert is 866 feet; the invert elevation of the culvert on the north side of the road is approximately 855 feet; and 852 feet on the south side of the road. The culvert is approximately 62 inches in diameter and at the time of the survey was carrying a water depth of 2.5 feet. The approximate elevation of the CTH S bride is 868.8 feet on the west edge of the deck, 867.3 in the center of the deck, and 866.48 feet on the east edge of the bridge deck. The elevation of the water is approximately 856 feet. The span of the bridge is approximately 107 feet over the Rock River. Figure 5.2 presents the location of the control points on the south end of Lake Sinissippi.

2.4 RIPARIAN VEGETATION

Stantec conducted a field survey of plant communities within the study area. The survey was conducted by interpreting plant communities using 2010 aerial photography and field reconnaissance from a boat. Plant communities were hand drawn on a field map and digitized used GIS (Geographic Information System) software. Photographs of vegetation types and shoreline condition were taken as part of the vegetation survey (Attachment C).

Figure 6 presents a map of the plant communities identified within the study area and the location/direction of photographs. The data indicates four primary plant community types; upland, wetland, mixed, and floating vegetation. The upland plant community consists of oak and hickory forest along with a mixed shrub layer. The wetland is dominated by rooted vegetation including cattail, red osier dogwood, black willow, and green ash. The mixed vegetation is a mixture of wetland and upland species along the shoreline with rooted trees and shrubs common. The floating vegetation is dominated by cattails.

2.5 RESTORABLE WETLANDS

Stantec completed a GIS analysis using WDNR datasets to evaluate potentially restorable wetlands (PRWs) within an area around Lake Sinissippi. This analysis included potentially drained hydric soils in agriculture production that are not currently mapped as wetlands on the Wisconsin Wetland Inventory. This information can be used for future planning to improve water quality through wetland restoration.

Figure 7 presents the results of this analysis showing PRWs located throughout the area. Restored PRW areas located in close proximity to existing waterways have the greatest potential to improve water quality.

2.6 SEDIMENT

Sediment sampling was performed on June 12-13, 2013, along the seven survey transects to supplement previous sediment information. Up to four sediment cores were collected along each transect with a vibrocore (VC) (Figure 3). The VC, which was deployed from a specialized sample vessel, allows undisturbed samples of soft sediment to be collected from the top of sediment down to bedrock or other stiff material. Representative soft sediment from each core within a transect was combined resulting in one composite sample for each of the transects except transect C-C'. If distinctive soil classifications were observed at a sediment sample core location, sample intervals may have been split to obtain layer specific data relating to the observed silt, sand or clay layers. Sediment samples were submitted for laboratory analysis of grain size, moisture content and organic content.

The laboratory analytical data and summary table are included in Attachment D. The data indicates the average sample contained 39.7% silt and 22.2% clay sized material. Silt percentages ranged from 5.7% to 53.5%. Clay percentages ranged from 3.3 to 39.0%. Organic matter content averaged 11.0% and ranged from 1.2% to 26.9%. Seven of the thirteen samples were classified as organic silt (OL) by the Unified Soil Classification System. Other classifications include poorly graded sand to silty sand (SP-SM), silt (ML), silty sand(SM), and clay (CL).

This physical sediment data will be used during future design phases of the project to estimate sediment dewatering characteristics and settling properties. The data will also be used to assist with future design by providing the characteristics of the sediments to estimate the subgrade sediment strengths for geotextile tube placement.

2.7 GEOMORPHOLOGY

Geomorphology plays an important role in the history of Lake Sinissippi. Stream mechanics (discharge and sediment transport) is a geomorphic response to system inputs. These inputs define the form and function of the Rock River within the study area.

Historically the Lake Sinissippi impoundment was a natural free-flowing river with the ability to carry sediment. Management of this impoundment as a lake provides attenuation and storage of flow and sediment. The Lake Sinissippi impoundment and contributing watershed has a long history of agriculture land uses therefore the hydrologic inputs and supply of sediment have remained relatively constant over the last fifty years, varying only with fluctuation in climate. Inherently, the matter of moving sediment through this existing impoundment is a problem that should be considered in the context of long term water quality improvement goals for the watershed.

A 2003 study analyzed US Geological Survey data from stream gaging stations in Horicon, Hustisford and Dead Creek tributary to estimate a sediment budget for the years 1999-2002. Sediment flux in large impoundments such as Lake Sinissippi varies from year to year. In 2002 the outgoing sediment load exceeded the incoming load, while in other years net sediment was retained within the basin and deposited in the river channel and lake.

Stantec completed a geomorphologic assessment within the study area which included collecting and evaluating hydraulic geometry data. Using a survey-grade GPS (TopCon GR-5 base station and rover) and an FC-2500 handheld data collector, various data were collected regarding the location and elevation of specific features including:

- Detailed surface and bathymetric cross sections in areas where the channel exhibited constrictions/hydraulic controls.
- Water surface elevation profile
- Wetland and upland boundaries

Using RIVERMorph© stream assessment software, the cross sections and profile data were evaluated for stability, hydraulic performance and sediment capacity. Consistent with field observations, the evaluation suggests that left unmanaged, aggradation will continue unless active management measures were taken. A more refined understanding of the existing conditions and possible management strategies require an understanding of the current system hydraulics as described in Section 2.8.

Lake management considerations may also include an assessment of entrained sediment transport from the project area to the lake basin and the effect of the limestone bedrock ledge near the lake outlet on sediment retention within the basin.

2.8 HYDRAULIC

Stantec developed a model (HEC-RAS 4.1.0) to serve as a baseline hydraulic condition to compare proposed hydraulic conditions. The model developed for the Hustisford Dam, Dam Failure Analysis (Bonestroo, 2011) was used to assess initial hydraulics. Additional flow information in the area of the CTH S channel was obtained and inputted into the model to review the split flow in this area. The model output data will facilitate the evaluation of the effect of the restoration design on the floodplain/floodway for future permitting. Further, the proposed condition model was used as a design discharge validation tool.

Sediment transport is a complex geomorphic process dependent on many factors, among them: l) availability, or supply, of sediment, 2) physical properties of the supply (particle size, gradation, and cohesiveness), 3) flow frequency/duration, 4) conveyance storage (volume) and 5) conveyance geometry and associated hydraulics (dimension, profile and pattern). As a result of these factors, a conveyance possesses transport properties of competency (ability to transport a given size of material) and capacity (ability to transport a volume of given supply) for a given discharge.

The competency can be evaluated in terms of tractive force shear stress, or τ, (lbs/ft^2):

$\tau = \gamma RS$ where:

1) γ = specific weight of water, 62.4 lbs/ft,
2) R = hydraulic radius, represented by flow depth in ft, and
3) S = energy grade slope ft/ft)

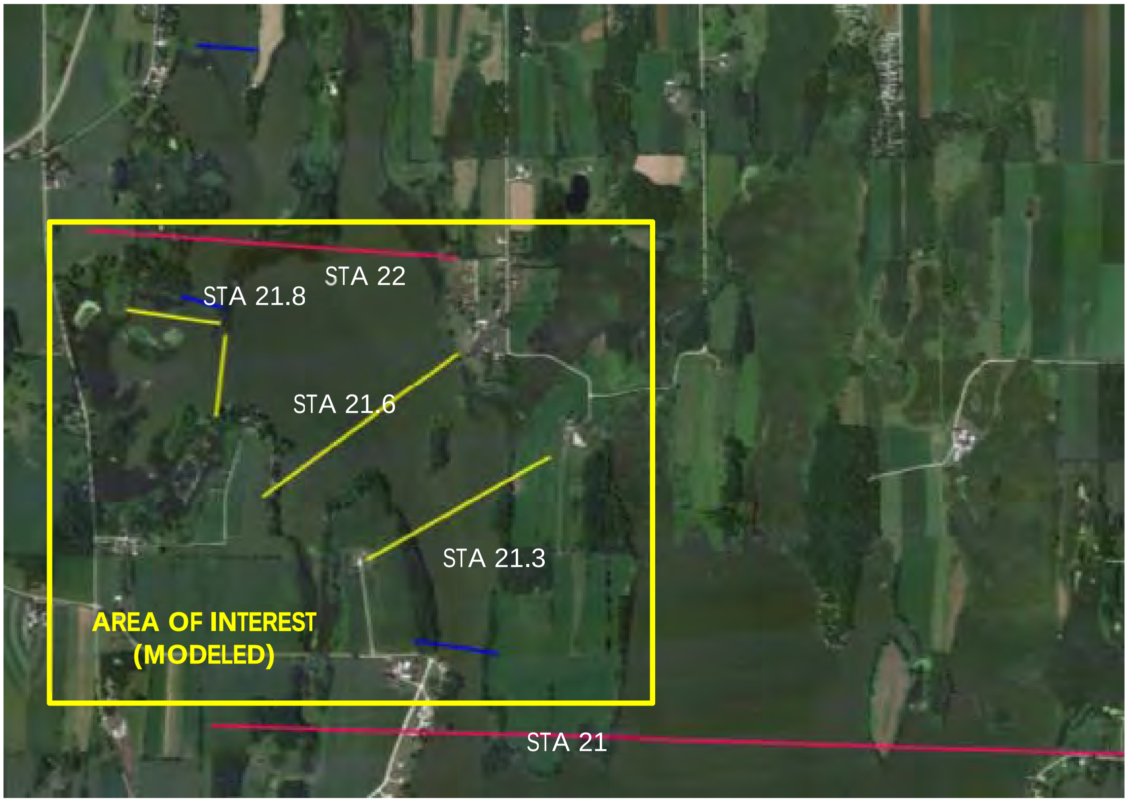
The capacity can be evaluated in terms of unit stream power, or ω_a (lb/ft-s):

$\omega_a = \tau u$ where:

1) τ = shear stress (lbs/ft^2), and
2) u = mean velocity (ft/s)

The conveyance properties of shear stress and stream power variations in channel geometry result in variations of these properties.

Using the previously developed HEC-RAS model to establish the overriding hydraulic context, additional conveyance cross section data (collected during geomorphic assessment) was evaluated. The CTH S culvert was determined to be non-material to flow dynamics in the project area. The various cross sectional data was inserted into the model geometry (Drawing 1). The flow conditions were modified to reflect uniform flow (as opposed to the previous gradually varied flow) and the boundary conditions adjusted to normal depth upstream and critical depth over the dam downstream.



Drawing 1 – LOCATION OF CROSS SECTION DATA

The HEC-RAS output of the existing condition and the proposed condition was evaluated for potential changes in these indicators to understand sediment transport.

Table 2 summarizes the results of the pre- and post-conceptual treatment indicating a trend in changes to sediment transport competency and capacity. Under the proposed conditions, the cross section at HEC-RAS River Station 22 underwent a small increase in depth (reflected by the water surface elevation), a decrease in energy slope, and a decrease in velocity. Given the above relationships for competency and capacity, we anticipate that if constructed as shown, the proposed conditions could result in slightly decreased capacity contributing to increased deposition. Because of the increased likelihood of deposition, the proposed placement of vane structures within the waterway would promote hydraulic conditions intended to localize deposition.

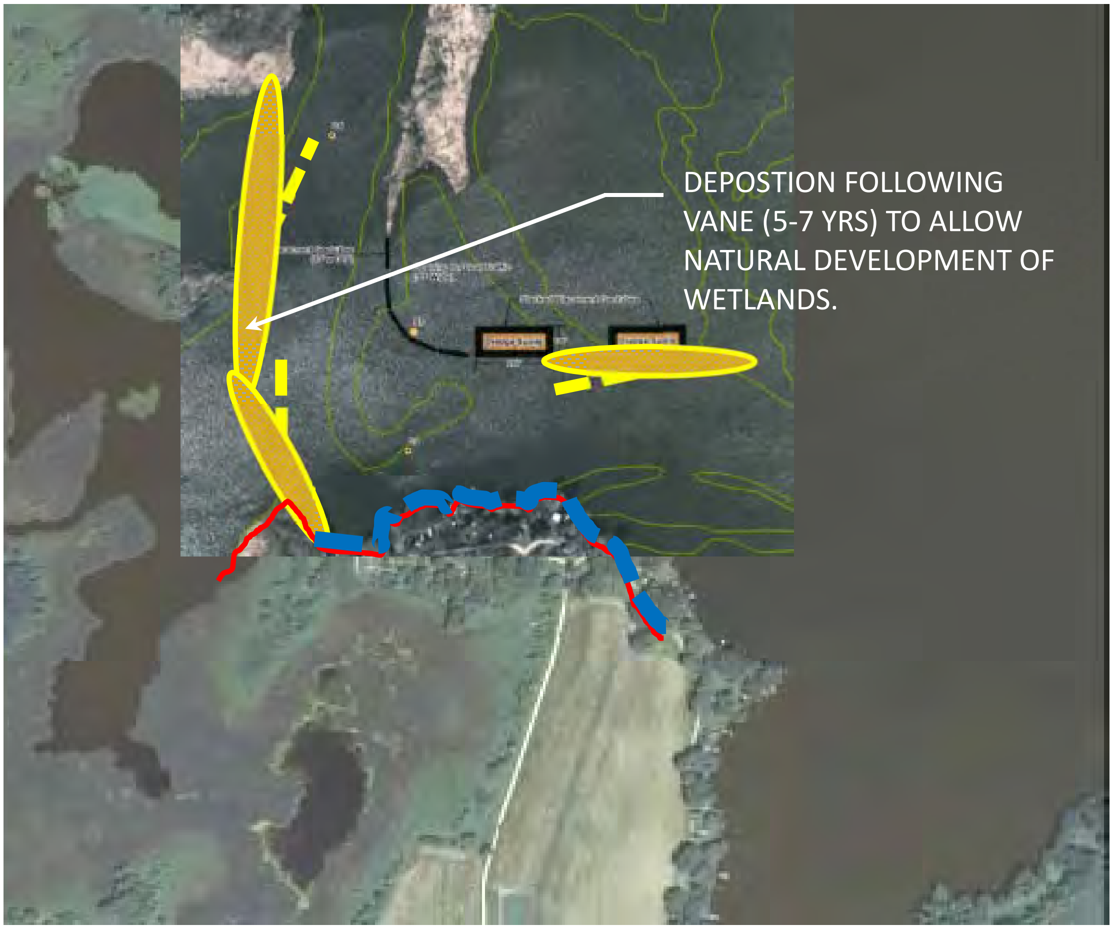
TABLE 2. CHANGE IN HYDRAULIC PROPERTIES FROM EXISTING CONDITIONS TO PROPOSED CONDITIONS

HEC-RAS River Station	Recurrence Interval	Flow Bed (dsl)	Channel WSEL(ft)	Increase in Energy	% Change in Slope	Change in Average Velocity (ft/sec)
22	2-YR	1900	850.35	0.14	-18%	-0.01
22	5-YR	2210	850.35	0.15	-15%	-0.01
22	10-YR	2230	850.35	0.16	-15%	-0.01
22	25-YR	2650	850.35	0.16	-14%	-0.01
22	50-YR	2960	850.35	0.16	-11%	-0.01
22	100-YR	3270	850.35	0.15	-9%	0
21.8	PF 1	1900	849.8	0.16	-8%	-0.02
21.8	PF 2	2210	849.8	0.17	-9%	-0.02
21.8	PF 3	2230	849.8	0.17	-8%	-0.02
21.8	PF 4	2650	849.8	0.17	-7%	-0.01
21.8	PF 5	2960	849.8	0.17	-7%	-0.02
21.8	PF 6	3270	849.8	0.16	-6%	-0.01
21.6	PF 1	1900	845.6	0.15	167%	0.09
21.6	PF 2	2210	845.6	0.15	167%	0.1
21.6	PF 3	2230	845.6	0.15	167%	0.1
21.6	PF 4	2650	845.6	0.16	167%	0.1
21.6	PF 5	2960	845.6	0.15	167%	0.11
21.6	PF 6	3270	845.6	0.15	167%	0.11
21.3	PF 1	1900	845.6	0.11	1100%	0.42
21.3	PF 2	2210	845.6	0.11	1200%	0.46
21.3	PF 3	2230	845.6	0.12	1200%	0.46
21.3	PF 4	2650	845.6	0.12	1333%	0.51
21.3	PF 5	2960	845.6	0.11	1000%	0.53
21.3	PF 6	3270	845.6	0.1	1025%	0.55
21	PF 1	1900	852	0	0%	0
21	PF 2	2210	852	0	0%	0
21	PF 3	2230	852	0	0%	0
21	PF 4	2650	852	0	0%	0
21	PF 5	2960	852	0	0%	0
21	PF 6	3270	852	0	0%	0

Under the proposed conditions, the cross sections at HEC-RAS River Stations 21.6 and 21.3 (also referred to as X-Section D-D' and X-Section E-E' on Figure 3) reflected the greatest difference in cross sectional geometry and as a result the greatest change in transport properties. From this data, we anticipate that if constructed as shown in the conceptual design, we would expect increased competency, increased capacity, and an overall increase in the channel's ability to maintain navigable depths. However, the increased transport throughout this reach means that the downstream sections should expect to receive additional sediment.

Under the proposed conditions, the cross sections at HEC-RAS River Station 21 remains unchanged and the water surface largely a function of the upstream backwater effect of the downstream dam. As a result, we anticipate the unaltered reach at and around HEC-RAS River Station 21 to experience deposition. Due to increased transport, hard and soft armor treatment may be required along the right bank through this reach.

Based on model results and knowledge of general stream mechanics (cross sectional distribution of energy), Drawing 2 illustrates speculative areas of sediment deposition.



Drawing 2 – ANTICIPATED AREAS OF SEDIMENT DEPOSTION

2.9 STREAMBANK

Erosion of historic streambank areas has been ongoing in the study area since construction of the impoundment. Historic photographs, presented in Attachment B, documents the loss of the streambank associated with the peninsula on the north side of the channel near the Lehman Cottage area. Photographs from 1940 to 1971 indicate continued loss of streambank associated with this peninsula. Photographs from 2005 and 2010 show loss of a large portion of this peninsula. Removal of this peninsula has altered water flow and sediment deposition in the study area.

Stantec conducted both streambank erosion and mass wasting analysis within the study area during the geomorphic analysis. The analysis was completed to evaluate existing condition using visual observations and protocols outlines in standardized assessment methods including: a Bank Erosion and Hazard Index (BEHI), the “Watershed Assessment of River Stability and Sediment Supply (WARSSS)” (Rosgen, 2006) and the BANCS (Bank Assessment for Non-point Source Consequences of Sediment) analysis. No evidence of bank erosion or near shore shear stress (mass wasting, bank failure) were noted along the survey segments. Many of the streambanks observed were reinforced with rip-rap and/or large rocks or cobbles. Vegetated streambanks were also observed. The vegetated banks were considered stable by the presence of shrub and tree growth and associated subsurface root structure. Additionally, the water surface elevation within the study area was unusually high due to abnormal spring rain events. Given the bank conditions observed within the study area (vegetated, bank armor, low bank slope, etc.), it does not appear that bank erosion is an issue under current conditions within the study area. However, improvements to rechannelize flow in the study area will require implementing protective measures in areas prone to erosion.

3.0 CONCEPTUAL DESIGN

This section highlights the overall concept design developed for the study area. The concepts include design elements developed in conjunction with LSID and initial WDNR consultation.

The goals of the conceptual design include:

1) Restore and protect wetland and shoreline habitat
2) Improve navigation
3) Beneficially reuse sediment from river channel to reduce downstream migration of sediment to lake basin
4) Enhance the natural aesthetics
5) Improve recreation

The CDR has divided this project into a minimum of two achievable phases to enhance funding opportunities and stage future enhancements (Figure 8.1). The first phase includes the area near Lehman Cottages as shown in Figure 8.2. The final build out which includes implementing the remaining enhancements using adaptive management strategies.

Phase 1 incorporates an area of primary importance, where review of historical aerials indicates the most significant loss of aquatic, open marsh, and upland habitat. This area also exhibits the greatest need for navigation improvements and provides access for future enhancements

Phase I will consist of the following elements:

1) Construction of an access road for material movement and serving as the "backbone" of the peninsula improvement.
2) Dredging and beneficial reuse of sediment to construct a continuation of the peninsula using a combination of geotextile and natural materials to provide a stable base upon which a biological community may be established.
3) Construction of rock vanes using a combination of geotextile tubes and stone (varying by specific structure placement) will serve to redirect flow energies and effectively "turn" the flow while providing for more efficient transport of sediment out of the main channel and deposition along the exterior.
4) Installation of shoreline protection which will minimize potential future erosion and promote more efficient transport of sediment.

3.1 DREDGING

The conceptual design focuses on the beneficial reuse of dredged sediment for habitat, island, and shoreline restoration. The use of hydraulic dredging methods and strategic in-river placement of geotextile tubes to receive the dredged sediment had previously been identified by LSID as a viable method for beneficial reuse of dredge material and habitat restoration.

The dredging considered for development of concepts identified in this CDR include returning or maintaining the historical navigation areas (in the focus area) of the lake to a suitable depth for recreational boat traffic. Sediment removal in conjunction with a restored river channel profile will increase velocity of flow to scour sediment from the channel on a sustainable basis.

The conceptual design consists of a phased dredging approach. Phase 1 consists of hydraulic dredging approximately 17,000 cubic yards of sediment and placement of that material into approximately 2,000 linear feet of strategically placed geotextile tubes. The geotextile tubes will serve to restore/extend the tip of the peninsula to conditions similar to what existed decades ago as well as to protect the peninsula from future erosion. Geotextile tube placement during this initial phase will also result in island creation extending outward from the peninsula to the east. The tubes will be arranged in manner such that natural island profiles and configurations present in other locations within the impoundment are mimicked. Phase 2 will utilize lessons learned from Phase 1 and consist of dredging approximately 20,000 cubic yards of additional sediment and placement of approximately 2,000 feet of additional geotextile tubes, establishing a chain of islands moving east from the peninsula.

3.2 GEOTEXTILE TUBE STRUCTURE

The sediment dredged for navigational improvement will be placed in geotextile tubes and serve as a beneficial structure for habitat restoration. The geotextile tubes will be filled and the structures will remain within the lake. The geotextile tube structures will be armored with rock where potential currents or wave action are a concern. Suitable soil cover will be placed over the geotextile tube structures to allow for the establishment of desired vegetative cover. The three types of geotextile tubes structures proposed include the following:

1) A single geotextile tube serving as access road component or shoreline protective barrier (Figure 9A). Multiple geotextile tubes serving as the perimeter of an island which would eventually be filled with additional dredged material to restore wetlands, islands and wildlife habitat. (Figure 9B).
2) Multiple geotextile tubes serving as the perimeter of an island which would eventually be filled with additional dredged material (Figure 9B). Multiple geotextile tubes placed side by side serving as the interior and exterior of an island for recreational purposes, including primitive campsites for canoeists and kayakers. (Figure 9C).
3) Multiple geotextile tubes placed side by side serving as the interior and exterior of an island for recreational purposes, camping etc. (Figure 9C).

3.3 VANE CHANNEL STRUCTURE

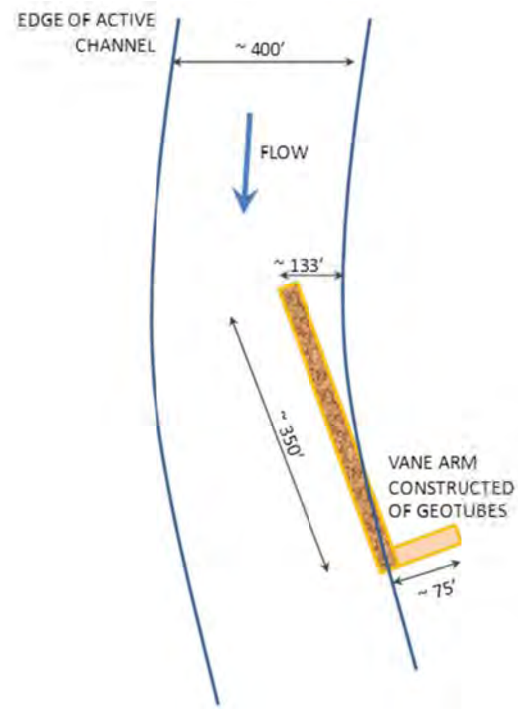
In-stream flow structures, or vanes, are intended to direct flow energies toward the main channel. This is accomplished by horizontally and vertically aligning these structures to promote a localized near-bank backwater condition. In response to the modified hydraulic condition, the following results are expected:

1) Promote sediment deposition along the near bank
2) Promote sediment transport through the main channel

Typically applied to high energy stream systems, vanes are commonly constructed of rock and/or logs. Given the existing and proposed conditions in Lake Sinissippi, this CDR proposes to construct the vanes with rock or geotextile tubes finished with natural materials to serve as substrate for revegetation along a portion of the constructed vane. Structures will help to nourish eroded streambanks and resulting scour pools in the river channel may prove beneficial for fish habitat. The final vane design will take into consideration potential obstructions to navigation and detainment of debris during high flow events.

The design and geometry of the proposed vane structures (location, horizontal alignment, vertical alignment, and dimensions) is relative to the system (sediment and flow regime) and corresponding hydraulic geometry (dimension, pattern, and profile). The proposed vane structures are intended to originate (or tie in) at the edge of channel (near water surface) and extend at a horizontal angle of 20-30 degrees at a downward vertical slope of less than 5% for a distance of about 350 feet (see Drawing 3). The invert (or tip) shall extent about 133 feet into the channel, at the existing channel elevation, leaving sufficient depth for navigation. Refined structure geometry will be based on channel geometry at specific placement locations.

The current plan proposes 12 vanes within the study area. As part of Phase 1, two vane structures are proposed.



Drawing 3 – ROCK VANE CONCEPT

3.4 STREAMBANK STABILIZATION

Streambank stabilization is utilized in areas prone to erosion. Based on the results of the streambank assessment, there are limited shoreline erosion areas within the study area. However, due to increased flow conditions expected near Lehman Cottages in the proposed CDR conditions, hard and soft armor treatment may be required. Examples of stabilization techniques include rock material (hard armor treatment) and soft armor/bioengineered technologies (vegetation/sod mats, root wads, toe wood). Stabilization designs will be developed to maintain visual aesthetics and provide additional near-shore biological habitat for a variety of plant and animal species. Approximately 1,000 linear feet of shoreline improvements are proposed during Phase 1.

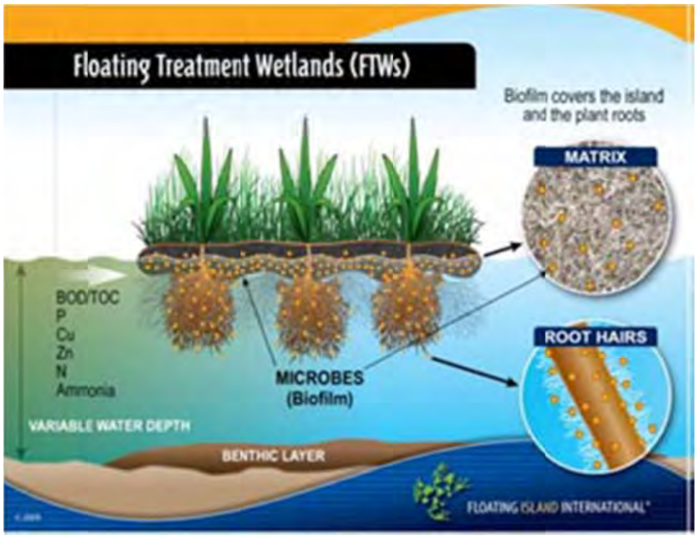
3.5 FLOATING ISLAND

Engineered floating treatment islands have been evaluated for use in the study area to promote emergent vegetation habitat lost over the last 50 years. This technology relies on wetland functions to provide fish and wildlife habitat and water quality improvement. Wetlands utilize natural processes to filter water through shallow areas of dense aquatic vegetation to reduce nutrient levels in surface water.

The primary process for nutrient removal include microbial transformation and uptake, macrophyte assimilation, absorption into organic and inorganic substrate materials, and volatilization. Floating wetlands utilize floating platforms, and macrophytes that extend roots into the water where they take up nutrients hydroponically. The roots from floating wetland plants also provide an additional submerged surface area to support the growth of microbes.

Floating wetlands are designed to accommodate fluctuating water levels and can be designed to provide habitat for fish and wildlife. Fish benefits include protection from predators and a source of food. Wildlife benefits include providing food and cover from predators. Terrestrial predation is also reduced by island habitat. The structures allow development of wetlands without the requirement of restricting carp from the project area. The plant structures of a vegetated island are in the upper water layer and not rooted in the bottom sediment where they would be susceptible to grubbing action of carp.

The current plan proposes one floating island during Phase 1 as a pilot enhancement feature. Depending on the success of this island, it is estimated that up to 10 additional floating islands could be installed during Phase 2. The technology of floating islands is evolving and further investigation is necessary to determine suitability for the project, including retention of structural integrity during periods of water level fluctuation and over wintering.



Drawing 4 - FLOATING ISLAND CONCEPT
Source: Floating Island International website.

3.6 ENGINEERS ESTIMATE

A cost estimate has been prepared to take into account implementation of the staged development concepts identified in this CDR (Attachment E). Staged development consists of the initial development of Phase 1. Using an adaptive management approach, an assessment of the effectiveness of Phase 1 will be used as the foundation for the design and implementation of Phase 2. The cost estimate considered two approaches to constructing the geotextile tube barriers and island features. One scenario is to access the construction area of the geotextile tube features from the south, requiring barge transport of construction materials. The other is to construct an access road from the north adjacent to the area where the geotextile tube features are proposed to be constructed. This second alternative assumes all construction materials are trucked to the work site.

For site preparation, haul road construction and restoration the estimate includes construction of the following proposed features:

- Roadway/Access from South – The South Access roadway is approximately 200 feet long by 25 feet wide. The costs include clearing and grubbing this area, site grading, construction of a gravel access road, replacing topsoil after the project is complete and seeding fertilizing and mulching. A silt fence will be constructed around this area during the project.
- Access Road (land) from North – The North Access roadway is approximately 1600 feet long by 25 feet wide. The costs include clearing and grubbing this area, site grading, construction of a gravel access road, replacing topsoil after the project is complete and seeding fertilizing and mulching. A silt fence will be constructed around this area during the project. The cost for access (both south and north) are consistent for either water dredging/filling alternative.

The cost estimates for the construction of the proposed geotextile tube features were determined for two dredge/tube filling alternatives:

1) Phase 1 - Filling approximately 2000 lineal feet of geotextile tubes in the lake, (Base estimate $1.5 million) and;

2) Phase 2 - Filling an additional 2000 lineal feet of geotextile tube length in the lake, primarily consisting of additional islands. Note: the Phase 2 costs include the total 4000 lineal feet of constructed geotextile tube features. (Base estimate $3.3 million).

Both alternatives involve extending the peninsula on the north into the lake to the first proposed geotextile tube island (western most island) as shown in Figure 8.1. This extension will consist of linear geotextile tubes filled with dredged sediment and covered with rip rap on the river channel side and soil cover on the backwater side. The South Access option assumes barge placement of the rip rap and soil along islands since the access road from the north will not exist. The North Access options assume placement of rip rap and soil using dump trucks. Geotextile fabric would be placed between the rip rap and the river subgrade and between the rip rap and the geotextile tubes In addition to the peninsula extension geotextile tubes, two islands-type features are proposed to be constructed: 1) geotextile tube islands for wildlife habitat, and 2) geotextile tube islands – recreational campsite. It is assumed the proposed habitat islands would consist of a series of two sets of three, 200 foot long geotextile tubes (two on the bottom and one on top), with each set constructed 50 to 100 feet apart (side by side). Sediment would ultimately be placed between the sets of geotextile tubes to create a land area between the sets of geotextile tubes. The proposed campsite islands would consist of one set of five, 200 foot long geotextile tubes (three on the bottom and two on top). All of the islands would be constructed with rip rap protection on the river side and soil cover on the backwater side. Geotextile fabric would be placed between the rip rap and river subgrade and the rip rap and the geotextile tubes.

Also included in the costs are a mobilization and demobilization charge of 6% of the base cost and permitting costs of $20,000 for each option. Additionally, design and construction oversight costs of 6% and 5% (Phase 1 and Phase II respectively) of the total cost are included. A ten percent contingency of the total cost was also applied to this estimate.

Engineers' estimates are based on current cost levels for materials and services believed to be representative of project activities. Construction estimates in future years need to be adjusted by an appropriate cost inflator. It is likely that actual costs of construction and project completion will be higher than the engineers' estimate.

4.0 AGENCY INVOLVEMENT

LSID organized and facilitated two meetings with the WDNR to discuss the purpose and need of the proposed dredging and habitat restoration project as well as the conceptual design features. Meetings were held at WDNR's offices in Madison and Horicon on October 2, 2013 and November 6, 2013 respectively. Meeting participants and copies of meeting documents are presented in Attachment F.

Continued agency involvement through the design and implementation phases of this project are essential to the overall success of the project. Open lines of communication amongst all interested parties will ensure a successful and beneficial project to all that utilize this resource. To facilitate agency involvement, LSID will schedule project review meetings with US Army Corps of Engineers (USACE) - Rock Island District and Dodge County Land Resources and Parks Department.

Permits for the project will be issued by local, state and federal agencies. The following requirements must be met to obtain agency permits:

1) Not materially affect the flood flow capacity of the Rock River
2) Not materially obstruct navigation
3) Not cause material injury to the rights of riparian owners and owners of submerged land parcels
4) Not cause environmental pollution
5) Not be detrimental to the public interest (navigation, fish and wildlife habitat, water quality, natural scenic beauty and public safety)

Agencies are evaluating floodplain storage zones as part of new floodplain ordinances. Loss of floodplain storage resulting from fill above normal water level, such as islands and wetland restoration, may need to be compensated by offsite excavation at elsewhere within the lake basin. LSID will need to address this issue with agencies.

WDNR has indicated that sediment dredging may be considered an eligible practice for phosphorus trading. Dredging projects must remove sediment to the native layer and result in net, long-term reduction of phosphorus released from sediment. Trade ratios for dredging are based on phosphorus concentrations of in situ material; ratios may be better if dredging is accompanied by aquatic habitat restoration.

5.0 GRANTS

Certain project elements may be eligible for cost-share grants. Table 3 summarizes potential grants. For example, WDNR Lake Protection Grants cover up to 75 % of project costs to a maximum amount of $200,000. Eligible activities include watershed management, lake restoration and purchase of land and conservation easements for water quality purposes. Dredging is not an eligible activity. Grants for restoration of wetlands and shorelands have a maximum amount of $100,000.

WDNR River Protection Planning Grants provide 75 % cost share and have a maximum amount of $10,000. Eligible activities include improvements to river ecosystems, assessment, planning and educational projects.

WDNR River Protection Management Grants provide 75 % cost share and have a maximum amount of $50,000. Eligible activities include land purchase, nonpoint source pollution control practices and river restoration activities. Multiple grants, up to a cumulative total of $100,000, can be used in phases to complete large projects.

Wisconsin Waterways Commission cost-share grants under the Recreational Boating Facilities Program cover up to 50 % of eligible project costs. Eligible activities include waterway channel dredging to provide safe water depth to accommodate recreational watercraft.

WDNR Sport Fish Restoration Grant may be used to construct fishing piers and motorboat access projects. Eligible activities include new boat ramp construction and renovations, development and renovation of parking lots, accessible paths, lighting and restroom facilities; channel dredging and feasibility studies. Projects receiving funding from other federal grants may not be eligible for this grant funding.

WDNR Stewardship Program Grants may be used to preserve valuable natural areas and wildlife habitat, protect water quality and fisheries, and expand opportunities for outdoor recreation. Eligible activities include land acquisition and easements, development of recreational facilities, and restoration of wildlife habitat.

Wisconsin Economic Development Corporation (WEDC) provides numerous financial assistance programs for local businesses and communities. WEDC provides grants, loans and tax credits for local economic development to attract, grow and retain businesses within the state.

Other potential agency grant sources include US Fish & Wildlife Service (USFWS) - Partners for Fish and Wildlife Program, Natural Resources Conservation Service (NRCS)- Wetland Reserve Program and other conservation programs, and USACE - environmental programs.

Private grant sources may include Ducks Unlimited (DU), Wisconsin Waterfowl Association (WWA) and other organizations.

As a local unit of government LSID can help finance a capital project by arranging a loan with the Board of Commissioners of Public Lands, a state agency that lends to local government.

TABLE 3. LAKE SINISSIPPI GRANT MATRIX

Grant	Source	Funding	Match	Purpose
Community Grants Program	Sustain our Great Lakes	$25,000 to $150,000	Meet or exceed a 1:1 match ratio more competitive	Habitat restoration and enhancement projects that simultaneously: 1) improve local habitat conditions; and 2) build local conservation capacity.
Stewardship Grants Program	Sustain Our Great Lakes	$150,000 to $1,500,000	Min. $150,001 in match; higher match ratio more competitive	Large-scale habitat restoration and enhancement projects that will have enduring and significant positive impacts on the ecological condition.
River Protection Planning	WDNR	Not to exceed $10,000	25%	Organizational development for existing river organizations; Formation of a qualified river organization; Public education projects; Planning and assessment projects (development of management strategies, plans, and special project designs; collection and assessment of water quality, water quantity, and biological/environmental data; collection of sociological data; description and mapping of existing and potential conditions; development of local ordinances.
Public Works, Economic Adjustment Assistance, and Global Climate Change Mitigation	US COMM - Economic Developme nt Admin	variable	50/50	PW - construction or rehabilitation of essential public infrastructure and facilities; EAA - construction and non-construction assistance.
CDBG - Planning Program	WI COMM	Variable	50%	Provide funding for projects that have clearly identified a community or economic development concern, or E3, and lack the resources needed to plan an appropriate response.
Federal Aid in Sport Fish Restoration Act	WDNR / US DOI - FWS	Variable	No statutory formula	Fish cleaning station.
State Trust Fund loan	WI Board of Commission ers of Public	$5,000,000	NA - loan	Simple, cost-effective alternative to bonding for many public purpose projects. Rates are competitive and the process is extremely simple.
Stewardship Urban Rivers Program	WDNR	Variable	Variable	Economic revitalization through the restoration or preservation of urban rivers or riverfronts ; improve outdoor recreational opportunities by increasing access to urban rivers for a variety of public uses, including but not limited to, fishing, wildlife observation, enjoyment of scenic beauty, canoeing, boating, hiking and bicycling; preserve or restore significant historical, cultural, or natural areas along urban
Stewardship Programs	WDNR	Variable	Variable	Grants for acquisition of land and conservation easements of land and development projects that support nature-based outdoor recreation.
Urban Nonpoint Source and Storm Water Grants	WDNR	Planning - max. = $85,000; Construction max. = $150,000	Planning - 30%; Construction - 50%	Grants to improve urban water quality by limiting or ending sources of urban nonpoint source (run-off) pollution. Reduce sediment load to Rock River.
USACE Section 22 Funding	USACE	Up to $500,000	50% (in-kind allowable)	Feasibility studies; project development and construction; substantial benefits to recreation. Focus on improving water resource infrastructure and to insure that sustainable, cost-effective solutions are developed to improve and mitigate near shore issues.
Aquatic Invasive Species Control Grant	WDNR	Variable	>25%	Prevent and control the spread of aquatic invasive species in the waters of the state. These grants can be used for education, prevention, planning, early detection, rapid response and established infestation control projects.

Grant	Source	Funding	Match	Purpose
Lake Classification (Implementation/ Management)	WDNR	$50,000	>25%	Eligible Applicant – Counties. Classification: Setting objectives for the classification system; Preliminary investigation of management tools; Selection of classification criteria; Data collection and analysis necessary for water classification. Implementation: Tracking / evaluating the enforcement/compliance with ordinance; Developing administrative forms, computer programs, and procedures; Conduct training/educational sessions or develop printed/electronic media; Support programs resulting from lake classification (such as shoreline restoration technical assistance); and Make revisions and/or amendments to the classification system (maps, GIS, and databases) or ordinances implementing them. Management: Public information and education; Setting objectives for individual lake classes; Ordinance development; Implementation of alternative management tools; Policy adoption that encourages managing waters based on the specific needs of each waterbody.
Lake Management Planning (Small Scale / Large Scale)	WDNR	$3,000-Small scale; $25,000-Large scale	>33%	Small scale: planning primary objectives include: public education and awareness, obtaining basic information on lake use and conditions and enhancing organizational capacity. These will be protection-oriented, often volunteer-led efforts that can be used to develop a foundation for lake management efforts or updating existing plans Large scale: projects are intended to address the needs of larger lakes and lakes with complex and technical planning challenges. The intent of these projects is to create a land management plan, a plan that may require more than one grant to complete.
Lake Protection	WDNR	Variable	>25%	Purchase of land or conservation easements; Restoration of wetlands and shorelands that will protect a lake's water quality or its natural ecosystem ; Development of local regulations or ordinances to protect lakes and the education activities; Lake management plan implementation projects recommended in a plan and approved by DNR.
Recreational Boating Facilities Grant	WDNR		>50%*	Eligible projects ramps and service docks to gain access to the water, purchase of aquatic weed harvesting equipment, navigation aids and dredging waterway channels.

6.0 CONCLUSION

Lake Sinissippi is man-made impoundment of the Rock River located in Dodge County. The study area for this project includes the Rock River channel extending approximately 2 miles downstream from the CTH S bridge to a point near the end of Lehman Cottages. The Stantec/Foth team collaborated with LSID and WDNR to develop this CDR. The objectives of the project include beneficial use of sediment for waterway restoration and enhancement, stabilization of existing shoreline, and river channel navigation improvements within the study area. The project team conducted a review of historic aerial photography, bathymetric measurements, topographic survey, sediment sample collection and analysis, geomorphologic assessment, and hydraulic analysis of the study area to gain additional knowledge used during the development of the CDR.

This project provided additional information used for:

1) Additional definition of sediment thickness and available dredge volumes in the study area.
2) Additional definition of sediment characteristics in anticipation of island restoration areas.
3) Development of conceptual island construction phased plans and associated conceptual cost estimates.

The project is proposed to be constructed in two phases. Phase 1 proposes navigational dredging and construction of a peninsula extension, two rock vane structures, and three islands. The purpose of Phase 1 is to focus activities in the area of greatest need and complete post-construction monitoring and adaptive management to guide future enhancements. Phase 2 will include construction of the remaining project features including additional dredging, island creation, habitat enhancements, and channel improvements.

The following is a list of anticipated future tasks to implement this project:

1) Obtain local stakeholder input.
2) Determine landownership and permissions.
3) Identify and secure funding.
4) An environmental assessment will be required under provisions of Wisconsin Environmental Policy Act and Chapter NR 150, Wisconsin Administrative Code. An assessment will include a formal alternatives analysis.
5) Secure local, state and federal permits.
6) Prepare Phase 1 preliminary and final engineering design and bid documents.
7) Construct Phase 1.
8) Monitor Phase 1 using adaptive management strategies.
9) Prepare Phase 2 preliminary and final engineering design and bid documents.
10) Construct Phase 2.

LSID should consider the anticipated utility, maintenance, sustainability and longevity of project improvements, along with evaluating project costs versus environmental benefits and value to lake residents and the community.

An environmental assessment specified in (4) above will require LSID to evaluate reasonable alternatives to the proposed project. This will include a rigorous evaluation of the environmental impacts of all alternatives, particularly those that might avoid some or all of the adverse environmental effects of the proposed project. Usually an alternative of no action is one of the alternatives to be evaluated.

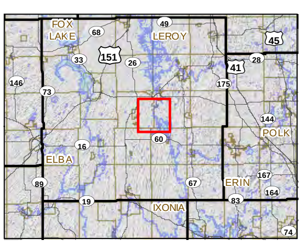
The WDNR has proposed amending Chapter NR 150 *Environmental Analysis and Review Procedures for Department Actions.* The amendment would categorize individual permits for navigable waterway structures and removal of stream bed material as Equivalent Analysis Actions for determining Wisconsin Environmental Policy Act (WEPA) compliance.

Evaluation of the project and its alternatives should also be made within the scope of any broader waterway improvement plans. Potential benefits from sequencing the project along with a lake drawdown should be evaluated. Also, consideration should be given by LSID to the potential impact to the project from possible restoration efforts for the Horicon Marsh by WDNR and USFWS.

FIGURES

FIGURE 1.1 PROJECT LOCATION AND TOPOPGRAPHY

G:\1937\active\193702335\07_gis\mxds\LakeSin_Topo_8-5x11.mxd Revised: 2014-03-11 By: abrasch



Legend

Approximate Project Area

0 2,000 4,000 Feet

1:48,000 (at original document size of 8.5x11)

N

Stantec Foth

Project Location
Lake Sinissippi, Dodge Co., WI

Prepared by mcp on 2014-01-30
Technical Review by ab on 2014-03-11
Independent Review by mr on 2014-03-11
193702335

Client/Project
Lake Sinissippi Improvement District
Rock River Channel Waterway Improvement

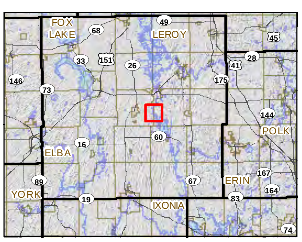
Figure No.
1.1

Title
Project Location and Topography

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec and USGS 7.5' Topographic Quadrangles

FIGURE 1.2 STUDY AREA AERIAL MAP

G:\1937\active\193702335\07_gis\mxds\LakeSin_Aerial_8-5x11.mxd Revised: 2014-03-11 By: abrasch



Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec and USGS 7.5' Topographic Quadrangles
3. Orthophotography: 2010 WROC

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

Legend
Approximate Project Area

0 1,000 2,000 Feet
1:24,000 (at original document size of 8.5x11)

N

Stantec Foth

Project Location
Lake Sinissippi, Dodge Co., WI

Prepared by mcp on 2014-01-31
Technical Review by ab on 2014-03-11
Independent Review by mr on 2014-03-11
193702335

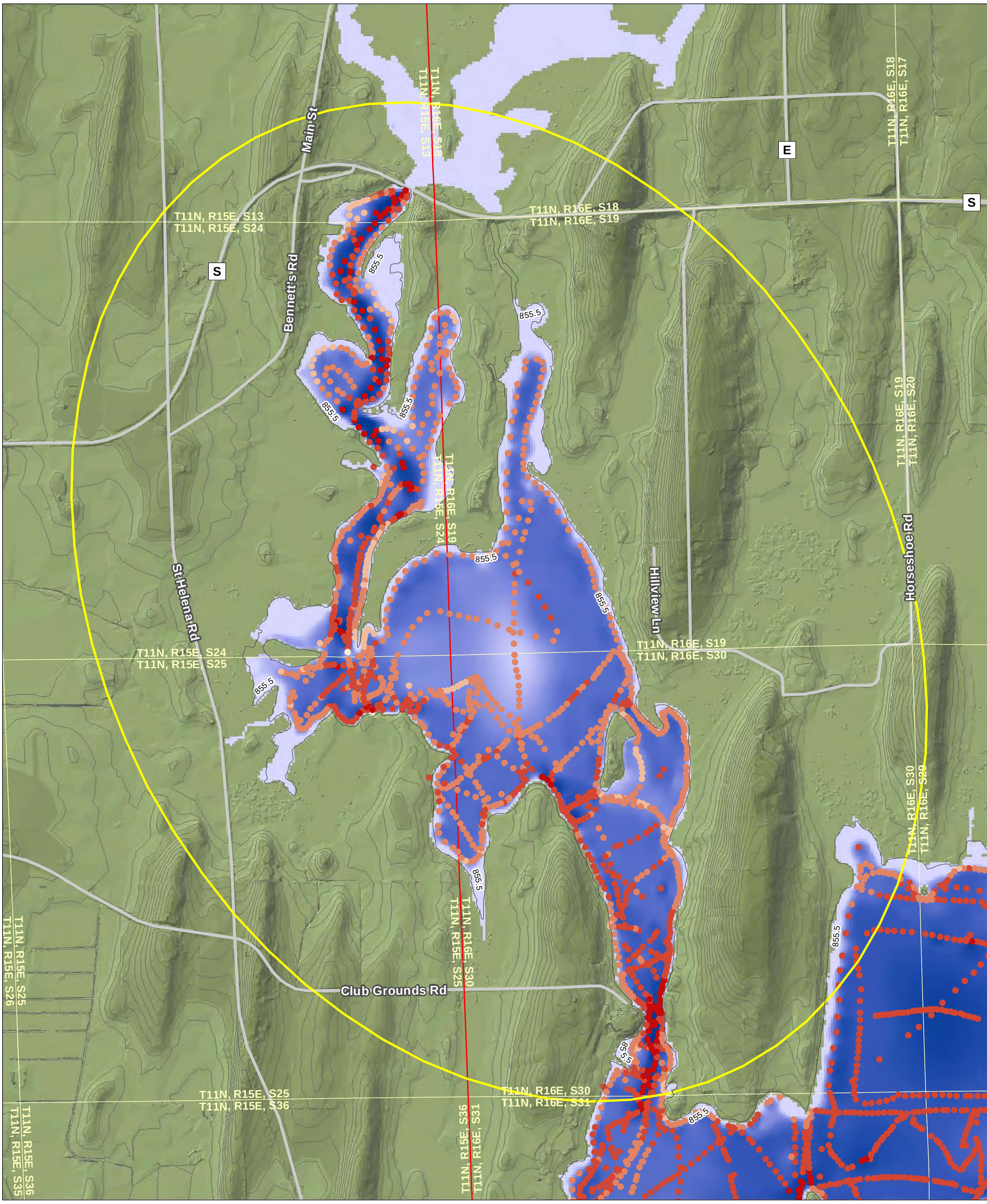
Client/Project
Lake Sinissippi Improvement District
Rock River Channel Waterway Improvement

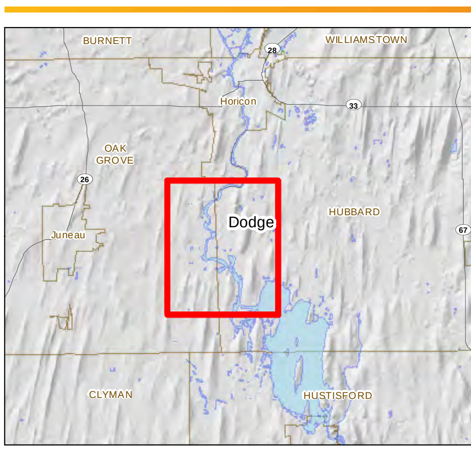
Figure No.
1.2

Title
Study Area Aerial Map

FIGURE 2 2005 BATHYMETRIC DATA

G:\1937\active\193702335\07_gis\mxds\Lake_Sinissipi_Water_Depth_Portrait11x17.mxd Revised: 2014-03-12 By: abrasch





Legend

Approximate Project Area

Contours - 5 ft

Sampled Water Depth (2005)

- 0.04 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 5.00
- 5.01 - 10.00

Water Depth (ft)

High : 8.65607

Low : -0.400024

0 625 1,250 Feet

1:15,000 (At Original document size of 11x17)

N

Stantec Foth

Project Location:
Sec 13, 24, & 25, T11N, R15E and
Sec 18, 19, & 30, T11N, R16E
Dodge Co., WI

Prepared by mcp on 2014-01-30
Technical Review by ab on 2014-03-12
Independent Review by mr on 2013-11-05

193702335

Client/Project
Lake Sinissippi Improvement District
Rock River Channel Waterway Improvement

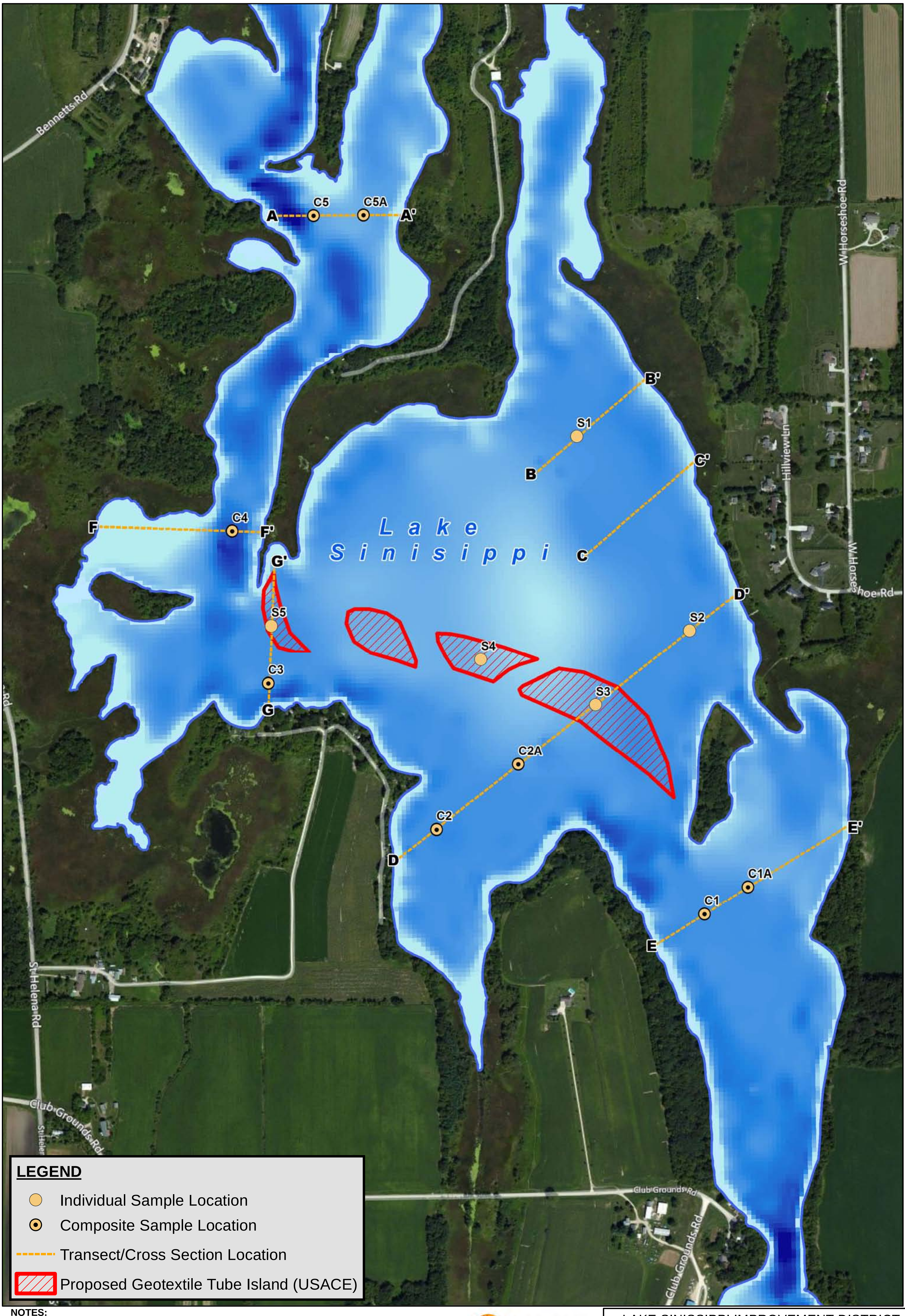
Figure No.
2

Title
Bathymetric Data

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: WDNR, Mapping Specialists, Stantec and WisDOT

FIGURE 3 SEDIMENT SAMPLE LOCATION MAP



NOTES:
1. Imagery supplied by Microsoft and its data suppliers.
2. Horizontal datum based on NAD 1983. Horizontal coordinate system based on Dodge County (feet).

Stantec

Foth

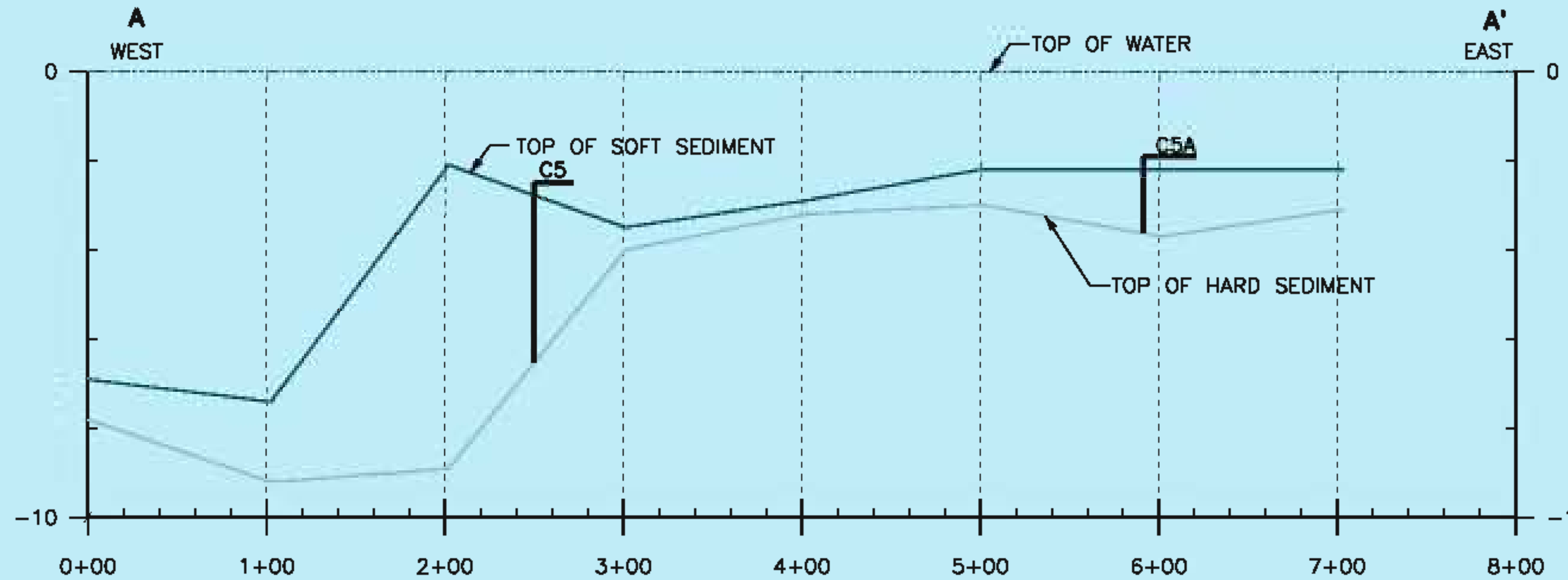
PRIVILEGED AND CONFIDENTIAL

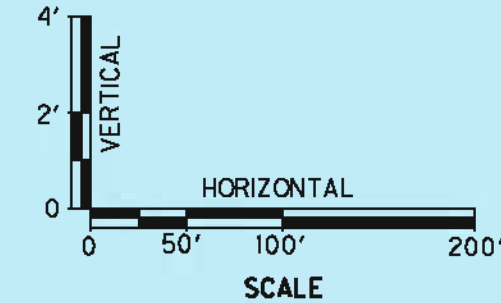
0 300 600 Feet

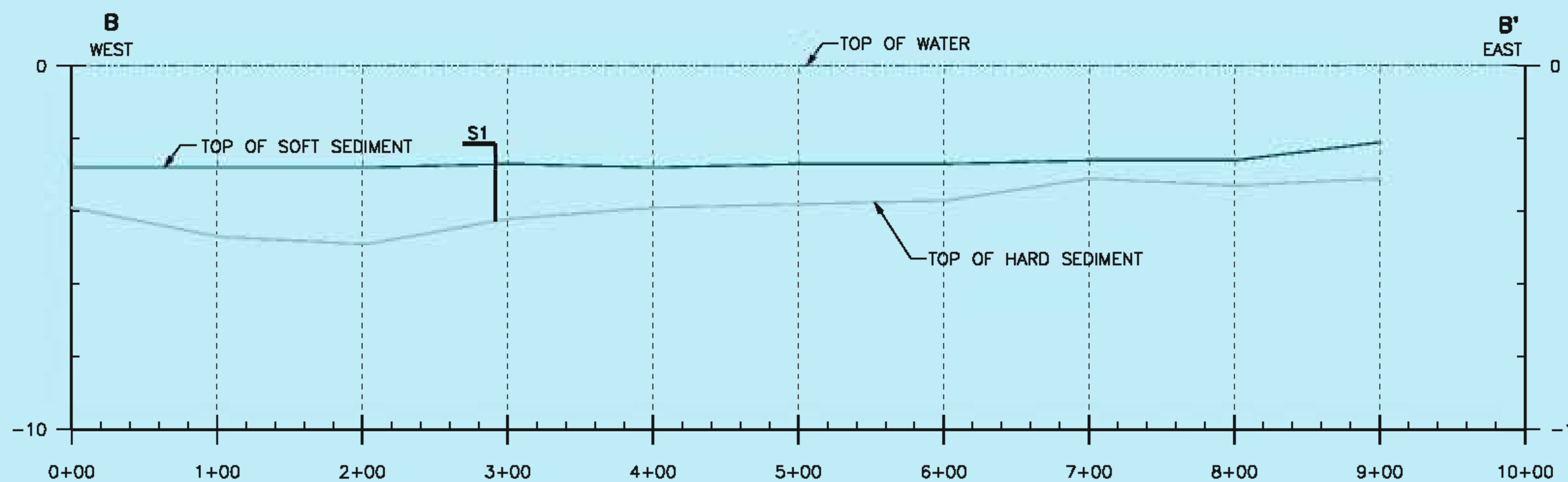
LAKE SINISSIPPI IMPROVEMENT DISTRICT		
FIGURE 3		
SEDIMENT SAMPLING LOCATION MAP LAKE SINISSIPPI, DODGE COUNTY, WISCONSIN		
Date: AUGUST 2013	Revision Date: FEBRUARY 2014	
Drawn By: BJW1	Checked By: MRO	Scope: 13S030

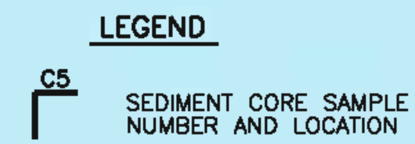
Path: X:\GB\IE\2013\13S030\GIS\mxd\Lake_Sinissippi_sample_locations_11x17.mxd Date: 2/26/2014

FIGURE 4.1 CROSS SECTION DRAWING (A-A' AND B-B')









Stantec

Foth

LAKE SINISSIPPI IMPROVEMENT DISTRICT

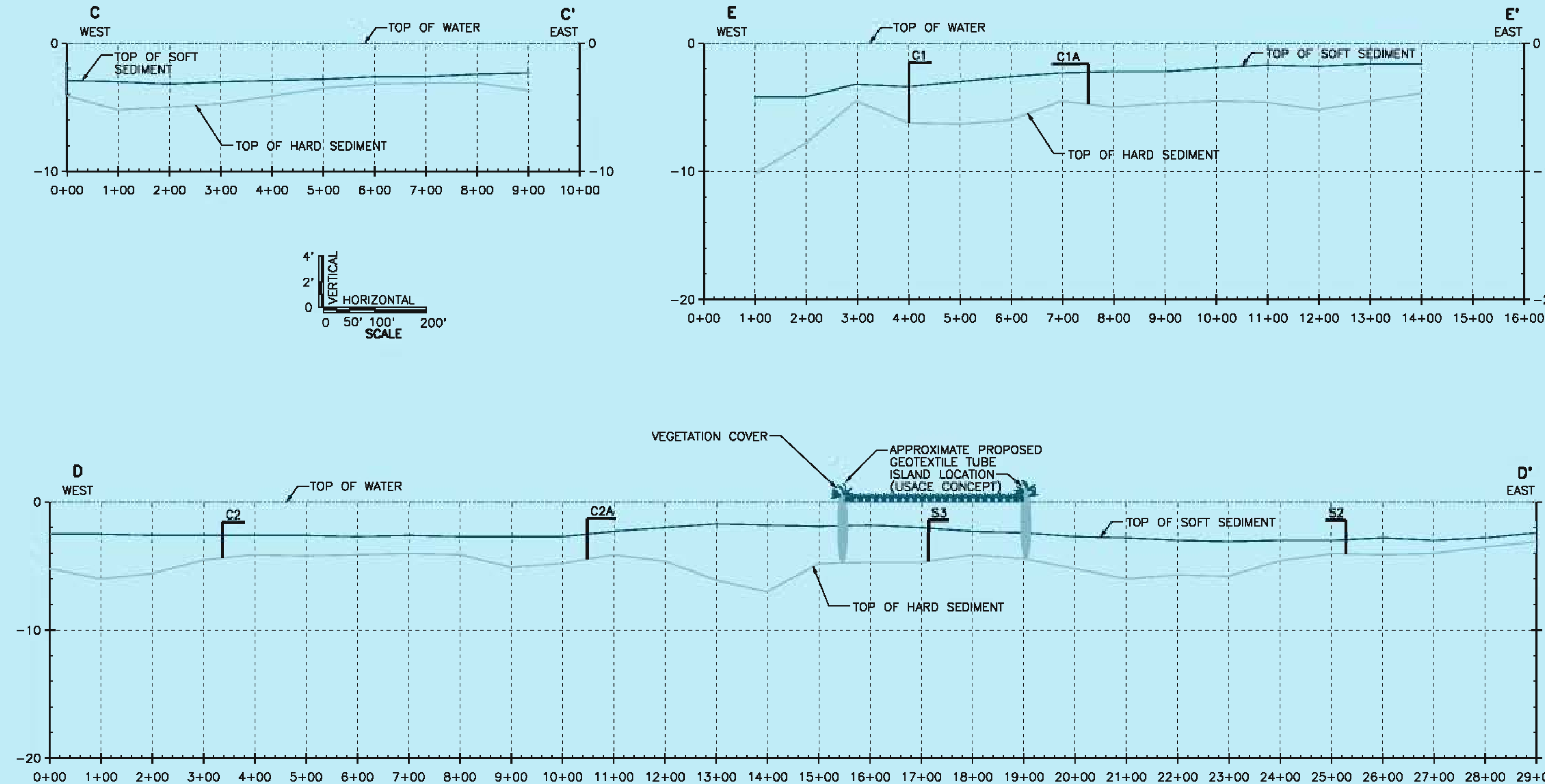
FIGURE 4.1

CROSS SECTIONS A-A' AND B-B'
LAKE SINISSIPPI, DODGE COUNTY, WISCONSIN

SCALE: AS SHOWN	Date: JANUARY, 2014	Revision Date: FEBRUARY, 2014
	Drawn By: JOW	Checked By: MRO	Project: 13S030

X:\GB\IE\2013\13S030\cad\figures\13s030 Fig 4-1 cross sections.dgn
2/27/2014 3:48:31 PM bjw1

FIGURE 4.2 CROSS SECTION DRAWING (C-C', D-D' AND E-E')



LEGEND

C2 — SEDIMENT CORE SAMPLE NUMBER AND LOCATION

APPROXIMATE PROPOSED GEOTEXTILE TUBE LOCATION

Stantec

Foth

SCALE: AS SHOWN

LAKE SINISSIPPI IMPROVEMENT DISTRICT

FIGURE 4.2

CROSS SECTIONS C-C', D-D' AND E-E'
LAKE SINISSIPPI, DODGE COUNTY, WISCONSIN

Date: JANUARY, 2014	Revision Date: FEBRUARY, 2014	
Drawn By: JOW	Checked By: MRO	Project: 13S030

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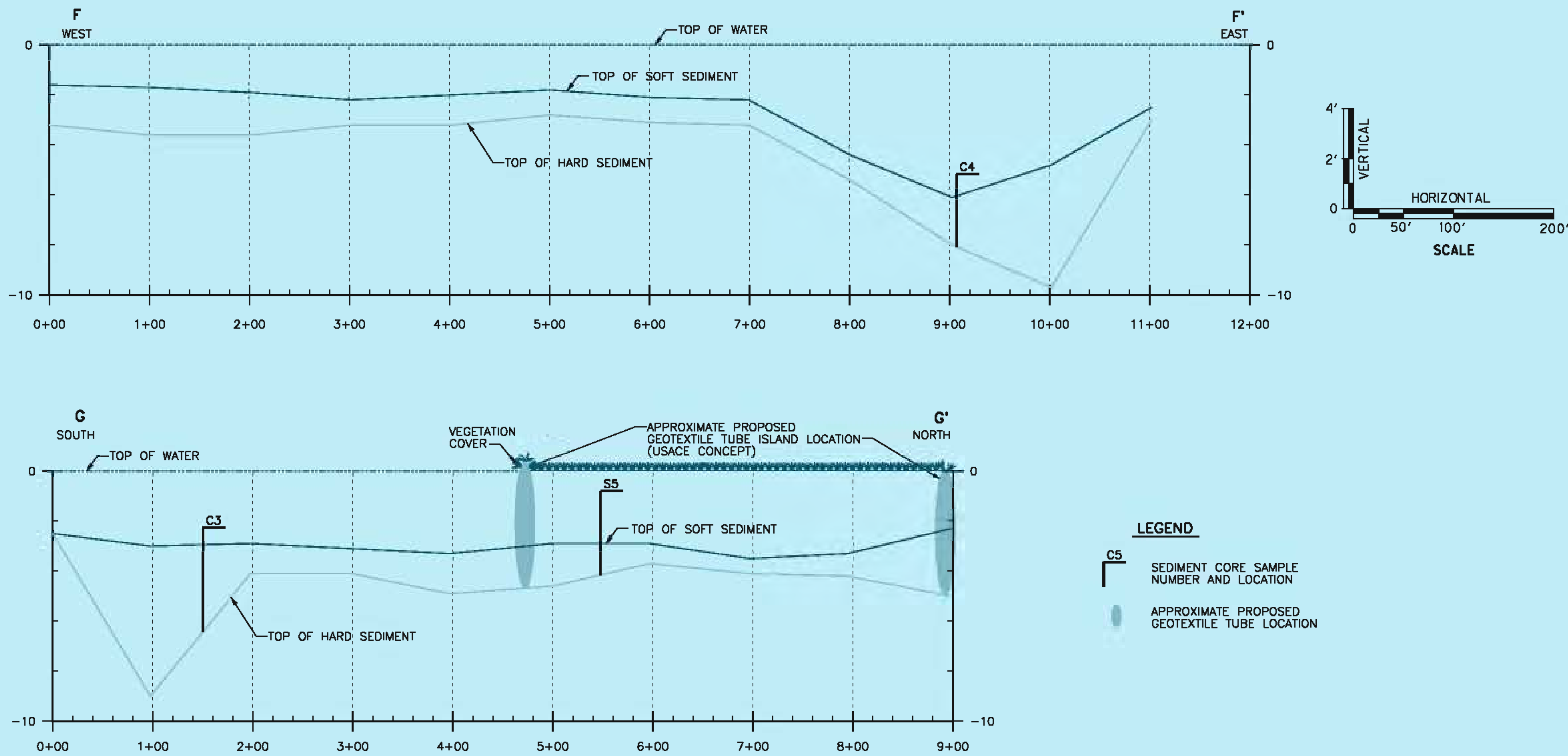
FIGURE 4.3 CROSS SECTION DRAWING (F-F' AND G-G')



Stantec

Foth

SCALE: AS SHOWN

LAKE SINISSIPPI IMPROVEMENT DISTRICT

FIGURE 4.3

CROSS SECTIONS F-F' AND G-G'
LAKE SINISSIPPI, DODGE COUNTY, WISCONSIN

Date: JANUARY, 2014	Revision Date: FEBRUARY, 2014
Drawn By: JOW	Checked By: MRO	Project: 13S030

X:\GB\IE\2013\13S030\cad\figures\13s030 Fig 4-3 cross sections.dgn
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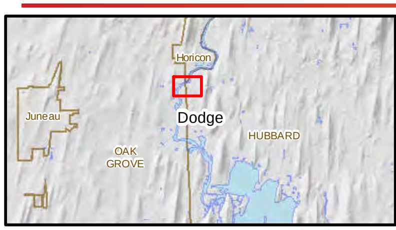
FIGURE 5.1 NORTH TOPOGRAPHIC SURVEY



N

Legend

- X invert culvert elevation: 855.52ft
- Y invert culvert elevation: 855.29ft
- culvert

Project Location
Lake Sinissippi, Dodge Co., WI

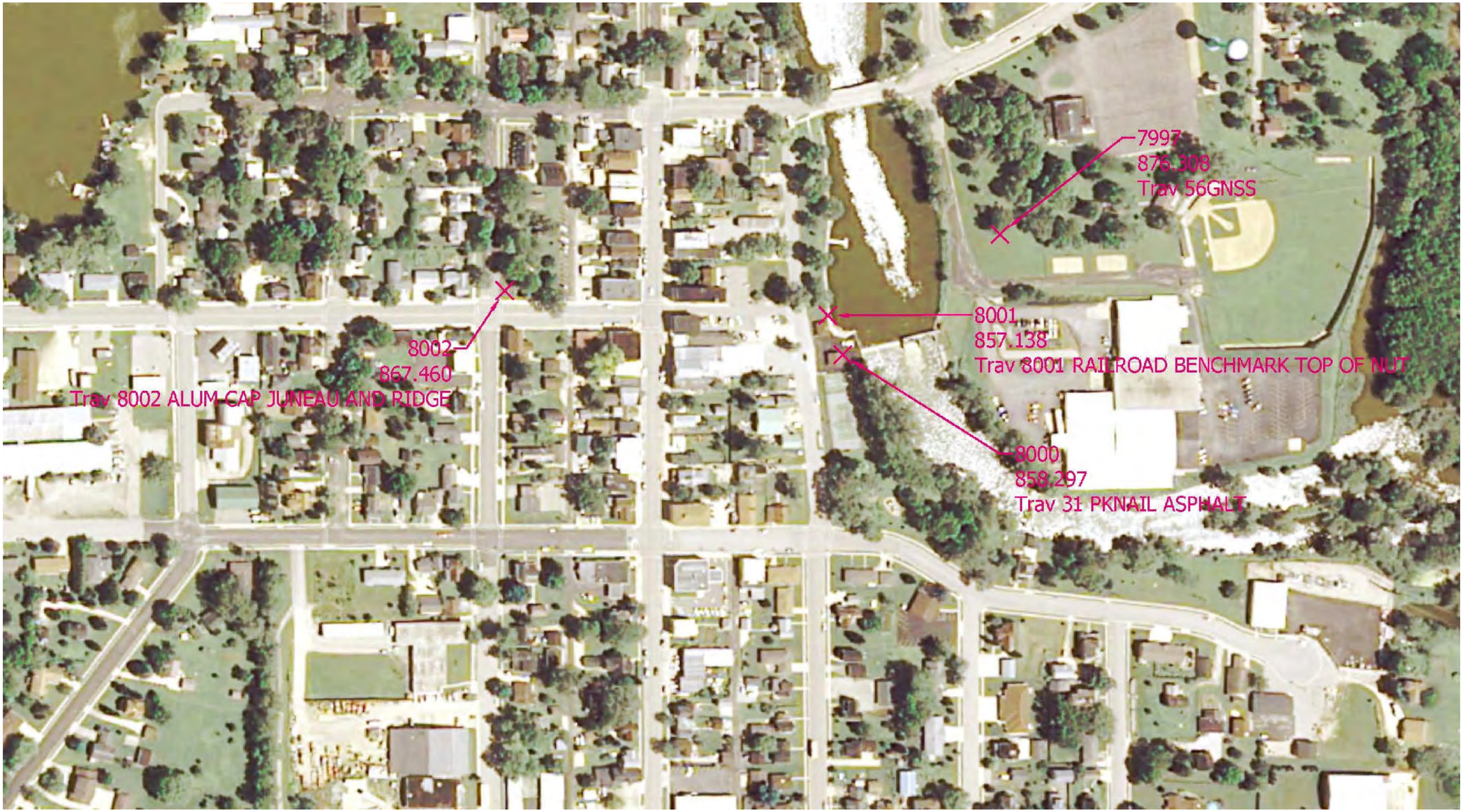
Prepared on 2014-01-31

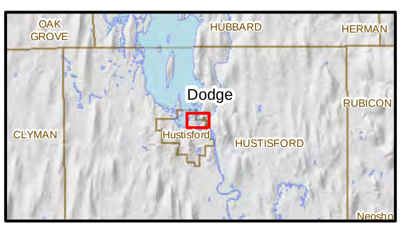
Client/Project
Lake Sinissippi Improvement District
Rock River Channel Waterway Improvement

Figure No.
5.1

Title
North Topographic Survey

FIGURE 5.2 SOUTH TOPOGRAPHIC SURVEY





N

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases

Stantec Foth

Project Location
Lake Sinissippi, Dodge Co., WI

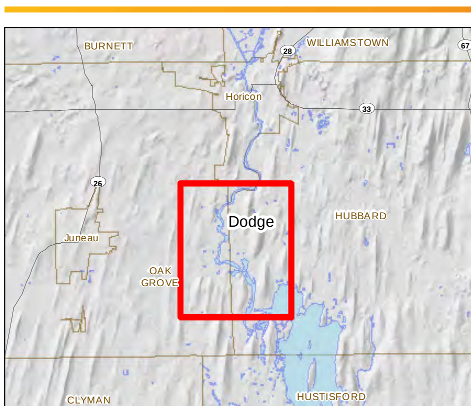
Prepared on 2014-01-31

Client/Project
Lake Sinissippi Improvement District
Rock River Channel Waterway Improvement

Figure No.
5.2

Title
South Topographic Survey

FIGURE 6 PLANT COMMUNITY MAP



Legend

- Improved Shoreline
- Photo Point
- Approx. Project Area

Vegetation Communities

- Upland (oak, hickory, mixed shrubs)
- Wetland (green ash, black willow, red osier dogwood, cattails, sedges, rushes)
- Mixed (green ash, black willow, oak, hickory, mixed shrubs, cattails, sedges, rushes)
- Floating (cattails)

0 625 1,250 Feet

1:15,000 (At Original document size of 11x17)

N

Stantec Foth

Project Location:
Lake Sinissippi, Dodge Co., WI

Prepared by mcp on 2014-01-30
Technical Review by ab on 2014-03-12
Independent Review by mr on 2013-11-05

193702335

Client/Project
Lake Sinissippi Improvement District
Rock River Channel Waterway Improvement

Figure No.
6

Title
Plant Community Map

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec, WDNR, and WDOT
3. Orthophotography: 2010 WROC

FIGURE 7 POTENTIALLY RESTORABLE WETLAND MAP

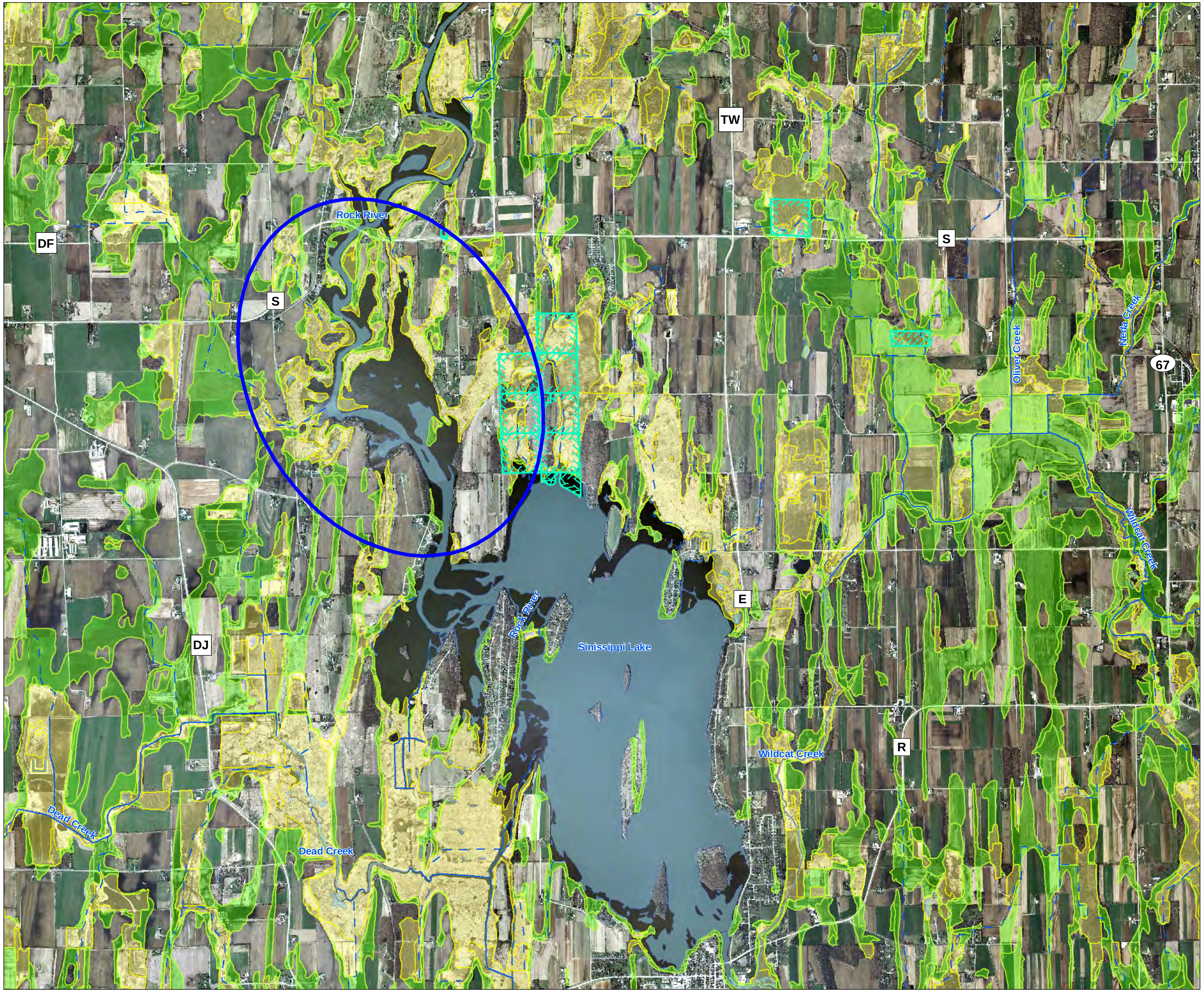


Figure No.
7

Title
Potentially Restorable Wetland Map

Client/Project
Lake Sinissippi Improvement District
Rock River Channel Waterway Improvement

Project Location:
Lake Sinissippi, Dodge Co., WI

Prepared by AB on 2014-01-08
Technical Review by MP on 2014-01-08
Independent Review by MR on 2014-03-12

193702335

0 1,500 3,000 Feet
1:42,000 (At Original document size of 11x17)

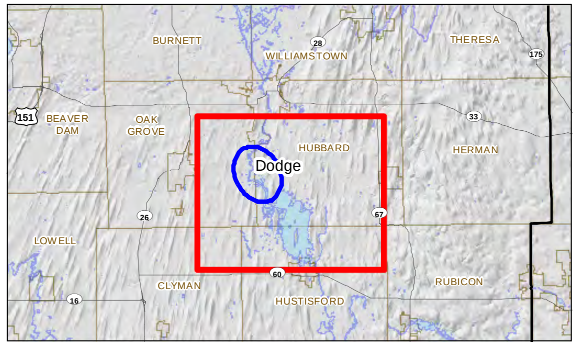
N

Legend

- Approximate Project Area
- Potentially Restorable Wetlands (WDNR)
- WDNR Managed Land
- WDNR Stewardship Grant Acquisition
- State Natural Area
- Public Property
- Wisconsin Wetland Inventory

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- WDNR Trout Stream
- Waterbody

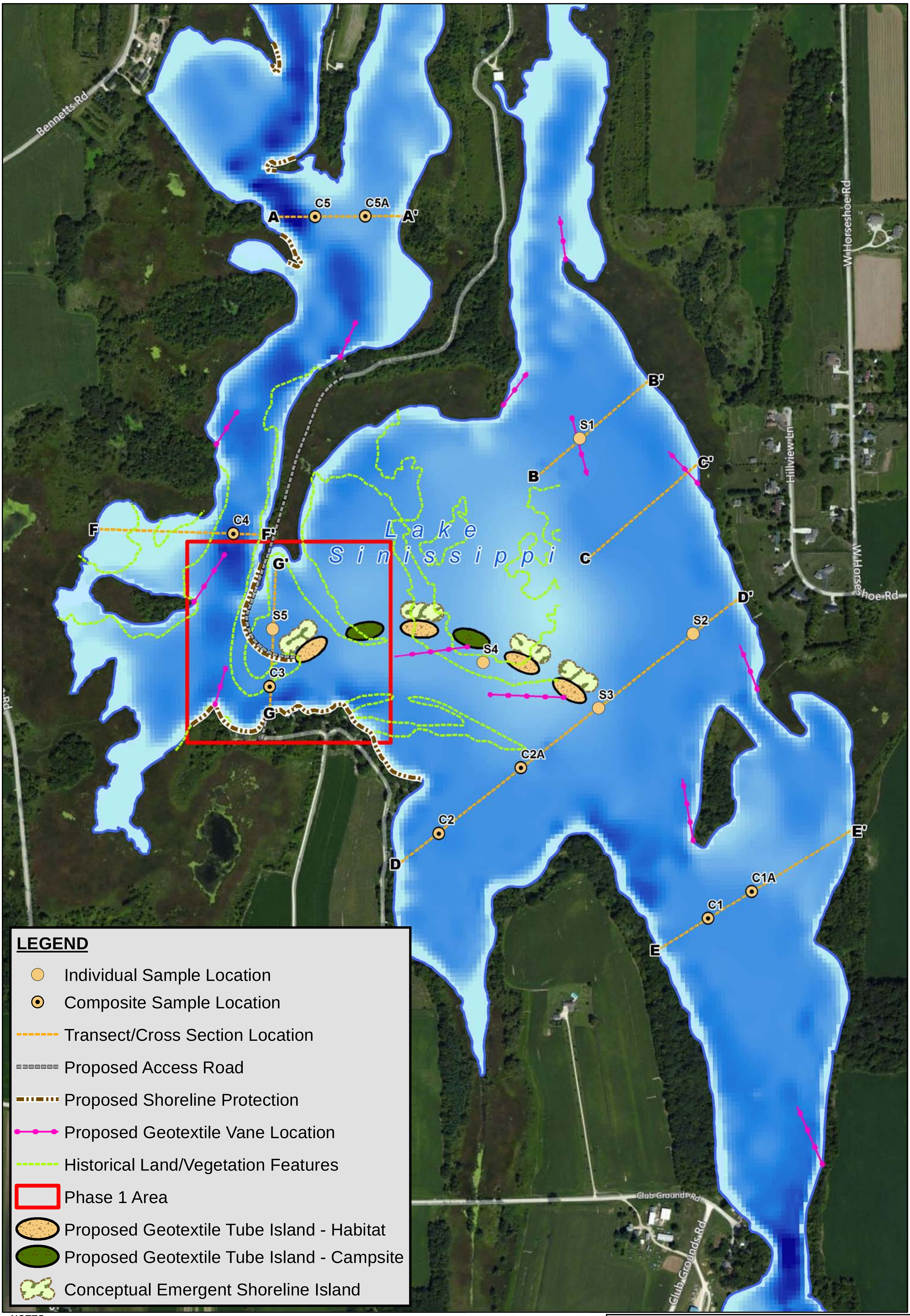


Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec, WDNR, and WDOT.
3. Orthophotography: WROC 2010.

Stantec Foth

FIGURE 8.1 CONCEPTUAL RESTORATION PLAN



NOTES:
1. Imagery supplied by Microsoft and its data suppliers.
2. Historical Land/Vegetation features extracted from 1950 air photo from HIG (received from Stantec).
2. Horizontal datum based on NAD 1983. Horizontal coordinate system based on Dodge County (feet).

Stantec
Foth

N

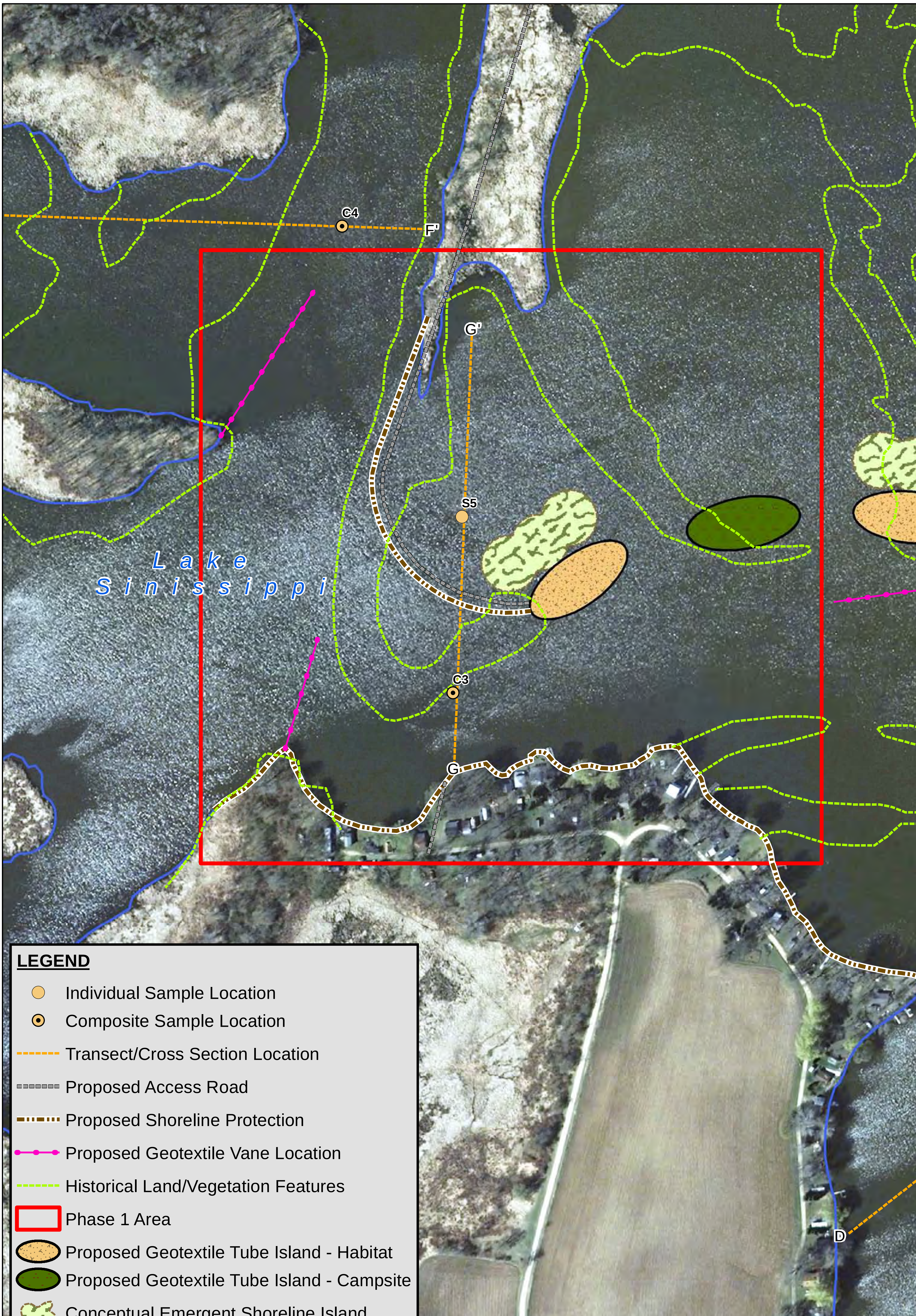
LAKE SINISSIPPI IMPROVEMENT DISTRICT		
FIGURE 8.1		
CONCEPTUAL RESTORATION PLAN LAKE SINISSIPPI, DODGE COUNTY, WISCONSIN		
Date: OCTOBER 2013	Revision Date: MARCH 2014	
Drawn By: BJW1	Checked By: MRO	Scope: 13S030

PRIVILEGED AND CONFIDENTIAL

0 300 600 Feet

Path: X:\GB\IE\2013\13S030\GIS\mxd\Lake_Sinissippi_conceptual_design_expanded_placement_Dec2013_11x17.mxd Date: 3/10/2014

FIGURE 8.2 CONCEPTUAL RESTORATION PLAN – PHASE 1



NOTES:
1. Imagery supplied by Microsoft and its data suppliers.
2. Historical Land/Vegetation features extracted from 1950 air photo from HIG (received from Stantec).
2. Horizontal datum based on NAD 1983. Horizontal coordinate system based on Dodge County (feet).

Stantec
Foth

N

PRIVILEGED AND CONFIDENTIAL

0 100 200 Feet

LAKE SINISSIPPI IMPROVEMENT DISTRICT

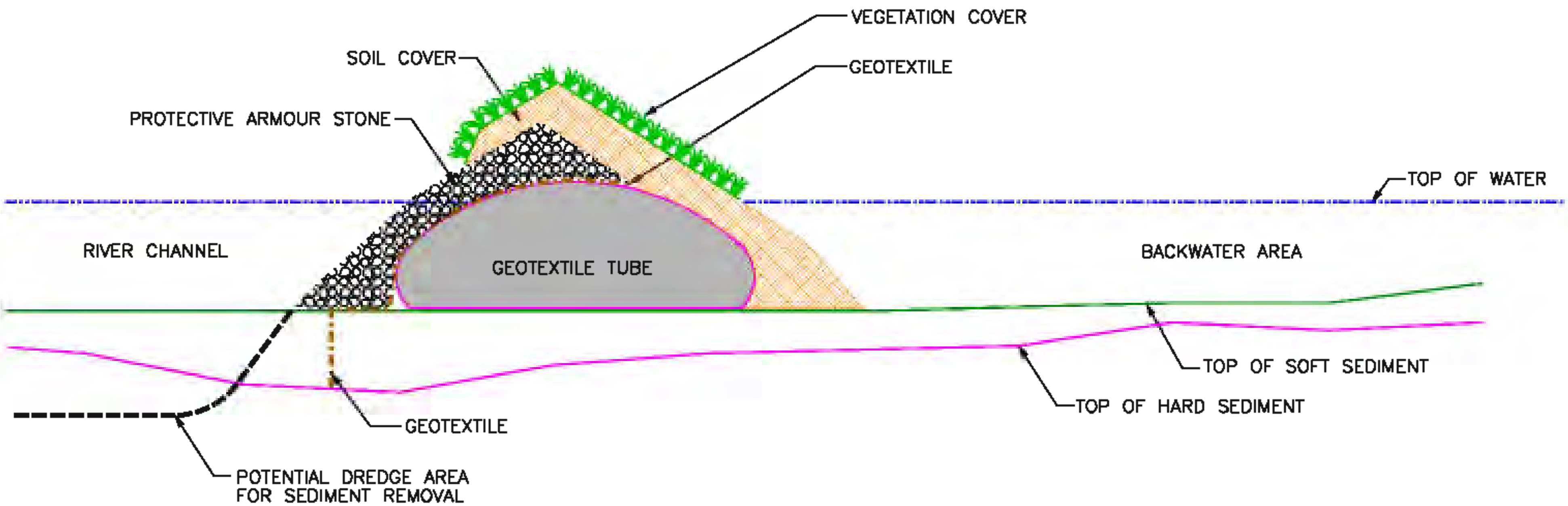
FIGURE 8.2

CONCEPTUAL RESTORATION PLAN - PHASE I
LAKE SINISSIPPI, DODGE COUNTY, WISCONSIN

Date: DECEMBER 2013	Revision Date: MARCH 2014	
Drawn By: BJW1	Checked By: MRO	Scope: 13S030

Path: X:\GB\IE\2013\13S030\GIS\mxd\Lake_Sinissippi_conceptual_design_expanded_placement_PhaseI_Dec2013_11x17.mxd Date: 3/10/2014

FIGURE 9A GEOTUBE PLACEMENT DETAILS (LINEAR ORIENTATION)



Stantec

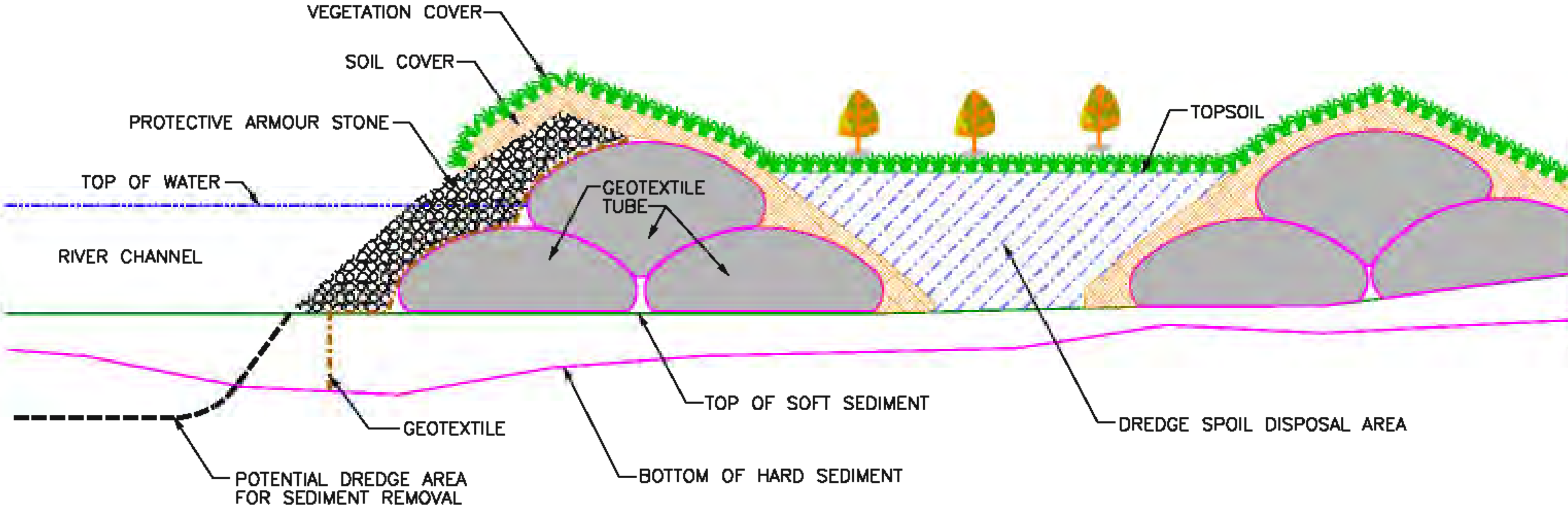
Foth

NOT TO SCALE

LAKE SINISSIPPI IMPROVEMENT DISTRICT		
FIGURE 9A GEOTEXTILE TUBE PLACEMENT DETAIL (LINEAR ORIENTATION)		
Date: JANUARY, 2014	Revision Date: FEBRUARY, 2014	
Drawn By: JOW	Checked By: MRO	Project: 13S030

X:\GB\IE\2013\13S030\cad\figures\13s030 Fig 9A geotube detail.dgn
2/27/2014 3:58:56 PM bjw1

FIGURE 9B GEOTUBE PLACEMENT DETAILS (ISLAND CONCEPT 1)



Stantec

Foth

NOT TO SCALE

LAKE SINISSIPPI IMPROVEMENT DISTRICT

FIGURE 9B

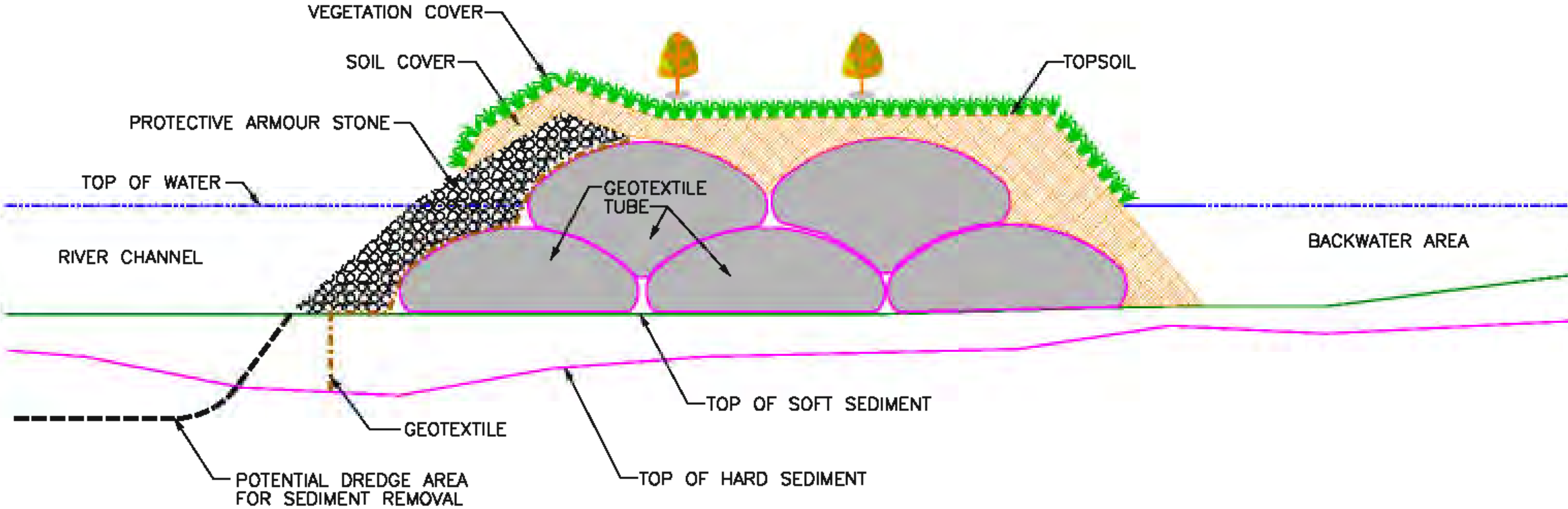
GEOTEXTILE TUBE PLACEMENT DETAIL
ISLAND CONCEPT (DREDGE SPILL FILL)

Date: JANUARY, 2014	Revision Date: FEBRUARY, 2014

Drawn By: JOW	Checked By: MRO	Project: 13S030

X:\GB\IE\2013\13S030\cad\figures\13s030 Fig 9B geotube detail.dgn
2/27/2014 3:48:31 PM bjw1

FIGURE 9C GEOTUBE PLACEMENT DETAILS (ISLAND CONCEPT 2)



Stantec

Foth

NOT TO SCALE

LAKE SINISSIPPI IMPROVEMENT DISTRICT

FIGURE 9C

GEOTEXTILE TUBE PLACEMENT DETAIL ISLAND CONCEPT (GEOTEXTILE TUBE ONLY)

Date: JANUARY, 2014	Revision Date: FEBRUARY, 2014	
Drawn By: JOW	Checked By: MRO	Project: 13S030

X:\GB\IE\2013\13S030\cad\figures\13s030 Fig 9C geotube detail.dgn
2/27/2014 3:47:34 PM bjw1

ATTACHMENTS

ATTACHMENT A - LIST OF EXISTING STUDIES / DOCUMENTS

LISTING OF FILES, DOCUMENTS AND REPORTS

CDs		
Title	**Author**	**Date**
DVD1 – Lake Sinissippi Map Data – No Elevations		December 8, 2009
DVD2 – Lake Sinissippi Map Data – No Elevations		December 8, 2009
Erosion Data – Lake Sinissippi LSID LR Plan	Hey and Associates, Inc. Hey and Associates, Inc.	2005 2002
Lake Planning Grant Report	Hey and Associates, Inc.	July 18, 2005
Lake Sinissippi = Main Folder No Map Data		December 8, 2009
Power Point Presentation to Lake Sinissippi Improvement District Board	Habitat Committee	June 3, 2004
Rock River Photo Waterdown Farms	Floyd Lehman	C-1950's

Documents and Reports		
Title	**Author**	**Date**
A Call to Action – with attachment: Final Report of the Lake Planning Grant for Lake Sinissippi	Lake Sinissippi Association	
A Fishery Survey of Lake Sinissippi	WDNR	1994
Big Muskego Lake and Bass Bay Management Plan – DRAFT		December 23, 2003
Bulk Sediment and Grain Size Analyses Results		October 2003
DINO Six Hydraulic Dredge Documents (Binder)		March 31, 2010
Geological Survey	US Department of Interior	April 19, 1994
Horicon Marsh Wildlife Area Master Plan Concept Element	WDNR	October 26, 1983
Lake Management Plants and Projects Presented to Wisconsin Department of Natural Resources, U.S. Fish and Wildlife Service Horicon National Wildlife Refuge	Lake Sinissippi Improvement District	September 6, 2007
Lake Management Strategy for Lake Sinissippi (DRAFT)	R.A. Smith & Associates, Inc. & Hey and Associates, Inc.	January 28, 1997
Lake Quality Summary and Management Strategy for Lake Sinissippi, Dodge County	R.A. Smith & Associates, Inc. & Hey and Associates, Inc.	March 17, 1998
Lake Sinissippi Property Owner's Survey	Dave Neuendorf – Community Development Agent UW – Extension Dodge County	September 1994
Long-Range Implementation Strategy	Hey and Associates, Inc.	June 6, 2002

LISTING OF FILES, DOCUMENTS AND REPORTS

Documents and Reports		
Title	**Author**	**Date**
Newspaper Article – Pilot Project will establish Lake Sinissippi breakwater	Watertown Daily Times	May 20, 2006
Planning Assistance to States, Section 22 Program for the Lake Sinissippi Improvement District Bulk Sediment and Grain Size Analyses Results		October 2003
Planning Assistance to States, Section 22 Program Lake Sinissippi Improvement District Alternatives Report	US Army Corps of Engineers, Rock Island District	September 2009
Proposal for a Lake Improvement Project at Butternut Island Causeway, Lake Sinissippi, Town of Hubbard, Dodge County, WI	Lake Sinissippi Improvement District	September 8, 2009
Restoration of submerged vegetation in shallow eutrophic lakes – A guideline and state of the art in Germany	Science Direct	December 2, 2005
The State of the Rock River Basin PUBL #WT-668-2002	WDNR	February 2002
The State of the Rock River Basis Partnership Supplement	WDNR	June 2002
Upper Rock River Water Quality Management Plan Appendix PUBL #WT-668-2002	WDNR	February 2002
Upper Rock River Watershed Management Plans PUBL #WT-668b-2002 (Pages 60 – 70 Only)	WDNR	April 2002
Water, Sediment and Nutrient Budget for Lake Sinissippi, Dodge County, WI Volume 1: Report	Hey and Associates, Inc.	September 30, 2003
Water, Sediment and Nutrient Budget for Lake Sinissippi, Dodge County, WI Volume 2: Appendices	Hey and Associates, Inc.	September 30, 2003
Wetland and Habitat Restoration Planning, Lake Sinissippi, Dodge County	Hey and Associates, Inc. and Lake Sinissippi Improvement District	July 18, 2005

ATTACHMENT B - HISTORICAL AERIAL PHOTOGRAPHS

, WI

N

1940 NW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

1940 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

, WI

N

1950 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

, WI

N

1950 NE

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

, WI

N

1956 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

1956 NE

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

, WI

N

1964 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

1964 NE

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

1971 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

1971 NE

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

, WI

N

1981 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

, WI

N

1981 NE

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

, WI

N

1986 W

HIG Project # 132512
Client Project #
Approximate Scale 1:9600 (1"=800')

HIG

, WI

N

2005 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

2005 NE

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

2010 SW

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

HIG

, WI

N

2010 NE

HIG Project # 132512
Client Project #
Approximate Scale 1:6000 (1"=500')

ATTACHMENT C - PHOTOGRAPH LOG

Photo 1: View as shown on Vegetation Communities Figure. Photo was taken looking southwest. Sandbar willow, tag alder red osier dogwood lake fringe with green ash, American elm, black willow interior.

Photo 2: View as shown on Vegetation Communities Figure. Photo was taken looking northwest. Narrow leaved cattail lake fringe, green ash, American elm, quaking aspen interior.

Photo 3. View as shown on Vegetation Communities Figure. Photo was taken looking south. Black willow and green ash lake fringe.

Photo 4: View as shown on Vegetation Communities

Photo 5: View as shown on Vegetation Communities

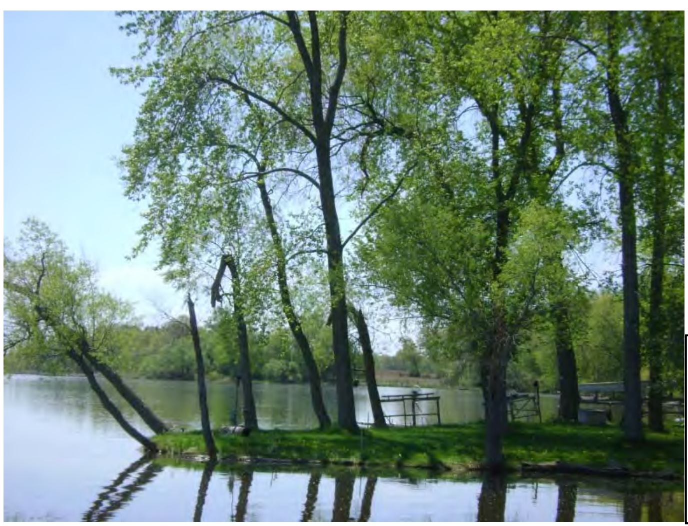


Photo 6: View as shown on Vegetation Communities

Photo 7: View as shown on Vegetation Communities Figure. Photo was taken looking northeast. Honeysuckle lake fringe with quaking aspen, red oak and green ash interior.

Photo 8: View as shown on Vegetation Communities Figure. Photo was taken looking east. Narrow leaved cattail fringe with green ash, American elm and black willow interior.

Photo 9: View as shown on Vegetation Communities Figure. Photo was taken looking south. Narrow leaved cattail marsh.

ATTACHMENT D - SEDIMENT SAMPLE LABORATORY SUMMARY

Table 1

Sediment Sample Laboratory Summary
Lake Sinissippi Improvement District
Dodge County, Wisconsin

June 2013

ASTM No.				D422						D2216	D2974	D2487
				Grain Size Analysis						Water	Organic	
Date Sampled	Sample Number	Sample Interval[1]	Location(s)	<1" (%)	<3/8" (%)	<#4 (%)	<#200 (%)	Silt (%)	Clay <.005	Content (%)	Content (%)	U.S.C.S.
6/12/13	LSC-T1	Composite	C1-C1A	100	100	97.0	69.1	36.6	32.5	153.4	15.4	OL
6/13/13	LSC-T2	Composite	C2-C2A	100	100	100	84.3	48.3	36.0	129.8	12.9	OL
6/13/13	LSC-T3	Composite	C3	100	100	100	63.4	42.9	20.5	175.3	19.1	OL
6/13/13	LSC-T4	Composite	C4	100	99.6	95.6	9.0	5.7	3.3	32.7	2.4	SP-SM
6/13/13	LSC-T5	Composite	C5-C5A	100	100	98.8	79.0	53.5	25.5	114.0	11.4	OL
6/13/13	LS-S1-A	0-1.5	S1	100	100	100	64.5	43.0	21.5	248.0	26.9	OL
6/13/13	LS-S1-B	1.5-3.0	LS S1	100	100	100	62.9	35.9	27.0	38.1	5.8	CL
6/13/13	LS-S2-A	0.8-1.2	LS S2	100	100	99.7	67.5	46.5	21.0	30.3	3.8	CL
6/13/13	LS-S2-B	1.2-1.8	LS S2	100	100	99.3	54.9	44.9	10.0	19.8	2.1	ML
6/13/13	LS-S3	0-3.1	LS S3	100	100	100	66.8	46.8	20.0	159.2	19.8	OL
6/13/13	LS-S4-A	0.5-2.0	LS S4	100	100	100	70.8	45.3	25.5	127.4	15.8	OL
6/13/13	LS-S4-B	3.0-4.0	LS S4	100	100	99.9	21.4	14.1	7.3	19.9	1.2	SM
6/13/13	LS-S5	0-2.2	LS S5	100	100	100	92.1	53.1	39.0	50.6	5.9	CL

Minimum:	100	99.6	95.6	9.0	5.7	3.3	19.8	1.2
Maximum:	100	100	100	92.1	53.5	39.0	248.0	26.9
Average:	100	100	99.2	62.0	39.7	22.2	99.9	11.0

[1]Depth below mud line.

Foth
Foth Infrastructure & Environment, LLC

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 1 of 1 | **COC Number:** COC-200813

Company: Foth Infrastructure & Environment	Invoice To: Matt Oberhofer	TAT: normal	Foth Project Manager: Matt Oberhofer
Address: 2737 S. Ridge Road, Suite 600	Address:	PM:	Project #: 13S030
Green Bay WI 54304		Phone:	
Phone: 920-497-2500 Fax: 920-496-6902	P.O.	Facility code: [redacted]-	Task code: (Subarea)
Site Contact: Matt Oberhofer Matt.Oberhofer@foth.com	Project Name: Lake Sinissippi	Regulatory Agency:	Sampling Team Members: Nick Atanasoff/ Brad Kussman
Site License No.:	Project Number: 13S030	State Location: Wisconsin	

Valid Matrix Codes

Matrix	Code
Soil	S
Sediment	SE
Solid	SO
Surface Water	SW
Drinking Water	DW
Wastewater	WW
Groundwater	GW
Hazardous Liquid	H
Air	A
Oil	O
Other	X

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	# Containers (bags)	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	PCB Fox River Method	Grain Size	Moisture Content	Organic Content	REMARKS / Lab ID
1	20130612 LSC-T1	S	C	6/12/2013	1600	1	1								X	X	X	
2	20130613 LSC-T2	S	C	6/13/113	1150	1	1								X	X	X	
3	20130613 LSC-T3	S	C	6/13/2013	1055	1	1								X	X	X	
4	20130613 LSC-T4	S	C	6/13/2013	1005	1	1								X	X	X	
5	20130613 LSC-T5	S	C	6/13/2013	0900	1	1								X	X	X	
6	20130613 LS-S1-A	S	C	6/13/2013	1305	1	1								X	X	X	
7	20130613 LS-S1-B	S	C	6/13/2013	1305	1	1								X	X	X	
8	20130613 LS-S2-A	S	C	6/13/2013	1244	1	1								X	X	X	
9	20130613 LS-S2-B	S	C	6/13/2013	1244	1	1								X	X	X	
10	20130613 LS-S3	S	C	6/13/2013	1225	1	1								X	X	X	
11	20130613 LS-S4-A	S	C	6/13/2013	1322	1	1								X	X	X	
12	20130613 LS-S4-B	S	C	6/13/2013	1322	1	1								X	X	X	
13	20130613 LS-S5	S	C	6/13/2013	1040	1	1								X	X	X	

Filtered (Y/N)

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
					[signature]	6/20/13	1530	[signature]	6/20/13	1530
					[signature]	6/20/13	1715	[signature] CSEM	6/20/13	1715

SAMPLE CONDITION:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

SAMPLE NOTES:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Matt Oberhofer

SIGNATURE of SAMPLER [signature] 6/20/2013

ADDITIONAL COMMENTS:

X:\GB-IE 2013\13S030\14000 field data\Chain of Custody 061313.xls

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LSC**
Sample No:	**LSC-T1**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/12/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	TKA

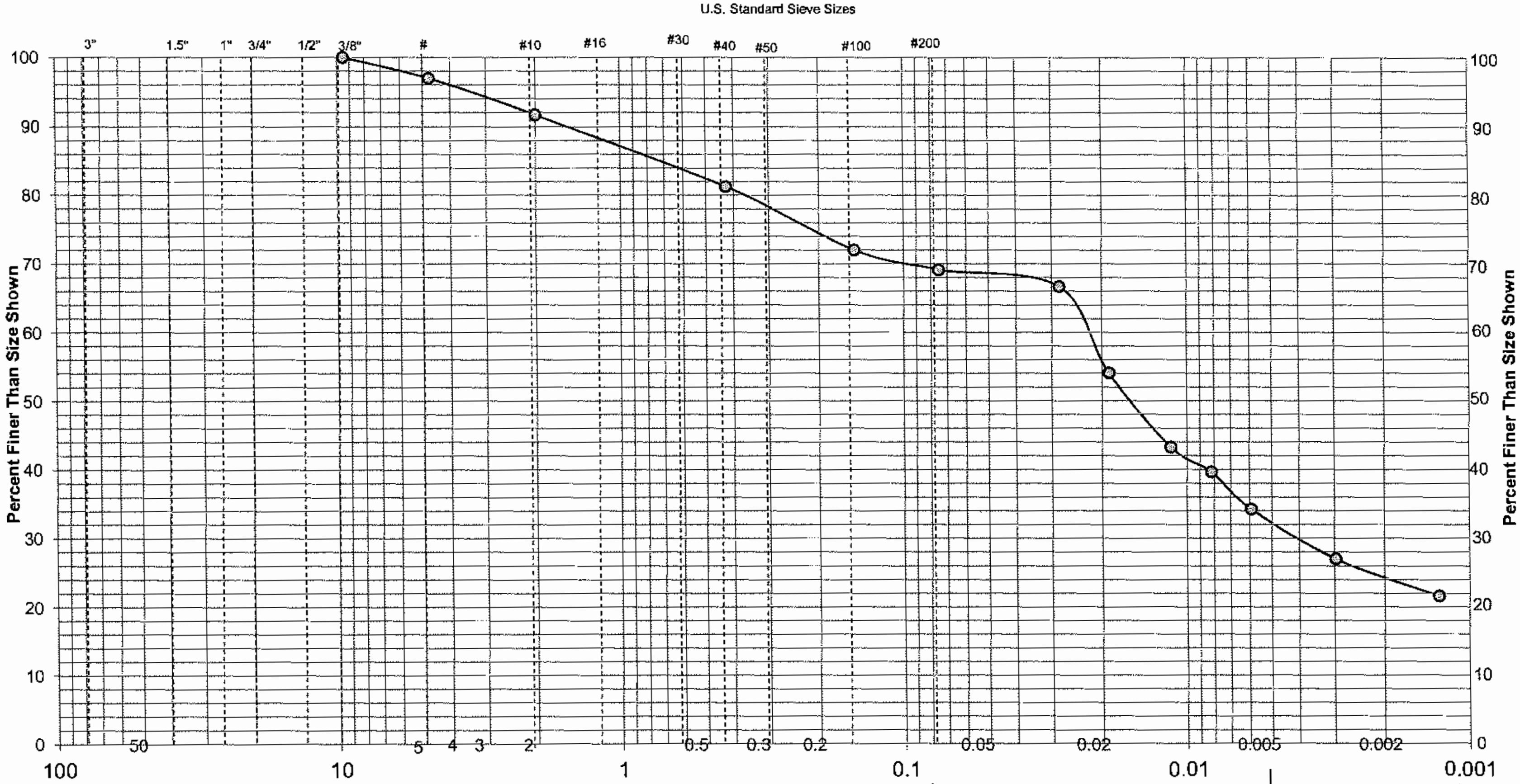
24 Hrs. Turn Around:	NO		
Washed Gradation:	YES	Dry Weight of Soil (gms):	174.8

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"	0.0	0.0	100.0		
#4	5.3	3.0	97.0		
#10	9.3	5.3	91.7		
#40	18.1	10.4	81.3		
#100	16.2	9.3	72.0		
#200	5.1	2.9	69.1		

REVIEWED BY:	Robert R Rosse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	3.0%	5.3%	10.4%	12.2%	36.6%	32.5%

Soil Classification: SANDY ORGANIC CLAY, very dark brown (OL)					
Location Sampled: LSC		Elevation or Depth:		Date Sampled:	6/12/13
Sample Number: LSC-T1		Sampled Moisture Content (%): 153.4		Report No.:	LSC-T1
Sample Source:		*CQM, INC.*			
Atterberg Limits: LL=	PL= PI=	Client:	**Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 10YR 2/2		Project:	**Lake Sinissippi**	Page:	2
Date Received: 6/20/13		Prepared by:	Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc=	Cu=	Checked by:	Robert R. Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LSC**
Sample No:	**LSC-T2**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	TKA

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

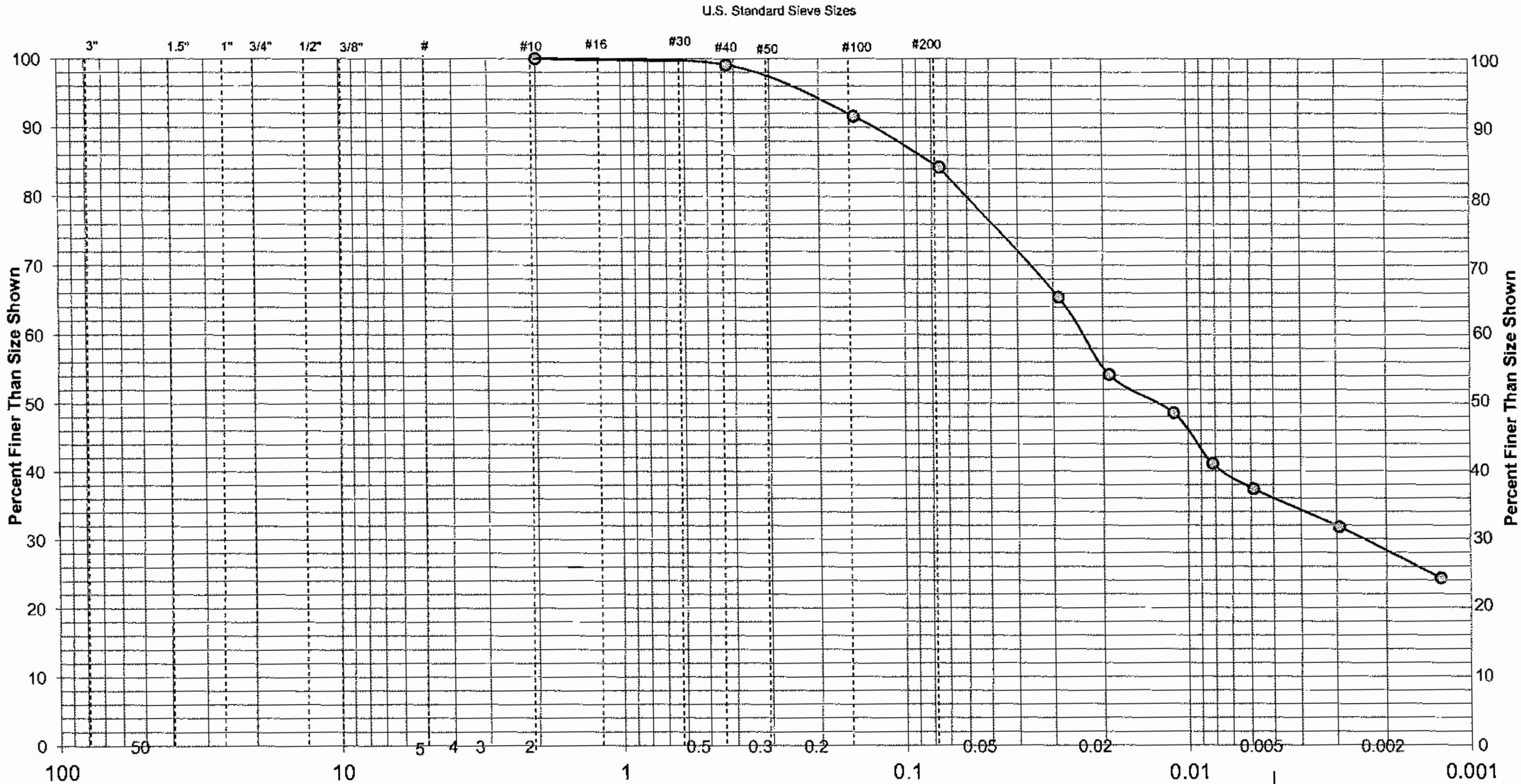
Dry Weight of Soil (gms): 197.7

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4					
#10	0.0	0.0	100.0		
#40	1.8	0.9	99.1		
#100	14.8	7.5	91.6		
#200	14.5	7.3	84.3		

REVIEWED BY:	Robert R. Brus
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			0.9%	14.8%	48.3%	36.0%

Soil Classification: ORGANIC CLAY W/SAND, very dark brown (OL)

Location Sampled: LSC	Elevation or Depth:	Date Sampled:	6/13/13
Sample Number: LSC-T2	Sampled Moisture Content (%): 129.8	Report No.:	LSC-T2
Sample Source:	*CQM, INC.*		
Atterberg Limits: LL= PL= PI=	Client: **Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 10YR 2/2	Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13	Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc= Cu=	Checked by: Robert R. Bouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LSC**
Sample No:	**LSC-T3**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	TKA

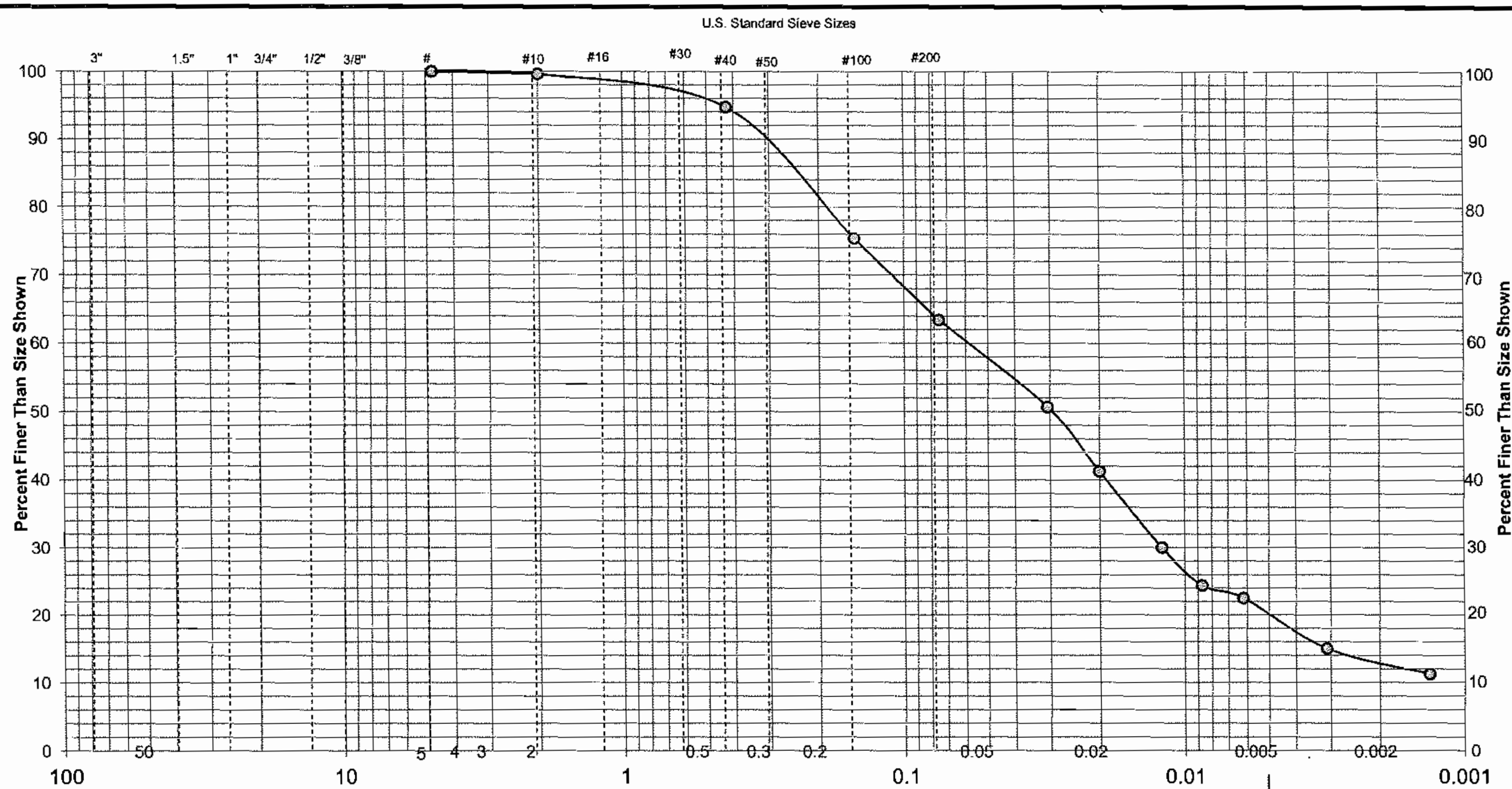
24 Hrs. Turn Around:	NO		
Washed Gradation:	YES	Dry Weight of Soil (gms):	165.4

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4	0.0	0.0	100.0		
#10	0.6	0.4	99.6		
#40	8.1	4.9	94.7		
#100	31.9	19.3	75.4		
#200	19.9	12.0	63.4		

REVIEWED BY:	Robert R. Rowse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		0.4%	4.9%	31.3%	42.9%	20.5%

Soil Classification: SANDY ORGANIC CLAY, very dark brown (OL)					
Location Sampled: LSC			Elevation or Depth:	Date Sampled: 6/13/13	
Sample Number: LSC-T3			Sampled Moisture Content (%): 175.3	Report No.: LSC-T3	
Sample Source:			*CQM, INC.*		
Atterberg Limits: LL=	PL=	PI=	Client: **Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 10YR 2/2			Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13			Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc=	Cu=		Checked by: Robert R. Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LSC**
Sample No:	**LSC-T4**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-24, 2013
Test Performed By:	TKA

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

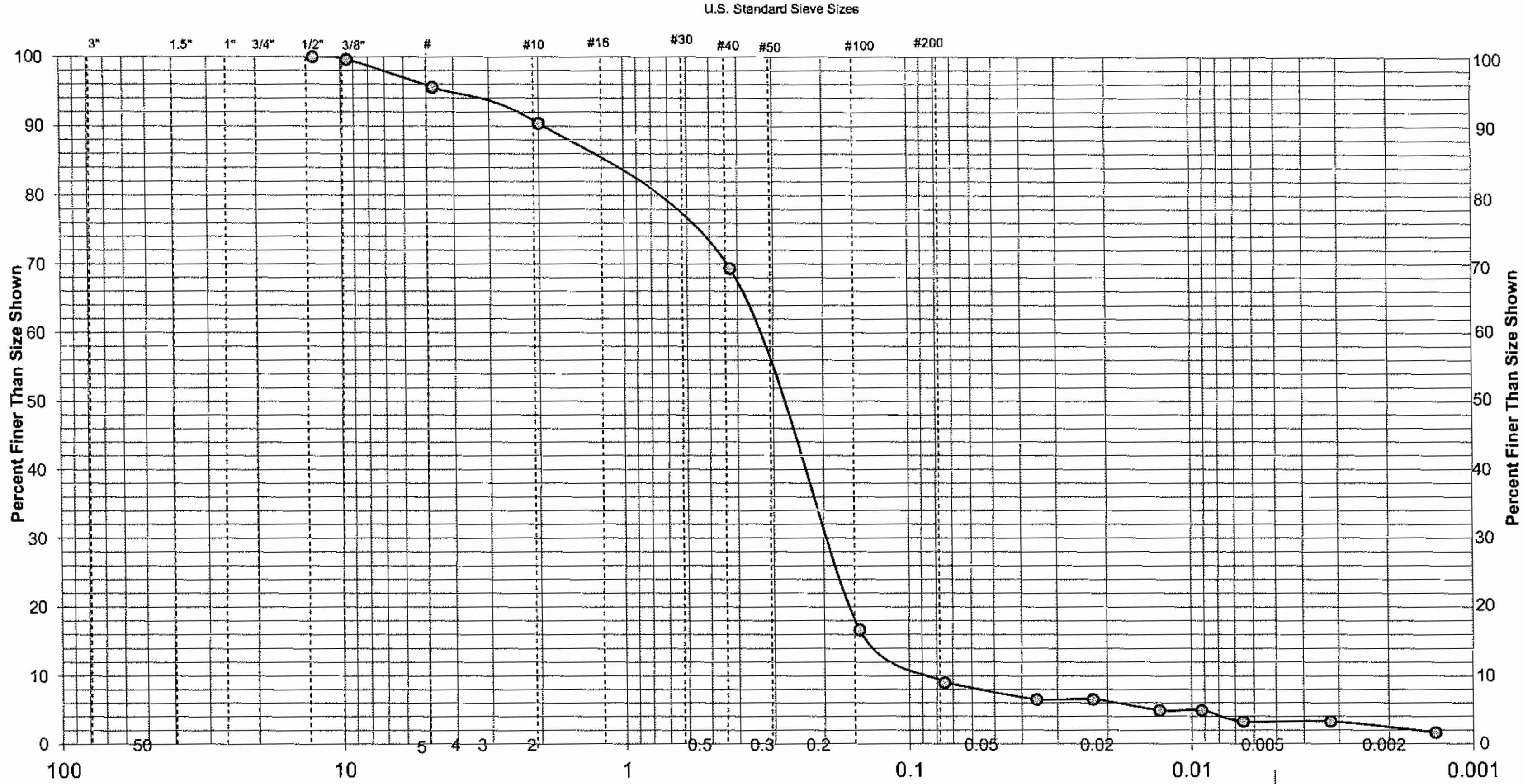
Dry Weight of Soil (gms): 342.3

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"	0.0	0.0	100.0		
3/8"	1.3	0.4	99.6		
#4	13.8	4.0	95.6		
#10	17.7	5.2	90.4		
#40	72.0	21.0	69.4		
#100	180.5	52.7	16.7		
#200	26.4	7.7	9.0		

REVIEWED BY:	Robert R Royse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	4.4%	5.2%	21.0%	60.4%	5.7%	3.3%

Soil Classification: SAND W/SILT, fine to medium grained, a little gravel, some organic fines, very dark brown (SP-SM)

Location Sampled: LSC	Elevation or Depth:	Date Sampled: 6/13/13	
Sample Number: LSC-T4	Sampled Moisture Content (%): 32.7	Report No.: LSC-T4	
Sample Source:	*CQM, INC.*		
Atterberg Limits: LL= PL= PI=	Client: **Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 10YR 2/2	Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13	Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc= Cu=	Checked by: Robert R Rowe	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LSC**
Sample No:	**LSC-T5**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	TKA

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

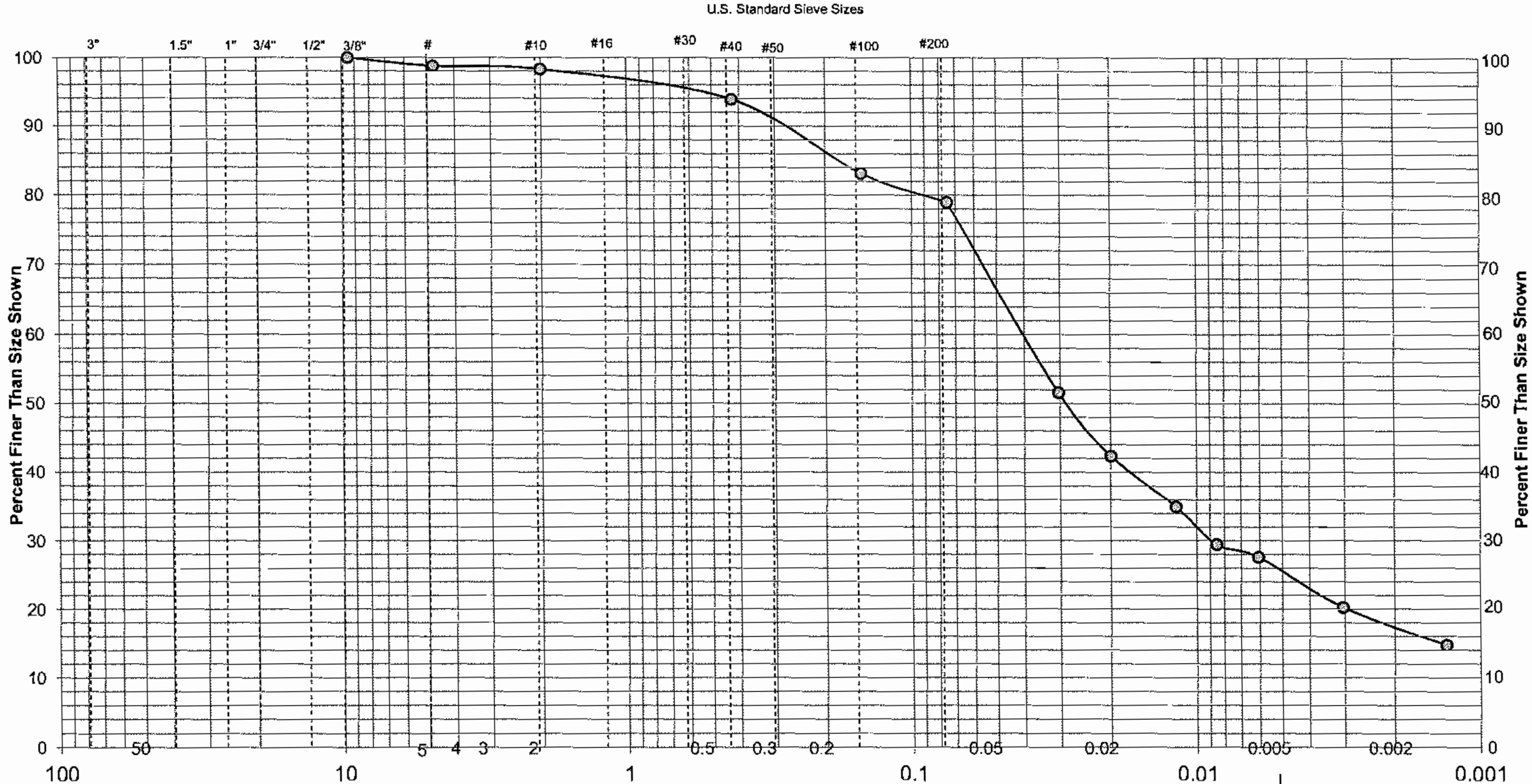
Dry Weight of Soil (gms): 209.4

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"	0.0	0.0	100.0		
#4	2.6	1.2	98.8		
#10	1.1	0.5	98.3		
#40	9.3	4.4	93.9		
#100	22.4	10.7	83.2		
#200	8.7	4.2	79.0		

REVIEWED BY:	Robert R Rouse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	1.2%	0.5%	4.4%	14.9%	53.5%	25.5%

Soil Classification: ORGANIC CLAY W/SAND, very dark brown (OL)			
Location Sampled: LSC	Elevation or Depth:	Date Sampled: 6/13/13	
Sample Number: LSC-T5	Sampled Moisture Content (%): 114.0	Report No.: LSC-T5	
Sample Source:	*CQM, INC.*		
Atterberg Limits: LL= PL= PI=	Client: **Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 10YR 2/2	Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13	Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc= Cu=	Checked by: Robert R. Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S1-A**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	TKA

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

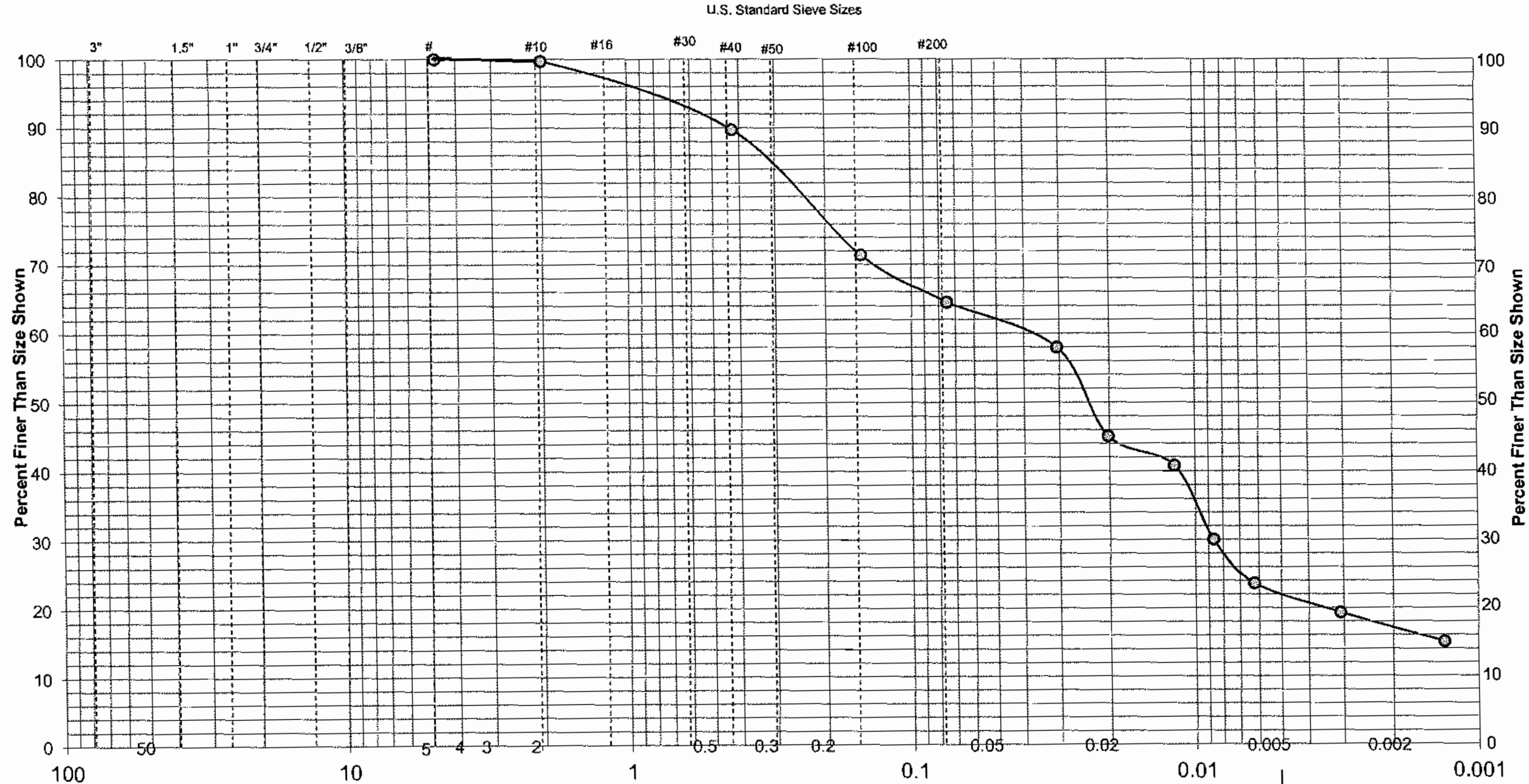
Dry Weight of Soil (gms): 132.4

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4	0.0	0.0	100.0		
#10	0.4	0.3	99.7		
#40	13.2	10.0	89.7		
#100	24.2	18.3	71.4		
#200	9.1	6.9	64.5		

REVIEWED BY:	Robert A Rouse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		0.3%	10.0%	25.2%	43.0%	21.5%

Soil Classification: SANDY ORGANIC CLAY, very dark brown (OL)

Location Sampled: LS			Elevation or Depth:	Date Sampled:	6/13/13
Sample Number: LS-S1-A			Sampled Moisture Content (%): 248.0	Report No.:	LS-S1A
Sample Source:			*CQM, INC.*		
Atterberg Limits:	LL=	PL=	PI=	Client:	Foth Infrastructure & Environment, LLC
Munsell Color Code: 10YR 2/2			Project: Lake Sinissippi	Page:	2
Date Received: 6/20/13			Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc=	Cu=		Checked by: Robert R. Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S1-B**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	BLT

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

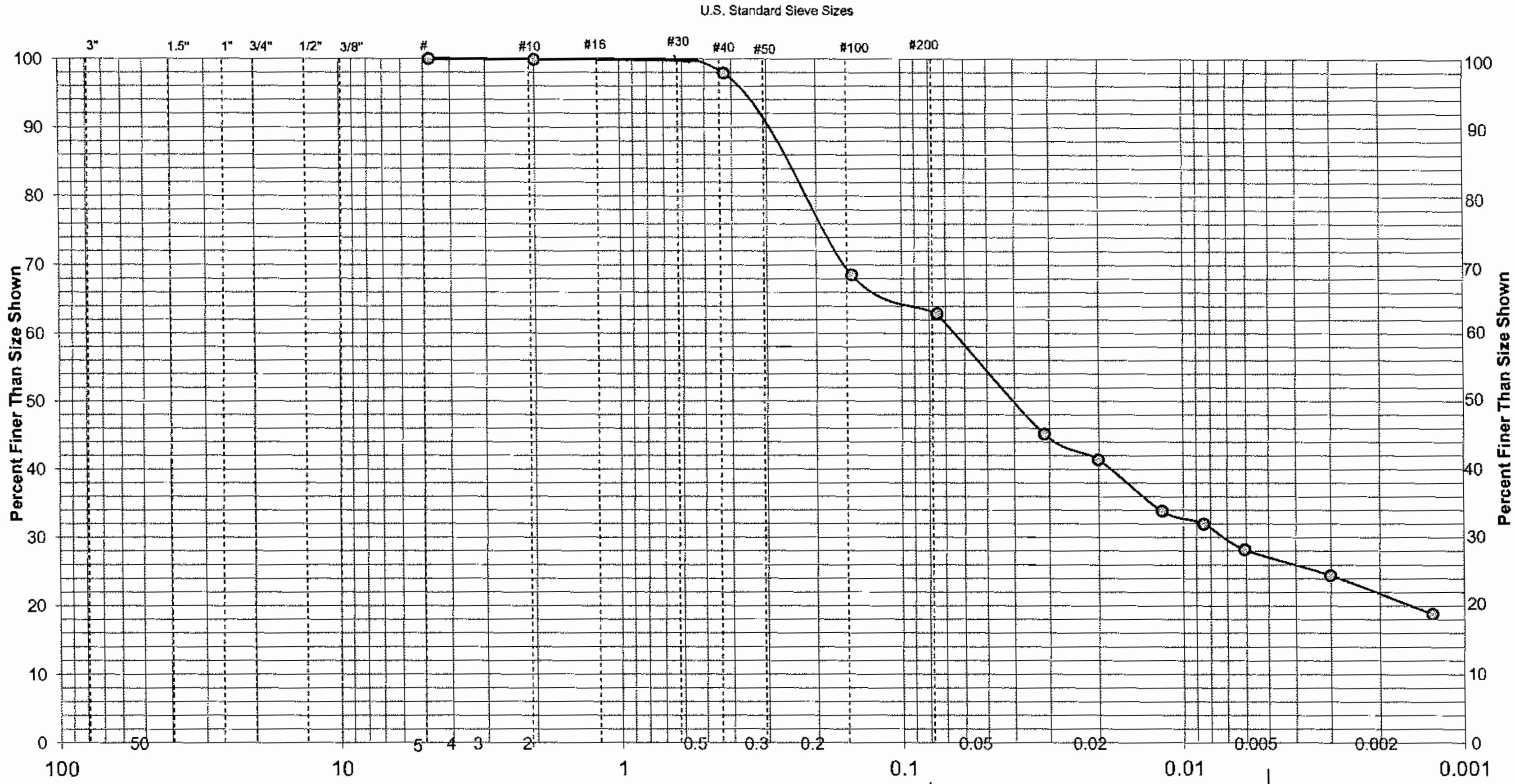
Dry Weight of Soil (gms): 367.5

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4	0.0	0.0	100.0		
#10	0.4	0.1	99.9		
#40	7.2	2.0	97.9		
#100	107.5	29.3	68.6		
#200	21.1	5.7	62.9		

REVIEWED BY:	Robert R Brune
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		0.1%	2.0%	35.0%	35.9%	27.0%

Soil Classification: SANDY LEAN CLAY, some organic fines, very dark brown (CL)

Location Sampled: LS	Elevation or Depth:	Date Sampled:	6/13/13
Sample Number: LS-S1-B	Sampled Moisture Content (%): 38.1	Report No.:	LS-S1B
Sample Source:	*CQM, INC.*		
Atterberg Limits: LL= PL= PI=	Client: **Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 10YR 2/2	Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13	Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc= Cu=	Checked by: Robert R. Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S2-A**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**5Y 3/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	BLT

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

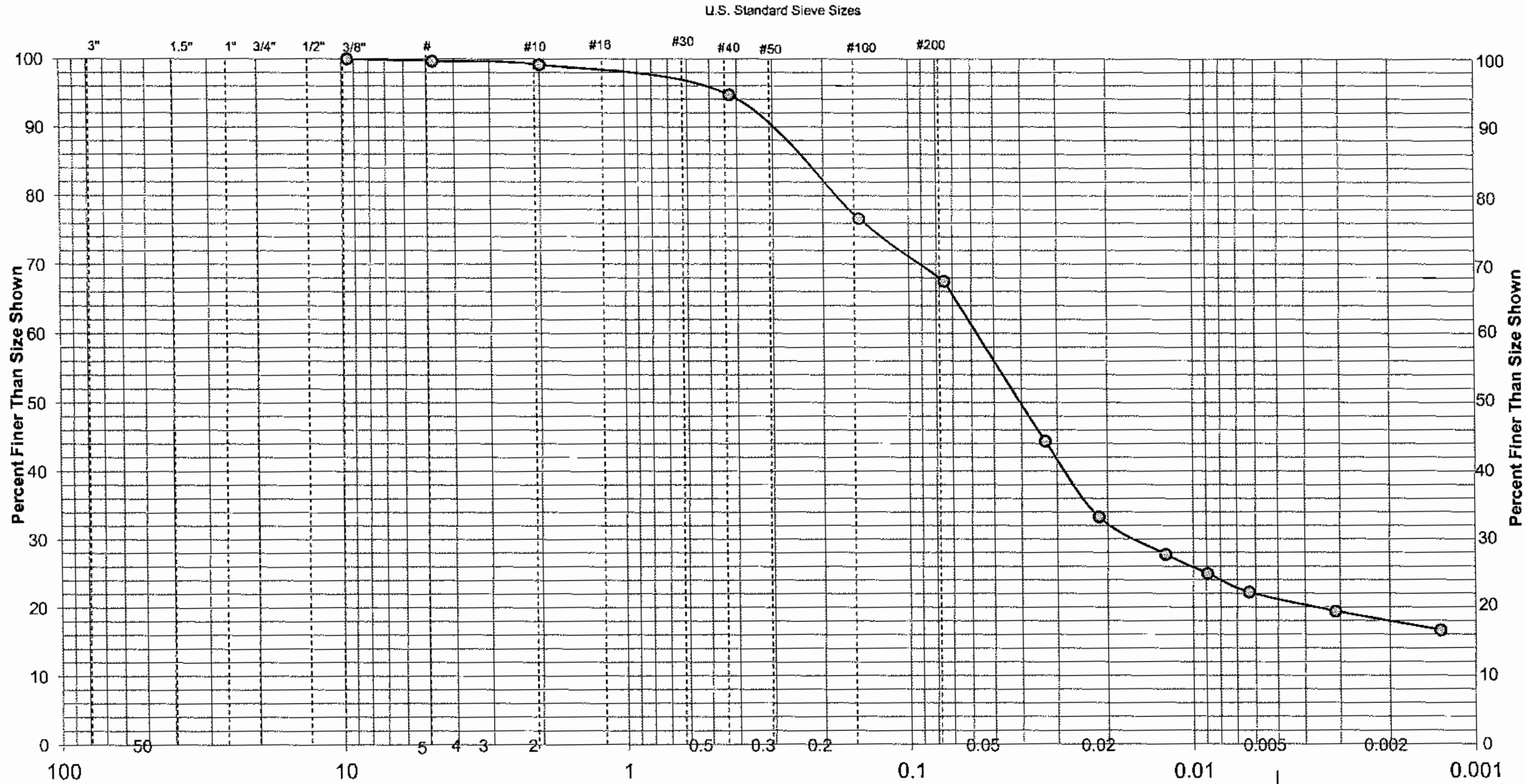
Dry Weight of Soil (gms): 212.8

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"	0.0	0.0	100.0		
#4	0.7	0.3	99.7		
#10	1.1	0.5	99.2		
#40	9.5	4.5	94.7		
#100	38.3	18.0	76.7		
#200	19.5	9.2	67.5		

REVIEWED BY:	Robert R. Rowe
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.3%	0.5%	4.5%	27.2%	46.5%	21.0%

Soil Classification: SANDY LEAN CLAY, some organic fines, dark olive gray (CL)			
Location Sampled: LS		Elevation or Depth:	Date Sampled: 6/13/13
Sample Number: LS-S2-A		Sampled Moisture Content (%): 30.3	Report No.: LS-S2A
Sample Source:		CQM, INC.	
Atterberg Limits: LL=	PL= PI=	Client: Foth Infrastructure & Environment, LLC	
Munsell Color Code: 5Y 3/2		Project: Lake Sinissippi	Page: 2
Date Received: 6/20/13		Prepared by: Michael R. Andraschko	Date: 6/26/13
Coefficients: Cc=	Cu=	Checked by: Robert R Rouse	Date: 6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S2-B**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**5Y 5/4**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-24, 2013
Test Performed By:	TKA

24 Hrs. Turn Around: NO

Washed Gradation: YES

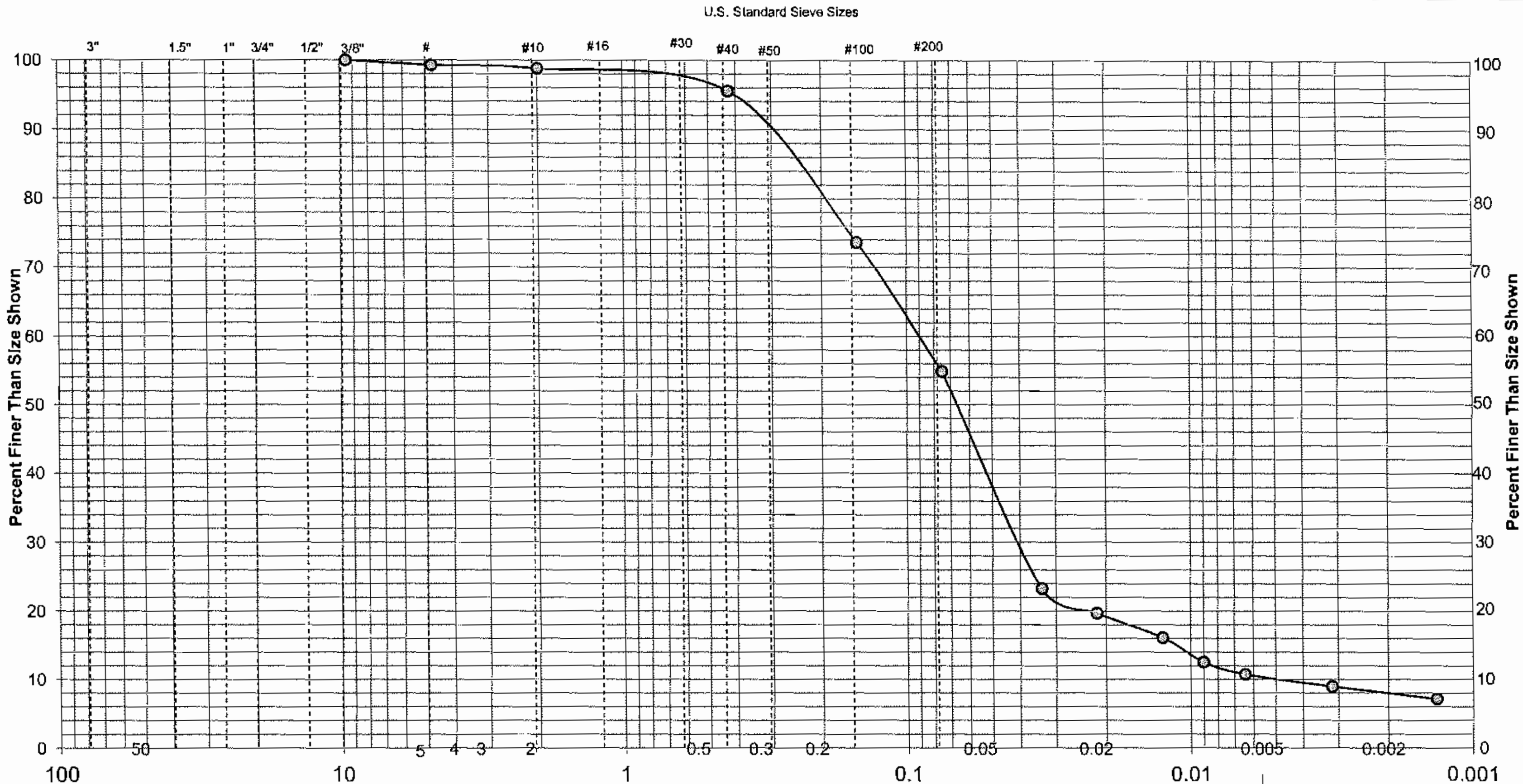
Dry Weight of Soil (gms): 369.3

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"	0.0	0.0	100.0		
#4	2.6	0.7	99.3		
#10	1.8	0.5	98.8		
#40	12.0	3.2	95.6		
#100	80.9	21.9	73.7		
#200	69.5	18.8	54.9		

REVIEWED BY:	Robert R. Rouse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.7%	0.5%	3.2%	40.7%	44.9%	10.0%

Soil Classification: SANDY SILT, trace of organic fines, olive (ML)

Location Sampled: LS	Elevation or Depth:	Date Sampled:	6/13/13
Sample Number: LS-S2-B	Sampled Moisture Content (%): 19.8	Report No.:	LS-S2B
Sample Source:	*CQM, INC.*		
Atterberg Limits: LL= PL= PI=	Client: **Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 5Y 5/4	Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13	Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc= Cu=	Checked by: Robert R Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S3**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	TKA

24 Hrs. Turn Around: NO

Washed Gradation: YES

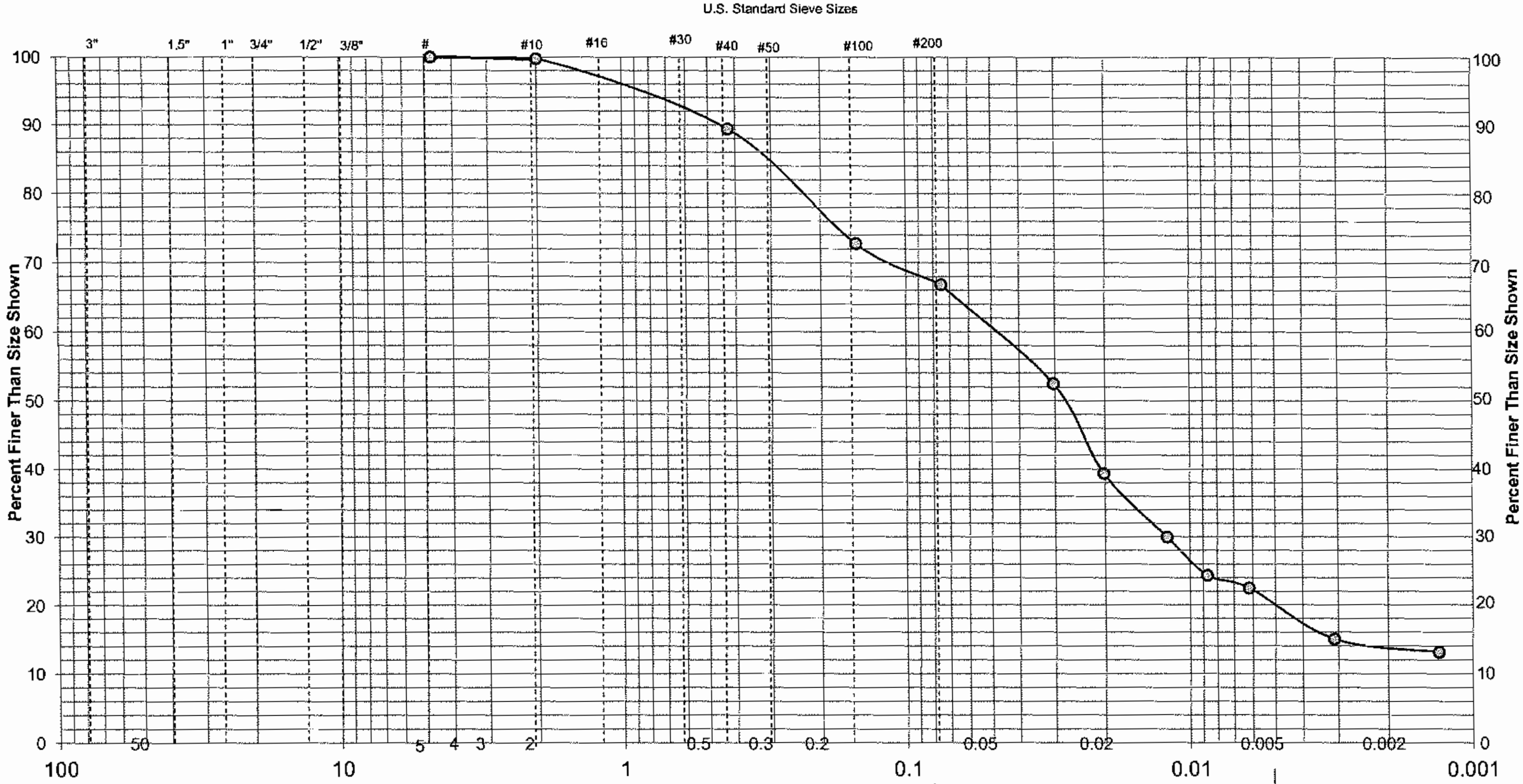
Dry Weight of Soil (gms): 179.7

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4	0.0	0.0	100.0		
#10	0.4	0.2	99.8		
#40	18.6	10.4	89.4		
#100	29.9	16.6	72.8		
#200	10.7	6.0	66.8		

REVIEWED BY:	Robert R Rowse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		0.2%	10.4%	22.6%	46.8%	20.0%

Soil Classification: SANDY ORGANIC CLAY, very dark brown (OL)

Location Sampled: LS	Elevation or Depth:	Date Sampled: 6/13/13
Sample Number: LS-S3	Sampled Moisture Content (%): 159.2	Report No.: LS-S3
Sample Source:	*CQM, INC.*	

Atterberg Limits:	LL=	PL=	PI=

Munsell Color Code: 10YR 2/2	Client: **Foth Infrastructure & Environment, LLC**		
	Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13	Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc= Cu=	Checked by: Robert R. Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S4-A**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	TKA

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

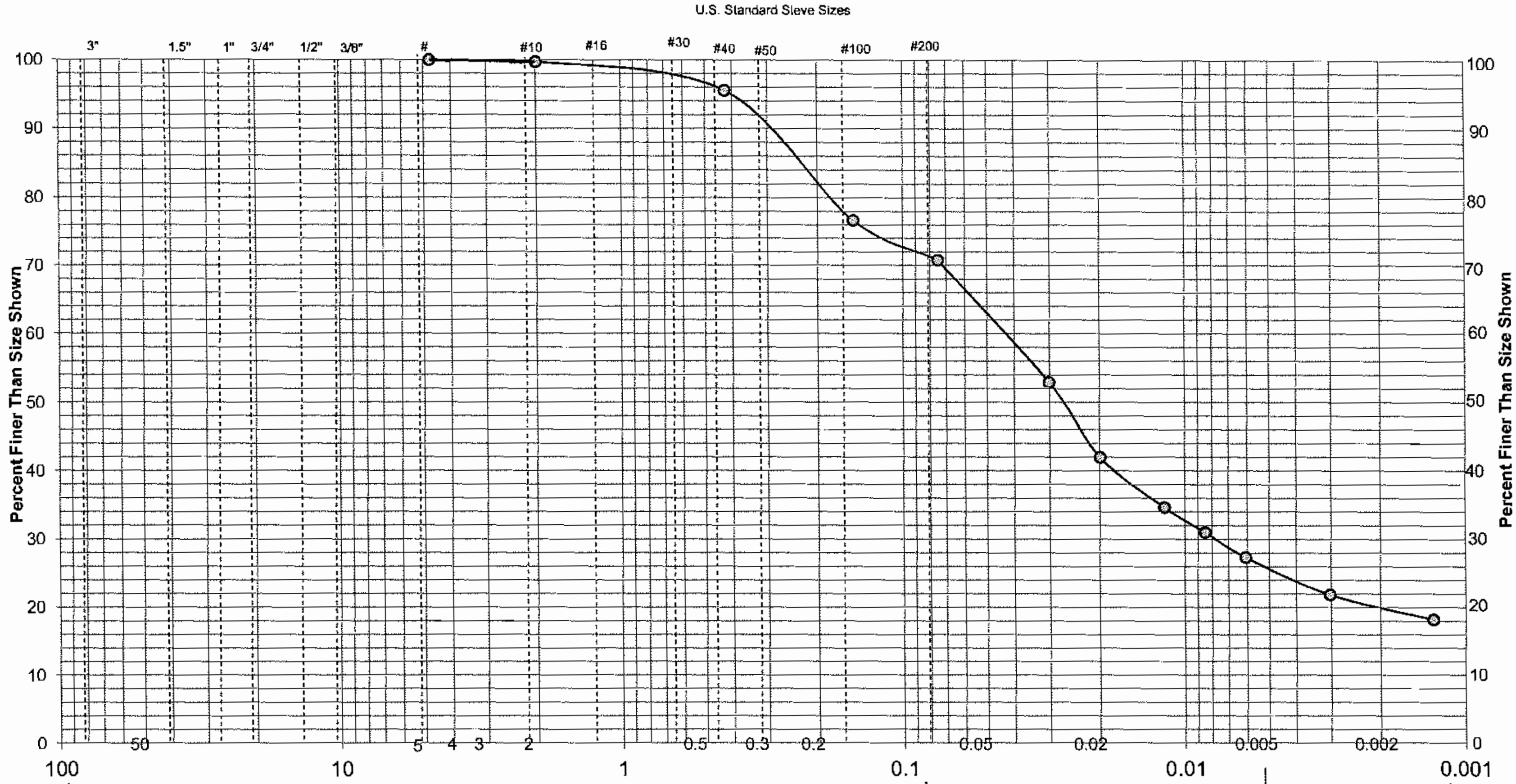
Dry Weight of Soil (gms): 193.2

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4	0.0	0.0	100.0		
#10	0.5	0.3	99.7		
#40	8.1	4.2	95.5		
#100	36.4	18.8	76.7		
#200	11.4	5.9	70.8		

REVIEWED BY:	Robert R Rouse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand			Silt	Clay
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		0.3%	4.2%	24.7%	45.3%	25.5%

Soil Classification: ORGANIC CLAY W/SAND, very dark brown (OL)

Location Sampled: LS	Elevation or Depth:	Date Sampled:	6/13/13
Sample Number: LS-S4-A	Sampled Moisture Content (%): 127.4	Report No.:	LS-S4A
Sample Source:	CQM, INC.		
Atterberg Limits: LL= PL= PI=	Client: Foth Infrastructure & Environment, LLC		
Munsell Color Code: 10YR 2/2	Project: Lake Sinissippi	Page:	2
Date Received: 6/20/13	Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc= Cu=	Checked by: Robert R Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S4-B**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**5Y 5/4**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-24, 2013
Test Performed By:	TKA

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

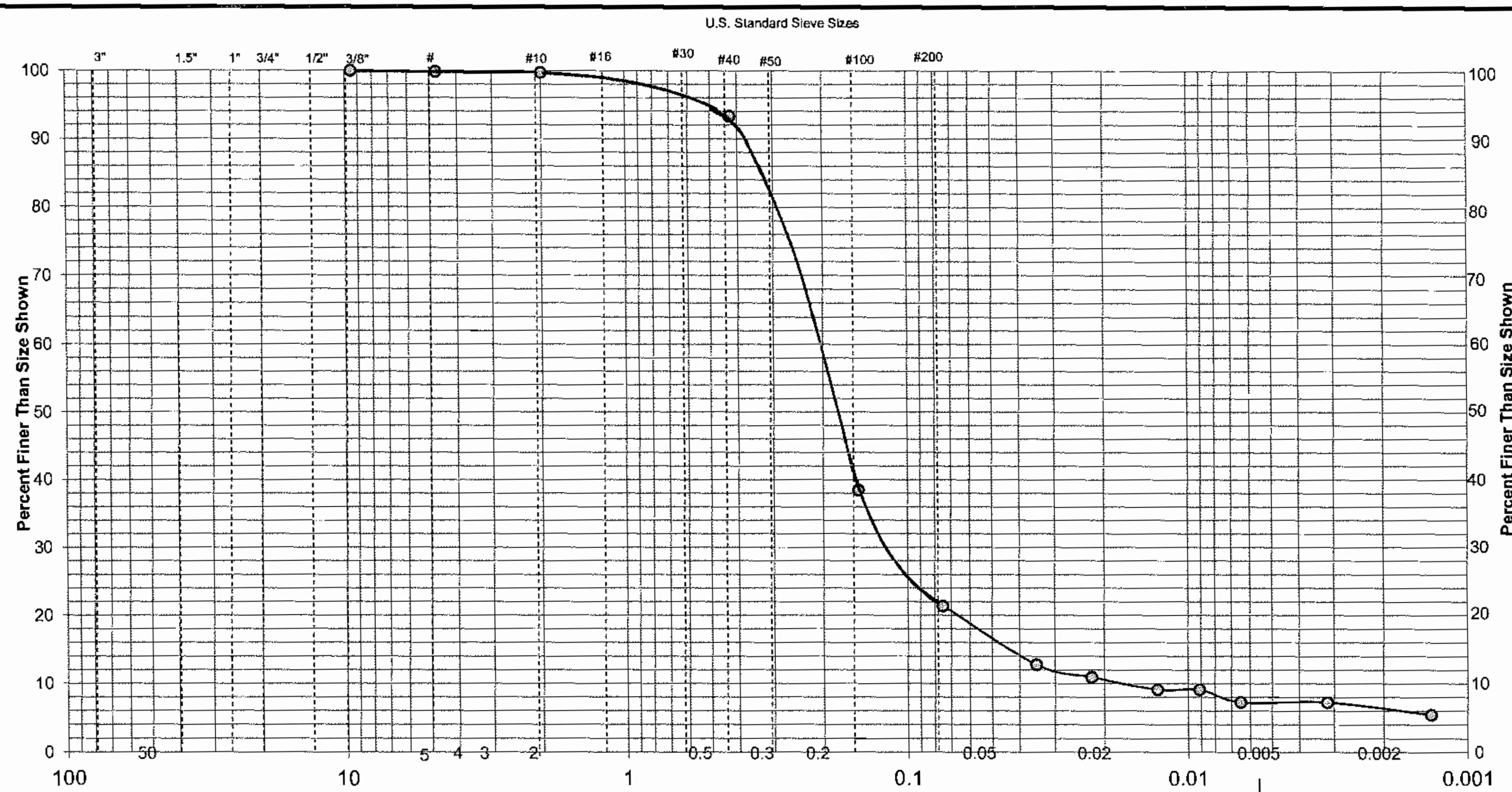
Dry Weight of Soil (gms): 448.3

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"	0.0	0.0	100.0		
#4	0.6	0.1	99.9		
#10	0.5	0.1	99.8		
#40	29.3	6.5	93.3		
#100	245.5	54.8	38.5		
#200	76.5	17.1	21.4		

REVIEWED BY:	Robert R Rouse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.1%	0.1%	6.5%	71.8%	14.1%	7.3%

Soil Classification: SILTY SAND, fine grained, trace of organic fines, olive (SM)

Location Sampled: LS		Elevation or Depth:		Date Sampled:	6/13/13
Sample Number: LS-S4-B		Sampled Moisture Content (%):	19.9	Report No.:	LS-S4B
Sample Source:		*CQM, INC.*			
Atterberg Limits: LL=	PL= PI=	Client:	Foth Infrastructure & Environment, LLC		
Munsell Color Code: 5Y 5/4		Project:	Lake Sinissippi	Page:	2
Date Received: 6/20/13		Prepared by:	Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc=	Cu=	Checked by:	Robert R Rouse	Date:	6/26/13

CQM, INC.

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES (ASTM D422)

GENERAL DATA:

Client:	**Foth Infrastructure & Environment, LLC**
Project:	**Lake Sinissippi**
Location Sampled:	**LS**
Sample No:	**LS-S5**
Depth of Sample:	
Date Received:	**6/20/13**
Sample Designated For:	**Soil Classification**
Source of Sample:	
Munsell Color Code:	**10YR 2/2**
Date Sampled:	**6/13/13**

LABORATORY DATA:

Date Tested:	June 21-25, 2013
Test Performed By:	BLT

24 Hrs. Turn Around:	NO
Washed Gradation:	YES

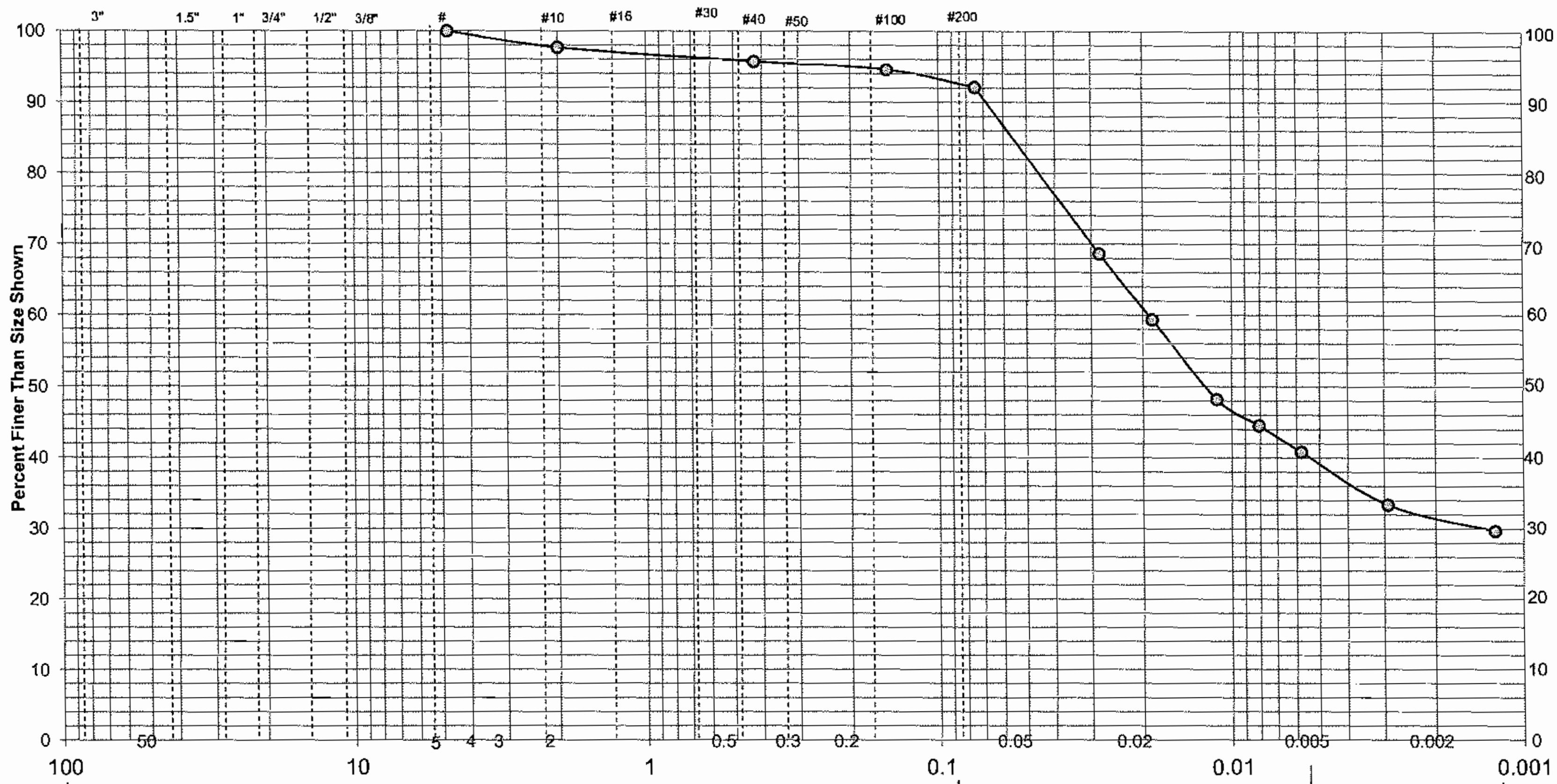
Dry Weight of Soil (gms): 321.9

Sieve Size	Weight Retained	% Retained	% Passing	Project Specification % Passing by Weight	Source of Specification
3"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4	0.0	0.0	100.0		
#10	7.5	2.3	97.7		
#40	6.3	2.0	95.7		
#100	3.7	1.1	94.6		
#200	8.2	2.5	92.1		

REVIEWED BY:	Robert R Rouse
DATE REVIEWED:	6/26/13

Remarks:

GRAIN SIZE DISTRIBUTION CURVE



Gravel		Sand				
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		2.3%	2.0%	3.7%	53.1%	39.0%

Soil Classification: LEAN CLAY, some organic fines, very dark brown (CL)

Location Sampled: LS			Elevation or Depth:	Date Sampled:	6/13/13
Sample Number: LS-S5			Sampled Moisture Content (%): 50.6	Report No.:	LS-S5
Sample Source:			*CQM, INC.*		
Atterberg Limits: LL=	PL=	PI=	Client: **Foth Infrastructure & Environment, LLC**		
Munsell Color Code: 10YR 2/2			Project: **Lake Sinissippi**	Page:	2
Date Received: 6/20/13			Prepared by: Michael R. Andraschko	Date:	6/26/13
Coefficients: Cc=	Cu=		Checked by: Robert R Rouse	Date:	6/26/13

ATTACHMENT E - ENGINEERING COST ESTIMATE

Client:	Lake Sinisippi Improvement District	Project ID.:	13S030
Project:	Dredge/Island Construction		
Prepared by:	JBH1	Date:	01/31/14
Checked by:	TMK1	Date:	01/31/14

South Roadway Access - Construction of PHASE 1 - 2000 feet of Tubes

Rev 1

Description	Estimated Quantity	Unit	Unit Cost	Item Cost	
◆ Roadway Subgrade/Gravel Road Preparation:					
Clearing and Grubbing (200' by 25')	0.12	ac	$ 10,000	$ 1,200	
Site Grading (Cut/stockpile 6" of topsoil, etc.)	0.12	ac-ft	$ 12,000.00	$ 1,440	
Site Grading (Replace topsoil after construction)	0	ac-ft	$ 12,000.00	$ 1,440	
Sedimentation Pond Grading	0	cy	$ 3.00	$ -	
Access Road (Gravel - 200' by 22' by 6") purchase and place	82	cy	$ 40	$ 3,260	
					$ 7,340
◆ Landscape Roadway:					
Topsoil (0.5' by 200' by 4' - Final Grading)	20	cy	$ 9.00	$ 180	
Seed, Fertilize & Mulch	0.02	acre	$ 4,000	$ 80	
					$ 260
◆ Stormwater Management Roadway (during construction):					
Silt Fencing (around area - 200' by 30')	460	lf	$ 3.00	$ 1,380	
					$ 1,380
				Roadway Total:	**$ 8,980**
◆ Construction of Rip Rap Island Protection (Mechanical Dredge Placement)					
Burry Lead Edge 40' by 20'	3.00	unit	$ 5,000.00	$ 15,000	
Construct Rip Rap 2' thick ($20/cy)	4,000	lf	$ 40.00	$ 160,000	
Construct Filter Fabric Beneath Rip Rap	72,000	sf	$ 1.50	$ 108,000	
Construct 3' Fill Above Geotube (2000 x 30)	6,700	cy	$ 40.00	$ 268,000	
Construct Fill Above Geotube Island (200 x 70 x 3)	1,600	cy	$ 40.00	$ 64,000	
Construct Fill Above Emergent Shoreline (200 x 60 x 3)	1,350	cy	$ 40.00	$ 54,000	
					$ 669,000
				Rip Rap Island Protection Total:	**$ 669,000**
◆ Dredge and Fill Geotextile Tubes					
Sediment Dredged (Hydraulic dredging)	17,000	cy	$ 27.00	$ 459,000	
Geotextile Bags (60' perimeter, filled 6')	17	units	$ 3,000.00	$ 51,000	
					$ 510,000
				Dredge and Fill Tubes Total:	**$ 510,000**
				Subtotal	***$ 1,187,980***
◆ Mobilization/Demobilization (6%)	1	L.S.		$ 71,279	
◆ Permitting	1	L.S.		$ 20,000	
				Construction Estimated Cost Total:	***$ 1,279,259***
				Design and Construction Oversight (6 and 5% respectively):	*$ 140,718*
				Contingency at 10%:	*$ 127,926*
				Total Cost:	***$ 1,547,903***

Note: No costs are assumed for land acquisition or easements.

Client:	Lake Sinisippi Improvement District	**Project ID.:**	13S030
Project:	Dredge/Island Construction		
Prepared by:	JBH1	**Date:**	01/31/14
Checked by:	TMK1	**Date:**	01/31/14

South Roadway Access - Construction of Phase 1 & 2 - 4000 feet of Tubes

Rev 1

Description	Estimated Quantity	Unit	Unit Cost	Item Cost	
◆ Roadway Subgrade/Gravel Road Preparation:					
Clearing and Grubbing (200' by 25')	0.12	ac	$ 10,000	$ 1,200	
Site Grading (Cut/stockpile 6" of topsoil, etc)	0.12	ac-ft	$ 12,000.00	$ 1,440	
Site Grading (Replace topsoil after construction)	0	ac-ft	$ 12,000.00	$ 1,440	
Sedimentation Pond Grading	0	cy	$ 3.00	$ -	
Access Road (Gravel - 200' by 22' by 6") purchase and place	82	cy	$ 40	$ 3,260	
					$ 7,340
◆ Landscape Roadway:					
Topsoil (0.5' by 200' by 4' - Final Grading)	20	cy	$ 9.00	$ 180	
Seed, Fertilize & Mulch	0.02	acre	$ 4,000	$ 80	
					$ 260
◆ Stormwater Management Roadway (during construction):					
Silt Fencing (around area - 200' by 30')	460	lf	$ 3.00	$ 1,380	
					$ 1,380
				Roadway Total:	**$ 8,980**
◆ Construction of Rip Rap Island Protection (Mechanical Dredge Placement)					
Burry Lead Edge 40' by 20'	6.00	unit	$ 5,000.00	$ 30,000	
Construct Rip Rap 2' thick ($20/cy)	8,000	lf	$ 40.00	$ 320,000	
Construct Filter Fabric Beneath Rip Rap	144,000	sf	$ 1.50	$ 216,000	
Construct 3' Fill Above Geotube (4000 x 30)	13,300	cy	$ 40.00	$ 532,000	
Construct Fill Above Geotube Island (400 x 70 x 3)	3,100	cy	$ 40.00	$ 124,000	
Construct Fill Above Geotube Island (800 x 60 x 3)	5,400	cy	$ 40.00	$ 216,000	
					$ 1,438,000
				Rip Rap Island Protection Total:	**$ 1,438,000**
◆ Dredge and Fill Geotextile Tubes					
Sediment Dredged (Hydraulic dredging)	37,000	cy	$ 27.00	$ 999,000	
Geotextile Bags (60' perimeter, filled 6')	37	units	$ 3,000.00	$ 111,000	
					$ 1,110,000
				Dredge and Fill Tubes Total:	**$ 1,110,000**
				Subtotal	***$ 2,556,980***
◆ Mobilization/Demobilization (6%)	1	L.S.		$ 153,419	
◆ Permitting	1	L.S.		$ 20,000	
				Construction Estimated Cost Total:	***$ 2,730,399***
				Design and Construction Oversight (6 and 5% respectively):	*$ 300,344*
				Contingency at 10%:	*$ 273,040*
				Total Cost:	***$ 3,303,783***

Note: No costs are assumed for land acquisition or easements.

ATTACHMENT F - AGENCY MEETING DOCUMENTS

October 2, 2013 Meeting

From: waterdown waterdown [mailto:waterdown@wildblue.net]
Sent: Wednesday, October 02, 2013 2:32 PM
To: Johnson, Kenneth G - DNR; Josheff, Susan G - DNR
Cc: Jim Gronowski; Ruth Johnson; Gumtow, Jon
Subject: Our Meeting this Morning

Ken and Sue:
Thank you for meeting with us this morning and providing constructive and helpful comments, suggestions and directions for the Rock River Channel Waterway Improvement Project.
We appreciate very much your interest and support.

I will connect with Sue on arranging a meeting with the WDNR-Horicon staff the first week in November.

Sue: FYI Attached is a copy of the 1999 Administrative Law Judge's ruling on the carp barrier at Greenhead Landing.

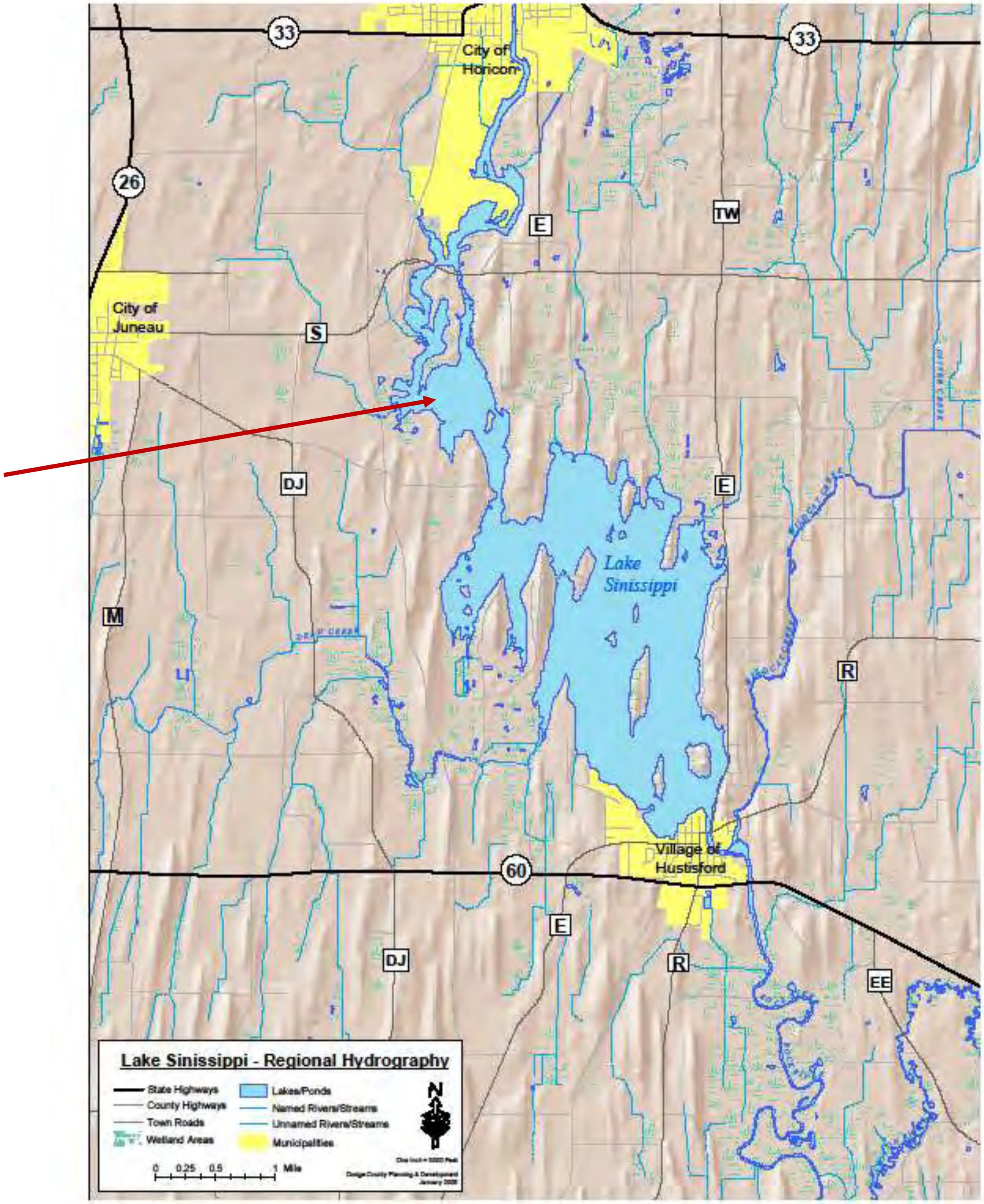
Thanks,
Greg Farnham, Commissioner
Lake Sinissippi Improvement District
Hustisford, Wisconsin
920 296-8771
www.lakesinissippi.org

COMPREHENSIVE ENGINEERING PLAN FOR ROCK RIVER CHANNEL WATERWAY IMPROVEMENT PROJECT:

- Environmental Restorations and Enhancements
- Stabilization of Existing Shoreline
- River Channel Restoration for Navigation

Conceptual Review with
Wisconsin Department of Natural Resources
Madison, Wisconsin
October 2, 2013

Lake Sinissippi Improvement District
Hustisford, Wisconsin
Stantec Consulting Services, Inc.
Mequon, Wisconsin



Lake Sinissippi - Regional Hydrography
State Highways
County Highways
Town Roads
Wetland Areas
Lakes/Ponds
Named Rivers/Streams
Unnamed Rivers/Streams
Municipalities
N
0 0.25 0.5 1 Mile
Dodge County Planning & Development
City of Horicon
City of Juneau
Lake Sinissippi
Village of Hustisford
33
26
60
E
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DJ
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EE

PROJECT BACKGROUND

Lake Sinissippi is a 3,000-acre shallow impoundment of the Rock River in Dodge County. Average water depth is 4 feet; maximum depth is 8 feet at the Hustisford Dam. Eroded sediment from the Horicon Marsh enters the Rock River several miles upstream of the lake adding silt, high BOD organic matter and nutrients to the water flow. Shoreline erosion and degraded wetland fringe contribute sediment to the waterway. Water quality is classified as eutrophic. The lake and river are on the federal EPA 303(d) list of impaired waters due to excessive sedimentation and nutrient enrichment from high levels of phosphorus.

The lake and river area is within the Southeast Glacial Plain ecological landscape. Five natural communities are represented in the area: two aquatic communities (impoundment and warmwater river) and three wetland communities (emergent marsh, shrub carr and sedge meadow). The waterway is also designated in the Natural Heritage Inventory due to the occurrence of rare animal and plant species. The lake and river are part of the Horicon Marsh staging area for migratory waterfowl and other birds migrating along the Mississippi Flyway.

The fishery of Lake Sinissippi is dominated by rough fish, such as carp and bullhead, and contains minimal gamefish and panfish populations.

Actions of the large carp population stir up bottom sediments, resulting in poor water clarity and uprooting of aquatic vegetation. The turbidity caused by carp and boat traffic and suspended sediment in the Rock River minimize light penetration through the water column, reducing the photic zone and inhibiting establishment and growth of submersed plants.

Information gathered from an earlier survey indicates the lake has low species diversity and biomass of aquatic plants; aquatic macrophytes were found at only 11 of the 104 sampling locations. Three species of vascular plants commonly found included cattail, water shield and yellow water lily. Wetland plant species in the shoreline area of lake and river include dogwood and black willow, typical plants of the shrub carr wetland community

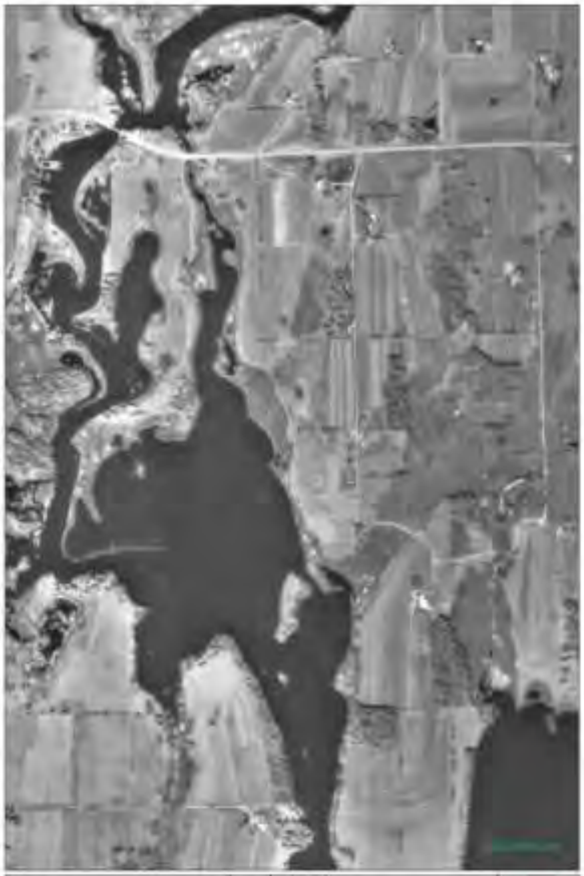
River shoreline and associated wetland habitat have experienced significant loss over the years. Emergent marsh has contracted due to high water levels, erosive effects of wave energy from wind and powerboats and degrading action of carp on rooted aquatic vegetation. Much of the left descending bank of the river channel downstream of the CTH S Bridge has been lost due to erosion, along with loss of small islands and emergent marsh northeast of the lower river channel. Remaining shoreline vegetative fringe is primarily monoculture stands of cattail, with isolated areas of water lily.

Loss of wetland habitat has contributed to a reduction in the number and diversity of waterfowl. Important bird species that once frequented the marsh and wetland areas of the lake and river such as American bittern, American black duck, snowy egret and redhead are now generally absent from the waterway.

The volume of the river channel and lake basin is estimated at 30 million cubic yards (3,000 acres x 6.3 feet average depth to hard bottom x 1,600 yd^3/foot-acre). The volume of the sediment layer in the river channel and lake basin is about 11 million cubic yards, representing 37 % of total channel-lake volume. Thus, over one-third of the waterway is filled with sediment. Some deep holes in the river channel are 15 feet to hard bottom, but are filled with 13-14 feet of sediment. Navigation within the river channel and recreational boating in many areas of the lake are adversely affected by excessive sediment deposition.

Archival Aerial Photographs 1940 - 2010 Showing Loss of River Shoreline, Small Islands and Emergent Marsh

Right Looking northeast across project area from Lehman's cottages. Circa 1956



1986 E

HIG Project # [illegible]
Client Project #
Approximate Scale [illegible]

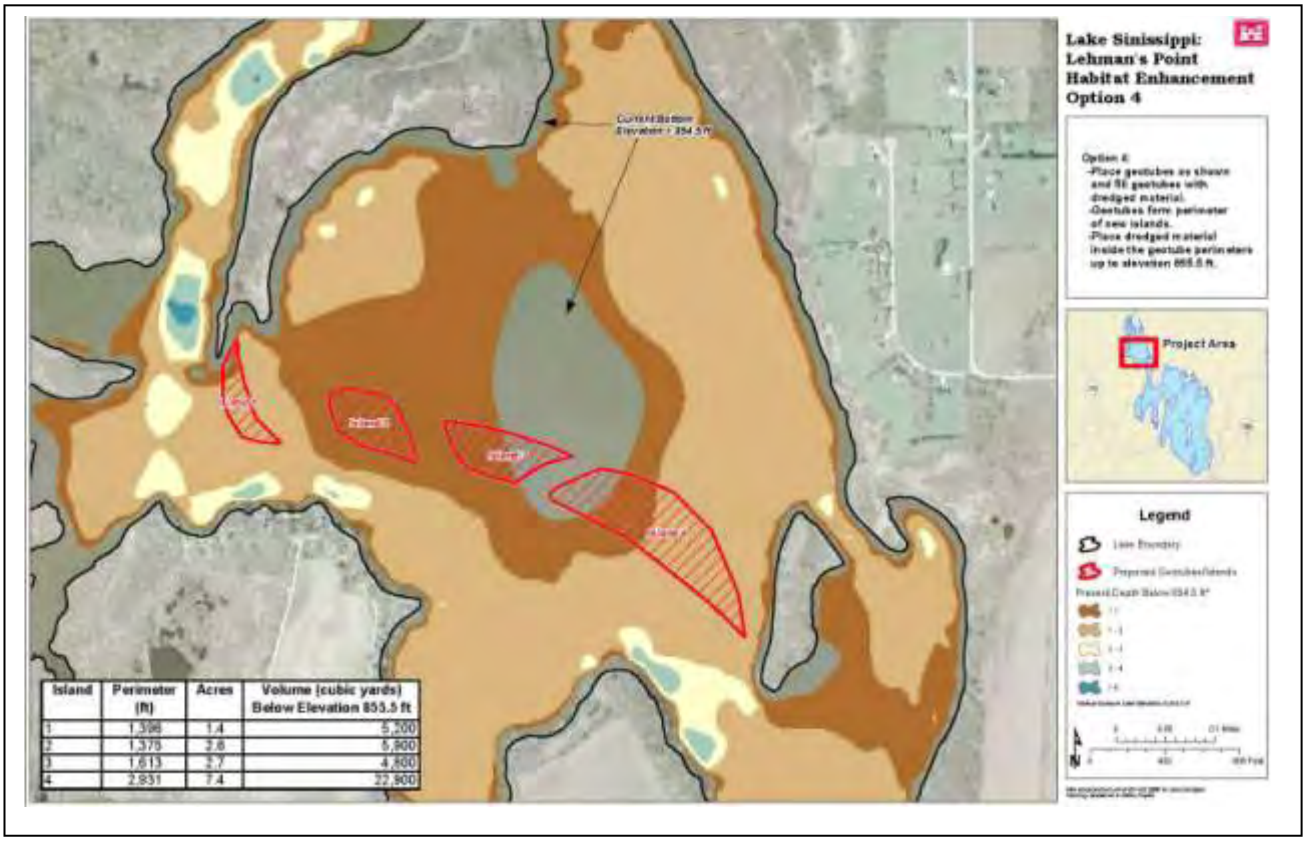
1993 SW

HIG Project # [illegible]
Client Project #
Approximate Scale [illegible]

2010 SW

HIG Project # [illegible]
Client Project #
Approximate Scale [illegible]

From: *Lake Sinissippi Alternatives Report, Planning Assistance to States, Section 22 Program.* US Army Corps of Engineers, Rock Island District, Rock Island, Ill. September 2009.



Island	Perimeter (ft)	Acres	Volume (cubic yards) Below Elevation 855.5 ft
1	1,396	1.4	5,200
2	1,375	2.8	5,900
3	1,613	2.7	4,800
4	2,831	7.4	22,900

From: *Lake Sinissippi Alternatives Report, Planning Assistance to States, Section 22 Program.* US Army Corps of Engineers, Rock Island District, Rock Island, Ill. September 2009.

EXPECTED OUTCOME AND BENEFITS

- **Environmental Restorations and Enhancements**

A successful project will restore emergent marsh and lost islands on a self-sustaining basis to provide new and diverse wetland habitat for waterfowl, marsh birds and other wildlife. The benefits of a successful project are many: create new wildlife habitat and food resources; filter runoff from shoreland to protect water quality; stabilize river bottom sediment; provide fish, reptile and amphibian habitat; reduce shoreline erosion; limit aquatic invasive plant growth; provide protective area for development of submergent aquatic vegetation; and, provide improved habitat for animal species of greatest conservation need that are associated with the emergent marsh community. The re-appearance of bird species such as the American bittern and Blue-winged teal in the restored marsh will be strong testimony of the success of the project and the important ecological benefits for the Horicon Marsh flyway.

- **Stabilization of Existing Shoreline**

A successful project will stop further erosion of river channel shoreline and river bank recession within the project area. The river bank will be protected and stabilized using methodologies that are supportive of enhancement of shoreline wildlife habitat.

- **River Channel Restoration for Navigation**

A successful project will partially restore the left descending bank of the Rock River channel, thereby creating new channel geometry that increases the velocity of river flow to scour sediment within the channel. The restored river channel will maintain sufficient water depth on a self-sustaining basis to provide open water for navigation and recreational boating. The restored channel will provide new deep-water habitat for fish. Reuse of sediment from the river channel for environmental restorations will benefit the entire waterway by halting downstream migration of the sediment to the main body of the lake.

November 6, 2013 Meeting:

From: waterdown waterdown [mailto:waterdown@wildblue.net]
Sent: Thursday, November 14, 2013 7:27 AM
To: Gumtow, Jon
Subject: Re: WisDNR Horicon Meeting - Lake Sinissippi Project

Jon:
The lake district board meeting was Tuesday and we discussed at length the river project and consequences of our meeting with WisDNR-Horicon. Below is the text draft of the minutes of our board meeting regarding the project. This may provide helpful background for our discussion this morning. I'll call you when I'm on my way to Madison. Thanks.
Greg Farnham

> G Farnham, R Johnson and J Gronowski reported on the November 6th meeting with WisDNR-Madison and -Horicon representatives and Jon Gumtow of Stantec to review the conceptual plan for the Rock River Channel waterway improvement project. Constructive critiques and recommendations were offered regarding the project concepts and design elements. A memorandum was provided by the agency to aid in preparation of the environmental assessment for the project, which raised additional questions of permit review criteria, floodplain issues and other department questions that must be answered as part of due diligence by the lake district. The board agreed that it may be helpful to segment the project into smaller manageable components that can be sequenced on the basis of engineering requirements, permit complexity, construction complexity, pilot-scale evaluation of rock vane and floating island components, land ownership questions and available funds. The board also agreed to investigate potential major funding via increased taxes, private donations and lake and river protection grants. The board will also need to develop cost estimates of costs for the various plan components to aid in fund raising and grant applications.

From: waterdown waterdown [mailto:waterdown@wildblue.net]
Sent: Friday, November 08, 2013 11:15 AM
To: Josheff, Susan G - DNR; Stremick-Thompson, Laura L - DNR; Hunt, Daniel E - DNR; Heim, Daniel R - DNR; Samerdyke, Paul S - DNR
Cc: Jim Gronowski; Ruth Johnson; Gumtow, Jon
Subject: WisDNR Horicon Meeting - Lake Sinissippi Project

Thank you, all, for your time yesterday and helpful constructive comments and critiques regarding the conceptual proposal for restoration on Lake Sinissippi and the Rock River. Your concerns and observations are important and will help us craft a better project proposal.

I spoke this morning with Andrew Leichty of the Corps-Rock Island regarding Sue's question of possible engineering significance of the island configuration in Option 4 of the Corps' report. Andy was the manager of the 2009 Lake Sinissippi Section 22 project. He thought the configuration was graphical freehand but will check with his hydraulics folks.

Thanks again for your time and sharing of your expertise and resource concerns.

Greg Farnham, Commissioner

Lake Sinissippi Improvement District

Hustisford, Wisconsin

920 296-8771

Lake Sinnissippi Restoration Project Meeting – November 6, 2013

Review Criteria

1. **Public Interests**
    a. Navigation
    b. Fish Habitat
    c. Wildlife Habitat
    d. Water Quality
    e. Natural Scenic Beauty
    f. Public Safety ~ buoys? ~
2. **Floodplain -New mapping – storage district**

a. Navigation

1. Filled areas will be lost to navigation
2. Navigation hazards of vane deflectors/floating islands/geotubes particularly during floods
3. Geotubes to close off bay? Property owners impacted? (Page 11)
4. Moving sediment to another location

b. Fish Habitat

Appears neutral

c. Wildlife Habitat

1. Birds will populate the islands. Cormorants and Pelicans can kill trees and vegetation.
2. Viable seed bank or plugs?

d. Water Quality

Appears neutral if dredging turbidity is controlled

e. Natural Scenic Beauty

Addition of rock   armor, but camouflage, vegetated armor

Department Questions

1. What are the positives and negatives of the first geotube project that we can learn from?
2. Purpose of the deep hole?
3. What's between the bottom of the soft sediment and the top of the hard sediment on the cross –section?
4. What is the chemical and physical properties of the sediment? In the other sediment samples?
5. Is there a viable seed bank in the sediments?
6. What is the depth of water that the geotubes will be placed in? Bathymetry map
7. How will dredging be done? Hydraulic or mechanical? Will a drawdown be required?
8. When? – not after October 1 to frost out – herptiles
9. How much?
10. What is the design of the floating islands? How will they be anchored to the bed?

11. Will there be any evaluation of the project's success?

District's Questions

1. Has the need for an environmental restoration project in the Rock River channel been adequately described and demonstrated?

The document does a good job at defining the problems but doesn't discuss the causes or which causes will be addressed by the plan.

2. Are the conceptual approaches to the restoration project sufficiently defined? Does the Department suggest others?

The report is a bit confusing. Needs to differentiate between existing and proposed structures as well as when rock or geotube will be used. Two restoration approaches we believe should be considered are rough fish control and periodic draw down. EA alternatives

3. Can the Department provide guidance so as to help us move the project forward to the Environmental Assessment and permitting process of Chapter 30?

Need

- detailed plans and locations for dredging, geotubes, vane deflectors
- sediment information
- , who, what, when, where, why, how

Dates of dredging. Disposal sites?

NR 328.22 definitions

(1) "Breakwater" means the placement of stone, concrete or similar inert material 10 or more horizontal feet offshore, generally parallel to the shoreline for the purpose of controlling shore erosion and preserving or restoring aquatic habitat. Breakwater designs may include, but are not limited, to stone dikes, stone islands, barrier islands and submerged off shore shoals.

NR 328.23 Standards. Breakwaters may be authorized where all of the following apply:

(1) They are determined by the department to be the best management practice to control shore erosion and preserve or restore aquatic habitat.

(2) The structure be designed by a licensed professional engineer to be stable under stated maximum water level and wave conditions in order to avoid a failed structure that quickly becomes a hazard to users of the waters.

(3) The practice is specifically recommended for the purpose specified in sub. (1) in a comprehensive plan approved by the department for management of a specific water body and its watershed.

(4) The requirements of s. 1.11, Stats., are met.

(5) The department has complied with the notice and hearing procedures in s. 30.02 (3) and (4), Stats.

4. Could the project be considered eligible for a River Protection Grant or other financial assistance? Yes, the lake district is eligible to compete for River and Lake Protection Grants.