North Shore Drive Drainage Improvement Project City of Crystal Lake, IL

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City of Crystal Lake



- 40 mi NW of Chicago
- McHenry County
- Population 40,000
- Settled in 1840, incorporated in 1874
- City Limits = 19 Sq. Mi.
 - Crystal Lake = 0.36 Sq. Mi.



"waters were as clear as crystal"



From Crystal Lake Clean Lakes Plan by Hey & Associates, Inc.

- Lake formation
- Surface expression of shallow aquifer
 - No surface runoff
- Watershed conversion from
 Oak Forest to Farmland to
 residential/commercial
- Phosphorus is primary pollutant of concern
- Water quality is outstanding
- Community Asset







Crystal Lake Watershed



From Crystal Lake Watershed Design Manual by Hey & Associates, Inc.

- Watershed = 3,400 acres
- High infiltration rates
- Complex water budget
- Drainage Evolution
 - Groundwater
 - Drain tiles
 - Storm sewers and ponds
- Watershed Ordinances
 - Limit Impervious
 - Pre-Treatment and Infiltration required
 - No new outlets



North Shore Drive and Cove Pond





North Shore Drive



- Re-development of individual lots
- No stormwater detention and few "storm sewers"
- Low, flat topography and reliance on dry wells
- Entrance road is only access to 250 homes



North Shore Drive



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Cove Pond



- Watershed Size = 540 acres
- Largely urbanized
- Wetland mitigation and runoff pre-treatment
- Volume = 21 Acre-ft
- Outlet = Elliptical storm sewer and roadway overflow



Cove Pond Sub-Watershed





North Shore Drive



North Shore Drive and Cove Pond



North Shore Drive FIRM





North Shore Drive Flooding



North Shore Drive Flooding



Development of Proposed Improvements

- August 2007 Flood Event
 - Approximately 12 inches of rain
 - Crystal Lake reaches BFE of 893 ft
- City-wide flood study completed in May 2009
- North Shore Drive high priority area
- Detailed Phase 2 Design begins in Fall 2012



Goals of Drainage Improvement Project

- Provide 10-year storm sewer capacity to residential areas
- Provide 100-year level of protection for North Shore Drive
- Provide safe overflow route from Cove Pond to Crystal Lake



Project Constraints

- No new storm sewer outfalls to Crystal Lake
- Cannot increase HWL of Cove Pond nor reduce water quality treatment capacity
- All water draining to Crystal Lake must be treated with BMPs
- Very little open space and no easements
- High groundwater and bad soils
- Utilities
- Floodplain
- Existing dry wells and storm sewers



Project Constraints

• Wetlands



Project Constraints

- Flat topography
 - Crystal Lake and Cove Pond NWL = 890.9 ft
 - Crystal Lake and Cove Pond BFE = 893 ft



Design Methodology

- Drainage system analyzed in XP-SWMM
- Developed 4 Alternatives
 - Raise North Shore Drive above BFE
 - Low profile box culverts (elevation, groundwater and soils)
 - Create treatment swale for pre-treatment of stormwater
 - RipRap Overflow Basin at Cove Pond to mimic previous roadway overflow
 - New storm sewer for residential area that outlets to new swale
 - In depth SE/SC and dewatering plans



Preferred Alternative





Chronology

- Public Meetings January through April 2012
- City Council design approval April 2012
- Final Design completed June 2012
- Project Bid July 2012
- Permits obtained September 2012
- City Council awards contract September 2012
 Berger Excavating \$850,000
- Construction Begins September 2012
- Construction Finishes December 2012



Drought

Pre and Post Construction photos



Looking Upstream in Overflow Swale





Looking Downstream in Overflow Swale



Pre and Post Construction photos



North Shore Drive





Action Shots – 1/29/2013



Culverts under Woodland Access



North Shore Drive Culvert



Lessons Learned

- A site visit is worth 1,000 survey points
- Be flexible and opportunistic



Lessons Learned



