**DEPARTMENT OF ADMINISTRATIVE SERVICES**

# MILWAUKEE COUNTY

# FINAL REPORT

McKinley Marina North
Phase 1: Site Investigation and Conceptual Design

Milwaukee County Project No. WP276011

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# 1. INTRODUCTION

In spring of 2013, Milwaukee County retained The Sigma Group and Marek Landscaping to complete a site investigation and conceptual design for McKinley Marina North. The primary goal was to create a recommended site plan that improved access and traffic flow along with providing improved storm water management to Lake Michigan. McKinley Marina, along Lake Michigan in the City of Milwaukee, consists of buildings, boat launches, boat washes, dry dock storage, boat maintenance facilities, vehicle parking, and pedestrian areas. *See Figure 1 for Site Survey.* The Milwaukee Yacht Club holds a master lease with the County for the south area of the site, and although the parking areas and utilities are maintained by the County, the buildings and grounds of the leased area is 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 first phase of the scope included an existing site investigation, compiling stakeholder and public input on the site, and evaluating stormwater and boatwash Best Management Practices (BMPs). This information obtained was used to create three site design concepts, which were vetted by both Milwaukee County Staff and the key stakeholders. The three site design concepts were evaluated individually by the design team and Milwaukee County staff to create a consolidated site plan that took into account all aspects of the varying uses on site. The consolidated site plan was then detailed further to a final recommended plan to move forward with design, along with preliminary cost estimates for the project. Because of the project size, it was broken into phases for the County to spread out proposed costs over several years.

This project report is a compilation of the site investigation, conceptual design analysis, and final plan recommendation for McKinley Marina North.

# 2. EXISTING SITE INVESTIGATION

## 2.1 Existing Site Topography

The 11-acre site predominantly consists of asphalt parking lot and access drives which drain internally to a storm sewer system on the parcel. *See Figure 1 for Site Survey.* The site is very flat and has many areas with standing water due to lack of drainage infrastructure and deteriorated condition of the asphalt. The asphalt pavement on site is in poor to failing condition, and in most locations has met its useful life. The asphalt has a thickness varying from 3"-5"with stone underlay, including an area towards Lincoln Memorial Drive that has a concrete underlay based on existing geotechnical borings. The asphalt parking area on the far southeast corner of the site serving the north marina slip tenants is in satisfactory condition, and it has approximately 3-5 years of useful life remaining.

## 2.2 Existing Site Infrastructure

The site has an extensive 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 north side of the site with an overhead line that steps down to transformers and underground feeds across the site on the west side of the Yacht Club. From this location, underground services to various buildings and site lighting are routed across the site. The County stubbed an underground primary electric line when Lincoln Memorial Drive was completed, and it is recommended that new services be fed from this underground line and the overheard infrastructure should be removed to maximum extent possible.

### Lighting

The parking lot contains an array of large light poles that provide a significant lighting level for the site, along with pedestrian level lighting along the boardwalk on the east side of the site. Although the lighting is functioning for the site, it is not appropriate and efficient for the site use, and should be replaced with any improvement projects at the site. The existing precast/aggregate light posts are in good condition and are salvageable, so consideration should be given to retrofitting with more efficient fixtures.

### Natural Gas

The site has gas and communication on the site that feeds the existing buildings. Unless use changes significantly on site, the existing gas is sufficient for the development on site.

### Communications

Additional communication and data feeds to the County building and the Yacht Club should be considered to improve data service to the area. Wi-Fi is provided from the yacht club to its users; however Wi-Fi is not currently available to north slip tenants and would be consistent with other slip rentals in the region.

### Storm Sewer

The storm system on site has miscellaneous inlets located in the parking lot with two outfalls to Lake Michigan. The system does not have enough inlets for the large area of parking lot. There are no permanent water quality improvements that serve the parking lots. Storm sewer improvements on site to provide more capacity

and provide improved water quality and quantity. These will be required by the Count's stormwater permits for any future improvement project.

Some of the existing infrastructure may be utilized in upgrades. However the realignment and grading of the site will require replacement and upgrades in general. Overall runoff volumes should be reduced through the implementation of stormwater BMP's.

There is an existing stormwater BMP on the northwest corner of the site that was installed recently by the County for storm water quality improvements. The existing stormwater BMP is in good condition and should be protected and/or expanded during future improvement. It is designed to serve upland (Lafayette Hill and Lincoln Memorial Drive storm sewers.

**Sanitary Sewer**

The existing sanitary sewer is a gravity system that flows north and discharges to an existing lift station on the North side of LMD in a line that is directly in line with the east fence line of the current dry sail storage area. In addition to the onsite buildings, the sanitary sewer serves the existing fish cleaning station on site. The waste from the fish cleaning station has caused back-ups on site and has been a continuing maintenance issue for the County causing backups to other buildings on site. There have also been backups in the winter when fish cleaning is minimal, possible caused by cooking grease in the lines. Although the existing sanitary pipe system is in good condition, the existing fish cleaning station grinder pump and respective sewer lateral should be updated as a part of any improvement project on site.

## 2.3 Existing Geotechnical Evaluation

The existing pavements that compose the surface of the site typically consist of 3 to 6 inches thickness of Hot Mix Asphalt (HMA) over 6 to 20 inches thickness of dense graded aggregate base. An exception is the westernmost parking lot (boring B1) where the asphalt is underlain by 4.5 inches of Portland Cement concrete as discussed in the "Site Topography" Section. Soils below the aggregate base typically consist of sandy to gravelly stiff clay fill with asphalt and brick chunks, and occasional soft and very stiff zones. The thickness of the clay fill is approximately 5 to 9 feet at the western edge of the property, increasing to approximately 10 to 12 feet at the eastern edge. At boring B2, the clay fill is interbedded with fine grained, medium dense sand. Below the clay fill is loose to medium dense, fine grained sand. Ground water was measured at depths ranging from 5 to 10 feet at boring completion.

The clay soils that comprise the soil subgrade beneath existing pavements generally provide fair to poor support to pavements, and will soften upon exposure to water or disturbance. They also have substantial potential for frost heave. The clay soils are NOT suitable for infiltration of storm water. Relatively deep excavations into the sandy soils below the clay may not be stable, particularly below the ground water table.

Conventional spread footings can be used to support light buildings or structures. Miller Engineers and Scientist's recommend that these have at least 42" of final cover for frost protection and be proportioned for not more than 2,000 psf allowable soil bearing stress. The diameter of shallow caisson foundations supporting light poles should be selected so they do not require excavation below the ground water table into sand soils. Their depths should be sufficient to resist frost heave effects but also avoid bearing over on soft soil layers that are present at some locations and depths. Meeting these criteria may be problematic at some locations due to localized soil conditions, and may require specific alternative solutions. For the more typical conditions, caisson foundations bearing on stiff clay or medium dense sand may be proportioned for end bearing up to 5,000 psf and lateral resistance of 2,000 psf.

Where final pavement grades are close to or slightly above existing grades, it may be advantageous to grind in place the existing asphalt pavement and mix it with the top half of existing aggregate base course. This can be graded and compacted to provide the base for new asphalt or concrete pavements. Similarly, the west lot existing pavement consisting of an asphalt overlay on top of Portland Cement Concrete (PCC) can be pulverized in place. The alternatives to dense graded aggregate base consisting of virgin crushed stone or crushed PCC are included in the pavement section recommendations in this report.

## 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 (see *Lake Michigan – Huron Average Annual Historic Water Levels and Histogram* attachment). However, the prolonged low water levels experienced prior to and during the site investigation will not last and will rise in the future (see *Water Levels in Recent Geologic Time* attachment. 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 existing building facilities on site. 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 included in Appendix B, but below is an overview of the results of the limited inspection:

| Building | Use | Year Constructed | Construction Type | General Condition |
|---|---|---|---|---|
| Fish Cleaning Station | Fish Cleaning | 1986 | Open structure<br>Steel and wood framing | Building in satisfactory condition<br>Major issue with sewage service |
| Round Building | Concessions<br>Restrooms<br>Marina Office | 1960<br>New roof and restroom in 2011 | One story with mezzanine<br>Wood columns and beams<br>Heated by gas fired units | Building in satisfactory condition<br>Air handling approaching useful life |
| North Marina Restroom | Meeting Space<br>Restroom<br>Showers<br>Laundry | 2005 | Two story<br>Wood and steel framed<br>Exterior stone with wood beams | Good Condition<br>Minor maintenance issues with building |
| Storage Buildings (3) | Marina supply storage<br>Wood Shop | Unknown<br>At least 30 years old | Wood framing<br>Asphalt shingle roof<br>Some with heaters | Buildings in satisfactory condition |
| Water Building | Water services with valves | Unknown | Wood Construction<br>Concrete slab on grade | Buildings in satisfactory condition |

## 2.6 Existing Site Use

The study area is the McKinley Marina North, which is used for many functions but predominantly supports boat launching, marina 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, coffee shop, and tennis courts. In addition, because this area is a part of the large Lakefront, the area also has supplemental use for activities that involve the entire Lakefront area.

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

| Parking Type/Use | Number of Spaces |
|---|---|
| General Park | 170 |
| McKinley Beach/Breakwater | 45 |
| Yacht Club | 132 |
| North Marina | 142 |
| Boat Parking | 101 |
| Boat Storage | 64 |
| **Total** | **654** |

McKinley Marina North is unlike any other marina in the area because of its mix of uses and its importance to the overall Milwaukee lakefront. All of the existing uses were taken into account when evaluating future improvements at the site

## 3. STAKEHOLDER AND PUBLIC INPUT

McKinley Marina is a key public destination along the Milwaukee lakefront. Due to its use by a large and diverse population from within Milwaukee County and the surrounding area it was determined early on that stakeholder input into the site planning process was imperative.

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 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.

### 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 McKinley north site or had a possible interest in the planning for future improvements. These groups were essentially divided into various sub groups defined by their use or role in servicing the site. These included:

1) User groups who are located on or have direct use of the site
    a. McKinley Marina Management Staff (County Parks employees)
    b. Milwaukee Yacht Club
    c. Milwaukee Area Sails and Trails (MAST)
    d. North Slip Tenants
    e. Charter Fishing Groups

2) Groups that provide service to the site or are responsible for public safety on the site
    a. Milwaukee County Sheriff Staff
    b. Milwaukee Fire Department Staff
    c. Milwaukee Police Department Staff
    d. Wisconsin Department of Natural Resources Staff

3) Neighborhood groups that have demonstrated a strong interest in lakefront planning activities in the area in the past
    a. Preserve Our Parks
    b. Park People
    c. Clean Marina Program

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. Other groups were also identified but the team determined that those groups would be asked to participate in the planning process at subsequent stages in the process.

## 3.2 Stakeholder Meeting #1

On Tuesday, February 5, 2013, stakeholder meeting #1 was held at the Milwaukee Yacht Club. Representatives of those groups identified in task 1 were invited to attend this session. Virtually all of these groups attended this meeting. (Sign-in Sheet - Exhibit XX.2)

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. A copy of the presentation is included in this report (Exhibit XX.3). 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 themes and areas of concern which were documented in meeting minutes (Exhibit XX.4). These included:

Site Improvements / Utilization
1) Replace or repair the pavement
2) Improved or increased lighting
3) More restrooms
4) Maintain/improve fish cleaning station

Traffic / Circulation
1) Improved circulation/traffic flow
2) Additional entry/exit to the lot
3) Decrease pedestrian/auto conflict
4) Improved traffic signalization

Parking
1) Increased parking
2) Increased/improved parking at the roundhouse
3) Better separation of MYC and general parking

4) Improved/increased parking for pavilion

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. This information was then used as a basis for the first newsletter (Exhibit xx.5) which was distributed via an online service (Constant Contact) on March 7, 2013 to 555 individuals identified as users of or individuals interested in McKinley Marina. Of those 555 email addresses 49 were returned as undeliverable (either blocked by the user or an inactive or incorrect email address). Of those successfully delivered through the system, 294 individuals opened the newsletter between March 7 and April 12, 2013.

After distribution of the information gathered in stakeholder meeting #1, the team broadened the list of stakeholders and potentially interested groups to include nearby businesses, neighborhood groups, water quality specialists, relevant city/county/agency staff members, etc. to increase the information available to the design team that might influence the planning process and final recommended plan (Exhibit xx.6).

### 3.3 Stakeholder Meeting #2

On Wednesday, April 17, 2013, stakeholder meeting #2 was held at the Milwaukee Yacht Club. Representatives from those groups invited to stakeholder meeting #1 and those groups identified in task 4 were invited to attend this meeting (Sign-in Sheet - Exhibit xx.7). Those who had not been invited to stakeholder meeting #1 were provided a copy of Newsletter #1 to provide them with background information on the process to-date.

The format of this meeting began as an "open house" meeting with three stations scattered around the meeting room with both a design team member and a county staff member present at each station. As individuals entered the meeting room they were invited to visit any of the three stations to speak with the team members there and learn more about the progress of the project to-date. Illustrations of three concept plans and a "Consolidated" plan were located at each of the three stations. 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 (Exhibit xx.8). The agenda for that presentation included:

1) Opening Comments
2) Where We Are To-Date
3) Stakeholder Meeting #1 Comments
4) Options
    a. A – Close to Existing
    b. B – Match Existing W/ Improvements
    c. C – Match Existing W/ Improvements Plus Additions

d. D – Consolidated Plan

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. Those comments were recorded in meeting notes (Exhibit xx.9).

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 (Exhibit xx.10) which was distributed via an online service (Constant Contact) on April 29, 2013 to 573 individuals identified as users of or individuals interested in McKinley Marina. Of those 573 email addresses 58 were returned as undeliverable (either blocked by the user or an inactive or incorrect email address). Of those successfully delivered through the system, 254 individuals opened the newsletter between April 29 and May 10, 2013.

### 3.4 Public Meeting

On Thursday, June 6, 2013, a public meeting was held in the McKinley Marina North Pavilion building. The latest version of the conceptual site plan was presented along with a description of the design and public involvement process (Exhibit xx.11). 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 30 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 and how it was arrived at.

Following the formal presentation, comments were received from those in attendance. Those comments were documented and, where appropriate, will be incorporated into the design before project completion.

As in prior stages, after the public meeting, a summary series of comments and illustrations were distributed in the form of a third newsletter (Exhibit xx.12) through the online service that had been utilized previously (Constant Contact). This newsletter was distributed on June 18, 2013 to 584 email addresses. Of those, 231 individuals opened the newsletter by June 24, 2013. 58 of these emails were returned as undeliverable (either blocked by the user or an inactive or incorrect email address). The newsletter also included a link to a location on the

Milwaukee County Parks website where a larger version of the proposed site plan was available for individuals to either view or download. As of June 24, 2013 54 individuals had clicked through the newsletter link to that website.

We experienced a high rate of opening and review when compared to other similar outreach campaigns.

The stakeholders were supportive, gave informed and thoughtful feedback, and have had a huge hand in shaping the plan. On several occasions during meetings they expressed gratitude for having been so directly involved and listened to.

## 4. STORM WATER BMP EVALUATION

A key aspect of the project planning process was to improve the stormwater quality of the runoff from McKinley Marina North. 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 on site.

Evaluation of the proper technologies to use on site is imperative for its efficiency and function 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
- Hydrodynamic Separators
- Floatable Control
- Catch Basin with Sump
- Grassed Swale
- Filter Strip
- Bioretention Infiltration Basin
- Permeable Pavements

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. BOAT WASH BMP EVALUATION

Boat Wash water from marinas is a key issue when designing a marina for improving water quality adjacent to the site in Lake Michigan. Along with the stormwater from the parking lots, it is a key contributor to water pollution in the marina specifically associated with heavy metals and other toxins from boat wash activities. Boat washing activities occur under two scenarios in most marina activities: washing boat for day launches before they leave the marina, heavy washing of boats at beginning and end of boating season for maintenance and storage. Day launchers typically wash boats for invasive species protection and residue removal, while the heavy washing at the end of the season usually involves a more thorough, higher pressure wash. This more seasonal boat washing produces a larger discharge of metals (from bottom paint), oil and grease, and antifreeze, along with potentially invasive organisms. This material can be treated in a number of ways as indicated in the table below, but it is imperative, to wildlife and aquatic organisms that the wash water does not discharge directly to the waters of Lake Michigan. Signage, with clear instructions and the reason for using it should be included in the facility.

The project team involved the *Clean Marina Program* during the stakeholder process along with consultation with other reference guides. The results of this work were the following options for boat wash/wash water treatment: on site recycling, on site containment and ship waste off site, on site pretreatment and discharge to sanitary sewer.

| System | Pros | Cons | Initial Costs |
|---|---|---|---|
| On Site recycling | Reduced Water Demand<br>Eliminates Discharge | Most Expensive<br>Heavy Operation/ Maintenance Commitment | $100,000 |
| On Site Storage and Removal | Cost Effective on small systems<br>No on site treatment used | Maintenance Commitment<br>Waste Costs and Buildup | $25,000 |

| | | | |
|---|---|---|---|
| On Site Pretreatment and Discharge to Sanitary Sewer | Cost Effective on Large Systems<br>Reduced Maintenance and Operation | Permit required from local sewer authorities<br>Minimal Operation/Maintenance Required | $50,000 |

One of the key goals for the design of McKinley Marina-North (and all other County facilities) is to create a design that is sustainable and does not cause excessive future maintenance and operation headaches. When evaluating the boat wash system options, serviceability along with economy were the key factors in determining the boat wash BMP recommendation for the site. The team is recommending that the project utilize a pretreatment system to filter solids and discharge the rest of the washwater to the sanitary sewer for final treatment before discharge to Lake Michigan. A pretreatment settling tank or sump that will separate solids from boat wash water is the simplest and most failsafe system for the site. The settling tank would need to be cleaned by a sewer vacuum truck an estimated 3-4 times per year basis. The waste solids would be shipped to a landfill, or MMSD, for waste management.

In order to eliminate stormwater discharge to the sanitary sewer during rain events either a canopy for the boat wash or a bypass drain is suggested. This can drain to a separate onsite bioremediation cell, or to one of the adjacent bioswales.

An optional feature that can be considered is a replaceable prefilter for the washwater that is destined for the sump and sewer. This can be synthetic, organic, or compost based media that filters the largest solids for collection and disposal at the surface in a shallow gutter. This may be particularly practical when more routine washing is anticipated and would minimize the collection of vegetative and animal deposits in the sump system.

It may be practical to include two separate boat wash facilities one that handles more intense renewal cleaning and is connected to the sanitary sewer, and one that is intended for routine/daily boat cleaning that drains to a bioremediation cell. These cells can be designed to remediate and or separate the occasional metals, or hydrocarbons that may incidentally come off in the washing process. In either case this would relieve congestion and encourage use if the simpler lower maintenance wash bay(s) were located near or at the tie down area. This could be as simple as just a high pressure hose with drainage water draining to the adjacent bioswale. Boats that have ablative paints (mostly sailboats) that are typically cleaned off in volumes only seasonally would be directed by signage to wash in the designated wash bay.

The system will need to be permitted by the City and MMSD during the final design phase of the project.

## 6. Conceptual Framework Plans

### 6.1 Overall Review

Three Framework Plans were generated based on preliminary stakeholder feedback. Each of the three "A","B", and "C", was founded in the premise that we would fill the most basic gaps of the current site as determined by the site managers, emergency management, and law enforcement, facility users, and public while building a matrix of priorities. "A" was the simplest and "C" includes the most improvement in terms of uses, amenities, stormwater quality, habitat, and aesthetics/beatification. "A" would be the least expensive, "B" the middle, and "C" the most expensive. With budget constraints forecasted by the County and our Design Team, even "C" might be considered pared back as the design approach was still relatively simple and amenities kept modest. All three plans were assigned cursory phasing strategies to allow for multiyear construction schedules.

All three framework plans were aimed at responding to the stakeholder input gathered from the meetings and design charrette as well as improving conformance with national standards for marina facilities as published by SOBA (States Organization for Boating Access).

### 6.2 Concept A

Plan "A" framework focused on improved drive lanes and way finding, improved parking lot organization, pavement replacements, necessary utility upgrades, very basic stormwater design (only meeting current state requirements), a boat wash station, it included few or no additional uses. It is more or less a pavement replacement plan. *See Figure 3 for Concept A Framework.*

### 6.3 Concept B

Plan "B" framework included the design drivers from "A" and added a new fish cleaning station, restrooms, improved staging area at boat launch, new dockage, a drop-off circle near A-D docks at the SE corner, an unimproved boardwalk at A-D docks (same as is current), more stormwater improvement capacity, as well as ecological enhancement areas adjacent to the project site. This plan added the highest priority improvements along with the Plan "A" objectives. *See Figure 4 for Concept B Framework.*

### 6.3 Concept C

Plan "C" framework included the design drivers from "B" and added a pedestrian bridge across Lincoln Memorial Drive to aid in easing pedestrian/auto congestion at the intersection, expanded ecological enhancements, improved playground area, a deli, ship shop, and rental building, improved pedestrian connections through all of the public areas of the site, including the marina overlook terrace at A-D dock, a kayak launch at McKinley Beach, harbor master's office improvements, better year round function, and up-to-date marina and beach facilities. *See Figure 5 for Concept B Framework.*

### 6.3 Consolidated

After reviewing the three concepts the County and the consulting team compiled the highest priorities and the stakeholder feedback on each of the "A", "B", and "C" framework plans into one "Consolidated Plan". It included parts from the marked up versions of A, B, and C, notes from the stakeholder meetings, and public official's input. This framework plan was used as the base to create the recommended site plan for the project. *See Figure 6 for Consolidated Framework.*

## 7. RECOMMENDED SITE PLAN

### 7.1 Basis of Design

As the team progressed from conceptual design through the initial site investigation and stakeholder input the team was able to develop a basis of design for the project. As the deliverable was only a 30% site plan, objective criteria was not required and instead the team formed larger criteria to shape the final site plans. *See Figure 7 for McKinley Marina North Site Plan Illustration*. The following are the key criteria for the basis of design:

- Provide an improved circulation for both vehicles and pedestrians on site.
- Provide a clearer separation between the parking area of the separate uses on site.
- Provide some additional parking on site, although most of the parking issues are a result of lack of organization of the existing parking lot.
- Provide an improved boat wash area to treat wash water prior to discharge into Lake Michigan.
- 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.

## 7.2 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 drive that provides a more direct route from the entrance off Lincoln Memorial Drive into the site towards the boat ramp; flanked by stormwater BMP's, and improved parking layout. The pedestrian and bike access to the site follows the overall layout of the access road to provide a more direct route to the primary amenity which is the breakwater and beach area. The main drive provides specific areas where access to other areas of the site is required including: Yacht Club, North Slip, McKinley Beach, and General Parking. Signage off the main access drive will be critical for people entering the marina to access the correct area for them to reach their destination. 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 8 for McKinley Marina CAD Site Plan and Phasing.* The following are some of the key design elements that are included in the recommended site plan:

- Improvements at the intersection of the Lincoln Memorial Drive and the main access drive. The preliminary site plan includes modifications to the signal and additional lanes to allow better egress from the site and improved pedestrian flow. The addition of a northbound exit lane will allow for congestion mitigation at peak flow.
- A plaza at the entry to the site to provide improved amenities for pedestrians, market space, and places to meet.
- Direct routing of all traffic through site.
- Delineated parking for the different uses and areas on site.
- Pedestrian connectivity throughout the site including wayfinding signage, controlled crossings, and more direct paths to destinations.
- More efficient boat launch and boat parking areas to provide a more intuitive traffic pattern.
- Additional boat parking and more oversized spots for larger rigs.
- Relocating and screening the boat storage on site.
- Public beach parking and access
- New restrooms, ship shop, deli, and rental building adjacent to McKinley Beach.
- Boat staging, tie down, and washing facilities.
- Marina overlook plaza.
- Better loading and drop off areas.
- Beautification with more consistent finishes, furnishings, and landscaping.

## 7.3 Facility Requirements

The recommended site plan not only includes site improvements but also facility improvements and new buildings. Although the primary two County buildings on site Marina Pavilion and Roundhouse are in good condition, additional building needs are required on the site to support the best use.

- Construction of a new centralized gate house to control access to the boat launch area.
- Adding a new building for restrooms and rentals at McKinley Beach. New restrooms at the beach area are needed, and rentals will help bring more people to the area.
- New vendor buildings at the Plaza to support the pedestrian activity in the area and provide storage for the County.
- New Fish Cleaning Station in a centralized location further away from the boat loading area.
- Proposed dinghy storage closer to the boat launch.

## 7.4 Infrastructure Requirements

In order to support the recommended site and facility changes, new infrastructure will be required throughout the site. Any infrastructure that has approached its useful life or that will need 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. *See Figure 2 for Proposed Site Utilities*. 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.
- New grinder pumps at fish cleaning station including new lateral to main sanitary sewer line and new sanitary lateral to future restrooms and vendor booths.
- Minor upgrades to water loop including new water lateral to future restrooms and vendor booths.
- New primary electric service to site via existing stub.
- New high efficiency/low pollution lighting in the parking lot and pedestrian areas.
- New boat wash system(s) with pretreatment, settling tanks, and sanitary sewer connections.
- Upgrades to existing telephone and data service to the site.

## 7.5 Project Phasing

Because of the size and complexity of the full development on site, the project was broken into phasing. The phasing was based on feedback from the County, and the ability to add specific uses and destinations without impacting work completed in prior phases. McKinley Marina Improvement 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. *See Figure 8 for McKinley Marina CAD Site Plan and Phasing.*

| Phase | Work Included |
|---|---|
| McKinley Marina Improvements | Pavement and Curbing<br>Stormwater Improvements and Landscaping<br>Gatehouse<br>Boat Wash<br>Intersection Improvements<br>Fish Cleaning |
| Lincoln Memorial Plaza | Pavement and Landscaping<br>Rental Buildings<br>Dockwall Improvements |
| Beach House and Restroom | New Beach House including Restrooms<br>Kayak Launch<br>Boardwalk |
| Break Water Amenity | Courtesy Dockage<br>Improved Access to Government Pier |
| Lincoln Memorial Addtl. Parking | Pavement and Curbing<br>Landscaping |
| North Marina Parking Lot and Access Improvements | Parking Lot and Curbing<br>Amenities at Riverwalk |

## 7.6 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 included a 15% construction contingency for the actual work but did not include any soft costs for engineering and construction administration. The County needs to add these costs in as they look at total project costs for budgeting purposes. A detailed cost estimate is included in Figure 9, but below is a summary of the overall costs of the primary project and future phases including construction contingencies:

| Phase | Construction Cost Estimate (Includes 15% Contingency) |
|---|---|
| **McKinley Marina Improvements** | **$ 3,400,000** |
| Lincoln Memorial Plaza | $ 625,000 |
| Beach House and Restroom | $ 575,000 |
| Break Water Amenity | $ 375,000 |
| Lincoln Memorial Addtl. Parking | $ 75,000 |
| North Marina Parking Lot and Access Improvements | $ 145,000 |

## 7.7 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 to become involved in the project and fund specific parts of the project that supported their group's goals and interests. The following groups were identified for possible funding and/or grants:

- Fund for Lake Michigan
- Wisconsin Coastal Management
- Wisconsin Department of Natural Resources
- Sea Grant Institute
- Wisconsin Clean Marina
- USEPA
- Fish and Wildlife Foundation
- MMSD Green Infrastructure
- Sustain our Great Lakes
- WDNR Urban Nonpoint Source & Stormwater Management Grants

## 7.8 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. The exact details of the permit requirements are not known at this time, but the following is a list of permit requirements that may be needed:

- City of Milwaukee Site Plan and Zoning
- City of Milwaukee/MMSD Stormwater Permits
- WDNR and Corps of Engineer Waterway Permits

- Corps of Engineer Breakwater Easement Impacts Approval
- WDNR Urban Nonpoint Source & Stormwater Management Grants