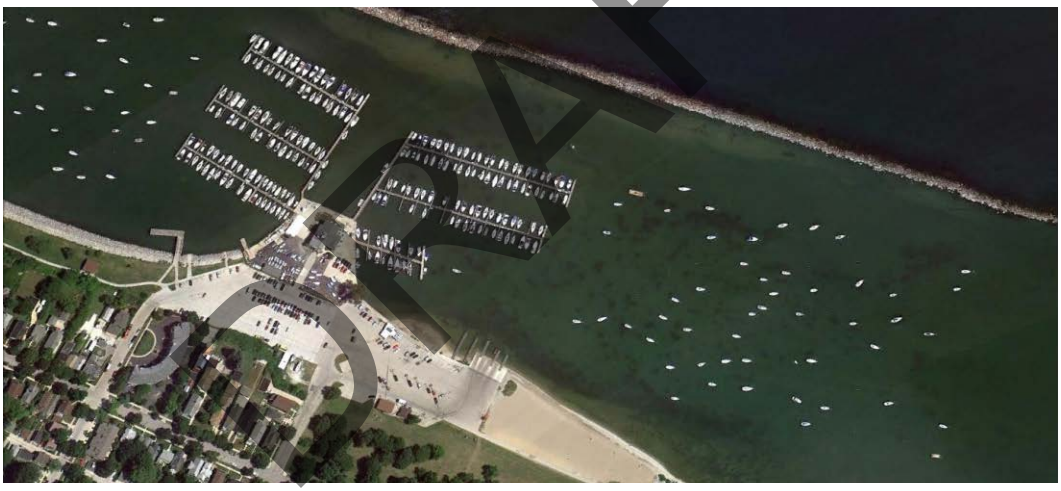
FINAL REPORT

South Shore Park
Site Investigation and Schematic Design

Project No. P298-14616

March 2015



The Sigma Group, Inc.
1300 W. Canal Street
Milwaukee, WI 53233
(414) 643-4200
Email: ccarr@thesigmagroup.com

SmithGroupJJR, LLC
44 E. Mifflin, Suite 500
Madison, WI 53703
(608) 251-1177
Email: ed.freer@smithgroupjjr.com

Stormwater Solutions Engineering LLC
247 Freshwater Way, Suite 410
Milwaukee, WI 53204
(414) 810-1245
Email: cbg@stormwatersolutions.com

Gestra Engineering, Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
(414) 933-7444

TABLE OF CONTENTS

FIGURES

APPENDICES

1. INTRODUCTION

In spring of 2014, Milwaukee County retained The Sigma Group, Smith Group/JJR., and Stormwater Solutions Engineering to complete a site investigation and conceptual design for improvements to South Shore Park in Milwaukee, WI. The study area did not include the entire park, but concentrated on the specific area adjacent to the Yacht Club and South Shore Beach as detailed below.

The primary goal was to study the current and future needs of the project area and surrounding land and develop a schematic design based on the assessed need with an emphasis on improving beach and water quality. South Shore Park, along Lake Michigan in the City of Milwaukee, consists of multiple buildings, boat launch, yacht club, bike trail, beaches, vehicle parking, and pedestrian areas. *See Figure 1: Existing Site Survey.*

The South Shore Yacht Club holds a master lease with the County for a part of this study area, and although the parking areas and utilities are maintained by the County, the buildings and grounds of the leased area are maintained by the Yacht Club. The parking and utility service to the Yacht Club has been evaluated in this report, but no evaluation of the Yacht Club building or on site pavement is included. The report does include an evaluation of stormwater Best Management Practices (BMPs) that could be installed within the lease area to improve water quality.

The scope of work included reviewing existing site documents, performing additional site investigation, compiling stakeholder and public input, and evaluating stormwater BMPs. The design team used the information obtained to create three site design concepts. The

design team evaluated the three site concepts and prepared a consolidated site plan that took into account the varying uses on site and the stakeholder comments. The consolidated site plan was then refined further to a final recommended plan, along with a preliminary cost estimate for the project broken into phases.

This project report is a compilation of the site investigation, conceptual design analysis, and final plan recommendation for the study area within South Shore Park.

2. EXISTING SITE INVESTIGATION

2.1 Existing Site Topography/Site Conditions

The study site predominantly consists of asphalt parking lot and access drives along with a beach area on the south. *See Figure 1: Existing Site Survey.* The site generally slopes from west to east. Surface water runoff is predominantly sheet flow directly to Lake Michigan. There are two existing rain gardens/bioinfiltration areas that are in poor condition and are not functioning properly. The asphalt pavement on site is in poor to average condition; the north parking lot is in significantly worse condition than the south parking area. The asphalt has a thickness varying from 2"-3"with stone underlay and miscellaneous fill below.

2.2 Existing Site Infrastructure

The site has a system of private utilities that serve the various County owned buildings and facilities on site. Milwaukee County also provides water and sanitary service to the Milwaukee Yacht Club.

Electrical Service

The electrical service is fed from the west side of the site with an overhead line that runs parallel to the parking lot adjacent to the Yacht Club. From this location there are services to the Yacht Club and miscellaneous lighting in the parking lot. The overhead line system is not visually appealing along the Lakefront and there could be more efficient ways to provide electrical service underground to the Yacht Club and other facilities as a part of a redevelopment project.

Lighting

Parking lot lighting is hung from the overhead poles on the east side of the site. In addition, there is stand alone lighting on the south side of the parking lot and along the recreational paths further south of the site. The existing lighting system is inappropriate and outdated for the area and needs to be updated and modernized.

Natural Gas

There is an existing natural gas line on the site that provides service to existing buildings. The Yacht Club stated that they have had discussions on upsizing their gas service during any redevelopment project. Other than the Yacht Club request, the additional gas service to the site is sufficient, and improvements would only be needed if additional services were added during redevelopment.

Communications

Additional communication and data feeds to the pavilion, future ticket booth, and the Yacht Club should be considered to improve data service to the area. The Yacht Club specifically stated that they are interested in improved service for internet to the site.

Storm Sewer/Storm Drainage

Stormwater runoff from the existing parking lot primarily sheet flows to Lake Michigan and therefore there is limited storm sewer on site. The only storm sewer inlet on site is a trench drain for the boat launch that is not functioning properly and needs to be removed or replaced. It is expected that new storm sewer will be installed as part of the site redevelopment.

There are two existing water quality BMPs that have been installed on site. These include a rain garden on the north side of the site and a mechanical settling BMP in the boat launch area. Both systems are performing poorly or not at all either due to poor design or lack of maintenance. Stormwater management system improvements to provide more capacity and provide improved water quality and quantity treatment are required.

Overall runoff volumes should be reduced and stormwater quality improved through the implementation of stormwater BMP's.

Sanitary Sewer

There is an existing sanitary sewer force main and associated pump system for the County facilities in the area including the Yacht Club and the fish cleaning station. There was little information known or given on the existing condition and function of the sanitary sewer system.

The sanitary drain and grinder pumps for the fish cleaning station has had issues with handling larger fish and has maintenance issues. The recommendation is that the existing fish cleaning station grinder pumps system be replaced during the redevelopment of the site.

There is also existing MMSD facilities that cross the site, which will need to be protected during redevelopment.

2.3 Existing Geotechnical Evaluation

As part of the study, a site geotechnical investigation was performed. *See Appendix B: Geotechnical Report.* The surface materials at the boring locations consist of 2½ inches to 3 inches of asphalt, underlain by approximately 4 inches to 9 inches of base course materials (with 4 inches to 6 inches being more typical at the boring locations). Below the existing pavement section, fill/possible fill materials were observed in the borings to depths ranging from about 5½ feet to 14 feet bgs. Beneath the fill/possible fill materials, the underlying native soils were comprised of silty sand, silty sand with gravel, sand with gravel, gravelly sand with silt, and/or lean clay to the termination depth of the borings. The following is an additional description of the soil types encountered.

Fill/Possible Fill: The fill and/or possible fill materials were variable in color, composition, and relative density, generally consisting of sand with silt, sand with gravel, silty sand, and silty sand with gravel. As an exception, a thin deposit of brown lean clay fill was encountered at a depth of about 4½ feet bgs within B-4. Intermixed wood matter, asphalt, metal, and slag-like fragments were encountered within portions of the fill/possible fill materials. Standard Penetration Test (SPT) blow counts, or N-values as shown on the boring logs, of the fill/possible fill materials ranged from 1 to 64 blows per foot (bpf).

Native Soils: The native soils primarily consisted of gray to dark gray loose to medium dense silty sand, silty sand with gravel, sand with gravel, gravelly sand with silt, underlain by medium stiff to stiff, grayish brown lean clay with thin seams of silt and sand that extended to the termination depths of the borings. Moisture contents of samples of the native lean clay soil tested ranged from 20% to 29%. Hand penetrometer readings in the native lean clay soils were between 0.5 tsf and 1.5 tsf. Standard Penetration Test (SPT) blow counts within the native granular materials ranged from 4 to 48 blows per foot (bpf). A split spoon sample of the fill materials collected from boring B-3 at a depth of about 1 foot to 3 feet bgs was subjected to a mechanical sieve analysis. The results of the sieve analysis indicated that approximately 24 percent of the sample was retained on the No. 4 sieve, 77 percent on the No. 40 sieve, and about 8 percent passed the No. 200 sieve.

Groundwater observations were made during and at the completion of drilling operations. During drilling, water was encountered within all of the borings at depths ranging from 5 feet to 8½ feet bgs. Upon completion of drilling, water was observed at depths ranging from 5 feet to 9 feet bgs. Cave in after drilling was recorded in the borings at depths between about 6 feet and 11½ feet. Based on the

field observations, the groundwater elevation at the time of the exploration is estimated to be at a depth below about 5 feet to 8 feet bgs or approximate elevations 582 to 579.

.

2.4 Existing Hydraulics and Lake Level

For the past decade, Lake Michigan water levels have been below average, and at the time of the site investigation work much of the Midwest was in drought condition. These factors resulted in water levels being in a position to beat the 1964 historic low water level. However, the prolonged low water levels experienced prior to and during the site investigation will not last based on historic averages and will rise in the future. Therefore, a calm high water level of 581.0' International Great Lake Datum (IGLD) is recommended for design of any coastal structure with an additional foot of water level allowance due to storm surge. Independent of storm surges, seiches on Lake Michigan often range from 0.5 to 1.0 feet in the Milwaukee area and may need to be considered.

2.5 Existing Building Facilities

The project team completed a limited inspection and review of existing conditions of the building facilities on site including the pavilion, fish cleaning/restrooms, and north restrooms. The review did not include the existing Yacht Club that has its own lease and provides maintenance on its building facilities. The review was limited to visual observations of the building exterior/roof, interior finishes, HVAC, electrical and plumbing systems. The purpose of this review was to determine the building use, general construction and identify any significant deterioration of building materials and systems. The report memo is included in *Appendix A*, but an overview of the results of the limited inspection is presented below:

Building	Use	Year Constructed	Construction Type	General Condition
Pavilion	Rental Hall Restrooms Concessions	1934	Two story w/ courtyards Reinforced concrete for main level Barrel Roof Wood Framed	Building in satisfactory condition Some issues with concrete and brick spalling
Fish Cleaning/ Restroom	Fish Cleaning Restrooms	1987	Concrete block with steel framing	Building in satisfactory condition Major issue with fish cleaning drain and pump system

North Restroom	Restroom	2000	Concrete masonry	Building in satisfactory condition Air handling approaching useful life

2.6 Existing Dock Wall Evaluation

A visual and dive inspection was completed at the South Shore Bulkhead between the Yacht Club and boat launch on November 5, 2014 by Bill Brose and Rob Wright of SmithGroup/JJR. Results of the inspection identified deteriorations along the lakeside length of the top 18-inches of the Wakefield sheeting. While the lake was calm, underwater pictures were not able to be completed due to low visibility. A sampling of pictures of the localized items of concern has been included in the full report. *See Appendix D for Dockwall Evaluation.*

Areas of the upper portion of the Wakefield sheeting at the top of the crib were observed to be fully deteriorated along the entire length of the crib that was exposed to the lake during the inspection. The evidence suggests further structural degradation of the wall and tieback system due to missing wailers and fully corroded tie back rods.

There is significant degradation to the Wakefield sheeting and tie rod connections from the piles to the back side of the wall. This is due to the age of the structures, as well as continued ice and wave action along the entire length of the sheeting. These degradations and structural deficiencies have directly resulted in loss of fill materials from the cribs. Evidence of cracking of the concrete cap is indicative of the loss of materials from the crib into the lake resulting in a cantilever of the cap over the crib. Further degradation of the sheeting and loss of material may result in significant failures of the bulkhead wall and concrete cap.

For the sake of this report and future infrastructure planning and budgeting, this report has assumed the dockwall will need to be replaced. The replacement costs of the system will vary depending on the final design ranging from the most cost effective approach of stone revetment to the most costly approach of steel sheet piles.

2.7 Existing Site Use

The study area within the South Shore Park is used for many functions but predominantly supports pedestrian and biking access, boat launching, yacht club access and parking. The parking on the site is not only used for onsite boating uses (Marina, Yacht Club, boat launch), but also provides parking for general park use and adjacent areas including the beach, and pavilion. In addition, because this area is a part of the larger South Shore Park, the area also has supplemental use for activities that involve South Shore Park including the Frolics and Farmers Market.

Although the site does have some flexibility the following is the overall existing parking count on site.

Parking Type	Number of Spaces
Vehicle Parking	271
Boat Trailer Parking	99
Total	**370**

3. STAKEHOLDER AND PUBLIC INPUT

South Shore Park is a key public destination for the south side of Milwaukee County, and specifically the Bay View neighborhood. Because of the Parks' status and popularity, stakeholder input was essential.

The design team, along with Milwaukee County staff, made a significant effort to ensure that the stakeholder and public input was actively sought out and used as a key element in informing the team on what improvements were needed and desired by those who use the site on a regular basis. The process that the team employed to ensure both the availability of information and a pathway for feedback back to the team is described below.

The consolidated plan included input from the stakeholder groups to make sure that the design was holistic to the community that uses the site. Because of the project size, it was broken into phases which would allow the County to spread out associated costs over several years.

3.1 User/Interested Group Identification

The team (consultants and county staff) identified as many user groups as possible that had either direct ties to the South Shore Park or had a possible interest in the planning for future improvements. This list of 60 individuals included:

a. South Shore Management Staff (County Staff)
b. South Shore Yacht Club
c. WI Coastal Management Program
d. WDNR
e. MMSD
f. Great Lakes Sports Fisherman
g. South Shore Park Watch
h. Wisconsin Sea Grant
i. Alliance for Great Lakes
j. UWM- School of Freshwater Sciences
k. Bay View Neighborhood and Community Groups
l. North Slip Tenants
m. Charter Fishing Groups

Very early in the planning process, representatives of these groups were invited to attend a meeting to openly discuss the scope, schedule and nature of the planning process to help in shaping the recommendations that the team would ultimately bring to the County.

3.2 Stakeholder Meeting #1

On Tuesday, April 29, 2014, stakeholder meeting #1 was held at the South Shore Pavilion, with 22 participants in attendance. See *Appendix C* for detailed information including sign-in sheet. In that meeting, representatives from the County and the design team described the intent and the process being undertaken to the group followed by a solicitation for comments. The agenda for that presentation included:

1) Opening comments by County Staff
2) Description of the project intents and limits
3) Schedule
4) Description of the planning process
5) Open discussion and comments

The discussion quickly identified several common concerns and opportunities for the project:

- Public Awareness
- Stormwater Run-off Treatment/Additions
- Additional Parking for Special Events
- Wayfinding Improvements

- Bike Trail Alignment Improvements
- Enhanced Lighting
- Jetty Improvement
- Boat Wash Additions
- Fish Cleaning Station Improvements
- Kayak Launch/Rental
- Additional Seating
- Better Use of Cuppertino Park
- Concession Upgrades
- Recreational Opportunities
- Beach Access Improvements
- Beach Health
- Bird and Pest Management
- Trash Collection Improvements

Following the stakeholder meeting all information collected was circulated amongst members of the planning team for verification to ensure that these notes accurately recorded the information shared by stakeholders. All recorded comments from Stakeholder Meeting#1 are included in this report in *Appendix C*.

This information was then used as a basis for the first newsletter which was distributed via e-mail.

3.3 Design Charette

On May 13, 2014, 9 of the project team members including County staff and design team, came together to discuss the "common concerns" bulleted above, for a half-day design charrette. The design team brainstormed potential alternative components to address each concern shown. By the end of the meeting, three sketches were developed using all input and feedback from the team. These sketches became the basis for the concept plans presented later.

3.4 Stakeholder Meeting #2

On Tuesday, June 24, 2014, stakeholder meeting #2 was held at the South Shore Pavilion. See *Appendix C* for detailed information including sign-in sheet. The format of this meeting began as an "open house" meeting with conceptual plans presented along with specific examples of trail design and stormwater best management practices. Illustrations of three concept plans were presented and as described in other sections of this report. These plans incorporated various elements identified through the planning process as needed/required improvements and/or desired amenities by site stakeholders.

Once all attendees had the opportunity to speak with team members one-on-one, the entire group was brought together for a brief presentation. The agenda for that presentation included:

1) Opening Comments
2) Where We Are To-Date
3) Stakeholder Meeting #1 Comments
4) Concepts
5) Wrap Up and Open Discussion

6) Going Forward

Discussion followed with a variety of comments and suggestions from the attendees which were used by the design team to further refine the proposed site plan. All recorded comments from Stakeholder Meeting #2 are included in this report in *Appendix C*. Following the second stakeholder meeting all information collected was circulated amongst members of the planning team for verification to ensure that these notes accurately recorded the information shared by stakeholders. This information was then used as a basis for the second newsletter which was distributed via e-mail.

3.5 South Shore Farmer's Market

Two members of the design team, including one County staff member, presented information at the South Shore Farmer's Market on Saturday, August 2, 2014, to distribute information about the upcoming Public Meeting and discuss the 3 concept plans with passers-by. The opportunity allowed for individualized conversations with many local residents during the 4 hour market, and approximately 30 flyers were distributed regarding the meeting. .

3.6 Public Meeting

On Tuesday, August 26, 2014, a public meeting was held at South Shore Pavilion. See Appendix C for detailed information including sign-in sheet. Prior to the meeting, the team created an invite flyer that was distributed not only to the stakeholder list but also on the Milwaukee County website to ensure that we got feedback from the largest group of users. The latest version of the conceptual site plan was presented along with a description of the design and public involvement process. The agenda for that presentation included:

1) Opening welcome and comments by County staff
2) Brief summary of the prior planning process steps
3) The proposed plan
4) Specific plan details
5) Comments from the public

Approximately 50 individuals attended in addition to County staff and planning team members.

Prior to the formal presentation, county staff and planning team members were available for one-on-one conversations and explanations of the proposed plan.

4. STORM WATER BMP EVALUATION

A key aspect of the project planning process was to identify ways to improve the stormwater runoff and beach quality from South Shore Park. The existing site is directly riparian to Lake Michigan, and with its significant amount of impervious paved area, there is a great opportunity to reduce pollution from stormwater run-off from the parking lots and improve beach quality on site.

A prior report was completed by Baird (*South Shore Relocation Study, April 8, 2013*) that concentrated on water and beach quality with respect to the water flow

in the Lake. The report stated that there are many factors impacting the water and beach quality at South Shore including larger issues with water circulation from the breakwalls. This report and subsequent improvements concentrate on landward improvements to water and beach quality, and will therefore not remedy all of the issues that occur at South Shore Park Beach.

Evaluation of the proper stormwater BMP technologies to use on site is imperative for efficient and functional for stormwater treatment. The basis of the design team's evaluation was the "Milwaukee County- Parking Lot Stormwater Management Design Guidelines, June 2011." Using the guidelines as the design driver, along with the geotechnical report and site characteristics, the team evaluated the BMP practices that would be most successful for the site.

When the team reviewed the Design Guideline, specifically the BMP matrix, it was concluded that water quality improvement BMPs would be the driver for the project, as peak flow and volume reduction were not important as the site is directly riparian to Lake Michigan. Although not specifically listed in the guidelines under water quality improvements, permeable pavers and bioretention basins were also considered for water quality improvement BMPs. The following technologies were evaluated for use on the site along with a breakdown of the technology and applicability:

- Filter Systems- Water quality improvement that has the ability to remove fine particles, but has very high install costs and maintenance requirements.
- Hydrodynamic Separators- Water quality improvement where solids are removed using a mechanical swirling motion that is best to reduce larger particles and has high maintenance requirements.
- Floatable Control- Water quality improvement that catch general floating trash with the use of screens and baffles.
- Catch Basin with Sump- Water quality improvement that includes the use of sumps in storm inlets to trap solids.
- Grassed Swale- Water quality improvement where a stormwater conveyance feature is used to improve water quality through settling and infiltration.
- Filter Strip- Water quality improvement where vegetated strips are used to slow velocity to allow for infiltration.
- Bioretention Infiltration Basin- Basins consist of an area that is excavated and replaced with an engineered soil mix to filter stormwater.
- Permeable Pavements- Pavements with reduced fines to allow infiltration into stone reservoir to promote water quality improvements.

The filter systems and hydrodynamic systems were eliminated from consideration on site because of the large upfront costs and future maintenance requirements. The remaining technologies provide improved water quality treatment efficiencies

and were easily incorporated to the overall site plan layout. The results of the evaluation include the following technologies for storm water BMP installation on site in some manner:

- Catch Basin with Sump
- Grassed Swale
- Biofiltration Infiltration Basin
- Permeable Pavements

5. Conceptual Framework Plans

5.1 Overall Review

Three concept plans were generated based on preliminary stakeholder feedback. Each of the three concepts "1","2", and "3", was founded based on comments provided by stakeholders with an emphasis on stormwater and beach water quality.

The primary drivers were to address:

1. Water Quality
2. Trail Alignment
3. Park Enhancement

The three conceptual plans concentrated on major design elements that were programmatically consistent throughout the process:

- Trail Alignment
- Park Improvements
- Beach Design/Features
- Encourage more effective bird management
- Parking Lot and Vehicular Circulation.
- Minimizing vehicular conflict, maximizing pedestrian safety
- Maximizing parking

All three alternative plans were aimed at responding to the stakeholder input gathered from the meetings, incorporating park operations/management needs and improving conformance with national standards for marina facilities as published by SOBA (States Organization for Boating Access) and ASCE Manual 50 (2012).

The planning process also included a Design Charrette with the consultant group and Milwaukee County Staff.

5.2 Concept 1- Naturalized Trail and Improved Recreational Beach

Concept 1 reorganized the site circulation by realigning the Oak Leaf Trail along the lakefront providing better access to the lakefront and reducing the conflicts at East

Iron + East Nock Streets . The parking lot then shifted focus on improved drive lanes, way finding, improved parking lot organization, pavement replacements, necessary utility upgrades, very basic stormwater design (only meeting current state requirements), incorporating a boat wash station, and improving the fish cleaning station. It also included widening the Oak Leaf Trail along the Pavilion Building. It is also suggested that there could be improvements for plazas between the pavilion and the lakefront, also to the south of the former bathhouse wing and improvements to the drop-off along South Shore Drive. *See Figure 2: Concept 1 Site Plan.*

5.3 Concept 2- Pedestrian Promenade and Naturalized Beach

Concept 2 uses the relocation of the Oak Trail alignment as a major organizational driver. Pedestrian circulation and its proximity to the lakefront is strong. However, the big idea in this scheme is to actually move the Oak Leaf Trail to the edge of the park along South Shore Park parallel to South Shore Drive. This would require a section of the Trail to share the road between East Nock and East Iron Streets before returning to the trails original alignment at Cupertino Park. This plan also adds a new fish cleaning station, restrooms, improved staging area at the boat launch, new dockage, an improved drop-off to the beach, more stormwater improvement capacity, as well as ecological enhancement areas adjacent to the Oak Leaf Trail. The treatment of the beach improvements introduces the idea of reconfiguring the beaches surface by blending a naturalized edge planting with a formalized garden treatment of the central beach area. The intent is to more strongly define the beach's edge and create a different beach experience by using plant material and spatially designing "garden- beach rooms". This would still function as recreational beach but help discourage use by the nuisance bird population. This scheme explores a different parking lot layout with changes in the traffic flow. *See Figure 3: Concept 2 Site Plan.*

5.4 Concept 3- Buffered Trail and Dune Beach

Concept 3 included many of the design drivers from both previously described concepts. The trail alignment in Concept 3 attempts to take advantage of the lakefront, eliminate street crossing conflicts at both streets and by-passing both the fish cleaning station and boat wash. The parking lot layout and travel lanes are somewhat similar to Concept 2. There are recommendations for an improved drop-off at the pavilion, a similar philosophy of more strongly defining the major outdoor activity areas and improvements to the immediate public gathering terraces around the Pavilion. The beach surface area is modified through the introduction of dunes. This is then augmented with beach plantings and cord-walks. The intent is to provide a recreational destination with a unique character while the topographic relief and planting zones become tools to help mitigate the bird population's

presence. One of the featured improvements in this scheme is the creation of a formal lakefront promenade. *See Figure 4: Concept 3 Site Plan.*

5.5 Master Plan

After reviewing the three concepts the County and the consulting team compiled the highest priorities and the stakeholder feedback on each of the Concepts "1","2",and "3"" into a preferred Master Plan. The master plan includes the most desirable programmatic elements from all three schemes as identified from the feedback obtained at the stakeholder meetings, the public's input and comments provided by public officials.. It is this document that has become the platform for the approval process, to help establish budget priorities, continued community dialogue, a road map for phased implementation and the fundamental tool for funding strategies and grant applications. *See Figure 5: Master Plan.*

6. Recommended Master Plan

6.1 Basis of Design

The initial design focus was on improving stormwater management and water quality in South Shore Park from East Iron Street to the South Shore Pavilion. Through the planning process and working sessions with County staff and stakeholders, it became clear that the improvements should renovate the Park in such way that would acknowledge and celebrate the design principles of the park as originally envisioned by its founders.

By assessing current circulation patterns, attempting to reduce vehicular and pedestrian conflicts, improve the integration of the Oak Leaf Trail, mitigating the impacts of bird behavior, rethinking the surface treatment of the parking and improving the interface with recreational boating needs, the process presented an opportunity to leverage infrastructure improvements in a way in which to improve the Park aesthetics, enrich the park experience, and elevate the public's interface with the lakefront .

PUT THE PARK BACK INTO THE PARKING LOT: Better separation of the pedestrian and recreational trails and the parking functions increases pedestrian safety but enhances the user's experience. The focus of the trail is shifted into the park and towards the lakefront. The most noticeable improvement is removing dedicated pedestrian trails from vehicular travel lanes, reducing the pedestrian crossings and minimizing pedestrian activity around vehicular staging areas serving boaters.

In addition to paving modifications strategic locations for bio-swales contribute to the reduction of impervious surface, better water quality, protect the lake and visually increase the presence of greenery.

INCREASED TREE CANOPY DEFINES FUNCTION AND CREATES EXPERIENCE: The addition of planters and canopy trees reinforces circulation and emphasizes the connection to the lake providing a stronger entrance to park. The planters with trees reduces the visual presence of expansive areas of asphalt, reduces the heat sinks, reduces impervious surface and starts the park experience at the entrance to the parking lot.

A FOCAL POINT ON THE LAKE: To elevate the sense of arrival to the lakefront an overlook with an iconic element on axis with the entrance on East Nock Street clearly acknowledges the Lakefront as a destination. This also becomes a signature element in the park, formalizing the lakefronts edge, accommodating recreational boating while providing a new public amenity in the form of a lakefront promenade. The proposed promenade allows for a new social space that celebrates the Lake and South Shore Park. The promenade provides an urban waterfront experience that can become the focal point for annual celebrations and gatherings.

COMPLEMENTING EXISTING BOATING FACILITIES: The proposed improvements complement and enhance the interface of the existing Yacht Club. The improvements elevate the aesthetics and provide better stormwater management and improved water quality while increasing the safety of pedestrians by providing greater separation between the parking and entrance to the Yacht Club.

The recommendations provide better management of circulation around the boat launch, resolving the water depths and reorientation of the courtesy docks for boat trailer users and expanding the opportunities for transient dockage to accommodating passenger pick up and drop offs .

INTERVENTION FOR A HEALTHER BEACH: To maintain the public's desire to continue to experience the lake from a beach like environment and deal with the challenges of the local bird population the plan introduces a concept of modifying the existing beach's current physical characteristics. The intent would be to reduce the attractiveness to birds while maintaining public access. The proposed modifications look to Lake Michigan's dune like environments for inspiration.

The incorporation of a vegetated dunes will introduce a management strategy to reduce the use of the beach zone by local geese and gull populations. In addition to the change of the physical characteristics the beach will need to introduce better signage, an educational initiative and better trash management.

IMPROVED INTERFACE WITH THE SOUTH SHORE PAVILION: Better integration of the recreational trail as well as widening the trail adjacent to the pavilion will accommodate more people and reduce conflicts among the diverse pedestrian use. This allows for future amenities to be developed that could include additional terraced gardens with outdoor sculpture, provide a better outdoor wedding venue

and complement the anticipation of a future concession expansion. Continued service access and ADA access would be enhanced around the Pavilion. To better serve the public access in general the plan recommends redesigning the drop off area along South Shore Drive.

A plan was developed which illustrates visionary interpretation of the original scope's intent, expanded site programming, conflict resolution and integration of the public's input.

The following is a summary of the key scope criteria for the basis of design:

- Provide stormwater quality improvement on site for the large parking areas to at least meet the 40% TSS reduction as specified by code with a goal of exceeding requirements. Our team also wants to design in anticipation of increased standards.
- Provide a beach design that integrated water quality improvements for the beach area.
- Provide an improved circulation for primary users: bikers, vehicles, and pedestrians on site.
- Provide an improved design of parking lot on site including the integration of additional and improved landscape areas on site.
- Provide a design that at a minimum matched the existing parking that is currently provided on site.
- Provide an improved boat wash area to treat wash water prior to discharge into Lake Michigan.
- Upgrade utilities where appropriate.
- Improve aesthetics of the Park and the larger surrounding neighborhood.

6.2 Site Requirements

The recommended site plan met all the requirements of the basis of design by achieving the key goals of the project which is a better organized site plan that provide water quality stormwater improvements. The key element of the recommended site plan is a revised access and parking lot configuration, the realignment reduces conflicts, better serves sub-district user areas and integrate Best Management Practices.

The pedestrian and bike alignment of the Oak Leaf Trail follows the lakefront and then diverts west of the fish cleaning and boat trailer parking areas which ultimately connects back to the trail at the beach. The parking lots serves the various user groups as before. The Yacht Clubs daily service, seasonal service and member access are not compromised. The parking areas, the beach, the Trail and functions around the pavilion are enhanced through stronger physical definition. The objective

of treating storm water, reduction of pedestrian conflict and better treatment of stormwater has been achieved.

Stormwater management has been planned throughout the site with bioretention areas planned adjacent to the parking lot and access drives. The stormwater treatment has been designed in a way that almost all of the paved areas will be treated before overflowing to the storm sewer and eventually Lake Michigan. *See Figure 5: Master Plan.* The plan allows for total flexibility in phasing pending available funding and the evolution of programming. The following are some of the key design elements that are included in the recommended site plan:

- Elimination of the Oak Leaf Trail crossing at East Iron and Nock Streets.
- Opportunity for better way finding at both vehicular entrances.
- Managed access and egress at the East Iron Street entrance.
- A public plaza and promenade along the lakefront as an iconic entry feature and element enhancing the identity of South Shore Park.
- Improved amenities for pedestrians, seasonal events, and places to enjoy at an individual scale.
- Improved routing of all traffic through site.
- Better delineation of parking for the different uses and areas on site.
- Pedestrian connectivity throughout the site including opportunities for wayfinding signage, controlled crossings, and more direct paths to destinations.
- An improved boat launch and boat parking areas with the addition of a new fish cleaning station, new restrooms, boat wash and short term parking immediately adjacent to these boater services.
- Better definition of the entire park use areas with park plantings, native plantings and bio-filtration features.
- Marina overlook plaza.
- Better drop off area at the pavilion.
- An improved aesthetic for the recreational beach with enhanced bird management benefit.
- Repair and improvements of the existing bulkhead and courtesy docks
- Park beautification will be achieved by providing a cohesive vocabulary for new pedestrian amenities/furnishings, new plantings, opportunities for way finding, better management of the bird population, incorporating tree canopies in the parking lots, better trash management and the development of a public lakefront promenade. All of these need to be executed in the spirit of honoring the mission of Milwaukee County's Park System.

6.3 Facility Requirements

The recommended site plan not only includes site improvements but also facility improvements:

- Stormwater infrastructure
- Site lighting improvements
- Providing new restrooms
- Improved use of the storage areas flanking the Pavilion.
- Improve wedding reception garden between the Pavilion and the lakefront.
- Upgrading the dockwall along the lakefront between the boat launch and Yacht Club
- Dredging the area around the bulkhead and courtesy dock.

6.4 Infrastructure Requirements

In order to support the recommended site and facility changes, some new infrastructure will be required throughout the site. Any infrastructure that has approached its useful life or that will need to be upgraded should be replaced as a part of the project. Because the project is broken up into phases, infrastructure improvements need to be completed for the master development at the beginning of the first phase including new utility stubs to future buildings and amenities. The following is a list of infrastructure improvements that are part of the recommended site plan:

- New storm sewer and inlets throughout the entire site possibly including new outfalls to Lake Michigan. These would be primarily installed as a part of proposed stormwater BMPs on site.
- Modifying existing overhead electric to underground services.
- New site lighting in parking lot and along multi-use paths.
- New grinder pumps at fish cleaning station.
- New boat wash system for site
- Upgrades to existing telephone and data service to the site.

6.5 Dockwall Requirements

We have explored three alternatives for rehabilitation, stabilization, and reconstruction of the bulkhead walls from the yacht club easterly to the boarding docks. Along with the reconstruction of this wall, these alternatives may provide an opportunity for integration with the Park Master Plan. The reconstructed area may be used for stormwater treatment or expanded access to the water. *See Appendix D: Dockwall Evaluation.*

Alternative 1- For Alternative 1, a typical revetment structure would be constructed against the existing timber crib edge and the voids below the concrete cap would be grouted. The top portion of the timber crib would be removed and the surface stabilized to prevent further settlement and loss of material. A standard three layer revetment section would be constructed using either land or water based construction. The exposed and highest portion of the crib wall would be removed.

Alternative 2- For Alternative 2, it is assumed that new steel binwall will be installed along the existing bulkhead wall.

Alternative 3- For Alternative 3, a typical steel sheetpile wall will be constructed adjacent to the existing wall. The top portion of the wakefield sheeting would be removed.

If funds are available, the design team would recommend Alternative 3 as it will provide the best protection of the shore in the long term with minimal maintenance.

6.6 Project Phasing

Because of the size and complexity of the full development on site, the project was broken into proposed phases. The phasing was based on feedback from the County, and the ability to add elements of the design without impacting work completed in prior phases. South Shore Park Improvements is considered the primary phase to complete most of the work on the project with additional specific details in future phases. Below is a breakdown of the phases of the project along with items included in the phase.

Phase	Work Included
South Shore Park Improvements- North Parking Lot, Bike Path, Stormwater, and Beach Improvements	Multi-use Trail realignment Stormwater Improvements and Landscaping North Parking Lot Reconstruction Beach Dune Construction Some Utility upgrades
South Shore Park Improvements- South Parking Lot and Remainder of Site Work	South Parking Lot Paving Some Utility upgrades Gatehouse Boat Wash Fish Cleaning Improvements Dredging
Yacht Club BMPs	Porous Pavement Boat Wash BMP
Plaza and Promenade Enlargement	Dockwall Improvements (Assumed Bin Wall) Additional Pavement, Landscaping, and Amenities
Pavilion Improvements	Sculpture Garden Additional Pavement, Landscaping, and Amenities
Beach Garden Construction	Plantings within Beach Area

6.7 Construction Cost Estimate

The team assembled a construction cost estimate for the main project and future phases for the master plan build out. The construction cost estimate was based on recent bid information received by the County and the design team. The construction cost estimates includes both a 25% construction contingency and 10% engineering and administration allowance. A detailed cost estimate is included in *Figure 6,* but below is a summary of the overall costs of the primary project and future phases including construction contingencies.

Phase	Construction Cost Estimate (Includes 25% Contingency and 10% Administration Allowance)
South Shore Park Improvements- Bike Path, Stormwater, and Beach	$ 1,663,538
South Shore Park Improvements- Parking Lot and Remainder of Site Work	$ 1,303,425
Yacht Club BMP	$ 55,000
Plaza and Promenade Enlargements	$ 840,000
Pavilion Improvements	$ 101,000
Beach Garden Construction	$ 675,000

6.8 Funding Opportunities

Throughout the project the design team and the County looked to engage public and private entities that may be interested in providing funding to support the project. There was significant amount of interest from these groups (MMSD, WDNR, Fund for Lake Michigan) to become involved in the project and fund specific parts of the project that supported their group's goals and interests. See *Appendix E* for a full matrix of all the grants available or the project along with timing and requirements for those grants. In addition to grant funds, there are opportunities within the new Master Plan for additional revenue including special events, increase boat launches, food trucks, rentals, and expanded Farmer's Market.

6.9 Permit Requirements

The project will require a significant amount of regulatory permitting because of its location adjacent to Lake Michigan in the City of Milwaukee. Below is a cursory list of possible permit requirements for the project:

- City of Milwaukee Site Plan and Zoning
- City of Milwaukee/MMSD Stormwater Permits
- WDNR and Corps of Engineer Waterway Permits
- WDNR Urban Nonpoint Source & Stormwater Management Grants

6.10 **Operation and Maintenance**

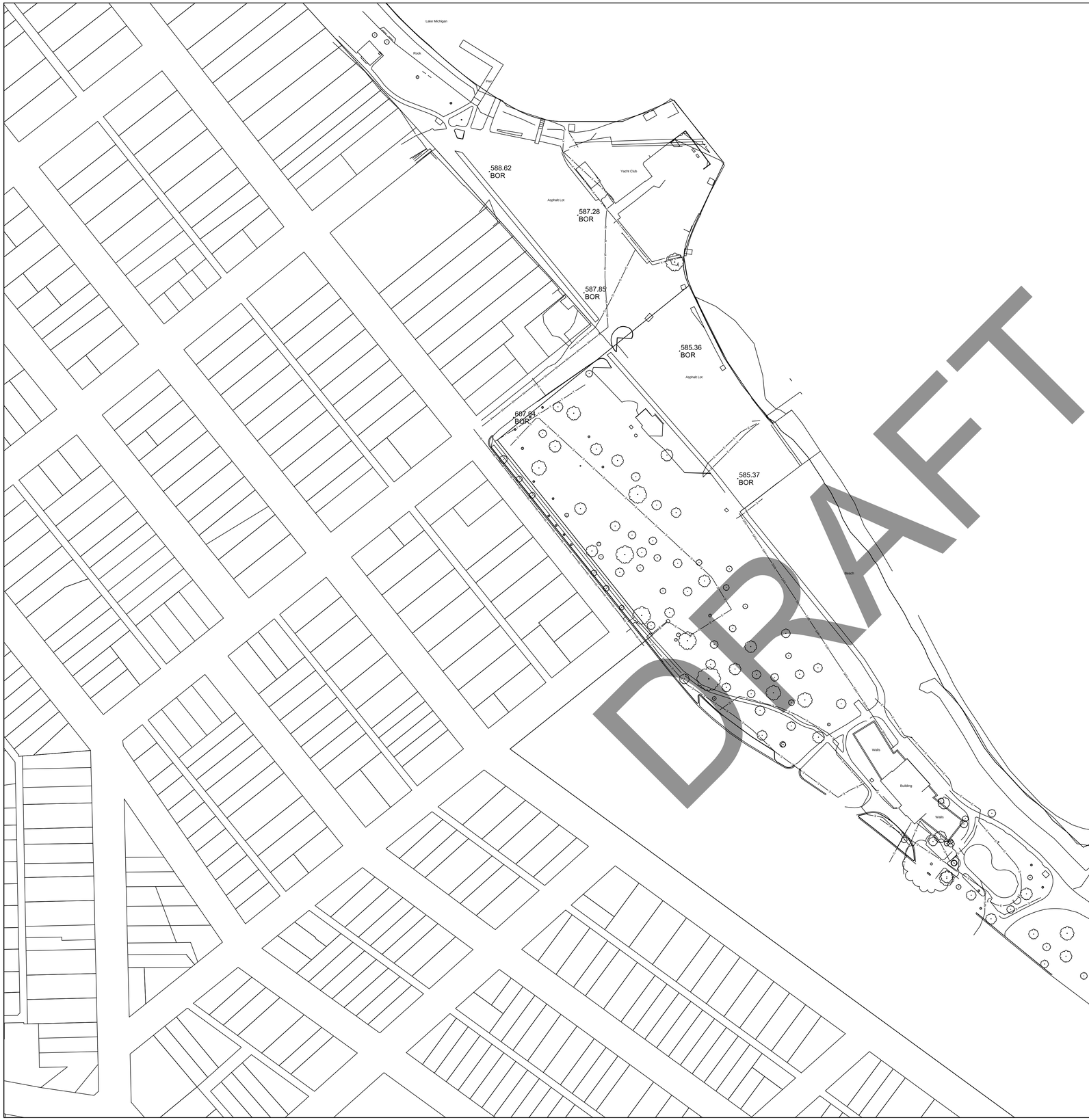
The proposed project includes infrastructure that requires both short term operation and maintenance requirements for the County. The design team has proposed elements that minimize extra ordinary maintenance. However there are specific items that will require maintenance for them to function properly; specifically the stormwater BMPs including biofiltration areas, porous pavement, boat wash areas, and fish cleaning station.

One operation item identified is the monitoring of the realigned Oak Leaf Trail. Staff should monitor the realigned Oak Leaf Trail for persistent conflicts. If conflicts persist after a reasonable amount of time given for people to become accustomed to the new layout, the design allows for limiting bicycle traffic in front of the Yacht Club. This could involve allowing bicycles to traverse the parking lot from Nock to Iron through the use of painted shared use bike/driving lanes and adding bicycle impediments near the yacht club.

During the design process, there were many stakeholder groups that were interested in supporting the long term viability of the project area. We recommend that the County engage with these local groups to take on some of the ongoing maintenance of some of these areas. Examples of this work could include:

- Weeding and maintenance of plantings in biofiltration areas.
- Removal of trash in the biofiltration areas
- Planting and maintenance of specific landscape areas throughout the park
- Beach cleanup programs

FIGURE 1
Existing Site Survey



THE SIGMA GROUP
Single Source. Sound Solutions.
www.thesigmagroup.com
1300 West Canal Street
Milwaukee, WI 53233
Phone: 414-643-4200
Fax: 414-643-4210

PROJECT TITLE
LOCATION
ADDRESS
ACAD, WISCONSIN

N

BEARING REFERENCE
ELEVATION DATUM

0 100' 200'

NO.	REVISION	DATE	BY

DRWNG NO.	TOPO MAP.dwg
DRAWN BY:	
DATE:	
PROJECT NO:	
CHECKED BY:	
APPROVED BY:	
SHEET NO.:	**1 OF 1**

THE UNDERGROUND UTILITY INFORMATION SHOWN ON THIS MAP IS BASED ON FIELD MARKINGS AND INFORMATION FURNISHED BY UTILITY COMPANIES AND THE LOCAL MUNICIPALITY. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, ITS ACCURACY AND COMPLETENESS CANNOT BE GUARANTEED.

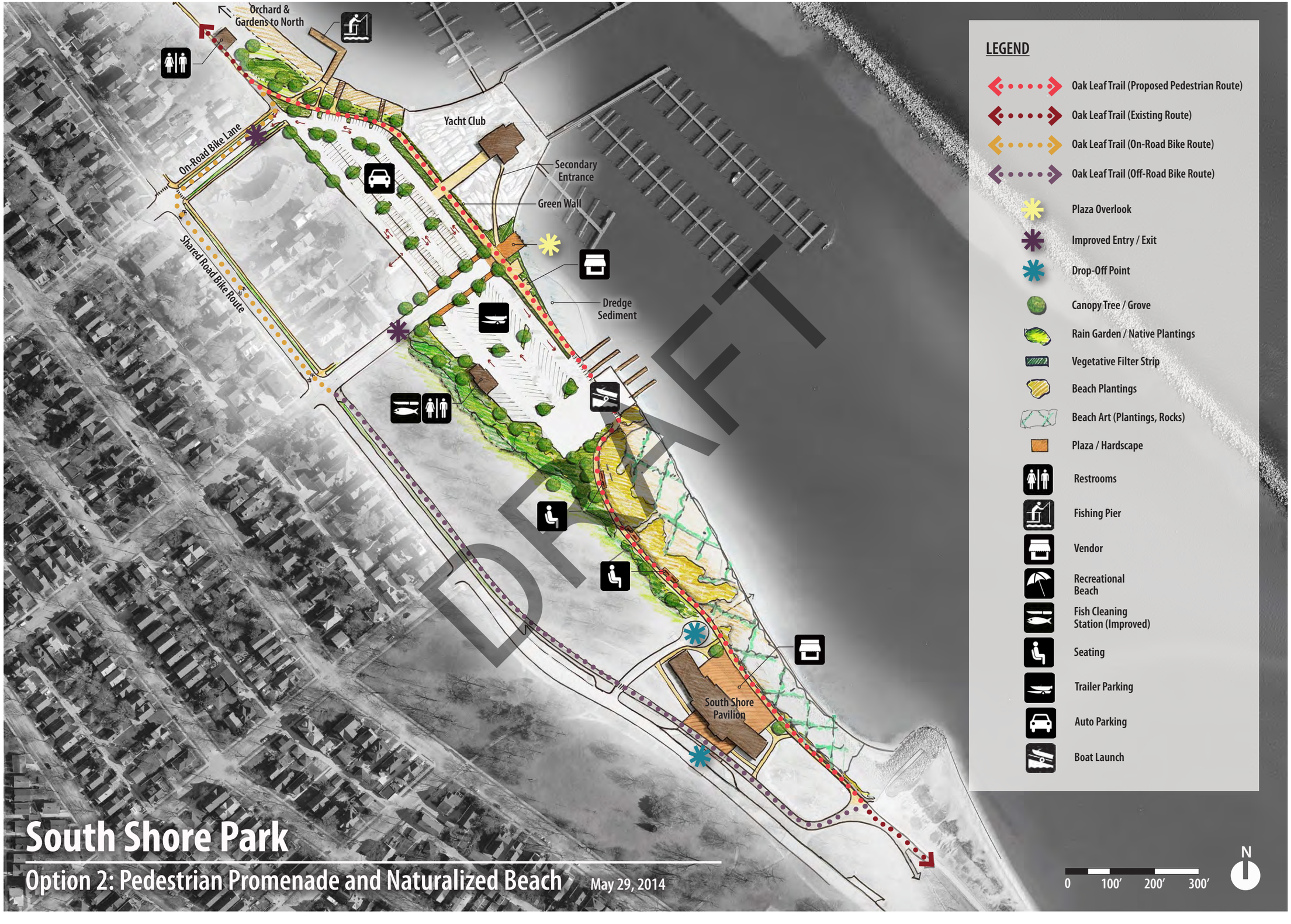
Figure 2
Option 1- Naturalized Trail and Improved Recreational Beach

South Shore Park

Option 1: Naturalized Trail and Improved Recreational Beach

May 29, 2014

FIGURE 3
Option 2- Pedestrian Promenade and Naturalized Beach



South Shore Park

Option 2: Pedestrian Promenade and Naturalized Beach

May 29, 2014

FIGURE 4
Option 3- Buffered Trail and Dune Beach

South Shore Park

Option 3: Buffered Trail and Dune Beach

May 29, 2014

FIGURE 5
Consolidated Master Plan

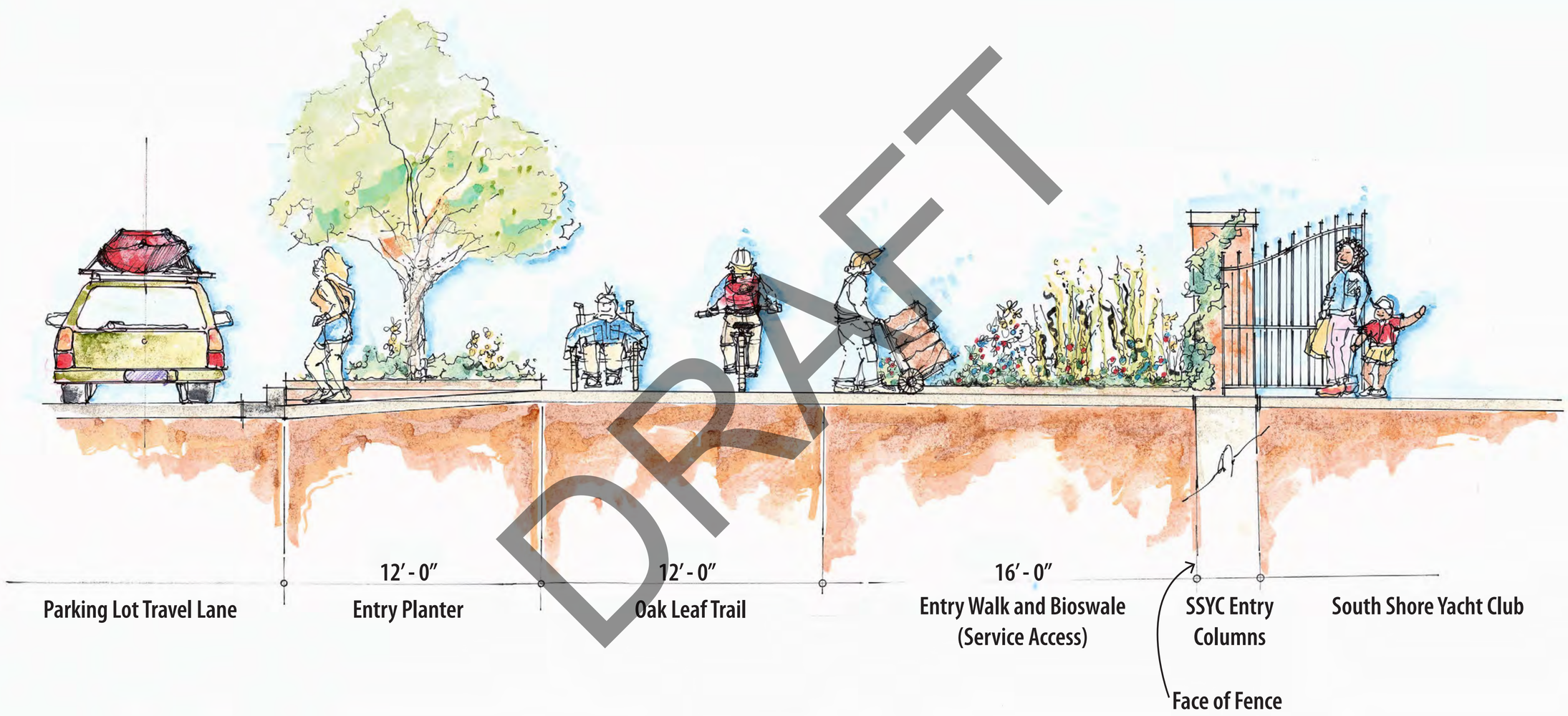
Legend

1. Realigned Oak Leaf Trail
2. Managed Entry
3. Pedestrian Walkway
4. Existing Fence
5. Expanded Rain Garden
6. Filtration Strip
7. South Shore Yacht Club Entry
8. Vehicle Parking
9. Existing Boat Slips
10. Parking Booth
11. Trailer Parking
12. Terminal Focal Element
13. Dredge Sediment
14. Courtesy Dock
15. Lakefront Promenade
    - Seating
    - Vending
    - Lighting
16. Renovated Fish Cleaning & Restrooms
17. Boat Washdown
18. Existing Boat Launch
19. Filtration Rain Garden
20. Naturalized Plantings
21. Phased Beach Garden/ Swimming Beach
22. Stepped Sculpture Garden
23. Patio
24. Existing Park Pavilion
25. Reconfigured Drop Off
26. Existing Play Area
27. Reconnection to Existing Trail
28. Pervious Pavement
29. Kayak Launch
30. Additional Recreational Beach Opportunities

South Shore Park

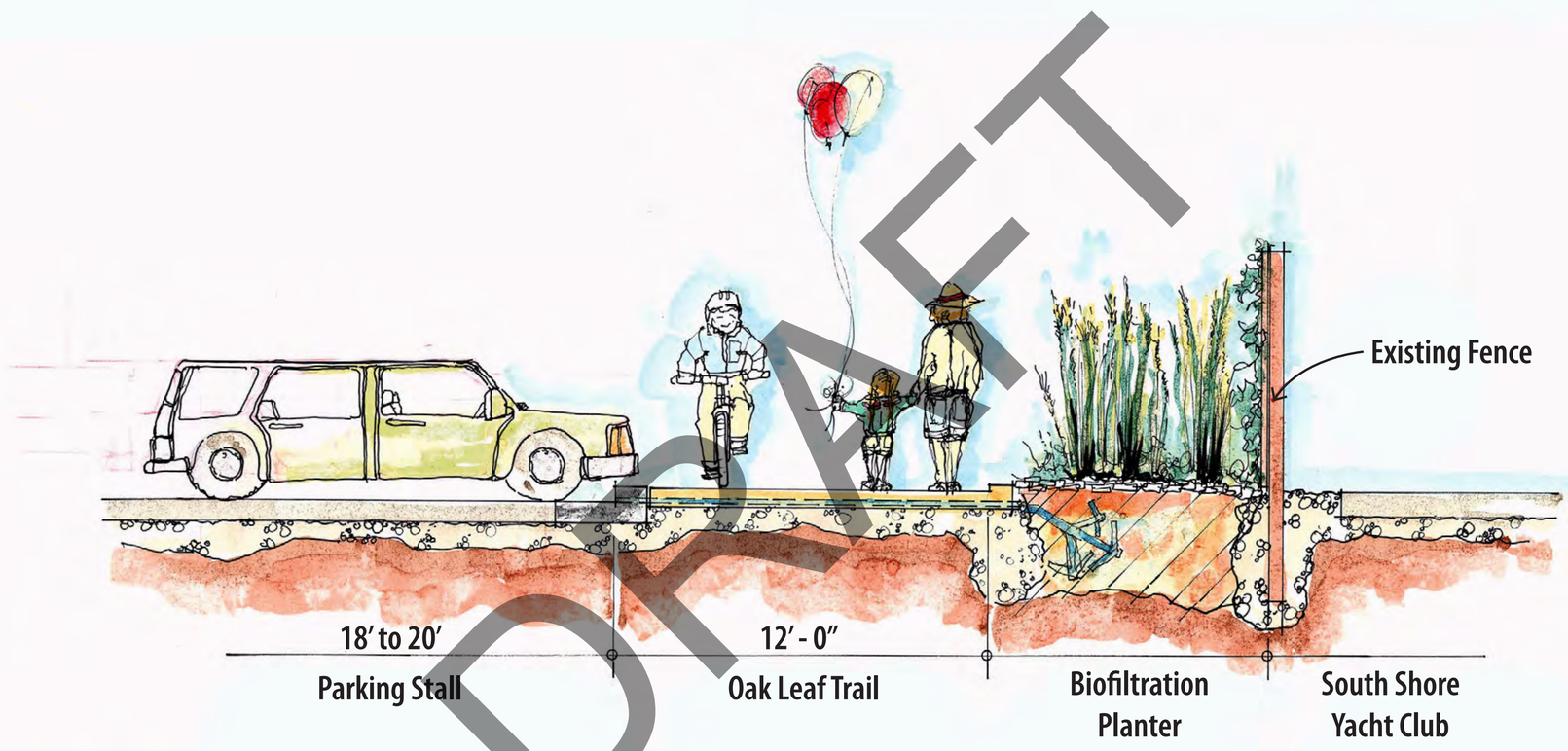
DRAFT Concept Plan September 23, 2014

Made possible by funding through:
Wisconsin Coastal Management Program
NOAA



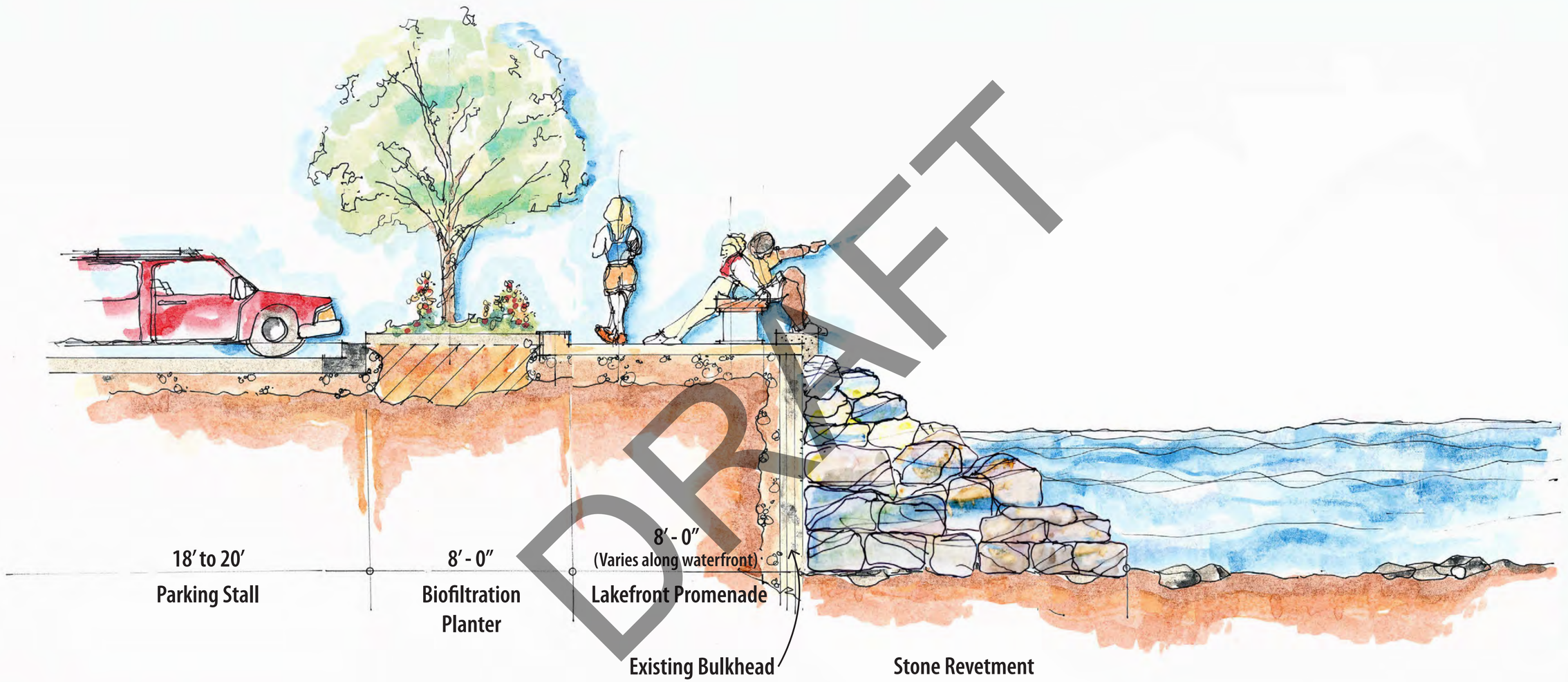
South Shore Park

Section 1: Oak Leaf Trail at South Shore Yacht Club Entrance July 29, 2014



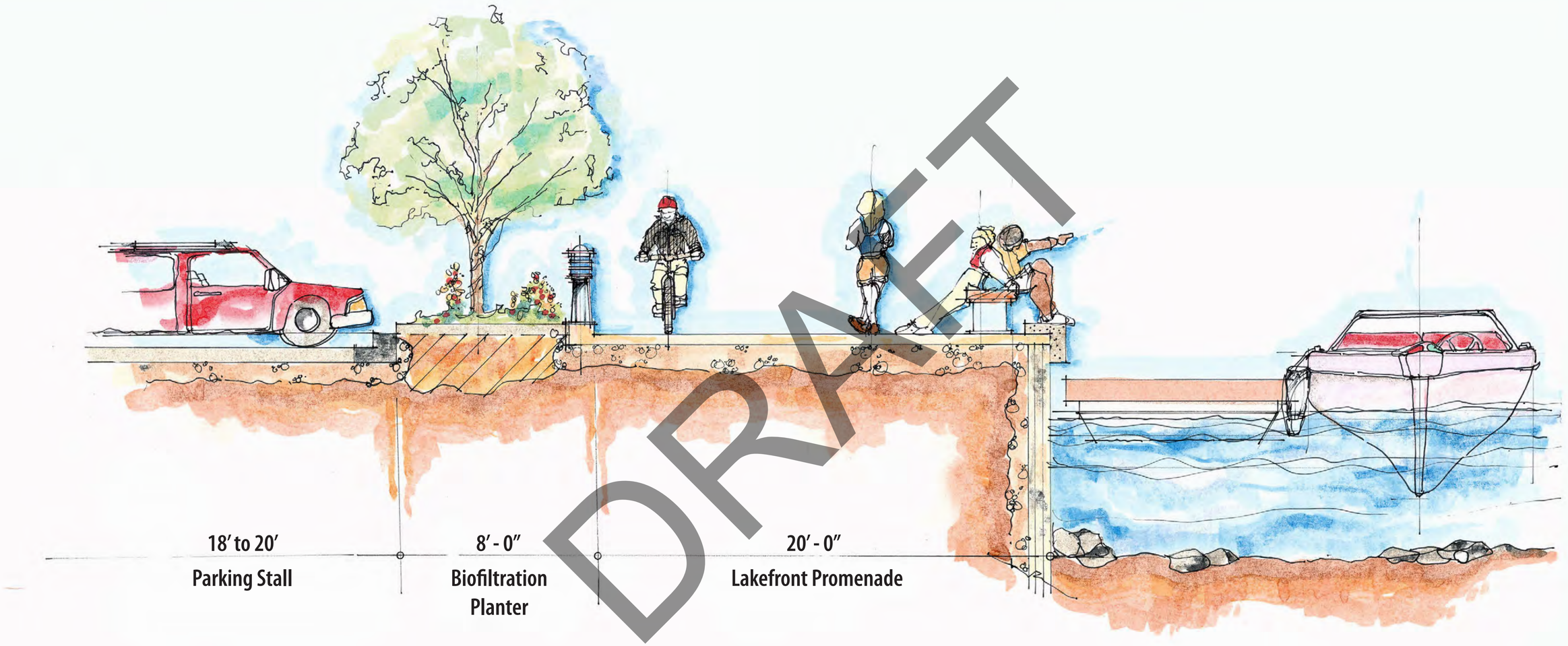
South Shore Park

Section 2: Oak Leaf Trail at South Shore Yacht Club July 29, 2014



South Shore Park

Section 3 - Phase I: Lakefront Promenade July 29, 2014



South Shore Park

Section 3 - Future Phase: Lakefront Promenade July 29, 2014

FIGURE 6
Cost Estimate Details

Preliminary Cost Opinion- Phased Approach
South Shore Park
REV. March 2015

South Shore Park Master Improvements- North Parking Lot, Bike Path, Stormwater and Beach Improvements

Item	Unit	QTY	Unit Cost	Cost
General Conditions				
Erosion Control	LS	1	$20,000	$20,000
Miscellaneous Dewatering	LS	1	$5,000	$5,000
Temporary Fencing and Security	LS	1	$15,000	$15,000
Temporary Roads	LS	1	$1,000	$1,000
Temporary Traffic Control	LS	1	$5,000	$5,000
Subtotal				*$46,000*
Site Clearing and Demolition				
Pavement Demolition [pulverize, reuse]	SY	7,000	$2	$14,000
Clearing and Grubbing, Vegetation	LS	1	$12,000	$12,000
Miscellaneous Site Demolition	LS	1	$15,000	$15,000
Utility Abandonment and Removal	LS	1	$7,000	$7,000
Subtotal				*$48,000*
Earthworks				
Master Grading (1 ft over whole site)	LS	1	$50,000	$50,000
Subtotal				*$50,000*
Storm Sewer				
RCP Storm	LF	600	$100	$60,000
Storm Manholes & Catch Basins	EA	5	$4,000	$20,000
Storm Outfalls to Lake	EA	1	$10,000	$10,000
Subtotal				*$90,000*
Sanitary Sewer				
Miscelaneous Adjustments	LS	0	$10,000	$0
Fish Cleaning Pump Imrovements	LS	0	$100,000	$0
Subtotal				*$0*
Water Service/ Fire Protection				
Misc. Adjustments	LS	0	$10,000	$0
Subtotal				*$0*
Dry Utilities				
Parking Lot Lighting	POLE	6	$4,000	$24,000
Light Controller and Cabling	LS	1	$50,000	$50,000
Pedestrian Path Lighting	POLE	10	$3,500	$35,000
Eliminate Overhead to Underground	Allow	1	$75,000	$75,000
Telephone and Data Upgrades	Allow	0	$25,000	$0
Subtotal				*$184,000*
Storm Water Biofiltration Areas				
Excavate Biofiltraton Areas	CY	1,000	$5	$5,000
6" PVC Drain Underdrains	LF	250	$20	$5,000
Washed Gravel Base	CY	200	$20	$4,000
Engineered Soil Mix	CY	1,000	$40	$40,000
Seed and Plantings	LS	1	$50,000	$50,000
Subtotal				*$104,000*
Pavement				
18" Concrete C&G (External)	LF	2,000	$18.00	$36,000
Asphalt Multiuse Paths (3")	SF	35,000	$3.00	$105,000
Asphalt Pavement Lots (3.5")	SF	90,000	$3.50	$315,000
Base Aggregate Dense Under Pavement (9")	Ton	0	Reuse	$0
Concrete Sidewalk	SF	3,000	$6	$18,000
Boat Launch Pavement Replacement	Allow	0	$75,000	$0
Detectable Warning Fields	EA	0	$500	$0
Pavement Markings	LS	1	$10,000	$10,000
Subtotal				*$484,000*
Landscaping				
Trees and Shrubs	Allow	1	$75,000	$75,000
Topsoil, Seed, Mulch	Allow	0	$10,000	$0
Subtotal				*$75,000*
Other				
Beach Dune Construction	Allow	1	$100,000	$100,000
Dockwall Rehabilitation	Allow	0	$75,000	$0
Dredging	Allow	0	$75,000	$0
Gatehouse	LS	0	$50,000	$0
Ornamental Fencing at Yacht Club	LF	350	$75	$26,250
Ammenities (Bike Racks, Benches, Etc.)	LS	1	$25,000	$25,000
Site Signage	LS	0	$25,000	$0
Dumpster Enclosures	LS	0	$15,000	$0
Boat Wash BMP	LS	0	$75,000	$0
Subtotal				*$151,250*
Total Base Construction Costs				**$1,232,250**
Engineering and Administration (10%)				**$123,225**
Construction Contingency (25%)				**$308,063**
TOTAL CONSTRUCTION COSTS				**$1,663,538**

South Shore Park Master Improvements- Parking Lot and Remainder of Site Work

Item	Unit	QTY	Unit Cost	Cost
General Conditions				
Erosion Control	LS	1	$15,000	$15,000
Miscellaneous Dewatering	LS	1	$5,000	$5,000
Temporary Fencing and Security	LS	1	$15,000	$15,000
Temporary Roads	LS	1	$1,000	$1,000
Temporary Traffic Control	LS	1	$5,000	$5,000
Subtotal				*$41,000*

Site Clearing and Demolition				
Pavement Demolition [pulverize, reuse]	SY	12,000	$2	$24,000
Clearing and Grubbing, Vegetation	LS	1	$12,000	$12,000
Miscellaneous Site Demolition	LS	1	$12,000	$12,000
Utility Abandonment and Removal	LS	1	$3,000	$3,000
Subtotal				*$51,000*

Earthworks				
Master Grading (1 ft over whole site)	LS	1	$25,000	$25,000
Subtotal				*$25,000*

Storm Sewer				
RCP Storm	LF	0	$100	$0
Storm Manholes & Catch Basins	EA	0	$4,000	$0
Storm Outfalls to Lake	EA	0	$10,000	$0
Subtotal				*$0*

Sanitary Sewer				
Miscelaneous Adjustments	LS	1	$10,000	$10,000
Fish Cleaning Pump Imrovements	LS	1	$100,000	$100,000
Subtotal				*$110,000*

Water Service/ Fire Protection				
Misc. Adjustments	LS	1	$10,000	$10,000
Subtotal				*$10,000*

Dry Utilities				
Parking Lot Lighting	POLE	4	$4,000	$16,000
Light Controller and Cabling	LS	0	$50,000	$0
Pedestrian Path Lighting	POLE	0	$3,500	$0
Eliminate Overhead to Underground	Allow	0	$75,000	$0
Telephone and Data Upgrades	Allow	1	$10,000	$10,000
Subtotal				*$26,000*

Storm Water Biofiltration Areas				
Excavate Biofiltraton Areas	CY	0	$5	$0
6" PVC Drain Underdrains	LF	0	$20	$0
Washed Gravel Base	CY	0	$20	$0
Engineered Soil Mix	CY	0	$40	$0
Seed and Plantings	LS	0	$50,000	$0
Subtotal				*$0*

Pavement				
18" Concrete C&G (External)	LF	500	$18.00	$9,000
Asphalt Multiuse Paths (3")	SF		$3.00	$0
Asphalt Pavement Lots (3.5")	SF	70,000	$3.50	$245,000
Base Aggregate Dense Under Pavement (9")	Ton	0	Reuse	$0
Concrete Sidewalk	SF	6,000	$6	$36,000
Boat Launch Pavement Replacement	Allow	1	$75,000	$75,000
Detectable Warning Fields	EA	5	$500	$2,500
Pavement Markings	LS	1	$10,000	$10,000
Subtotal				*$377,500*

Landscaping				
Trees and Shrubs	Allow	1	$75,000	$75,000
Topsoil, Seed, Mulch	Allow	1	$10,000	$10,000
Subtotal				*$85,000*

Other				
Beach Dune Construction	Allow	0	$100,000	$0
Dockwall Rehabilitation	Allow	0	$75,000	$0
Dredging	Allow	1	$75,000	$75,000
Gatehouse	LS	1	$50,000	$50,000
Ornamental Fencing at Yacht Club	LF	0	$75	$0
Ammenities (Bike Racks, Benches, Etc.)	LS	0	$25,000	$0
Site Signage	LS	1	$25,000	$25,000
Dumpster Enclosures	LS	1	$15,000	$15,000
Boat Wash BMP	LS	1	$75,000	$75,000
Subtotal				*$240,000*

Total Base Construction Costs				**$965,500**
Engineering and Administration (10%)				**$96,550**
Construction Contingency (25%)				**$241,375**
TOTAL CONSTRUCTION COSTS				**$1,303,425**

Yacht Club BMP

Porous Pavement	SF	750	$35	$26,250
Boat Wash BMP	LS	1	$15,000	$15,000

Total Base Construction Costs				**$41,250**
Engineering and Administration (10%)				**$4,125**
Construction Contingency (25%)				**$10,313**
TOTAL CONSTRUCTION COSTS				**$55,688**

Plaza and Promenade Enlargement

Dockwall Improvements (Assume Bin Wall)	LF	375	$1,400	$525,000
Concrete Pavement	SF	7,000	$7	$49,000
Additional Landscape	LS	1	$25,000	$25,000
Additional Amentities	LS	1	$25,000	$25,000

Total Base Construction Costs				**$624,000**
Engineering and Administration (10%)				**$62,400**
Construction Contingency (25%)				**$156,000**
TOTAL CONSTRUCTION COSTS				**$842,400**

Pavilion Improvements

Misc. Demolition	LS	1	$25,000	$25,000
Concrete Pavement	SF	1,000	$5	$5,000
Sculpture Garden	LS	1	$25,000	$25,000
Additional Landscape	LS	1	$10,000	$10,000
Additional Amentities	LS	1	$10,000	$10,000

Total Base Construction Costs				**$75,000**
Engineering and Administration (10%)				**$7,500**
Construction Contingency (25%)				**$18,750**
TOTAL CONSTRUCTION COSTS				**$101,250**

Beach Garden Construction

Beach Garden	LS	1	$500,000	$500,000

Total Base Construction Costs				**$500,000**
Engineering and Administration (10%)				**$50,000**
Construction Contingency (25%)				**$125,000**
TOTAL CONSTRUCTION COSTS				**$675,000**

Total Master Plan Costs				**$3,438,000**
Engineering and Administration (10%)				**$343,800**
Construction Contingency (25%)				**$859,500**
TOTAL MASTER PLAN COSTS				**$4,641,300**

FIGURE 7
Consolidated Plan Rendering- View 1

South Shore Park Improvements

Looking East along Oak Leaf Trail from Boat Launch to Pavilion

Milwaukee County PARKS countyparks.com

THE SIGMA GROUP Single Source. Solid Solutions.

STORMWATER SOLUTIONS ENGINEERING

SMITHGROUP JJR

GEStra

Made possible by funding through:

Wisconsin Coastal Management Program

NOAA

FIGURE 8
Consolidated Plan Rendering- View 2

South Shore Park Improvements

Looking West from Bulkhead into Parking Lot

Milwaukee County PARKS countyparks.com

THE SIGMA GROUP

STORMWATER SOLUTIONS ENGINEERING

SMITHGROUP JJR

GESTRA

Made possible by funding through:

Wisconsin Coastal Management Program

NOAA

South Shore Park Improvements

Looking West from Boat Launch into Parking Lot

Milwaukee County PARKS countyparks.com

THE SIGMA GROUP · SMITHGROUP JJR · STORMWATER SOLUTIONS ENGINEERING · GEStra

Made possible by funding through: Wisconsin Coastal Management Program · NOAA

APPENDIX A
Limited Facility Condition Review

July 2, 2014 Project Reference #14534

Mr. Sean Hayes, P.E.
Milwaukee County
Dept. of Administrative Services
2711 W. Wells St., 2nd Floor
Milwaukee, WI 53208

RE: Limited Facility Condition Review
South Shore Park
Milwaukee, WI

Dear Mr. Hayes:

As part of our overall site review, we have completed a limited condition review of the three structures on the site. These structures included the Pavilion, the restroom/fish cleaning station and north restroom buildings. Our review was limited to visual observations of the building exterior/roof, interior finishes, and HVAC, electrical and plumbing systems. The purpose of this review was to determine the building use, general construction and identify any significant deterioration or deficiencies of building materials and systems.

Our site visit took place on June 17, 2014. At the site we met with Cliff Hale, Humboldt Unit Coordinator. Photographs of typical conditions along with a site plan are attached.

Our observations were as follows.

PAVILION

Use –Rental Hall, restrooms, concessions

Building Age – Built as a bath house in 1934. On National Historic Register according to Cliff Hale.

General Construction – Two story structure with courtyards (former bath house changing area) at north and south side of building. Main level is supported by reinforced concrete construction. Foundation type is unknown. Barrel roof at rental hall is wood framed.

Exterior walls are brick. Windows vary in age with some windows appearing to be original. Peaked roof areas are covered with clay tile that was reported to be original. Roof over barrel roof not observed but reported to be replaced with a new rubber membrane 5 years ago.

Building includes two sets of men's/women's toilet rooms. Building is heated only via a hot water boiler. A fire alarm system is provided but no fire protection sprinkler system.

General Condition – The building was in overall satisfactory condition. Cliff Hale reported no major issues. We noted the following deficiencies.

- Brick was spalling in numerous areas at the building exterior.

- Brick cracking at the boiler chimney.

- The former bath house courtyards were in fair to poor condition. The concrete cap on the concrete screen walls was deteriorated in numerous areas. Exterior brick at the screen walls was deteriorated in numerous locations. The floor slab of the courtyards was cracked and broken up with vegetation growing.

- Concrete spalling and corroded reinforcing steel were observed in two small areas (i.e. roughly 3" x 5") at the bottom side of the main level floor slab.

- Galvanized water pipe was present in a portion of the building. This piping has not been used in commercial construction for more than 40 years and typically has issues with corrosion.

- The boiler appeared to be at least 30 to 40 years old. Above average maintenance can be expected until replacement.

FISH CLEANING STATION/RESTROOM FACILITY

Use – Fish cleaning/restrooms

Building Age – Less than 20 years old according to Cliff Hale.

General Construction – Concrete block and steel framing. Foundation unknown.

General Condition – The structure was in overall satisfactory condition. Mr. Hale reported no major deficiencies with this building other then the drain for the fish waste getting plugged frequently and may be too small of drain. We noted the following deficiencies.

- Roof shingles were in fair condition but were missing in a few areas.

- Steel columns and wood trim are in need of painting.

- Some corrosion was noted on door frames.

- Exposed electrical wires were observed at the exterior.

- A potential trip hazard exists between building floor slab and the surrounding asphalt.

NORTH RESTROOM FACILITY

Use – Restrooms.

Building Age – Less than 20 years old according to Cliff Hale.

General Construction – Concrete masonry construction. Foundation unknown.

General Condition – The structure was in overall satisfactory condition. Mr. Hale reported

no major deficiencies. We noted the following deficiencies.

- Roof shingles were in fair condition but were missing in numerous areas.
- Wood siding/trim is in need of painting.
- Some corrosion was noted on door frames.

Sincerely,

THE SIGMA GROUP, INC.

Thomas M.R. Lamb, P.E., LEED® AP
Senior Project Engineer

APPENDIX B
Geotechnical Report

GEOTECHNICAL ENGINEERING REPORT

Proposed Parking Lot Reconstruction
South Shore Park
Milwaukee, Wisconsin

GESTRA Project No.: 14031-10
June 23, 2014

Prepared For:
The Sigma Group
Milwaukee, Wisconsin

Geotechnical Engineering Report

Proposed Parking Lot Reconstruction
South Shore Park
Milwaukee, Wisconsin

GESTRA Project No.: 14031-10
June 23, 2014

Prepared for:

The Sigma Group
1300 W. Canal Street
Milwaukee, WI 53233

Report Prepared by:

GESTRA Engineering, Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI

TABLE OF CONTENTS

Geotechnical Engineering Report
Proposed Parking Lot Reconstruction
South Shore Park
Milwaukee, Wisconsin
GESTRA Project No.: 14031-10

1.0 INTRODUCTION

GESTRA Engineering, Inc. (GESTRA) was authorized by The Sigma Group (Sigma) to complete this Geotechnical Engineering Report for the proposed South Shore Park parking lot reconstruction in Milwaukee, Wisconsin. The engineering recommendations and analysis contained within this report are based on the following project information which is a projection of our understanding of the project. If for any reason the actual project information differs from what is reported below, GESTRA should be contacted so that the recommendations can be reviewed in light of the new information.

1.1 Project Information

We understand the overall project will consist of the reconstruction of portions of South Shore Park located at 2900 South Shore Drive in Milwaukee, Wisconsin, with an emphasis on improving beach and water quality. As part of the development, reconstruction or rehabilitation of the existing parking lot within South Shore Park is planned, which is the focus of this geotechnical evaluation.

Reconstruction or rehabilitation of the existing asphalt parking lot is understood to be planned due to the age and serviceability of the existing pavement, as well as to redesign the layout of the existing lot. The footprint of the existing parking lot will remain the same. We have assumed that the final design grades will be within 1± foot of existing grades.

Based on information provided by Sigma, the project site is a known historical fill site. However, additional information was not available at the time of this report concerning the existing fill.

2.0 SCOPE OF WORK

GESTRA has performed the following services for the project:

1. Contacted Diggers Hotline to locate the public utilities at the site. Private utilities were located by Milwaukee County.
2. Performed a total of five (5) standard penetration test (SPT) borings to a termination depth of 15 feet below ground surface (bgs). Upon completion of drilling, the boreholes were backfilled as required by WNDR and pavement patching was performed at the surface of each boring location.
3. Performed laboratory tests including hand penetrometer, moisture content, and mechanical sieve analysis to determine engineering properties of the soils.
4. Prepared this engineering report presenting the results of the field exploration and laboratory testing. The report includes recommendations pertaining to the site preparation/soil correction recommendations, and asphalt and base course thicknesses for the proposed parking lot and drives based on anticipated traffic.

3.0 EXPLORATION RESULTS

3.1 Site Conditions

The proposed development site is comprised of an asphalt paved parking lot within South Shore Park, located at the east ends of E. Iron Street and E. Nock Street in Milwaukee, Wisconsin. The parking lot is generally utilized for automobile and boat launch parking, with an estimated 300 parking stalls. The existing parking lot is bordered by lawn areas and a yacht club to the north, Lake Michigan and a beach to the east, and a combination of residences and lawn areas to the south and west. A fish cleaning/restroom structure and a separate fishing store building are present within the south portion of the existing parking lot.

The existing pavement consists of hot mix asphalt (HMA), and it is our understanding that the serviceability of the pavement is in poor condition. Therefore, the pavement is designated for an improvement, with reconstruction and/or rehabilitation yet to be determined based on the degree of deterioration.

Based on information provided by Milwaukee County, the existing elevations at the boring locations ranged between 585.4 feet and 588.6 feet.

3.2 Subsurface Soil Profile

The surface materials at the boring locations consist of 2½ inches to 3 inches of asphalt, underlain by approximately 4 inches to 9 inches of base course materials (with 4 inches to 6 inches being more typical at the boring locations). Below the existing pavement section, fill/possible fill materials were observed in the borings to depths ranging from about 5½ feet to 14 feet bgs (see Table 1). Beneath the fill/possible fill materials, the underlying native soils were comprised of silty sand, silty sand with gravel, sand with gravel, gravelly sand with silt, and/or lean clay to the termination depth of the borings. The following is an additional description of the soil types encountered.

Fill/Possible Fill: The fill and/or possible fill materials were variable in color, composition, and relative density, generally consisting of sand with silt, sand with gravel, silty sand, and silty sand with gravel. As an exception, a thin deposit of brown lean clay fill was encountered at a depth of about 4½ feet bgs within B-4. Intermixed wood matter, asphalt, metal, and slag-like fragments were encountered within portions of the fill/possible fill materials. Standard Penetration Test (SPT) blow counts, or N-values as shown on the boring logs, of the fill/possible fill materials ranged from 1 to 64 blows per foot (bpf).

Native Soils: The native soils primarily consisted of gray to dark gray loose to medium dense silty sand, silty sand with gravel, sand with gravel, gravelly sand with silt, underlain by medium stiff to stiff, grayish brown lean clay with thin seams of silt and sand that extended to the termination depths of the borings. Moisture contents of samples of the native lean clay soil tested ranged from 20% to 29%. Hand penetrometer readings in the native lean clay soils were between 0.5 tsf and 1.5 tsf. Standard Penetration Test (SPT) blow counts within the native granular materials ranged from 4 to 48 blows per foot (bpf).

A split spoon sample of the fill materials collected from boring B-3 at a depth of about 1 foot to 3 feet bgs was subjected to a mechanical sieve analysis. The results of the sieve analysis indicated that approximately 24 percent of the sample was retained on the No. 4 sieve, 77 percent on the No. 40 sieve, and about 8 percent passed the No. 200 sieve. Based on the laboratory

testing, the bulk sample from B-3 was classified as sand with silt and gravel. The gravel portion of the sample appeared to primarily consist of asphalt fragments.

A composite sample of split spoon samples of fill material collected at a depth of about 3½ feet to 5 feet within B-1, B-2, and B-3 was also subjected to a mechanical sieve analysis. The results of the sieve analysis indicated that approximately 15 percent of the sample was retained on the No. 4 sieve, 80 percent on the No. 40 sieve, and about 6 percent passed the No. 200 sieve. Based on the laboratory testing, the composite sample was classified as sand with silt and gravel. Slag-like fragments were observed within portions of the composite sample.

Table 3-1: Summary of Pavement Section and Fill Profile

Boring No.	Asphalt Thickness (inches)	Base Course Thickness (inches)	Depth of Fill/Possible Fill (feet)
B-1	2-1/2	6	14
B-2	2-1/2	5	13
B-3	3	6	10-1/2
B-4	3	4	11-1/2
B-5	3	9	5-1/2

Results of the field and laboratory tests and observations are depicted on the individual test boring logs included in the Appendix of this report. Soils were grouped together based on similar observed properties. The stratification lines were estimated by the reviewing engineer based on available data and experience. The actual in-situ changes between layers may differ slightly and may be more gradual than depicted on the boring logs. Subsurface and groundwater conditions can vary between borehole locations and in areas not explored.

It is important to note that the soil observations and soil layer thickness estimates were made in small diameter boreholes. Therefore, it should be understood that thicker or thinner deposits of the individual strata are likely to be encountered within other portions of the project. Furthermore, the estimation of base course and strata thickness, such as fill, at a particular location can differ from person to person due to a sometimes indistinct transition between the soils encountered. Additionally, it must be recognized that in the absence of foreign substances and/or debris within the soil samples obtained, it is difficult to distinguish between natural soils and clean soil fill.

3.3 Groundwater Observations

Groundwater observations were made during and at the completion of drilling operations. During drilling, water was encountered within all of the borings at depths ranging from 5 feet to 8½ feet bgs. Upon completion of drilling, water was observed at depths ranging from 5 feet to 9 feet bgs. Cave in after drilling was recorded in the borings at depths between about 6 feet and 11½ feet. Based on the field observations, the groundwater elevation at the time of the exploration is estimated to be at a depth below about 5 feet to 8 feet bgs or approximate elevations 582 to 579.

Groundwater level fluctuations may occur with time and seasonal change due to variations in precipitation, evaporation, surface water runoff and local dewatering. The prevailing water level of Lake Michigan is also likely to have a significant influence on the static water level at the

project site. Perched water pockets at a higher elevation may also be encountered during wet weather periods.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 Subgrade Preparation

If reconstruction is selected for this project, we recommend compacting the anticipated granular subgrade with a vibratory drum roller after existing pavement section removal. After compaction, a proof roll is recommended for evaluation of the subgrade stability prior to placement of the base course. The proof roll should be completed with a fully loaded tri-axle dump truck moving at no more than 5 mph.

Pulverization of the existing pavement, if planned, should be performed with suitable equipment and to a depth that extends through the existing asphalt section and into the existing base course, but not into the underlying subgrade soils. This will likely require adjustment of the pulverizing depth and should be monitored to prevent intermixing the subgrade soil into the recycled base material.

Asphalt millings and the existing base course have the potential for reuse as aggregate base, if desired. If the existing pavement section is pulverized and planned to be reused as base material (reclaimed asphalt pavement base material), we recommend the pulverized material meet the requirements of Section 305.2.2.2 of WisDOT Standard Specifications.

- 100 percent passing a 1 1/4-inch sieve.
- 75 percent or less of the aggregate passing a No. 4 sieve.
- Asphalt content between 3 percent and 6.5 percent inclusive.

If pulverized asphalt surface is used for all or part of the base course, we recommend a gradation analysis on the pulverized material be performed to verify that it satisfies WisDOT specifications. Additionally, we recommend the placement and compaction follow the general guidelines in this report and the construction include oversight and evaluation of the material during placement, including a proof roll prior to paving.

Soil remediation work will be needed where excessive yielding and/or rutting is observed during the proof roll. The remediation type and depth should be determined at the time of construction based on drainage, weather and soil conditions. Therefore, a geotechnical engineer should be present during the proof roll in order to identify soft or unstable areas, if any, and subsequently recommend rectification procedures. Where subgrade remediation is needed, the options for improvement may include the methods described in the following paragraphs. Please note that all methods discussed below can improve subgrade strength; however, these may not reduce the potential for settlement/consolidation of underlying fill materials.

Recondition the soft subgrade through moisture/density control: If this option is chosen, the subgrade (upper 12-inches) should be aerated through disking and dried to within two (2) percent of its optimum moisture content. After which, the dried soils should be re-compacted in place to at least 95% of the maximum Modified Proctor density (ASTM D1557) at the pavement subgrade elevation.

Removal and Replacement: Removal and replacement of soft or unstable soils can also be performed and the excavated material replaced with well graded granular fill. The granular fill should be compacted to at least 95% of the maximum dry density as obtained by the maximum

Modified Proctor density (ASTM D1557). Pulverized pavement material may be suitable for use as granular fill.

Additional Base Course Thickness: Provision of additional base course thickness could also be considered for improving subgrade conditions and reducing the amount of excavation. For budgeting purposes, an additional 6 inch thickness of base course material can be assumed to be an equivalent improvement to 12 inches of undercut and replacement with granular fill.

4.2 Pavement Recommendation

The Wisconsin Asphalt Pavement Association (WAPA) Design Guide and the results of the geotechnical evaluation were used to provide the recommendations for the proposed parking lot. Based on the existing fill material encountered and relatively low N-values encountered in borings B-1, B-3 and B-5, GESTRA recommends that the "poor soils" class, with an estimated CBR value of 2 to 5, be assumed as the prevalent subgrade soil, regardless of site corrections methods that may be performed. The following traffic class was considered to determine the pavement section recommendations meeting the minimum of a 10-year life expectancy.

- Traffic Class II – parking lots with more than 50 stalls.

In Table 4-1 below, we present our recommendation thicknesses for the hot mix asphalt pavement and base course layers, based on the anticipated traffic class. Please note that these recommendations have been develop based on the assumption that a stable subgrade has been established. Additional corrective action may be required at the time of construction for areas where it is necessary to provide a more consistent subgrade; however, it should be understood that the presence of existing fill will result in a higher potential for reduced pavement life regardless of additional site work performed.

Base course material should be placed at moisture content within 2% of optimum and compacted to minimum of 95% of the maximum dry density as determined by the Modified Proctor. Hot Mix Asphalt (HMA) should be placed and compacted following the guidelines of WisDOT Standard Specifications for Highway and Structure Construction, section 460.3.

Table 4-1 - Pavement Design Recommendations

Pavement Layer Type	Thickness, inches	Material Type	WisDOT Specifications
	Parking Lots, More Than 50 Stalls (Traffic Class II)		
Hot Mix Asphalt	4	HMA Mix E-0.3	Section 460
Base Course (Dense Graded)	9	1¼ inch Crushed Stone	Section 305

The pavement section presented in the above table should not be used for areas that will see heavy truck loading, loading and unloading areas, trash dumpster loading zones, and entrance and exit aprons. In these areas, a Portland Cement Concrete pavement should be used. Where applicable, the PCC pavement thickness is recommended to be 6.0 inches with a minimum of 6.0 inch-thick crushed stone base course. The reinforcement details, as needed, for PCC pavement

section should be designed by the project design engineer as the project conditions dictate. Design of pavement for boat ramps is outside the scope of services of this report.

All pavements require regular maintenance and repair in order to maintain the serviceability of the pavement. These repairs and maintenance are due to normal wear and tear of the pavement surface and are required in order to extend the serviceability life of the pavement. However, after 10 years of service, a normal pavement structure is likely to deteriorate to a point where pavement rehabilitation may be required to maintain the serviceability

One of the important considerations in designing a high quality and durable pavement is providing adequate drainage. Drainage design for the proposed pavement section is out of the scope of GESTRA for this project. It is important that bird baths (leeching basins) and surface waves are not created during construction of the HMA layer. A proper slope should be allowed and drainage should be provided along the edges of pavements to prevent the accumulation of free water within the base course, which otherwise may result in subgrade softening and pavement deterioration under exposure and repeated traffic conditions.

4.3 Additional Engineered Fill and Construction Consideration

Our recommendations are based on the understanding that all earthwork and construction will be performed in accordance with the appropriate sections of the *State of Wisconsin Standard Specifications for Highway and Structure Construction* (latest edition). Engineered fill should be used in all new pavement and curb areas to bring them to proper design grades unless other options have been presented. We recommend that engineered fill be unfrozen and free of organics, wood, construction debris, lumps, and/or deleterious materials. We recommend that engineered fill be placed in lifts not exceeding 8 inches for clayey soils and 12 inches for granular soils and be compacted with proper compaction equipment depending on the soil type. All fill material should be compacted at moisture contents within 2% of the optimum moisture content and to a minimum of 95% of the maximum dry density as determined by a Modified Proctor test.

The detailed means and method of excavation and construction for the proposed construction should be decided by the contractor and approved by the project design team. Based on the specific site information and the geotechnical exploration results, the following additional issues should be taken in consideration during construction.

Dewatering

Groundwater was encountered below a depth of 5 feet or more within the borings during or after drilling. Therefore, groundwater is not expected at the grade level of new pavement; however, the contractor should be prepared to perform dewatering, if deeper excavations, such for utility construction, are planned. Typically, if water is encountered during the shallow parking lot grading, an appropriate number of temporary sump pits and pumps should be sufficient to remove water from the excavation. Additionally, the contractor should take precautions during earthwork to prevent the ponding of water on the subgrade from precipitation.

Weather Implications

The subgrade soil or the soil at the pavement subgrade might become unstable with exposure to adverse weather such as rain, snow and freezing temperatures. The unstable areas may require an additional undercut or stabilization and the representative geotechnical engineer should assist with the determination of the depth of additional undercut or the appropriate stabilization procedure, based on observation of the field condition.

Soil Sensitivity

Soil at the construction site will be exposed to moisture and disturbance from construction traffic, construction equipment and human factors. Due to the disturbance, portions of the on-site soil may become sensitive with contact of water. The contractor should try to minimize subgrade exposure to moisture and disturbances. Therefore, pavement should be placed soon after approval from the representative geotechnical engineer.

Existing Fill Material

The existing fill encountered indicated variability in the type of soil and relative strength and no information is available as to the placement or compaction of the fill material. The new pavement will likely be supported above the existing fill. Construction of new pavement over existing fill includes some risk related to the material. These risks may include inconsistent conditions in the subgrade resulting in additional subgrade preparation or consolidation of the underlying fill as a result of new loading or changes in site conditions. The site preparation recommendations presented in this report should be followed to help mitigate the risk and the owner must understand the potential additional risk.

5.0 EXPLORATION AND TESTING PROCEDURES

5.1 Layout and Elevation Procedures

Five (5) SPT soil borings were completed at the locations specified on the attached Boring Location Map in Appendix I. The location of each of boring was selected and located in the field by a representative from Sigma. The ground surface elevations were obtained by Milwaukee County staff and subsequently provided to GESTRA.

5.2 Field Testing Procedures

All of the boreholes were drilled using a CME-75 truck mounted drill rig. Each borehole was initiated and drilled to the termination depth using 3¼ inch hollow stem augers. Soil samples were collected at 2½ foot intervals to the termination depth of each boring. All representative soil samples were taken in general accordance with the "Standard Method for Penetration Test and Split-Barrel Sampling of Soils" (ASTM D1586). After collecting each sample, a soil sample was retained and placed in a jar and recorded for type, color, consistency, and moisture, sealed and then transported to the laboratory for further review and testing, if required. The specific drilling method used including the depths, rig type, crew chief, and borehole abandonment are included on each of the individual boring logs.

5.3 Laboratory Testing Procedures

After completion of drilling operations, all of the retained soil samples were transported to GESTRA's laboratory and classified by a geotechnical engineer using the Unified Soil Classification System (USCS). A chart describing the USCS classification system is included in the appendix of this report. The engineer assigned laboratory testing suited to extract important index properties of the soil layers. These tests included moisture content and mechanical sieve analysis. Results from the laboratory testing can be found on the individual boring logs and in Appendix II of this report

STANDARD OF CARE

Our exploration was limited to evaluating subsurface soil and groundwater conditions pertaining to the proposed project. GESTRA did not perform any environmental, chemical, or hydrogeologic testing as these were not part of our work scope.

This report should be made available in its entirety to bidding contractors for information purposes. The soil borings and site sketch should not be detached from this report. Our report is not valid if used for purposes other than what is described in the report.

All OSHA regulations such as those regarding proper sloping and temporary shoring of excavations should be followed during the entire construction process.

GESTRA has presented our professional opinions in this report in the form of recommendations. Our opinions are based on our understanding of current project information and related accepted engineering practices at the time of this report. Other than this, no warranty is implied or intended.

Sincerely,

GESTRA Engineering, Inc.

Report Prepared By:

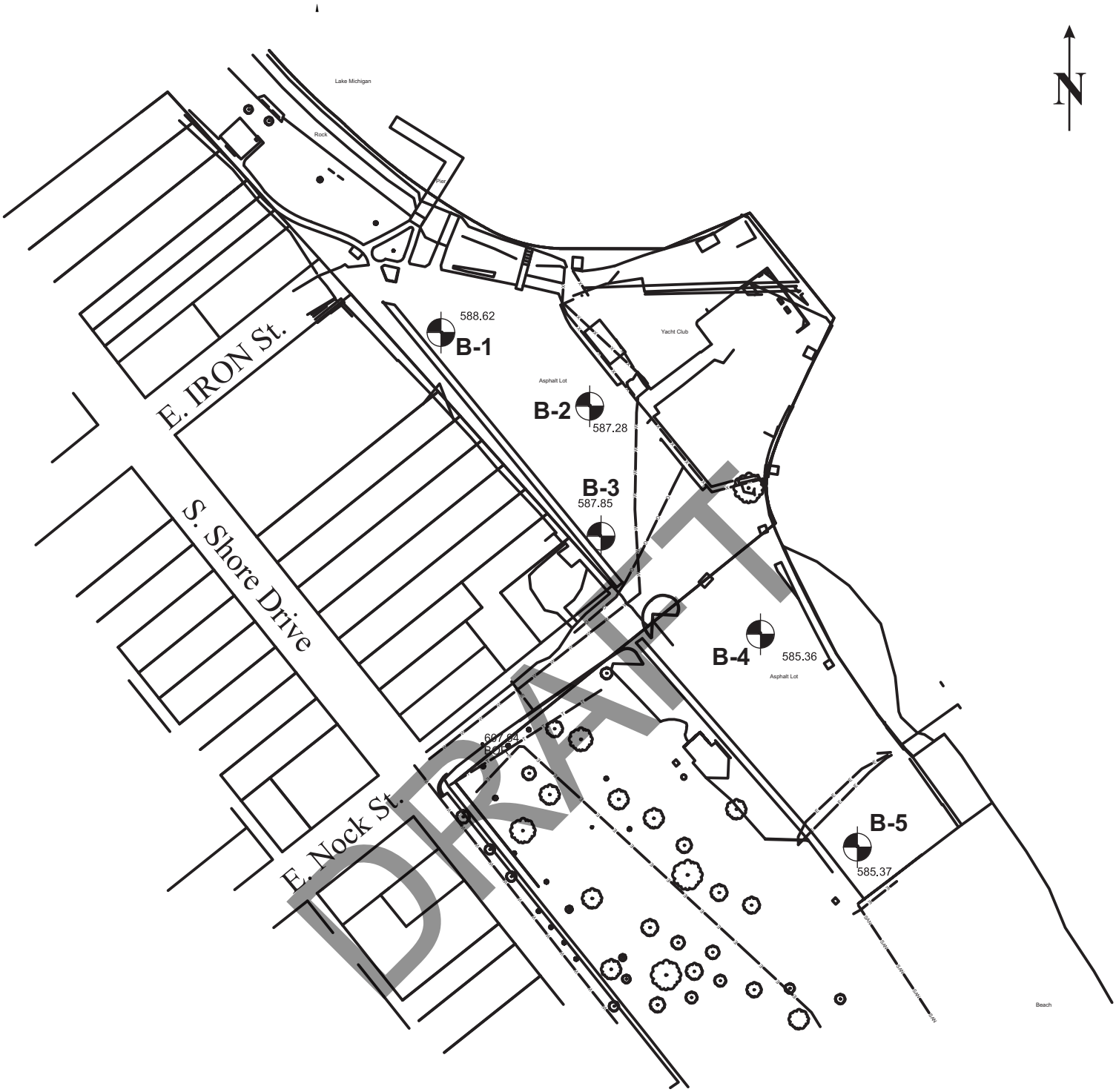
Ryan J. Portman, P.E
Project Engineer

Report Reviewed By:

Douglas Dettmers, P.E.
Senior Engineer

APPENDIX I

BORING LOCATION MAP, TEST BORING LOGS AND NOMENCLATURE



SITE PLAN PROVIDED BY MILWAUKEE CO.

= BOREHOLE LOCATION

GESTRA Engineering, Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI 53202
Phone: (414) 933-7444
Fax: (414) 933-7844

Project Name & Location:
South Shore Park
2900 South Shore Drive
Milwaukee, WI 53207

Drawing Title:
Borehole Location Map

Project No.: 14031-10

Scale: NOT TO SCALE

Drawing No.: 1 of 1

Drawn by: DB

Checked by: RP

Date: June 23, 2014

SOIL BORING LOG

GESTRA
Gestra Engineering Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: South Shore Park	DATE DRILLING STARTED: 4/30/2014	PAGE NUMBER: 1 of 1	
PROJECT LOCATION: Milwaukee, WI	DATE DRILLING ENDED: 4/30/2014	BORING NUMBER: B-1	
BORING DRILLED BY: FIRM: GESTRA; CREW CHIEF: A. Woerpel	FIELD LOG: D. Harris	NORTHING	PROJECT NUMBER: 14031-10
	LAB LOG / QC: R. Portman	EASTING	DRILLING RIG: CME 75 (International)
			DRILLING METHOD: 3¼" HSA
			SURFACE ELEVATION: 588.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
						ASPHALT (2.5")								Boring was drilled at the staked location.
						0.2 (588.4)								
SS - 1	18	14 22 10	32			BASE COURSE (6")								
						0.7 (587.9)								
						SAND WITH SILT AND GRAVEL, gray and white, moist, slightly cemented, traces of intermixed slag-like fragments, (FILL)								
SS - 2	13	2 2 1	3	5	583.6									
SS - 3	18	2 1 1	2				SP-SM							
SS - 4	18	2 2 4	6	10	578.6	Wet below 8.5'								
SS - 5	8	3 5 9	14			Pieces of metal in samples SS-5 and SS-6								
						14 (574.6)								
SS - 6	15	8 13 7	20	15	573.6	SILTY SAND WITH GRAVEL, dark gray, wet, medium dense,	SM						23	Unable to obtain Q_p value due to recovery of cohesive material.
						14.5 (574.1)	CL							
						LEAN CLAY, grayish brown, wet, with thin silt and sand seams								
						15 (573.6)								
						End of Boring at 15.0 ft.								
				20	568.6									
				25	563.6									
				30	558.6									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING (ft): 8.5 ft.	▨	CAVE DEPTH AT COMPLETION (ft): 11.5 ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION (ft): 9 ft.	■	CAVE DEPTH AFTER 0 HOURS (ft): NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA
Gestra Engineering Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: South Shore Park		DATE DRILLING STARTED: 4/30/2014	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Milwaukee, WI		DATE DRILLING ENDED: 4/30/2014	BORING NUMBER: B-2
BORING DRILLED BY: FIRM: GESTRA; CREW CHIEF: A. Woerpel	FIELD LOG: D. Harris	NORTHING:	PROJECT NUMBER: 14031-10
	LAB LOG / QC: R. Portman	EASTING:	DRILLING RIG: CME 75 (International)
			DRILLING METHOD: 3¼" HSA
			SURFACE ELEVATION: 587.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
						ASPHALT (2.5")								Boring was drilled at the staked location.
						0.2 (587.1)								
SS - 1	16	15 40 24	64			BASE COURSE (5") 0.6 (586.7) SAND WITH SILT AND GRAVEL, gray to grayish brown, moist, slightly cemented, traces of intermixed slag-like fragments, (FILL)								
SS - 2	15	4 4 5	9	5	582.3		SP-SM							
SS - 3	18	4 5 3	8			8 (579.3)								
SS - 4	15	7 8 5	13	10	577.3	SAND WITH GRAVEL, dark gray, wet, very loose to medium dense, (POSSIBLE FILL)	SP							
SS - 5	16	2 2 2	4			13 (574.3)								
SS - 6	15	8 8 5	13	15	572.3	SILTY SAND, dark gray, wet, trace wood matter 15 (572.3)	SM							
						End of Boring at 15.0 ft.								
				20	567.3									
				25	562.3									
				30	557.3									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING (ft): 7 ft.		CAVE DEPTH AT COMPLETION (ft): 10 ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION (ft): 5 ft.	■	CAVE DEPTH AFTER 0 HOURS (ft): NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA
Gestra Engineering Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: South Shore Park		DATE DRILLING STARTED: 4/30/2014	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Milwaukee, WI		DATE DRILLING ENDED: 4/30/2014	BORING NUMBER: B-3
BORING DRILLED BY: FIRM: GESTRA; CREW CHIEF: A. Woerpel	FIELD LOG: D. Harris	NORTHING:	PROJECT NUMBER: 14031-10
	LAB LOG / QC: R. Portman	EASTING:	DRILLING RIG: CME 75 (International)
			DRILLING METHOD: 3¼" HSA
			SURFACE ELEVATION: 587.9 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
						ASPHALT (3")								Boring was drilled at the staked location.
						0.3 (587.6)								
SS - 1	9	6 38 24	62			BASE COURSE (6") 0.8 (587.1)	SW-SM							Gravel = 24.2% Sand = 67.8% P200 =8%
						SAND WITH SILT AND GRAVEL (ASPHALT FRAGMENTS), brown, moist, trace clay, (FILL)								
						3 (584.9)								
SS - 2	18	2 2 2	4	5	582.9	SAND WITH SILT AND GRAVEL, brown to gray, moist, slightly cemented, (FILL)								
SS - 3	11	1 1 1	2			Wet below 7'	SP-SM							
SS - 4	18	2 2 2	4	10	577.9	Greenish gray below 9.5'								
						10.5 (577.4)								
SS - 5	16	3 17 21	38			SAND WITH SILT AND GRAVEL, dark gray, wet, dense	SP-SM							
						13 (574.9)								
SS - 6	15	3 2 3	5	15	572.9	LEAN CLAY, grayish brown, wet, medium stiff, with thin silt and sand seams	CL			0.5-0.75			23	
						15 (572.9)								
						End of Boring at 15.0 ft.								
				20	567.9									
				25	562.9									
				30	557.9									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING (ft): 7 ft.	▨	CAVE DEPTH AT COMPLETION (ft): 9.5 ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION (ft): 8 ft.	■	CAVE DEPTH AFTER 0 HOURS (ft): NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA
Gestra Engineering Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: South Shore Park	DATE DRILLING STARTED: 4/30/2014	PAGE NUMBER: 1 of 1	
PROJECT LOCATION: Milwaukee, WI	DATE DRILLING ENDED: 4/30/2014	BORING NUMBER: B-4	
BORING DRILLED BY: FIRM: GESTRA; CREW CHIEF: A. Woerpel	FIELD LOG: D. Harris	NORTHING	PROJECT NUMBER: 14031-10
	LAB LOG / QC: R. Portman	EASTING	DRILLING RIG: CME 75 (International)
			DRILLING METHOD: 3¼" HSA
			SURFACE ELEVATION: 585.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
						ASPHALT (3")								Boring was drilled at the staked location.
						0.3 (585.1)								
SS - 1	16	4 9 10	19			BASE COURSE (4") 0.6 (584.8) SAND WITH SILT, brown, moist, intermixed black asphalt fragments, trace gravel, (FILL)	SP-SM							
						4.5 (580.9)								
SS - 2	12	2 3 1	4	5	580.4	LEAN CLAY, brown, wet, trace gravel, (FILL) 4.8 (580.6)	CL						29	Unable to obtain Q_p value due to recovery of cohesive material.
						SAND WITH SILT, black, wet, (FILL)								
SS - 3	1	1 1 0	1				SP-SM							
						8 (577.4)								
SS - 4	10	2 2 1	3	10	575.4	SAND WITH SILT AND GRAVEL, black, trace asphalt fragments and wood matter, (FILL)	SP-SM							
						11.5 (573.9)								
SS - 5	18	2 3 6	9			LEAN CLAY, grayish brown, wet, stiff, thin seams of silt and sand	CL			1.0-1.25			24	
SS - 6	18	2 3 5	8	15	570.4	15 (570.4)				1.0-1.5			22	
						End of Boring at 15.0 ft.								
				20	565.4									
				25	560.4									
				30	555.4									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING (ft): 5 ft.	▩	CAVE DEPTH AT COMPLETION (ft): 9.5 ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION (ft): 6 ft.	■	CAVE DEPTH AFTER 0 HOURS (ft): NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA
Gestra Engineering Inc.
1626 W. Fond du Lac Avenue
Milwaukee, WI 53205
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: South Shore Park		DATE DRILLING STARTED: 4/30/2014	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Milwaukee, WI		DATE DRILLING ENDED: 4/30/2014	BORING NUMBER: B-5
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: A. Woerpel	FIELD LOG: D. Harris LAB LOG / QC: R. Portman	NORTHING EASTING	PROJECT NUMBER: 14031-10 DRILLING RIG: CME 75 (International) DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 585.4 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u, or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
						ASPHALT (3")								Boring was drilled at the staked location.
						0.3 (585.1)								
SS - 1	8	11 9 13	22			BASE COURSE (9")								
						1 (584.4)								
						SILTY SAND WITH GRAVEL, dark brown to brown, moist, (FILL)	SM							
						3 (582.4)								
SS - 2	16	6 15 20	35	5	580.4	SAND WITH SILT, brown, moist, dense, (POSSIBLE FILL)	SP-SM							
						5.5 (579.9)								
						SAND WITH SILT AND GRAVEL, gray, wet, dense								
SS - 3	12	18 23 25	48											
							SP-SM							
SS - 4	18	7 17 30	47	10	575.4									
						10.5 (574.9)								
						LEAN CLAY, grayish brown, wet, medium stiff, with thin sand and silt seams								
SS - 5	18	2 3 2	5							0.5-0.75			22	
							CL							
SS - 6	18	1 2 3	5	15	570.4	15 (570.4)				0.5-0.75			20	
						End of Boring at 15.0 ft.								
				20	565.4									
				25	560.4									
				30	555.4									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING (ft): 6 ft.	▨	CAVE DEPTH AT COMPLETION (ft): 10 ft.	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION (ft): 6 ft.	■	CAVE DEPTH AFTER 0 HOURS (ft): NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS (ft): NMR		NE = Not Encountered; NMR = No Measurement Recorded	

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

GENERAL NOTES

DRILLING AND SAMPLING SYMBOLS

SYMBOL	DEFINITION
HSA	Hollow Stem Auger
RWB	Rotary Wash Boring (Mud Drilling)
_FA	4", 6" or 10" Diameter Flight Auger
_HA	2", 4" or 6" Hand Auger
_DC	2 1/2" , 4" , 5" or 6" Steel Drive Casing
_RC	Size A, B, or N Rotary Casing
PD	Pipe Drill or Cleanout Tube
CS	Continuous Split Spoon Sampling
DM	Drill Mud
JW	Jetting Water
SS	2" O.D. Split Spoon Sample
_L	2 1/2" or 3 1/2" O.D. SB Liner Sample
ST	3" Thin Walled Tube Sample (Shelby Tube)
3TP	3" Thin Walled Tube (Pitcher Sampler)
_TO	2" or 3" Thin Walled Tube (Osterberg Sampler)
W	Wash Sample
B	Bag Sample
P	Test Pit Sample
_Q	BQ, NQ, or PQ Wireline System
_X	AX, BX, or NX Double Tube Barrel
CR	Core Recovery – Percent
NSR	No Sample Recovered, classification based on action of drilling, equipment and/or material noted in drilling fluid or on sampling bit.
NMR	No Measurement Recorded, primarily due to presence of drilling or coring fluid.
▽	Water Level Symbol

TEST SYMBOLS

SYMBOL	DEFINITION
MC	Moisture Content - % of Dry Wt. – ASTM D 2216
OC	Organic Content - % of Dry Wt. – ASTM D 2974
DD	Dry Density – Pounds Per Cubic Foot
LL, PL	Liquid and Plastic Limit – ASTM D 4318
	Additional Insertions
Qu	Unconfined Comp. Strength-psf – ASTM D 2166
Qp	Penetrometer Reading – Tons/Square Foot
Ts	Torvane Reading – Tons/Square Foot
G	Specific Gravity – ASTM D 854
SL	Shrinkage Limits – ASTM D 427
OC	Organic Content – Combustion Method
SP	Swell Pressure - Tons/Square Foot
PS	Percent Swell
FS	Free Swell – Percent
pH	Hydrogen Ion Content. Meter Method
SC	Sulfate Content – Parts/ Million, same as mg/L
CC	Chloride Content - Parts/ Million, same as mg/L
C*	One Dimensional Consolidation – ASTM D 2453
Qc*	Triaxial Compression
D.S.*	Direct Shear – ASTM D 3080
K*	Coefficient of Permeability – cm/sec
D*	Dispersion test
DH*	Double Hydrometer – ASTM D 4221
MA*	Particle Size Analysis – ASTM D 422
R	Laboratory Receptivity, in ohm – cm – ASTM G 57
E*	Pressuremeter Deformation Modulus – TSF
PM*	Pressuremeter Test
VS*	Field Vane Shear – ASTM D 2573
IR*	Infiltrometer Test – ASTM D 3385
RQD	Rock Quality Designation – Percent

*See attached data sheet or graph

WATER LEVEL

Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In sand, the indicated levels may be considered reliable ground water levels. In clay soil, it may not be possible to determine the ground water level within the normal time required for test borings, except where lenses or layers of more pervious waterbearing soil are present. Even then, an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed texture soils may not indicate the true level of the ground water table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the log sheet.

DESCRIPTIVE TERMINOLOGY

DENSITY TERM	"N" VALUE
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

CONSISTENCY TERM	Unconfined Compressive Strength, (tsf)	"N" VALUE
Very Soft	<0.25	0-2
Soft	0.25 - 0.49	2-4
Medium Stiff	0.5 - 0.99	4-8
Stiff	1.0 - 1.99	8-16
Very Stiff	2.0 - 3.99	16-30
Hard	4.0+	Over 30

Standard "N" Penetration: Blows per Foot of a 140 Pound Hammer Falling 30 inches on a 2 inch OD Split Barrel Sampler

Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Lens	1/2" to 6" discontinuous stratum
Varved	Alternating laminations
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Water bearing	Pervious soil below water

RELATIVE GRAVEL PROPORTIONS

CONDITION	TERM	RANGE
Coarse Grained Soils	trace of gravel	2-14%
	with gravel	15-49%
Fine Grained Soils		
15-29% + No. 200	trace of gravel	2-14%
15-29% + No. 200	with gravel	15-29%
30% + No. 200	trace of gravel	2-14%
30% + No. 200	with gravel	15-24%
30% + No. 200	gravelly	25-49%

RELATIVE SIZES

Boulder	Over 12"
Cobble	3" - 12"
Gravel	
Coarse	3/4" - 3"
Fine	#4 – 3/4"
Sand	
Coarse	#4 - #10
Medium	#10 - #40
Fine	#40- #200
Silt & Clay	- # 200, Based on Plasticity

SOILS CLASSIFICATION FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 - 83

(Based on Unified Soil Classification System)

SOIL ENGINEERING

		Criteria for Assigning GroupSymbols and Group Names Using Laboratory Tests [A]		Soil Classification[B] Group Symble	Group Name
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less Than 5% fines [C]	Cu≥ 4 and 1≤ Cc ≤3[E]	GW	Well graded gravel [F]
			Cu< 4 and/or 1> Cc >3[E]	GP	Poorly graded gravel [F]
		Gravels with Fines more than 12% fines [C]	Fines Classify as ML or MH	GM	Silty gravel [F.G.H.]
			Fines classify as CL or CH	GC	Clayey gravel [F.G.H.]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean sands Less than 5% fines [D]	Cu≥ 6 and 1≤ Cc ≤3[E]	SW	Well graded sand [I]
			Cu< 6 and/or 1> Cc >3[E]	SP	Poorly graded sand [I]
		Sands with Fines more than 12% fines [D]	Fines Classify as ML or MH	SM	Silty sand [G.H.I]
			Fines classify as CL or CH	SC	Clayey sand [G.H.I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	inorganic	PI >7 and plots on or above " A" line	CL	Lean clay [K.L.M]
			PI<4 or plots below " A " line	ML	Silt [K.L.M]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [K.L.M.N] Organic Silt [K.L.M.O]
	Silts and Clays Liquid Limit 50 or more	inorganic	PI plots on or above " A " line	CH	Fat clay [K.L.M]
			PI plots below " A " line	MH	Elastic silt [K.L.M]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [K.L.M.P] Organic Silt [K.L.M.Q]
Highly organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat
Fibric Peat > 67% Fibers		Hemic Peat 33 % - 67 % Fibers		sapric	Peat < 33% Fibers

[A] Based on the material passing the 3-in (75- mm)sieve

[B] If field sample contained cobbles or boulders, or both, add with cobbles or boulders, or both to group name

[C] Gravels with 5 to 12 % fines require dual symbols:
GW - GM well-graded gravel with silt
GW - GC well-graded gravel with clay
GP - GM poorly-graded gravel with Silt
GP - GC poorly-graded gravel with clay

[D] Sands with 5 to 12 % fines require dual symbols:
SW -SM well-graded sand with silt
SW - SC well-graded sand with clay
SP - SM poorly-graded sand with Silt
SP - SC poorly-graded sand with clay

[E] $Cu = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name

[G] If fines classify as CL-ML, use dual symbol GC-GM. or SC-SM

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL_ML silty clay
If soil contains 15 to 29% plus No. 200, add, "with sand" or " with gravel", whichever is predominent

[L] If soil contains ≥ 30% plus No.200, predominantly sand, add "sandy" to the group name

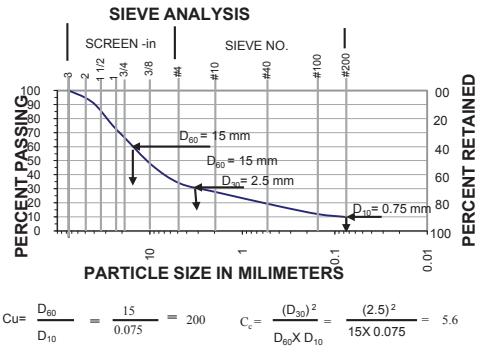
[M] If soil contains ≥ 30% plus No.200, predominantly gravel add "gravelly" to the group name

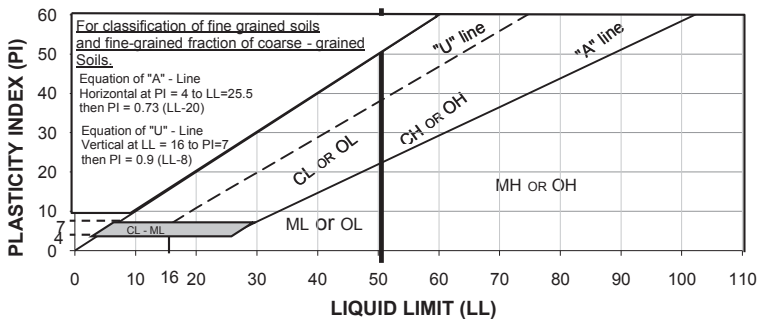
[N] PI ≥4 and plots on or above "A" Line

[O] PI < 4 or plots below "A" Line

[P] PI plots on or above "A" Line

[Q] PI plots below "A" Line





APPENDIX II

LABORATORY TEST RESULTS

GESTRA Engineering, Inc
715 Post Road, Suite A
Madison, WI 53713
Phone: (608) 222-9406; Fax: (608) 222-9408

Laboratory Test Results of
Moisture Content, Organic Content, and Density of Soil

Project Name: South Shore Park
Project Number: 14031-10
Project Location: Milwaukee, WI
ASTM Designation: **D2216, D 2974**

Date: May 6, 2014
Report To: The Sigma Group

Boring Number	B-3		B-4	B-4	B-4		B-5	B-5
Sample Number	6-SS		2-SS	5-SS	6-SS		5-SS	6-SS
Cup Number	1		2	3	4		5	6
Weight of Cup (g)	179.50		151.60	135.00	135.30		107.90	92.70
Weight of Wet Soil and Cup (g)	373.60		305.50	317.00	313.60		302.60	238.10
Weight of Dry Soil and Cup (g)	337.30		270.80	282.00	282.00		267.90	214.00
Weight of Soil and Cup After Burn (g)								
Weight of Sample for Density (lbs)								
Diameter (in)								
Length(in)								
Moisture Content (%)	23.0		29.1	23.8	21.5		21.7	19.9
Organic Content (%)								
Wet Density (pcf)								
Dry Density (pcf)								

Boring Number								
Sample Number								
Cup Number								
Weight of Cup (g)								
Weight of Wet Soil and Cup (g)								
Weight of Dry Soil and Cup (g)								
Weight of Soil and Cup After Burn (g)								
Weight of Sample for Density (lbs)								
Diameter (in)								
Length(in)								
Moisture Content (%)								
Organic Content (%)								
Wet Density (pcf)								
Dry Density (pcf)								

Performed by: CP

Reviewed by: RJP

GESTRA Engineering, Inc
715 Post Road, Suite A
Madison, WI 53713
Phone: (608) 222-9406; Fax: (608) 222-9408

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

Project Name: South Shore Park Parking Lot Recon.
Project Number: 14031-10
Project Location: Milwaukee, WI
ASTM Designation: **C136, D422**

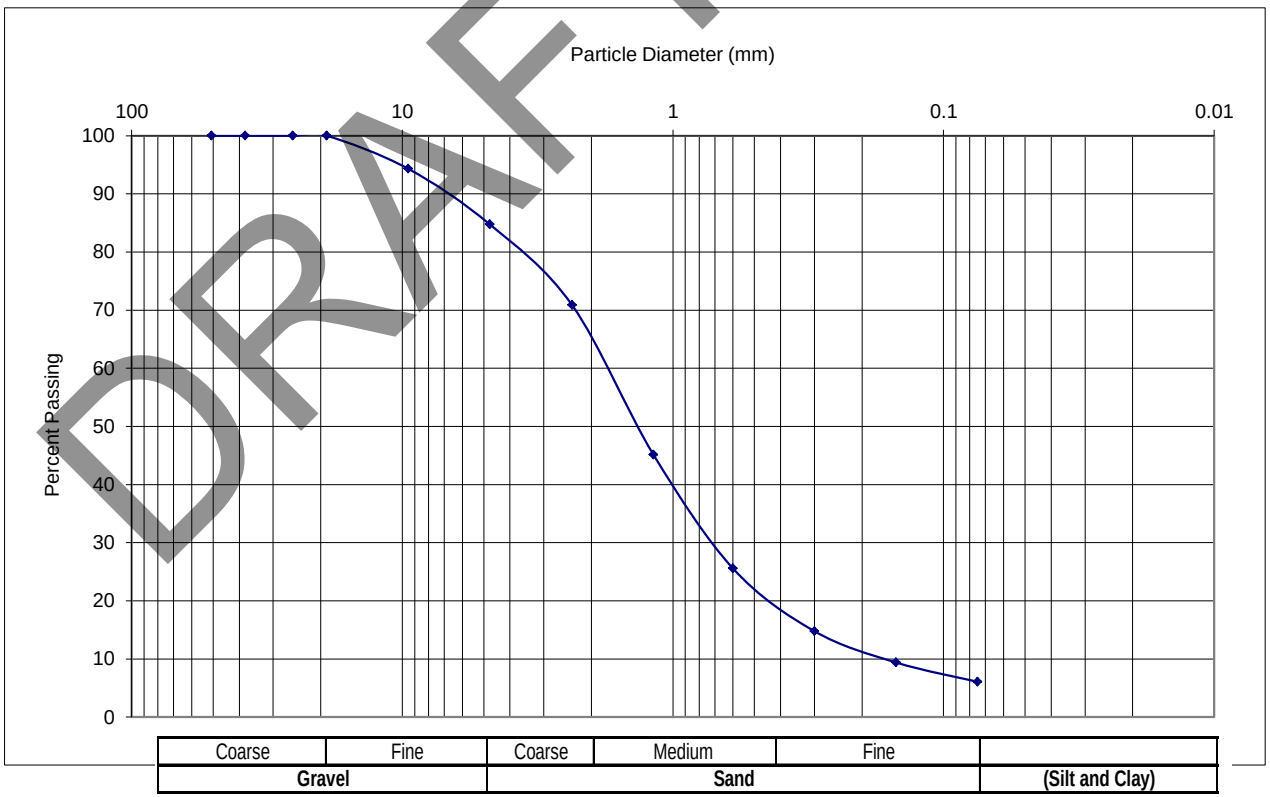
Date: May 8, 2014
Reported To: Sigma

Sample Information

Type of Sample: SS
Sample Number: 1242
Boring Number: B-1; B-2; B-3
Depth of Sample: 3-1/2' to 5'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	94.3
#4	4.75	84.8
#8	2.36	70.9
#10	2	64.6
#16	1.18	45.1
#30	0.6	25.6
#40	0.425	19.7
#50	0.3	14.8
#100	0.15	9.4
#200	0.075	6.1



Moisture Content 44.9 %

Remarks: Gravel 15.2 % Sand 78.7 %
Passing #200 Sieve (Silt & Clay) 6.1 %

Performed by: CP

Reviewed by: RJP
GESTRA Engineering, Inc.

GESTRA Engineering, Inc
715 Post Road, Suite A
Madison, WI 53713
Phone: (608) 222-9406; Fax: (608) 222-9408

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

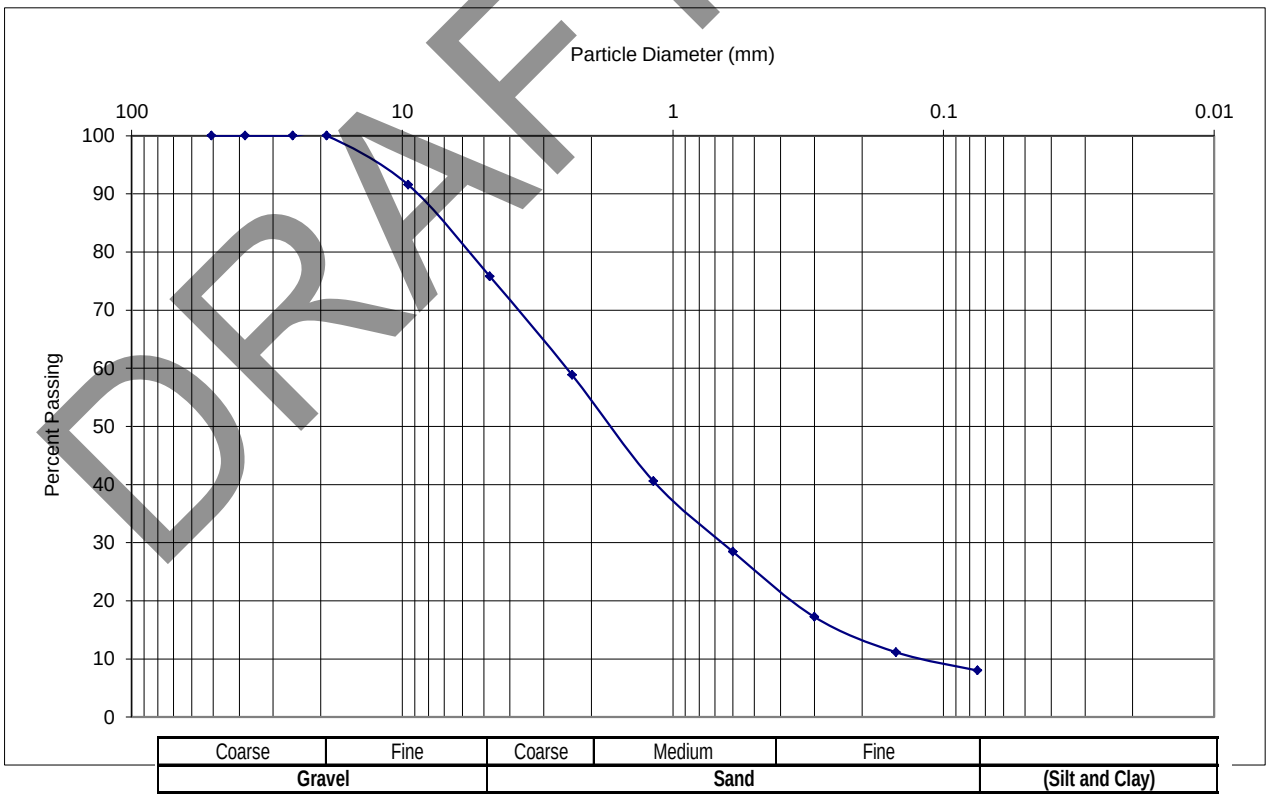
Project Name:	South Shore Park Parking Lot Recon.	Date:	May 8, 2014
Project Number:	14031-10	Reported To:	Sigma
Project Location:	Milwaukee, WI		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	SS	Sample Number:	1243
Boring Number:	B-3	Depth of Sample:	1' to 2-1/2'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	91.6
#4	4.75	75.8
#8	2.36	58.9
#10	2	53.5
#16	1.18	40.6
#30	0.6	28.5
#40	0.425	22.8
#50	0.3	17.2
#100	0.15	11.2
#200	0.075	8.0



Moisture Content 8.4 %

Remarks: Gravel 24.2 % Sand 67.8 %

Passing #200 Sieve (Silt & Clay) 8.0 %

Performed by: CP

Reviewed by: RJP

GESTRA Engineering, Inc.

APPENDIX C
Stakeholder and Public Meeting Information

APPENDIX D
Dockwall Evaluation

SMITHGROUPJJR

South Shore Park - Phase 1:
Site Investigation and Schematic Design
Milwaukee County, Project #P298-14616

The following memorandum documents the site investigation and assessment of the existing bulkhead wall parallel to the parking lot between the boat launch and yacht club in South Shore Park.

The photographs captured during the recently completed dive inspection highlight the significant deterioration observed along the existing timber cribs of the northerly section of the bulkhead wall. At multiple areas along the bulkhead, a number of potential concerns were discovered including:

- Voids in the face of the Wakefield sheeting that has allowed crib stone to spill out into the lake bed;
- Degradation and missing iron tie rods from the piles through to the back of the crib;
- Degradation of the top 12 to 18-inches of the Wakefield sheeting and timber piles;
- Whalers on both the outside and inside of the Wakefield sheeting were either missing or highly degraded along the length of the wall.
- Numerous cracks and surface degradation of the concrete cap.

Project Context

The timber crib wall extends approximately 317-feet from the north at the yacht club fence southeasterly towards the boarding docks near the launch. The Wakefield sheeting and timber cribs are tied into the yacht club sheet pile wall at the northwest corner. The timber cribs have a concrete cap that extends to a depth of 40 to 44-inches along the length of the wall at a width of approximately 10-ft. The thickness of the cap at the landward side was unable to be determined. Surface deterioration of the concrete showed spalling and cracking. There did not appear to be settlement of the concrete cap at the interface with the asphalt parking lot to the southwest. From the water-side, significant deterioration along the water line and areas below the water's surface was observed. Stone and other materials from the crib fill has eroded from the upper portion through sections of deteriorated Wakefield sheeting.

The bulkhead wall from the boarding dock westerly to approximate Station 1+50 had sand deposited against the wall. Three test holes were excavated by hand to expose the top of the Wakefield sheeting. It appeared that in the areas protected from ice and constant wave action that the crib piling, sheeting, and whalers were in better condition than observed in the areas located to the west that are in direct and continuing contact with changing water levels and ice conditions.

See drawing Sheet C102 for additional information on the layout of the area inspected.

Bulkhead Inspection

A visual and dive inspection was completed at the South Shore Bulkhead on November 5, 2014 by Bill Brose and Rob Wright of SmithGroupJJR. Results of the inspection identified deteriorations along the lakeside length of the top 18-inches of the Wakefield sheeting. While the lake was calm, underwater pictures were not able to be completed due to low visibility. A sampling of pictures of the localized items of concern have been included below and referenced in drawing C101.

Areas of the upper portion of the Wakefield sheeting at the top of the crib were observed to be fully deteriorated along the entire length of the crib that was exposed to the lake during the inspection. The evidence suggests further structural degradation of the wall and tieback system due to missing wailers and fully corroded tie back rods.

The following pages contain Images that illustrate and describe the deterioration taking place along the bulkhead wall and cribs.

Figure 1: Location Map

Figure 2 – Typical sheeting and timber degradation at water/ice line

Figure 3 – Voids directly under concrete cap. Missing sheeting has allowed rubble fill to erode from crib.

Figure 4 – Corroded tie-rods and Wakefield sheeting and whalers not present.

Figure 5 – Voids below the concrete cap due to deterioration of top portion of sheeting and cribs. Concrete cap is cantilevered over lake side of the crib due to missing rubble fill.

Figure 6 – Tie rod from the sheeting completely severed due to age and corrosion

Figure 7 – Deterioration of sheeting, whalers, and corroded tie-rod.

Figure 8 – Deterioration of sheeting and voids below concrete cap.

Figure 9 – Station 2+00 – deterioration of sheeting, whalers and piling visible from the top of the concrete cap.

Figure 10 – cracking of concrete cap – evident throughout the length of the cap inspected.

Figure 11 – Spalling, cracking and voids through cap to crib. Typical of numerous areas of cap.

Figure 12 – Parallel cracking on cap due to cap cantilevered over voids in the crib.

It is our opinion that there is significant degradation to the Wakefield sheeting and tie rod connections from the piles to the back side of the wall. This is due to the age of the structures, as well as continued ice and wave action along the entire length of the sheeting. These degradations and structural deficiencies have directly resulted in loss of fill materials from the cribs. Evidence of cracking of the concrete cap is indicative of the loss of materials from the crib into the lake resulting in a cantilever of the cap over the crib. Further degradation of the sheeting and loss of material may result in significant failures of the bulkhead wall and concrete cap.

Bulkhead Repairs

We have explored three alternatives for rehabilitation, stabilization, and reconstruction of the bulkhead walls from the yacht club easterly to the boarding docks. Along with the reconstruction of this wall, these alternatives may provide an opportunity for integration with the Park Master Plan. The reconstructed area may be used for stormwater treatment or expanded access to the water. The reconstructed area behind the improvement has not been included within the cost opinions.

The original, as-built, site plans for the crib walls and sheeting replacement of the yacht club bulkhead, indicate the piles can be driven 15-feet into the lake bottom. The lake bed varies from a depth of 0 feet below the water surface at the southeasterly end, to a depth of approximately 9-10 feet at the northwest end. For purposes of preparing the three Alternatives and Opinion of Probable Construction Costs, we have assumed the site conditions for the bulkhead to be similar as depicted on the as-built drawings, along with the assumption that depth to bedrock is at least 45-ft from the top of the existing concrete cap. Using this assumption, steel sheet pile may be able to be drive to a depth of 30-ft below lake bed. Additional geotechnical investigations are required to confirm these assumptions and to complete a detailed engineering analysis and design of the rehabilitation improvements. That detailed design and analysis is not part of this feasibility study.

Alternative 1 – Stone Revetment

For Alternative 1, a typical revetment structure would be constructed against the existing timber crib edge and the voids below the concrete cap would be grouted. The top portion of the timber crib would be removed and the surface stabilized to prevent further settlement and loss of material. A standard three layer revetment section would be constructed using either land or water based construction. The exposed and highest portion of the crib wall would be removed. Typical construction sequence and items would include:

- Filling the void-space in the crib structure with grout to create a stable base;
- Demolition of the top portion of the existing Wakefield sheeting structure (approximately the recorded low water elevation);
- Installation of core, filter, and armor stones to construct the revetment;
- Grout and seal spalled areas on concrete cap;
- Install surface treatment to concrete cap – epoxy and granite chips.

Schematic details of the alternative are shown in drawing Sheets C101.

The OPCC for Alternative 1 details the items included and is summarized below:

	Item	Quantity	Unit	Unit Cost	Item Total
1.	Mobilization	1	LS	$ 50,000	$ 50,000
2.	Erosion Control - Turbidity Barrier	1	LS	$ 18,000	$ 18,000
3.	Armor Stone	4,000	Ton	$ 65	$ 260,000
4.	Filter Stone	2,225	Ton	$ 50	$ 111,250
5.	Core Stone	850	Ton	$ 35	$ 29,750
6.	Grout	163	CY	$ 300	$ 49,000
8.	Demo - Removal of top of Wakefield sheeting	1	LS	$ 12,000	$ 12,000
9.	Grout and Seal Concrete Cap	3,308	SF	$ 10	$ 33,075
	Project Subtotal				$ 563,075
	Construction Contingency/Design Engineering / Permits				
	Construction Contingency/Design Engineering / Permits		25%		$ 141,000
	Project Total				$ 704,075

Assumptions:

1. Typical section as shown in Figure 1 of the Location Map
2. Assumed dredge depth along the entire bulkhead of 10-ft
3. Repairs along entire length of bulkhead - approximately 325-ft
4. Revetment section placed directly adjacent to the existing concrete cap
5. Does not include dredging in the basin to remove accumulated materials.
6. Does not include upland improvements or restoration other than those listed above.

A drawback of this alternative is the standard revetment section used to stabilize the bulkhead will take away the ability for access of the vertical edge as it currently exists. This may be an important and highly regarded function of the water for recreational uses.

Alternative 2 – Binwall

For Alternative 2, it is assumed that new steel binwall will be installed along the existing bulkhead wall. The extent of the deterioration present along segments of the existing wall are likely to require:

- Demolition of portions of the Wakefield sheeting and removal of the concrete cap;
- Filling the void-space below the cap to create a stable base;
- Placement of a geo-textile separator and backfilling of the excavated area;
- Placement of engineered fill and future stormwater infiltration/retention material.

Schematic details of the alternative are shown in Sheet C101.

The Opinion of Probable Construction Cost (OPCC) for Alternative 2 details the items included and is summarized below:

	Item	Quantity	Unit	Unit Cost	Item Total
1.	Mobilization	1	LS	$ 50,000	$ 50,000
2.	Erosion Control - Turbidity Barrier	1	LS	$ 18,000	$ 18,000
3.	Steel Binwall - Aluminized	5,850	SF	$ 130	$ 760,500
4.	Demo - Removal of top of Wakefield sheeting	1	LS	$ 12,000	$ 12,000
5.	Backfill - Between crib and Binwall	420	CY	$ 30	$ 12,600
6.	Backfill - Binwall	2,100	CY	$ 10	$ 21,000
7.	Demo - Existing Concrete Cap	1	LS	$ 38,400	$ 38,400
9.	Pavement repairs	175	SY	$ 40	$ 7,000
10.	Toe Stone for Binwall	325	CY	$ 50	$ 16,250
12.	Concrete Cap	3,250	SF	$ 14	$ 45,500
	Project Subtotal				$ 981,500
	Construction Contingency/Design Engineering / Permits				
	Construction Contingency/Design Engineering / Permits		25%		$ 245,000
	Project Total				$1,226,250

Assumptions:

1. Typical section as shown in Figure 1 of the Location Map
2. Assumed dredge depth along the entire bulkhead of 10-ft
3. Repairs along entire length of bulkhead - approximately 325-ft
4. Void space between binwall and existing bulkhead wall assumed to be 2-ff
5. Does not include dredging in the basin to remove accumulated materials.
6. Does not include upland improvements or restoration other than those listed above.

This option will allow access to the vertical edge as it currently exists.

Alternative 3 – Steel Sheetpile

For Alternative 3, a typical steel sheet pile wall will be constructed adjacent to the existing wall. The top portion of the Wakefield sheeting would be removed. Typical construction sequence and items would include:

- Demolition of the existing concrete cap;
- Filling the void-space in the remaining structure to create a stable base;
- Placement of a geo-textile separator and backfilling of the excavated area;
- Driving of new steel sheet pile and deadman tie backs

Schematic details of the alternative are shown in drawing Sheets C101

The OPCC for Alternative 3 details the items included and is summarized below:

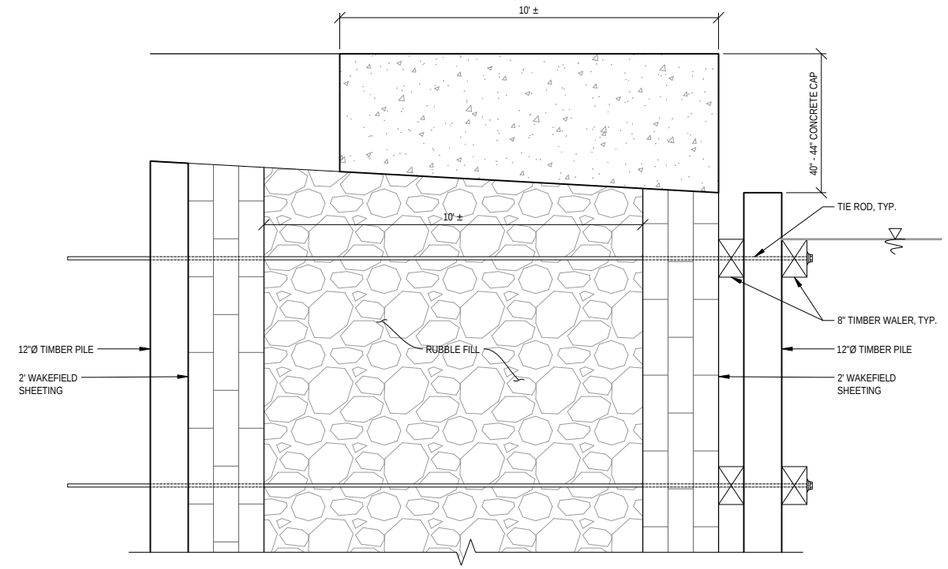
	Item	Quantity	Unit	Unit Cost	Item Total
1.	Mobilization	1	LS	$ 50,000	$ 50,000
2.	Erosion Control - Turbidity Barrier	1	LS	$ 18,000	$ 18,000
3.	Sheeting	14,625	SF	$ 45	$ 658,125
4.	Deadman	117	CY	$ 350	$ 40,833
5.	Backfill - between crib and sheet pile	350	CY	$ 30	$ 10,500
6.	Backfill - excavated area to deadman	1,517	CY	$ 15	$ 22,750
7.	Pavement repairs	700	SY	$ 40	$ 28,000
8.	Demo - Existing Concrete Cap	1	LS	$ 38,400	$ 38,400
9.	Toe Stone for sheet pile	325	CY	$ 50	$ 16,250
10.	Unclassified excavation	1,806	CY	$ 14	$ 25,278
	Project Subtotal				$ 908,969
	Construction Contingency/Design Engineering / Permits				
	Construction Contingency/Design Engineering / Permits		25%		$ 227,000
	Project Total				$1,135,969

Assumptions:

1. Typical section as shown in Figure 1 of the Location Map
2. Assumed dredge depth along the entire bulkhead of 10-ft
3. Repairs along entire length of bulkhead - approximately 325-ft
4. Void space between sheet pile and existing bulkhead wall assumed to be 2-ff
5. Does not include dredging in the basin to remove accumulated materials.
6. Does not include upland improvements or restoration other than those listed above.

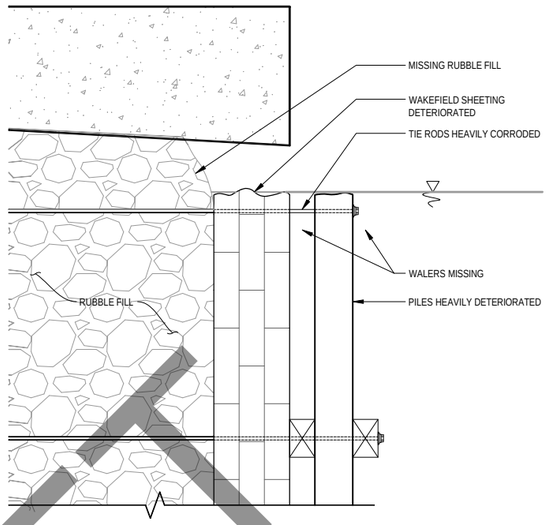
This option will allow access to the vertical edge as it currently exists.

Attachments: C101 Wall Conditions and Options
C102 Bulkhead Wall and Plan and Profile



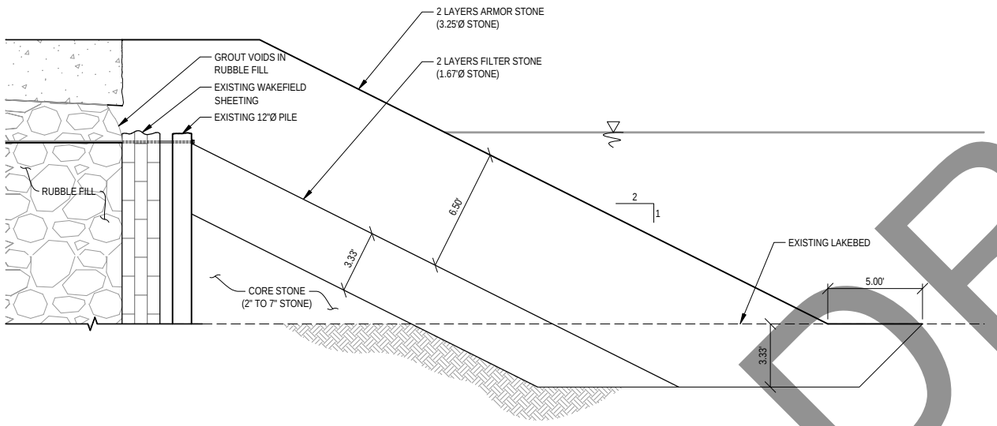
1 ORIGINAL WALL DESIGN

SCALE: 1/2" = 1'-0"



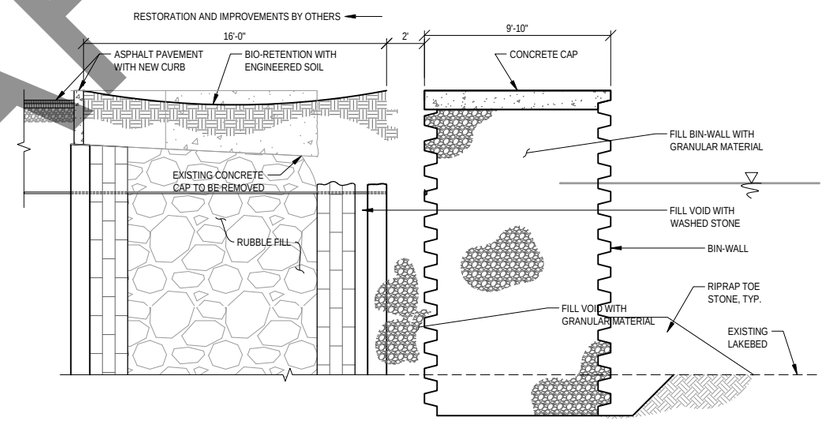
2 EXISTING WALL CONDITIONS

SCALE: 1/2" = 1'-0"



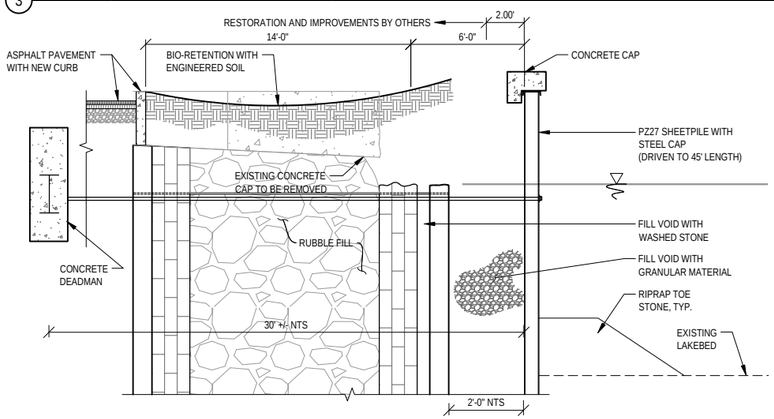
3 OPTION 1 (RUBBLE REVETMENT STRUCTURE)

SCALE: 1/4" = 1'-0"



4 OPTION 2 (BIN-WALL STRUCTURE)

SCALE: 1/4" = 1'-0"



5 OPTION 3 (SHEETPILE WALL)

SCALE: 1/4" = 1'-0"

South Shore Park
Bulkhead Inspection

Owner:
Milwaukee County Parks
9480 Watertown Plank Rd
Wauwatosa, WI 53226

SMITHGROUP JJR

44 EAST MIFFLIN STREET
SUITE 500
MADISON, WI 53703
608.251.1177
www.smithgroupjjr.com

ISSUED FOR	REV	DATE

SEALS AND SIGNATURES

NOT FOR CONSTRUCTION

KEY PLAN

PROJECT NORTH

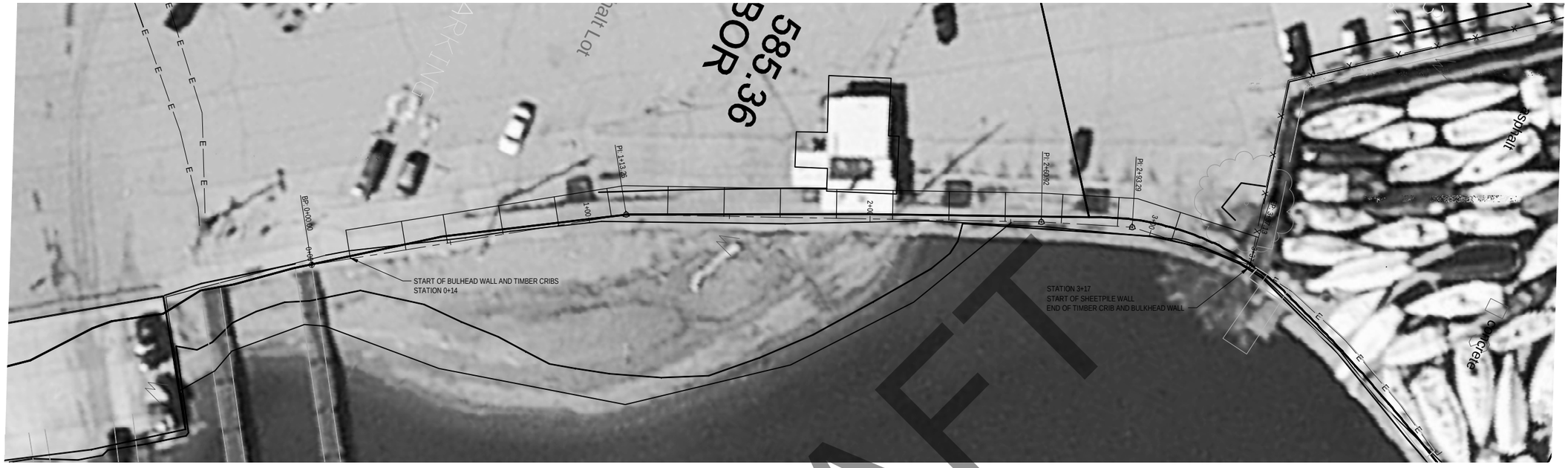
DRAWING TITLE
Wall Conditions and Options

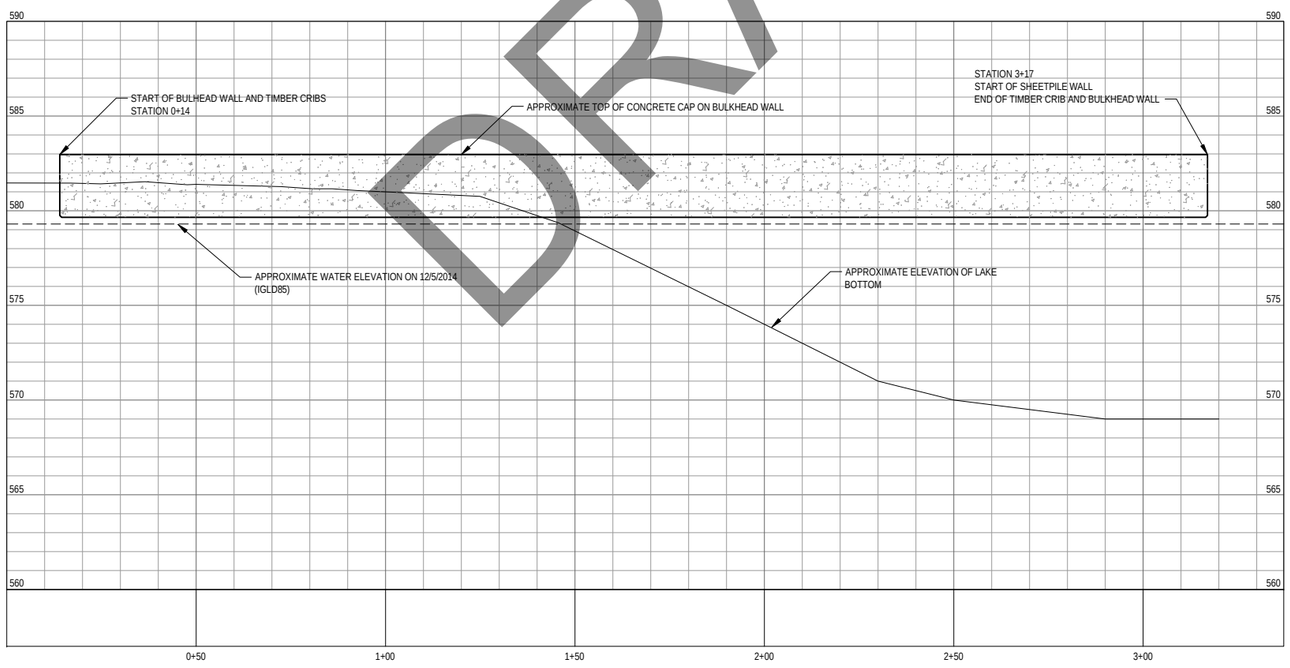
0" 1/2" 1" 2"
SCALE AS SHOWN

SCALE

PROJECT NUMBER
20036.001

DRAWING NUMBER
C 101





South Shore Park
Bulkhead Inspection

Owner:
Milwaukee County Parks
9480 Watertown Plank Rd
Wauwatosa, WI 53226

SMITHGROUP JJR

44 EAST MIFFLIN STREET
SUITE 500
MADISON, WI 53703
608.251.1177
www.smithgroupjjr.com

ISSUED FOR	REV	DATE

SEALS AND SIGNATURES

NOT FOR CONSTRUCTION

KEY PLAN

PROJECT NORTH

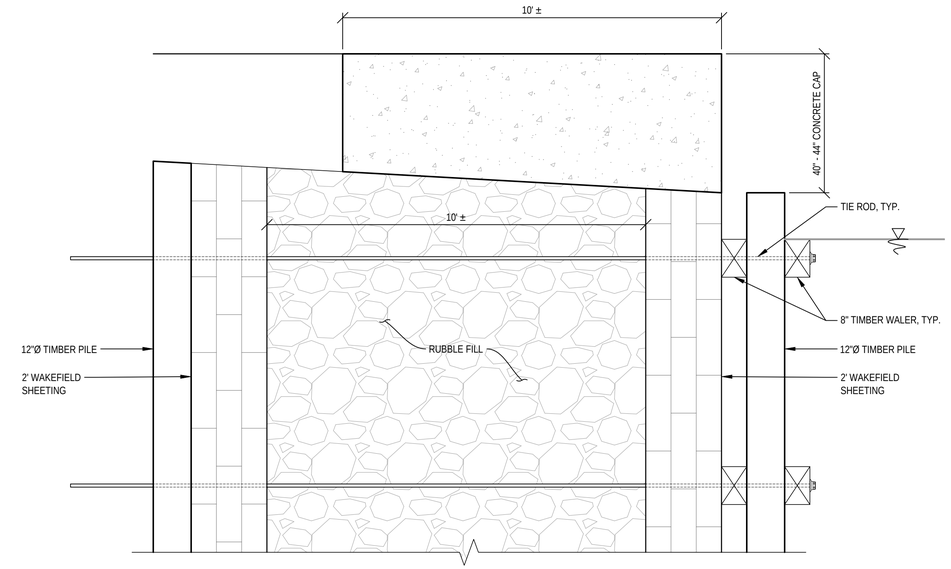
DRAWING TITLE
BULKHEAD WALL PLAN AND PROFILE

0' 10' 20' 40'

SCALE

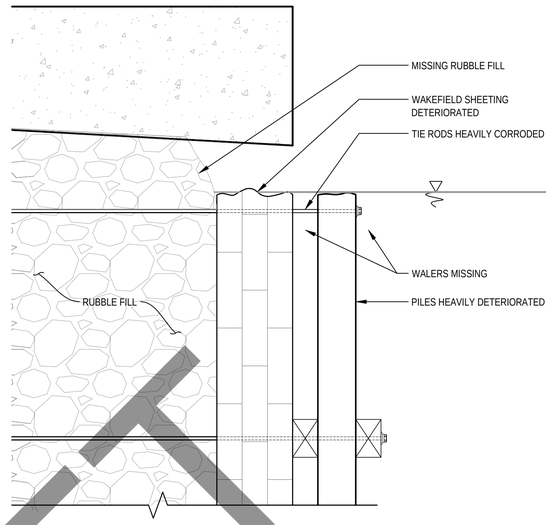
20036.001
PROJECT NUMBER

C102
DRAWING NUMBER



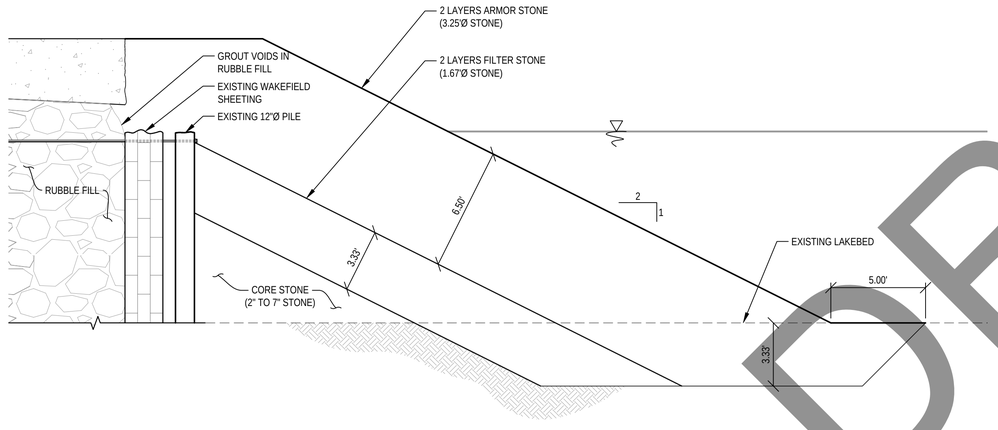
1 ORIGINAL WALL DESIGN

SCALE: 1/2" = 1'-0"



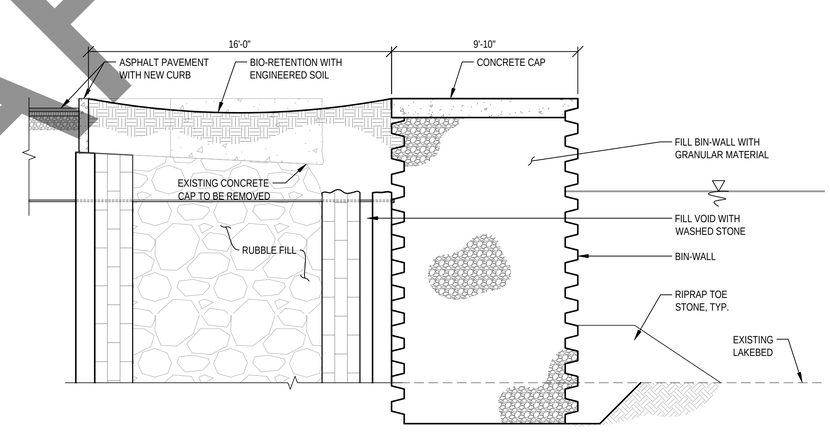
2 EXISTING WALL CONDITIONS

SCALE: 1/2" = 1'-0"



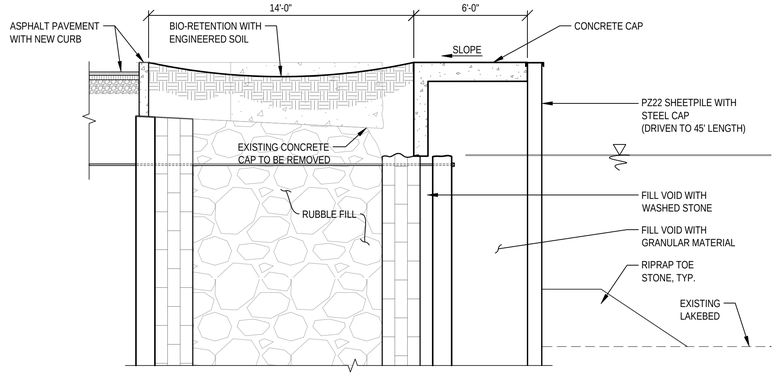
3 OPTION 1 (RUBBLE REVETMENT STRUCTURE)

SCALE: 1/4" = 1'-0"



4 OPTION 2 (BIN-WALL STRUCTURE)

SCALE: 1/4" = 1'-0"



5 OPTION 3 (SHEETPILE WALL)

SCALE: 1/4" = 1'-0"

South Shore Park

Bulkhead Inspection

Owner:

Milwaukee County Parks
9480 Watertown Plank Rd
Wauwatosa, WI 53226

SMITHGROUP JJR

44 EAST MIFFLIN STREET
SUITE 500
MADISON, WI 53703
608.251.1177
www.smithgroupjjr.com

ISSUED FOR	REV	DATE

SEALS AND SIGNATURES

NOT FOR CONSTRUCTION

KEY PLAN

PROJECT NORTH

DRAWING TITLE

Wall Conditions and Options

0" 1/2" 1" 2"

SCALE AS SHOWN

SCALE

PROJECT NUMBER

20036.001

DRAWING NUMBER

C 101

APPENDIX E
Funding Matrix

Grants and Awards							
Program	**Administered By**	**Applies To**	**Applicable Project Stage**	**Award**	**Matching Requirements**	**Application Cycle/Due Date**	**Contact**
Aquatic Ecosystem Restoration and Protection Projects	U.S. Army Corp of Engineers	Aquatic ecosystem restoration and protection projects that will improve the quality of the environment, are in the public interest, and are cost-effective	Planning, Design, Construction	Up to $5 million	Planning - 50%, Design and Construction - 35%	Continuous	http://www.mvr.usace.army.mil/BusinessWithUs/OutreachCustomerService/EcosystemRestoration/Section206.aspx, (cemvr-outreach-web@usace.army.mil)
Corporate Grants for Community Development	J.P. Morgan Chase	Community development, education, arts, and culture. Note that only non-profit entities are eligible (with the possibility of municiple partners)	Planning, Design, Construction	Variable	Encourged from broad base of supporters	Continuous	http://www.jpmorganchase.com/corporate/Corporate-Responsibility/grant-programs-us.htm, Charlie Corrigan (midwest.giving@jpmchase.com)
Recreation Boating Facilities Program	Wisconsin Department of Natural Resources	Examples: ramps, service docks, bulkheads, breakwaters, dredging, support facilities (parking lots, sanitary facilities and security lighting), feasibility studies for safe boating facilities	Construction, Capital Investments	Variable	1:1	Continuous	http://dnr.wi.gov/AID/RBF.html
The Coastal Program	US Fish and Wildlife Service	Restoration to protect wildlife habitat on public and private lands, promote biodiversity, based on sound scientific biological principals	Planning, Design, Construction	Up to $500K	no requirement, but 1:1 encouraged	Continuous	http://www.grants.gov/search-grants.html?fundingCategories%3DNR%7CNatural%20Resources
Bikes Belong Grant Program	Bikes Belong Coalition	Construction of bicycle facilities (i.e. trails) which will serve to increase ridership and advocacy for bicycling	Construction	Quarterly Maximum grant of $10,000	none	rolling application process, reviewed/ awarded quarterly	http://www.bikesbelong.org
Community-Based Restoration Program (Design)	National Oceanic & Atmospheric Administration	Habitat restoration projects	Engineering and Design	Up to $350k	none required, but 1:1 most competative		http://www.grants.gov/web/grants/view-opportunity.html?oppId=249323
Community-Based Restoration Program (Implementation)	National Oceanic & Atmospheric Administration	Habitat restoration projects	Construction	Up to $2 million	none required, but 1:1 most competative		http://www.grants.gov/web/grants/view-opportunity.html?oppId=249323
Fund for Lake Michigan	Fund for Lake Michigan	On the ground enhancement of shorelines and rivers leading into Lake Michigan, through habitat preservation/restoration and pollutant mitigatin	Design, Construction	Variable	none	Feb-15	http://www.fundforlakemichigan.org/apply-for-funding/grant-focus, Vicki Elkin (vicki@fundforlakemichigan.org)
Lake Protection Grants (Management)	WI Dept of Natural Resources	Fee simple/easement land acquisition, wetland/shoreline restoration, lake plan implementation	Pre/Post Engineering Design, Construction	Up to $100,000	0.25	Feb-15	http://dnr.wi.gov/Aid/documents/SurfaceWater/LakeProtectionGrantOverview.pdf
Five Star and Urban Waters Restoration Grant	National Fish and Wildlife Service	On the ground wetland/riparian/coastal habitat restoration, education and training activities, measureable ecological/educational/community benefits, partnerships	Engineering, Design, Construction	Up to $50,000	1:1 most competative	Feb-15	http://www.nfwf.org/fivestar/Pages/home.aspx#.VIcxNjHF9KI, Sarah MacIntosh (Sarah.McIntosh@nfwf.org)

Program	Administered By	Applies To	Applicable Project Stage	Award	Matching Requirements	Application Cycle/Due Date	Contact
Fresh Coast 740 Signature Project Status	MMSD	Costs of GI materials and construction	Materials and construction	Up to $240k	> 50%	Mar-15	http://www.freshcoast740.com/learn/funding-programs/gi-partnership-program
Environmental Education Grants	US EPA	Environmental education projects to promote awareness and stewardship, provide people with skills to take action	Design, Development, Dissemination	Up to $91,000	25%	Mar-15	http://www2.epa.gov/sites/production/files/2014-12/documents/2014_ee_local_grants_rfp.pdf
Urban Nonpoint Source and Storm Water Management Grant Program (Planning)	WI Dept of Natural Resources	Focus on stormwater management planning, preparation of local ordinances, evaluation of SW management utilities, illicit discharge detection, public information/education	Planning, Educational component	Up to $85,000	0.3	Apr-15	http://dnr.wi.gov/Aid/UrbanNonpoint.html
Urban Nonpoint Source and Storm Water Management Grant Program (Construction)	WI Dept of Natural Resources	BMP construction, engineering design and construction services, land acquisition, stream bank/shoreline stabilization	Design, Cosntruction	Up to $150,000	1:1	Apr-15	http://dnr.wi.gov/Aid/UrbanNonpoint.html
Targeted Runoff Management (TRM) Grant Program	WI Dept of Natural Resources	Small-scale TMDL projects, urban nonpoint source control, construction of BMPs	Construction	Up to $150,000	30%	Apr-15	http://dnr.wi.gov/Aid/TargetedRunoff.html
Community Development Block Grant (City of Milwaukee)	Housing and Urban Development	Develop viable communities by providing decent housing, suitable living environment, and opportunities to expand economically for low- to mod-income persons	Permanent Job Development	Variable	none	May-15 Allocation, Sept-15 Allocation	https://www.hudexchange.info/grantees/milwaukee-wi/, Steven Mahan (steve.mahan@milwaukee.gov)
Community Development Block Grant (Milwaukee County)	Housing and Urban Development	Develop viable communities by providing decent housing, suitable living environment, and opportunities to expand economically for low- to mod-income persons	Infrastructure design and construction	Variable	none	May-15 Allocation, Sept-15 Allocation	http://county.milwaukee.gov/HealthampHumanServic7753/HousingDivision/Programs/CDBG-Program/2014-CDBG-Application.htm, Victoria Toliver (victoria.toliver@milwaukeecountywi.gov)
Sustain Our Great Lakes Program	National Fish and Wildlife Service	Habitat restoration/delisting of habitat-related beneficial use impairments	Design, Engineering, Permitting, Construction, Monitoring	Up to $1.5M	none	May-15	http://www.nfwf.org/greatlakes/Pages/home.aspx#.VIc1NzHF9KI
Recreational Trails Grant Program	WI Dept of Natural Resources	Funded by Federal gas excise taxes to develop and maintain recreational trails and trail-related facilities	Design/ Development of trailside facilities, Construction	Variable	1:1	May-15	http://dnr.wi.gov/Aid/RTA.html
Land and Water Conservation Fund	WI Dept of Natural Resources	Projects that provide water or shoreline based recreation, natural/scenic areas open to general public, land development within urban areas for picnicing, rennovation of existing outdoor rec areas		Variable, greater than $250K needs approval by Joint Committee on Finance	1:1	May-15	http://dnr.wi.gov/aid/LWCF.html

Program	Administered By	Applies To	Applicable Project Stage	Award	Matching Requirements	Application Cycle/Due Date	Contact
North American Wetland Conservation Grant (Standard Grant)	US Fish and Wildlife Service	Wetland and upland habitat restoration projects that benefit migratory wetland bird species	Construction/ Implementation	Variable	1:1	Jul-15	http://www.fws.gov/birdhabitat/Grants/NAWCA/Standard/index.shtm
Great Lakes Restoration Initiative (GLRI)	US EPA	On the ground invasive species control, watershed management, and sediment reduction in priority watersheds	Construction/ Implementation	Up to $750,000	none, but voluntary cost sharing encouraged	Aug-15	http://www.epa.gov/greatlakes/fund/2014rfa02/
C.D. Besadny Conservation Grant	Private Grant	Local conservation projects including kiosks and interpretive signs, invasive species removal, BioBlitz sponsorship, boardwalk construction, prairie restoration, and other projects that benefit the public	Implementation	Up to $1000, not awarded to projects w/ >$10,000 budgets	none	Sep-15	http://www.wisconservation.org/how-we-work/c-d-besadny-conservation-grants/
Boating Infrastructure Grant	WI Dept of Natural Resources	Construction of facilites that will enhance non-trailerable recreations boats, including docks, retailing walls, utilites, etc.	Construction	Variable	Recommended	Sep-15	http://dnr.wi.gov/Aid/BIG.html
Community Activity Grant	Office Depot Foundation	Building communities, affecting children's lives, disaster relief	Construction/ Implementation	Up to $3000	none	Oct-15	http://officedepotfoundation.org/?page_id=214
North American Wetland Conservation Grant (Small Grant)	US Fish and Wildlife Service	Wetland and upland habitat restoration projects that benefit migratory wetland bird species	Construction/ Implementation	Up to $75,000	1:1	Nov-15	http://www.fws.gov/birdhabitat/Grants/NAWCA/Small/index.shtm
Wisconsin Coastal Management Fund	WI Dept of Administration	Wetland/habitat restoration, non-point source pollution control, coastal resources and community planning, education, public access/historic preservation	Planning, Design, Construction, Engineering	Variable, discuss with staff if >$100,000	> $60,000	Nov-15	http://www.doa.state.wi.us/Divisions/Intergovernmental-Relations/Wisconsin-Coastal-Management/grant-program/
Sweetwater Water Quality Mini-Grant	Sweetwater	Support local, grassroots efforts towards green infrastructure and water quality-related activities to improve water quality, enhance conservation, restore habitat or educate people about water quality issues and associated stewardship actions, Private companies and units of government not eligible (only non-profits, community, and civic groups)	Construction/ Implementation	Up to $5000	none	Nov-15	http://swwtwater.com/sweetwater-announces-rfp-for-2014-water-quality-mini-grant-program
Environmental Solutions for Communities	National Fish and Wildlife Service	Conserving and restoring critical land, natural resources, habitat, and ecosystems important to community livlihoods, includes focus on water quality, sustainable agriculture, green infrastructure, citizen participation	Construction/ Implementation	Up to $100,000	1:1 most competative	Dec-15	http://www.nfwf.org/environmentalsolutions/Pages/2015rfp.aspx#.VKrJmCvF9KI
Great Lakes Fish and Wildlife Restoration Act (GLFWRA)	US Fish and Wildlife Service	On the ground restoration, maintenance, and minimizing impacts on fish/wildlife habitat in the Great Lakes	Design, Engineering, Construction	Variable (avg $120,000)	25% non-federal match	Dec-15	http://www.fws/midwest/fisheries/glfwra-grants.html, Rick Westerhof (Rick_Westerhof@fws.gov)
Transportaion Alternatives Project (TAP)	Wis DOT	Providing facilities for pedestrians and bicycles, streetscaping and landscaping, providing safe routes to school	Planning, Design, Construction	Variable	20%	2016	http://www.dot.state.wi.us/localgov/docs/te.pdf

Program	Administered By	Applies To	Applicable Project Stage	Award	Matching Requirements	Application Cycle/Due Date	Contact
Other Funding Sources							
Crowdfunding	Public Stakeholders	Encourage public ownership/investment in project by soliciting donations using website (Spacehive, IOBY, CitizInvestor, etc.)	Design, Construction	Variable	none	Continuous	http://www.salon.com/2014/05/18/kickstarting_the_city_can_crowd_funding_save_our_neighborhoods/
Clean Water Fund Program	Wisconsin Department of Natural Resources	Wastewater treatment and urban storm water projects	Planning, Design, Construction	Loans at or below market interest rates, up to $2M	none	Continuous	http://dnr.wi.gov/Aid/documents/EIF/small.html, Michelle Eis (michellem.eis@wisconsin.gov)