

# Crystal Lake

## Rehabilitation, Access and Management Plan



Crystal Lake Park  
Urbana, Illinois  
September 2016



Urbana Park District



## Executive Summary

The Urbana Park District is pleased to share the “Crystal Lake Rehabilitation, Access and Management Plan” with our community. This plan captures a year-long process of research, public input, and reflection by park district staff and stakeholders into how we can make critical improvements to the lake itself and park as a whole. The Crystal Lake rehabilitation plan will guide the Park District through the installation of new trails, repairing the shoreline, improving access for events, and enhancing the overall quality of Crystal Lake Park.

As the founding park for the District and a unique recreational experience for our citizens, it is our mandate to reclaim Crystal Lake as a welcoming, appealing, and beautiful amenity. We also have the opportunity to make significant environmental improvements to the lake, addressing water quality issues and restoring much needed habitat for local pollinators and wildlife.

While we are confident that these plans will accomplish the needed rejuvenation of Crystal Lake, there is no single solution to the challenges we face. The 100-plus years of lake rehabilitation efforts demonstrates an on-going cycle of natural decline, with renewal and growth through careful intervention. Our work at Crystal Lake will be accomplished through continual enhancement as our knowledge of lake management strategies improves through time, research and experience.

We hope you join us as we begin these improvements. On behalf of the Urbana Park District’s Board of Commissioners, we would like to thank our citizens for their continued support as we finalize designs and begin rehabilitation efforts in 2018.

*Timothy A. Bartlett*  
Executive Director

## Table of Contents

Introduction.....	1
Planning Process.....	2
Water & Sediment Quality.....	5
Shoreline Enhancement & Habitat Restoration.....	8
Public Recreation.....	11
Next Steps and Timeline.....	14
Cost Estimates.....	15





## Introduction

Crystal Lake Park has served as a preferred site of aquatic and environmental recreation for Urbana citizens for over 130 years. In that time the park has transformed from a “summer resort” with a flooded river, to the founding park of the Urbana Park District, to a premier regional outdoor attraction. While the history of the park is filled with joyful stories of boating with friends or enjoying a picnic by the shore, it is punctuated by periods of decline and degradation with citizens troubled over the poor conditions.

Today in 2016, the lake is in just such a state of deterioration, the cause of which is illuminated by its history.

The body of water known as “Crystal Lake” was created in 1906. Originally part of the Saline Branch of the Salt Fork of the Vermillion River, the lake was formed when the Saline was channelized from 19 to 14 miles and deepened to improve drainage due to development in Urbana. As such, the ox-bow lake was detached from its natural course and is no longer connected to environmental, riverine processes that would have impacts on water quality, sediment transport/deposition and shoreline stability, some positive and some negative.

In less than 100 years the lake went through at least three notable periods of intervention – in 1910 with sediment dredging, in the 1950s with dredging and shoreline enhancement, and a significant intervention in 1985. This latest rejuvenation, spearheaded by local engineering firm Berns, Clancy & Associates, included:

- Draining and dredging the lake;
- Deepening the lake to an average of 10 feet;
- Shoreline stabilization through rock gabions and grading;
- Installation of a sediment trap basin at the north end of the lake;
- Installation of a fountain connected to the Glasford Aquifer to provide make-up water;
- Construction of a new Lake House and associated boat dock and piers for increased public recreation.



The Lake House circa 1910



The excavation and rehabilitation of 1985

These improvements have served Crystal Lake and Urbana residents admirably for over 30 years. Many of the features, like the sediment basin, have upgraded conditions on the lake such that less intensive work will be required in the upcoming revitalization.

Still, today’s lake and park are plagued with a high nutrient load causing blooms of unsightly green watermeal and duckweed, an eroded shoreline covered in invasive shrubs, and outdated infrastructure (trails, lights, etc.) that are unwelcoming for visitors.

The Urbana Park District is confident that Crystal Lake can be transformed again with comprehensive planning and integral community participation. The following sections of this document provide an overview of the planning process to date and conceptual designs for new construction at the lake, anticipated to begin in 2018.



The lake as of 2015, covered in watermeal and duckweed which feed on nutrients like phosphorus

## Planning Process

The Urbana Park District released a “Request for Qualifications” (RFQ) for the Crystal Lake Rehabilitation, Access and Management Plan. This plan focused on three main areas of concern: 1) Water Quality, 2) Shoreline Stability and Habitat Restoration, and 3) Public Recreation. The full scope of work is included below.

### A. Existing Conditions Report:

- a.1. Water quality and contaminants
- a.2. Bank erosion and flooding
- a.3. Sediment deposition
- a.4. Lake infrastructure, including piers, pathways, and bridges
- a.5. Biotic resources, such as watermeal and Canada Geese

### B. Lake Rehabilitation Plan:

- b.1. Shoreline stabilization
  - b.1.1. Soil erosion
  - b.1.2. Built features, such as boardwalks, rock outcroppings, etc.
  - b.1.3. Removal of existing failed practices
- b.2. Stormwater management
  - b.2.1. Contaminant prevention/mitigation
  - b.2.2. Sediment treatment/removal
  - b.2.3. Infiltration, low impact development, flooding
- b.3. Habitat restoration
  - b.3.1. Removal of invasive plants along the shoreline
  - b.3.2. Biotic control (watermeal and duckweed)
  - b.3.3. Installation of robust native prairie buffer along shoreline
  - b.3.4. Island habitat restoration
  - b.3.5. Minimization of impact on wildlife and ecosystem currently dependent on the lake

### C. Public Recreation and Access Points:

- c.1. Shoreline pathways, bridges, boardwalks, and rock outcroppings
- c.2. Public fishing piers and boat/kayak launches
- c.3. Downtown Urbana Connections
  - c.3.1. Park entrance at Broadway and Park
  - c.3.2. Race Street connectivity

### Timeline of Meetings

<b>June 24, 2015</b> Kickoff Meeting	<b>November 19, 2015</b> Staff Meeting
<b>July 7, 2015</b> Steeting Committe	<b>March 29, 2015</b> Mercury Consultation
<b>July 15, 2015</b> UPD All Staff Meeting	<b>April 5, 2016</b> Staff Meeting
<b>July 15, 2015</b> Public Meeting #1	<b>June 28, 2016</b> Steering Committee
<b>August 17, 2015</b> Staff and Steering Committee Meeting	<b>June 30, 2016</b> Public Meeting #2

As with the 1980s revitalization, local firm Berns, Clancy & Associates (BCA) were selected to lead this plan after careful review by UPD staff, volunteers and the district's Natural Areas Committee. BCA partnered with environmental engineers Living Waters Consultants and landscape architects SmithGroup JJR, both of whom had worked on previous projects with the district.



**Volunteers**

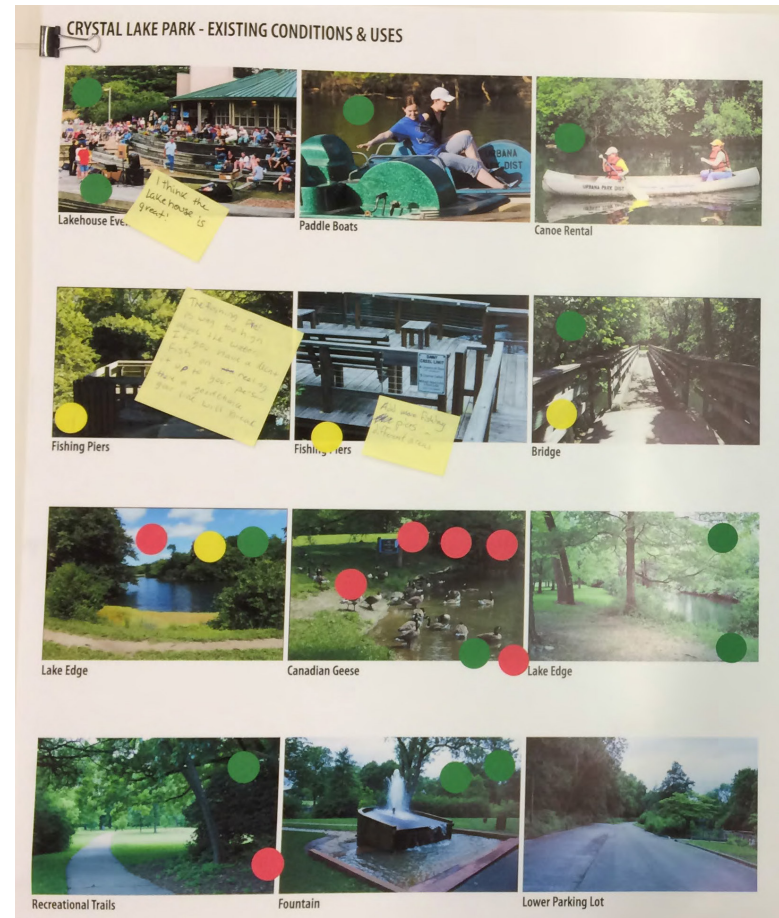
Beth Chato	Champaign County Audubon Society
Scott Tess	City of Urbana
Brad Bennett	City of Urbana
Bruce Stickers	Soil and Water Conservation District
Mike Garthaus	Illinois Department of Natural Resources
Van Grissom	Illinois Department of Natural Resources
Elliana Brown	IL Water Resources Center/ IL-In Sea Grant
Carletta Donaldson	Urbana Community Alternative Policing
Dave Kovacik	University of Illinois, Retired

Work commenced in June of 2015 with a review of current conditions and discussion of the successes and challenges of the 1985 revitalization. The district assembled a steering committee of local stakeholders and environmental professionals as well as a larger staff review group.

On July 15, 2015 the district hosted two events. First, UPD staff were invited to provide input on their area of expertise, including facility maintenance, natural areas, programming, and customer service. Second, a public meeting was held in the evening to solicit comments from local citizens who utilize the parks. Over 40 people attended to hear about the history of the park and provide input on their preferences for recreational opportunities. An online public comment form on the UPD website also received an additional 30 submissions between July and August of 2015.

The district hosted a second public meeting on June 30, 2016 to unveil conceptual designs and plans for the lake. Approximately 50 attendees reviewed plans and provided feedback, which was generally constructive and positive. Support for goose control measures and the need for water quality intervention was notable.

The Crystal Lake Rehabilitation, Access, and Management Plan was presented to the UPD Board of Commissioners on September 6, 2016 in preparation for the approval of initial engineering later in 2016.



One of the "public comment" boards from the July 15, 2015 public meeting, with dots indicating visitor preferences for the images. Green dots represented favorable responses and yellow dots are neutral while red represented negative reactions.



A map showing the current features to be removed during the rehabilitation of the lake, focusing on past shoreline stabilization and outdated fishing piers.



### Three Areas of Concern and Presented Solutions

The Crystal Lake Rehabilitation, Access and Management Plan focused on three primary areas of concern, those being 1) Water Quality, 2) Shoreline Stability and Habitat Restoration, and 3) Public Recreation. The conceptual designs and plans for each of these are detailed in the following three sections of this report.

## Section 1: Water & Sediment Quality

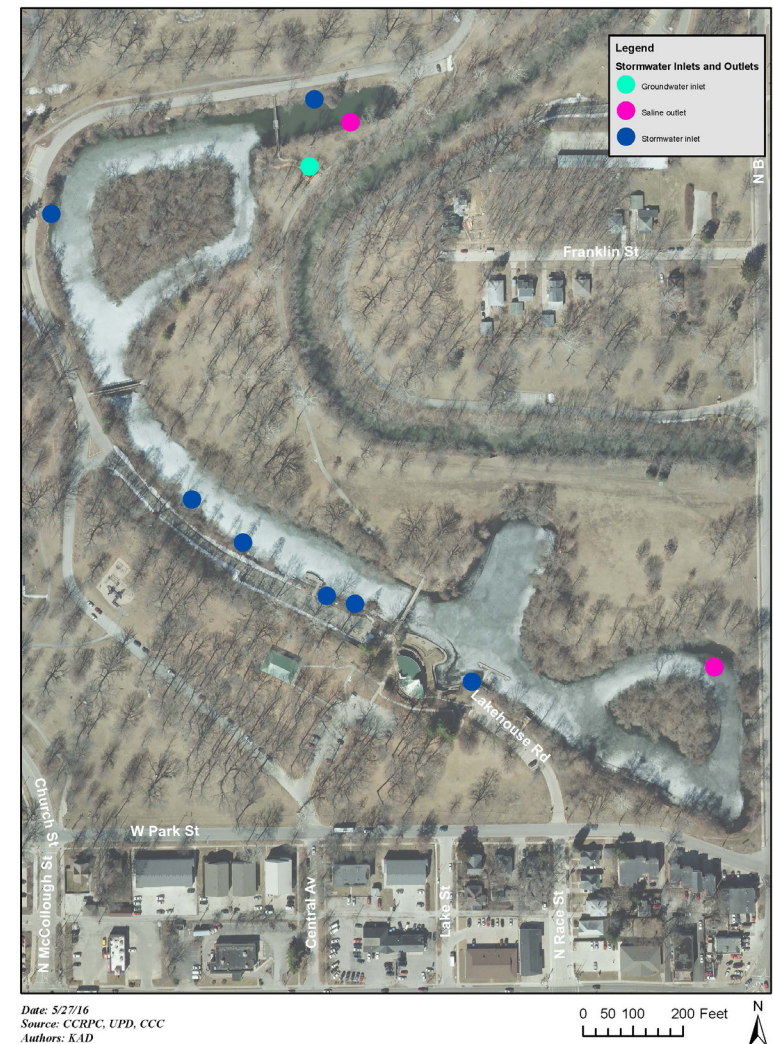
### Current Conditions

Crystal Lake is the recipient of drainage from a 160 acre watershed. Water enters the lake through seven stormwater drainage inlets, including a 54-inch inlet into the sediment forebay on the northeast corner of the lake, and a groundwater well to the Glasford Aquifer that supplies make-up water 9 hours per day, 7 months per year.

Surface and ground water testing (2015) indicated elevated phosphorus levels that can produce “**eutrophic**” conditions in the lake that contribute to nuisance weeds, lake sedimentation, alteration in the fish community, and low dissolved oxygen levels. The eutrophic condition of the lake is considered to be directly connected to the quantity of watermeal and duckweed seen at the lake surface (the nuisance aquatic plants that cause a green sheen over the lake). Other chemical constituents, including nitrogen, chloride, and suspended solids, were found within acceptable levels at this time.

Similarly, sediments through the majority of the lake were considered relatively low in thickness and nutrient load. An average of 1.0 foot of sediment was measured across 12 transects around the lake. Compared to the significant sedimentation observed during the 1985 lake rehabilitation (8-10 feet in places), the low levels today indicate that the sediment forebay on the northern end of the lake has been effective in reducing sediment accumulation in the rest of the lake. At this time, the sediment forebay has reached capacity and is known to contain contaminated levels of polynuclear aromatic hydrocarbons (PAHs) present in the granular accumulations (comprised largely of asphalt pieces) that will be removed in the fall of 2016. The emptying of the sediment forebay may have positive impacts on water quality because of reduced nutrient load.

Urbana Park District  
Crystal Lake Stormwater Inlets and Outlets



A map of the stormwater inlets and outlets at Crystal Lake

**Eutrophic-** A eutrophic body of water, commonly a lake or pond, has high biological productivity. Due to excessive nutrients, especially nitrogen and phosphorus, these water bodies are able to support an abundance of aquatic plants. Usually, the water body will be dominated either by aquatic plants or algae.” (Source” Wikipedia)

Of a different concern, however, is that the lake has been placed on a fish consumption advisory for largemouth bass based on two elevated mercury samples tested by the Illinois Environmental Protection Agency. Methylmercury, which is known to bioaccumulate in fish, may be entering the lake through particles in stormwater runoff or atmospherically through the lake surface. In order to determine the impact of mercury on the lake, the district is pursuing independent mercury testing for sediments and three additional species of fish (crappie, bluegill, and catfish). Additional testing will be completed throughout 2016.

Sample Year	Fish Species	Hg Level	Tested by
2008	Largemouth Bass	"Impaired"	IEPA w/IDNR
2010	Crappie	0.28 ug/g	IEPA w/IDNR
2014	Largemouth Bass	0.30 ug/g	IEPA w/IDNR
2014	Crappie	Unknown	

As of May 2016 the district is also participating in the Volunteer Lake Monitoring Program with the IEPA. Moving forward, three lake locations will be tested monthly for nutrient content of water samples (water quality) and bi-monthly for visibility, sediment depth, and dissolved oxygen levels.



**Potential Solutions**

The water quality issues of Crystal Lake are complex and will require a multifaceted, long-term approach to regain healthy nutrient and sediment levels. The planning team has recommended the following protocol be considered:

**1) Phosphorus Source Reduction**

The groundwater inlet fountain that provides make-up water for the lake has been identified as high in phosphorus. Modifications to the well structure will be considered along with a reduction in hours the fountain runs.

Canada Geese can also contribute to total phosphorus loading. The district is managing the Canada Goose population through an egg and nest program with the Illinois Department of Natural Resources.



Canada Geese contribute to the nutrient issues at Crystal Lake

**2) Alum Dosing**

Applications of aluminum sulfate (alum) can be used to reduce phosphorus levels in a body of water. Liquid alum will bind phosphorus into the sediments at the bottom of the lake, reducing the amount available in the water column for use by nuisance weeds like watermeal and duckweed. Treatments would be ongoing over a minimum of two years in order to see results.

**3) Physical Control**

Watermeal and duckweed, the primary nuisance weeds on Crystal Lake, typically do not tolerate moving water. As is further described in the Shoreline Enhancement & Habitat Restoration section, it is recommended to remove dense areas of shoreline shrub vegetation along the long and narrow shoreline. This can increase wind velocities and reduce the extent of calm shoreline conditions.

**4) Sediment Removal**

Sedimentation is problematic in two areas of Crystal Lake. First, the sediment forebay at the north end of the lake is at capacity and the granular sediments (approximately 1/3 to 1/2 of the volume of sediment) will be removed in the winter of 2016. This will remove contaminants such as PAHs as previously described, and hopefully reduce general nutrient load in the north end of the lake.

The second area of concern is the soft sediments present in the rest of the lake. While averaging only 1-foot throughout, these sediments may be high in stored nutrients and in methylmercury. Pending the results of additional mercury testing, whole-lake dredging may be considered a practical option for stabilizing water quality.



Technicians from Midwest Engineering & Testing taking a core sample from the sediment forebay

**5) Aeration**

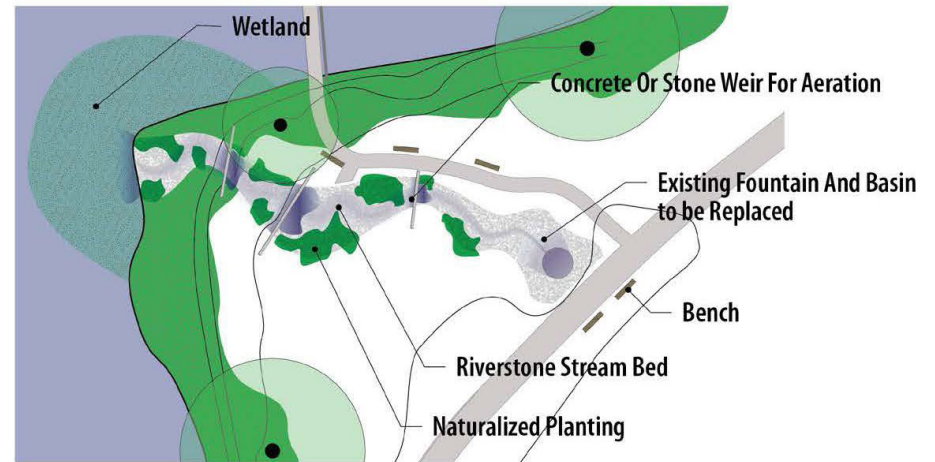
Bubbler aeration hydrologically lifts bottom waters to the lake surface. This circulates water, prevents pond stratification, and increases dissolved oxygen (DO) levels in lakes that form a thermocline. Pending additional DO testing, bubblers may be recommended in order to increase oxygen levels near the lake bottom and thereby reduce the release of phosphorus from the lake sediment.

**Thermocline-** horizontal plane within the transitional zone where the water temperature makes the greatest change. Temperatures rapidly change and dissolved oxygen levels may fluctuate. (Source: Illinois VLMP Training Manual)

**6) Natural Filtration and Habitat Restoration**

Native plantings and wetlands are known to reduce nutrient loads naturally. The creation of a filtration wetland has been recommended due to the high levels of phosphorus in the supplemental groundwater as well as the low quality stormwater entering through the sediment forebay. The groundwater would be diverted directly to the sediment forebay in order to maximize time in the filtration wetland.

Additional wetland plantings are planned for outside the sediment forebay, which may provide additional support to nutrient reduction throughout the system.



**REDESIGNED AND NATURALIZED CHANNEL BELOW FOUNTAIN**

A depiction of a new, natural channel to filter water from the Glasford Aquifer before it enters the lake

**7) Watershed Best Management Practices**

Best Management Practices (BMPs) have been recommended for within Crystal Lake Park, adjoining neighbors, and landowners within the 160-acre watershed. Examples include permeable pavers in parking lots, reduction of turf lawns to urban wetland filtration basins and rain gardens, improvements to storm sewers, and phosphate-free lawn fertilization. Many of these BMPs require cooperation on the part of adjacent landowners, such as the City of Urbana, Champaign County Fairgrounds and Carle Hospital.

## Section 2: Shoreline Enhancement & Habitat Restoration

Crystal Lake has over 6,000 linear feet (1.1 miles) of shoreline habitat with an additional 1,380 linear feet (0.26 miles) in island shoreline. There are a variety of shoreline vegetative conditions, slopes, bank heights and existing erosion control structures at Crystal Lake.

The majority of the shoreline is directly adjacent to overbank roads or parking lots, particularly on the south and west borders of the lake. These areas contain tall bank heights, typically 6 to 8 feet in height with relatively steep and less accessible side slopes, with a handful of piers providing access to the water. These same areas are dominated by a narrow width of dense invasive shrub vegetation that block visibility and reduce visitor’s sense of safety. The tall and steep shoreline slopes can partially be explained as a historical remnant of the meandering bends of the Saline Branch. Most of the east shoreline area contains flatter bank slopes and lower bank heights, especially in the “lagoon” area across from the Lake House.



The eroded shoreline surrounding one of the outdated fishing piers on Park Street

### Benefits of Shoreline Stabilization:

- 1) Improved lake access;
- 2) Improved water quality;
- 3) Environmental integrity and habitat diversity;
- 4) Improved public safety with more gradual slopes.

Most of the existing shoreline vegetation consists of a dense thicket of invasive shrubs and trees at Crystal Lake. In areas where shrubs have been cleared, turf grasses and eroded banks are dominant. The existing shoreline condition is detrimental to lake water quality, habitat diversity, public use, and access to recreational activities. Drawbacks include the following:

1. Invasive shrubs and trees have created a shaded condition that prevents the formation of a desirable herbaceous plant understory in eroded shoreline areas.
2. Turf grasses, with their shallow root structure (compared with native plantings), provides a relatively low capacity for stabilizing shoreline soils and contributes to bank erosion. This condition is also particularly suitable to Canada geese.
3. While the Urbana Park District does not fertilize its turf lawns with phosphorus, turf has a relatively low capacity to absorb or filter polluted runoff. Lack of shoreline vegetation to filter and absorb polluted runoff can contribute to watermeal, duckweed, and algae production.
4. While there is a desirable abundance of fallen logs, fallen brush, and related woody cover along many shoreline areas, there is a lack of variable vegetative habitat. Submerged aquatic plants which are important for largemouth bass habitat are also lacking.
5. Dense shrubs and trees obscure the view of the lake for the public, preventing access to recreational opportunities and enjoyment along the shoreline.
6. A reduced sense of safety occurs due to the shrub layers present. The UPD Advisory Committee has previously reported feeling claustrophobic and unsafe due to lack of visibility on trails and roads in the park.
7. Dense shrubs and trees reduce the apparent size of the lake.

The poor conditions of the Crystal Lake shoreline provide broad opportunities for improvements that will promote public use while accomplishing significant environmental recovery. There are a variety of methods and techniques that could be used to provide an aesthetically pleasing, attractive, environmentally sound, and more accessible shoreline in many areas. Techniques are presented below for a variety of costs and approaches, and accounting for the heavy urban use that Crystal Lake Park facilitates.

**1) Vegetation Enhancements: Native Plants & Shallow Emergent Wetlands**

Crystal Lake will greatly benefit from the restoration of native habitat along the shoreline. A combination of re-graded shoreline and deep-rooted native plantings will reduce erosion and provide benefits to pollinators and the public. The installation of deep-rooted plantings will improve uptake of nutrients from the water’s edge and provide a significant overbank runoff pollutant filtration system, reducing nutrient loads from overbank turf grass installation areas above the shoreline before it enters the water’s edge. Native plantings will also help prevent loss of bank soils and promote bank stability.

The installation of native plantings can also impact the Canada Goose population on the lake, which prefers the low turfed areas. This would follow a recommendation by the Illinois Department of Natural Resources to restore native habitat in order to reduce areas where geese congregate.



An example lake shore with native plant buffer

In addition to new native plantings, nearly 100 trees currently along the shoreline have been identified as high quality natives that should be saved. Plans call for an additional 50 trees to be planted along with shrubs, especially on the restored islands.

**2) Gravel Shorelines/Flagstone Trails**

Placement of stable sand/gravel beach materials on the lakeshore will provide public access with less risk of disturbing sensitive plantings. Pairing these areas with offshore habitat and/or lake depth modifications can be used to provide desirable fish habitat and opportunities for anglers. Flagstone fishing piers and flagstone trail/steps can be used for constructed or natural lake settings and may address areas that are too eroded for successful grading and planting.

**3) High-use/Programming Locations**

Crystal Lake is a highly prized urban lake resource in the Urbana Park District. It is expected with the level of annual use and new special events that certain locations of Crystal Lake will be subject to very high use. In these areas either mowed turf grasses, buffalo grass (in full sun areas), or high-mow fescue buffers could be considered. Steep shorelines can be graded and protected with multiple layers of flat rock materials, flagstone, or lannonstone steps.



A special event at the Lake House

#### 4) Biotechnical Shoreline Stabilization for Moderate to Severely Eroded Areas

Crystal Lake enhancement can include biotechnical shoreline stabilization practices with natural or manufactured products and materials. In areas exhibiting moderate shoreline erosion, the shorelines can be lightly graded back, seeded/planted, covered with an erosion control blanket, and protected long-term with logs or rock toe. Alternative stabilization techniques can include log toe (cabled), terraced steps, re-shaped slopes, rock jetties for wave protection, and/or other measures. Shoreline enhancement will be a critical component for enhancing overall lake accessibility, visibility, and use potential.



“Rock toe” stabilization around a lake edge

#### 5) Island Habitat Considerations

The existing south island and north island can be enhanced through the removal of invasive species and replacement with high quality native habitat. Establishing native shorelines may over time reduce nesting by Canada Geese. The existing islands are considered to be fairly stable, but with similar erosion and vegetative issues as the shoreline areas. It is likely that other than the added complexity of construction access, that the execution of island grading and grade modifications will be similar to re-shaping the perimeter lake shoreline area.

Shelf wetlands may also be added to the perimeter of the north island to improve water quality and provide a unique, “heron’s-eye” experience for boaters.

#### 6) Other Aquatic Habitat/Fish Habitat Considerations

Many areas of the shoreline have desirable brush and log cover that may represent some of the only significant habitat structure in the lake. It is recommended in the future that selected trees that are cut be placed as log structures either parallel to the shoreline for wave protection, or perpendicular extending offshore (submerged) for deep-water fish habitat. Crappie and largemouth bass use brush cover extensively. Sunfish often prefer aquatic plants for protection from bass predation.

As an option, more diverse shoreline habitat with emergent vegetation could be constructed by excavating and pulling back the existing water’s edge. This would ensure naturally appearing lake edges with soft curves that allow the eye to wander around the edges, bends, and islands. The construction of shallow depths along the shoreline would provide improved protection for younger fish from predation. Studies have shown that largemouth bass populations may be optimal in biomass with 20% to 40% vegetative coverage in a lake. In contrast, little to no submergent aquatic vegetation currently exists at Crystal Lake.

#### Recommendations include:

- Brush and tree bundles can be tied together and sunk to a variety of water depths.
- Catfish spawning could be enhanced with the installation of clay tile, weighted PVC pipe sections, concrete pipe sections, or other hollow structures placed horizontal at a variety of depths.
- The size structure of the largemouth bass population is adequate for recreational fishing. But to increase the number of large fish, a slotted size limit can be considered.
- It is recommended that grass carp should never be stocked in Crystal Lake due to impact on aquatic vegetative growth.



Brush and trees provide animal habitat at Crystal Lake

## Section 3: Public Recreation

The third and final component of the Crystal Lake Rehabilitation Plan is the critical importance of public recreation and access to the success of the park. Without facilitating use by the citizens of Urbana and Champaign County the remaining park improvements would be ineffectual.

Conceptual designs for public access focused on several categories of experiences. These include the following:

### 1) Trails and Paths

An enhanced public trails system is the foundation of public access at Crystal Lake Park, particularly in relation to the lake itself. Plans call for the construction of new 8-10 foot concrete paths along both Broadway Avenue and Park Street on the borders of the park, with new paths extending inwards to all major park amenities. Secondary paths of mulch, limestone aggregate, or mowed grass are planned to curve with the interior of the lake through areas that are more heavily forested or contain steep slopes.

Through the Urbana Park District Master Trails Plan (2015), staff and planners began exploring new uses for the asphalt road through the park. With strong public responses, plans for the park call for the conversion of the road into half one-way road for vehicular traffic and half shared-use bicycle/pedestrian path. Traffic studies will be needed to determine road and path alignment, entrances, and parking considerations; these will be completed as part of engineering for the lake plan.

### 2) Water Access & Boating

The importance of water access was among the most commonly cited issues received through public comments on Crystal Lake. Visitors to the park are excited by the opportunity to get down to the water for an experience that is unavailable elsewhere in Urbana. This will be facilitated through stone outcroppings leading to the water's edge, as well as new accessible paths close to the lake shore.

Boating operations will also be improved with a new, relocated boat dock closer to the Lake House. A public kayak launch is also planned for the northwest corner of the lake, with a gravel beach graded to allow for easy access for private kayak owners.



Stone outcroppings allow access to the water

### 3) Viewsheds

A common concern is the lack of visibility for Crystal Lake, given the overgrowth of invasive plants and weedy trees. One benefit to the removal of the overgrowth is the opening of the lake from all perspectives: from the road, from the trails, and around the Lake House. This will improve the aesthetic enjoyment of the lake by visitors, capitalizing on the unique experience of a lakefront stroll in Urbana.

In this effort, planners have proposed two considerable changes to the profile of Crystal Lake. The first is to build up the shoreline along Broadway Avenue to provide adequate space for an 8-10 foot path and gentle slopes to the water's edge. At present this area is highly eroded and would need significant fill in order to accomplish these improvements. However, the second opportunity is in further opening the viewshed through "shaving" the peninsula across from the Lake House to allow clear views across the lake from Park & Broadway, the Lake House, and the Memorial Bridge. The removal of soil and material from this area would then be reused in the build-up of Broadway Avenue to save on the cost of both projects, accomplishing two influential parts of the lake rehabilitation together.

#### 4) The Lake House and Programming

The Lake House has been the center of Crystal Lake programming since 1987. It is the popular home of summer concerts, seasonal boating and concessions, and year-round event rentals. However, the Lake House and surrounding grounds are challenged in significant ways, primarily through visibility from the road and surrounding park land, parking, path access, shade, and connectivity between the upper and lower levels of the wooden decks.

Plans for the Lake House include expanded parking, improved paths and refreshed terraces with new landscaping and limestone rock outcroppings for lake access. Shade sails are being considered for the terraces to provide relief from the sun during concerts and other programs. Generally, views to the Lake House will be opened through reduction of the berm in the east parking lot and removal of outdated landscaping. These improvements will help facilitate more regular music programming and greater appeal for rentals at the Lake House.

Additional design for path alignment and terrace configuration will be completed alongside engineering for other lake elements.

#### 5) Infrastructure Improvements

Along with improvements to the lake and trails, the infrastructure in the park will benefit from upgrades. This includes improvements to the lighting, bridges, signage, water fountains, electrical and plumbing capacities, storm sewers, and parking lot conditions. These elements will be addressed in future conceptual designs completed during the engineering phase. These improvements are intended to be completed simultaneous to the larger park improvements to water quality, shoreline restoration, and public access.

#### 6) Interpretation

As in other natural areas and signature parks, the Urbana Park District will install interpretive signage at Crystal Lake Park to tell stories of the natural and historical features of the lake. Interpretation will be a later phase in renovating the park, designed once major construction is complete.



1. VIEW LOOKING TO THE NORTHWEST ACROSS CRYSTAL LAKE, FROM BROADWAY



2. VIEW LOOKING TO THE SOUTHWEST, FROM BROADWAY





**LEGEND**

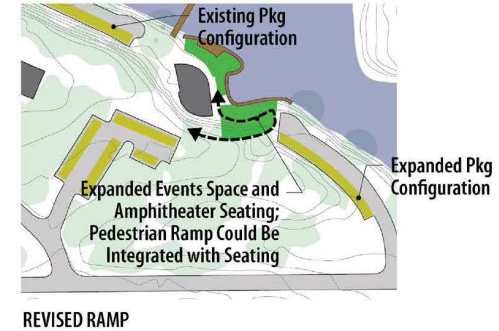
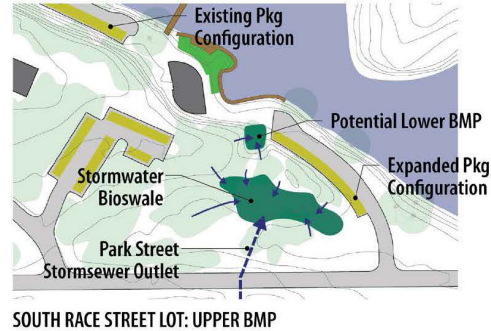
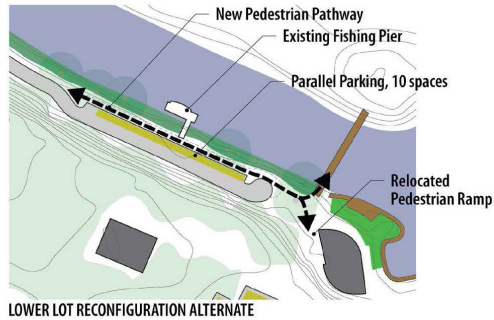
- INTERPRETIVE NODE
- STONE OUTCROPPING
- SIGNIFICANT EXISTING TREE TO REMAIN
- BENCH
- PRIMARY PATHWAY - PAVED
- SECONDARY PATHWAY - GRAVEL
- ON-STREET PEDESTRIAN/CYCLE PATHWAY WITH NARROWED ROAD

J. U. L. L. E. NOTE: THE EXACT LOCATION OF ALL UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION ACTIVITIES FOR ALL UTILITY LOCATIONS CALL JULIE. (800) 892-0122 © 2016 URBANA PARK DISTRICT	SURVEYED: _____ DRAFTED: KL CHECKED: KL / PW FILE: DCK.DWG	REVISIONS _____ _____	<b>BERNS, CLANCY AND ASSOCIATES</b> ENGINEERS • SURVEYORS • PLANNERS 455 EAST MAIN STREET - POST OFFICE BOX 9755 URBANA, ILLINOIS 61803-9755 PHONE: (312) 384-1144 • FAX: (312) 384-3355	<b>LIVING WATERS CONSULTANTS</b> 16 West 455 South Frontage Road Suite 119 Burr Ridge, IL 60527 Phone: 630.321.1133	<b>SMITHGROUP JJR</b> 35 E. Wacker Drive, Suite 2200 Chicago, IL 60601 Phone: 312.641.0770 Fax: 734.780.2300	CRYSTAL LAKE REHABILITATION AND ACCESS MANAGEMENT PLAN URBANA PARK DISTRICT	<b>MASTER PLAN</b>	DATE: 06/28/16 SHEET: 2 of 15 JOB: 7171
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The trails and public access plan for Crystal Lake

## Next Steps & Timeline

With the Crystal Lake planning process complete, the Urbana Park District will turn attention towards the engineering of the shoreline and trails as well as further design of infrastructure and the Lake House. Engineering will address the specific treatments needed throughout the shoreline, such as where is best stabilized with rock toe or is suitable for a limestone rock outcropping to provide public access. Additional considerations will be given to known areas of concern, such as parking lots and floodzones.



	2016					2017												2018				
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
Completion of Conceptual Designs and Plans	█	█																				
Mercury Testing	█	█	█																			
Sediment Basin – Removal of Granular Materials				█	█																	
Shoreline & Trails Engineering			█	█	█	█	█	█	█	█	█	█	█									
Lake House and Infrastructure Conceptual Designs			█	█	█	█	█	█	█	█	█	█	█									
Public Bidding														█	█							
Tree & Brush Removal																█	█	█	█			
Shoreline & Trail Construction																				█	█	█

Project Development Schedule: projected timeline for additional work at Crystal Lake

## Cost Estimates

Cost estimates were provided by Berns, Clancy & Associates in August 2016. These estimates are preliminary and do not reflect final costs. Final costs will be determined through the engineering and bidding process over the next three years.

### 1) Water Quality Treatment

In- Lake Alum Application	4 applications	\$28,000
Sediment Removal- Sediment Forebay	1 lump sum	\$400,000
Full-Lake Hydraulic Sediment Excavation	1 lump sum	\$350,000
Park Street- Stormwater BMP	1 lump sum	\$35,000
Fountain Removal	1 lump sum	\$14,000
Revise Lake Level Control Structure	1 lump sum	\$14,000
Well Water Treatment Pools	1 lump sum	\$70,000
<b>Total \$911,000</b>		

### 2) Shoreline and Habitat Restoration

Invasive Species Removal	4.1 acres	\$140,000
Shoreline Shaping, Grading and Armoring	4.1 acres	\$1,097,600
Shoreline Native Plant Seeding and Trees	3.9 acres	\$71,680
Fish Habitat	34 structures	\$23,800
Island Restoration	1.4 acres	\$39,200
Shelf Wetland Fill and Planting	2400 sq. ft.	\$208,600
<b>Total \$1,580,880</b>		

### 3) Public Access

Concrete Trails System	3,500 linear feet	\$1,865,780
Bridge Modifications	3 bridges	\$627,900
Lake House Improvements	1 lump sum	\$140,000
Stone Rock Outcroppings	1,450 sq. ft.	\$138,600
Beaches and Boat Launches	1 lump sum	\$38,500
Parking Improvements	1 lump sum	\$18,060
One-Way Road Striping	6,300 linear feet	\$17,640
Stone Vista and Park Benches	7 benches	\$16,800
Interpretive Nodes	6 nodes	\$33,600
<b>Total \$2,896,880</b>		

**Grand Total \$5,388,760**

The Urbana Park District will be completing Crystal Lake projects in phases, utilizing funds from the capital program. The district will also be applying for state and federal grants and fundraising with the Urbana Parks Foundation.

