Urban Storm Water Runoff and Inland Lakes: A Tale of Two Cities

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ECOSYSTEM HEALTH CONCERN: COLIFORM BACTERIA AND NUTRIENT LOADING
SOLUTION: DIVERSION OF STORM SEWER INPUTS

ECOSYSTEM HEALTH CONCERN: EUTROPHICATION: ALGAE AND AQUATIC MACROPHYTES
SOLUTION: DIVERSION OF STORM SEWER INPUTS

GOALS OF STORM SEWER DIVERSION:
- Reduce coliform bacteria inputs and improve swimming health of the lake
- Remove inputs of phosphorus which stimulates growth of aquatic organisms
- Manage the 10-year design storm runoff from Iron Mountain and Kingsford
- Find the least expensive option for storm sewer diversion

STORM CAD PROCESSES:
- Design Data:
  - Storm Data
    - IDF Curve
    - Land Use
    - Design Storm
  - Drainage Area
  - Elevations
  - Street Layout
- Pipe Design Characteristics
  - Diameter
  - Flow
- Profiles of Pipe Network
  - Slope
  - Ground Cover

DESIGN 1:
- Uses existing open channel and explores the possibility of using additional open channel to reduce the amount of concrete pipe needed to convey storm water.
- Cost including concrete pipe, pipe installation, and contractor mobilization: $3,870,517

Design Data:
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<th>Drainage Area</th>
<th>Elevations</th>
<th>Street Layout</th>
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DESIGN 2:
- Uses existing open channel connected with the proposed storm sewer.
- This design involves 2,580 feet of pipe in addition to what is needed for design 1.
- Cost including concrete pipe, pipe installation, and contractor mobilization: $4,829,390

COAST OF STORM SEWER DIVERSION:
- Removal of oxygen consuming sediment to reduce phosphorus release and sediment oxygen demand
- Restore lake bottom to natural sand and improve lake depth

GOALS OF AERATION:
- Improve oxygen conditions in the lake to allow the reestablishment of a fishery
- Offset sediment oxygen demand from organic decomposition

GOALS OF SEDIMENT DREDGING:
- Removal of oxygen consuming sediment to reduce phosphorus release and sediment oxygen demand
- Restore lake bottom to natural sand and improve lake depth

The majority of work done has been on Crystal Lake. Details of the work done towards restoration of this lake are shown at right.