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"

- 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

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

- 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

From Crystal Lake Watershed Design Manual by Hey & Associates, Inc.
North Shore Drive and Cove Pond

Crystal Lake

North Shore Drive

Cove Pond
- Developed in 1940s
- 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

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

Study Area
North Shore Drive

- Crystal Lake BFE = 893 ft
- Roadway Sag = 891.9 ft
- Level of Protection = 2yr
North Shore Drive and Cove Pond
North Shore Drive FIRM

Cove Pond

North Shore Drive

Crystal Lake
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

- 12-inch to 18-inch Storm Sewer
- Riprap Overflow Basin
- Raise North Shore Drive ±1 ft
- Triple 5’x1’RCBC
- 30-ft wide overflow channel
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
Pre and Post Construction photos

Looking Upstream in Overflow Swale

Looking Downstream in Overflow Swale
Pre and Post Construction photos

Before
North Shore Drive

After
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

No turtles were harmed during this project