Flood Risk Management in Chicagoland

- 1900’s – Canal System
- 1970’s – Tunnel and Reservoir Plan
- 1980’s – Stormwater Reservoirs
- 2004 – Stormwater Management, Cook County
- 2014 – Local Program
- 2016 – The Robbins Plan
“Sanitary District of Chicago”
Chicago Sanitary and Ship Canal Excavation, 1895
The city grew rapidly in the 1850s.
Chicago discharged sewage into the Chicago River, which drained into Lake Michigan.
St. Louis filed an injunction to stop flow in the CSSC
After Canal Construction

Chicago Waterway System
Tunnels

- Chicago’s first water tunnel placed in service in 1847
  - 5’ brick tunnel in clay
  - 60 feet below Lake Michigan
  - Extended 2 miles into the lake
- Chicago’s first rock tunnel completed 1911
  - 9’ to 14’
  - 102 to 160 feet deep
  - 79/foot for the concrete lined 14’ section
- Over 65 miles of water tunnels larger than 9’
Press Plan For Flood Curbs Here

City Spurs Action On Drainage Plan

Envision Use of I-M Canal in Flood Plan

SANITARY BODY ACTS TO AVOID FLOOD THREATS

Sanitary district trustees moved yesterday to ease the danger of floods along the Illinois River just below Chicago. They instructed Horace Ramey, chief engineer, to confer with J. John P. Corey, chief engineer, on a plan to prevent backwater conditions from causing damage to the board, told other trustees. "If the area is flooded by heavy or extended rains, we will have no jurisdiction over the area which could relieve us," Ramey said.

Tells of Recent Perils

Ramey said the army corps was working to prevent another flood in the area. The board also formally approved the sale of 2 million dollars in bonds to raise revenue for acquisition of a city sanitary sewer for Mount Prospect. The project has been hampered by the sale of revenue bonds issued by the legislature.

SANITARY DISTRICT TOLD TO DREDGE CHANNEL TO CUT FLOOD DAMAGE

Sanitary district trustees voted yesterday to dredge the North Shore channel and cut trees along the 300-mile stretch between Detroit and Chicago. The project, costing $50 million, would be undertaken by the Illinois and Michigan Canal Commission.

Must Keep Pace

The district must keep pace with the city of Chicago, which has spent $500,000 to dredge the North Shore channel and cut trees along the banks.

Silt To Be Removed

An average accumulation of silt of depths deep water will be removed and spillsage will be placed in low areas along the banks. The project is expected to cost $50 million, said Ramey.
A tabulation, showing the storage basin volumes and the channel discharges for 17 sub-basins, for drainage, covering the entire Cook County region, is shown (page 52). The total of all the channel discharges amounts to 148,000 cfs.

Then (page 53) is listed the suggested program and works recommended for construction, as follows:

1. Creation of a central authority for flood control.
2. Installation of transmitting instruments and centralised recording devices for control of operation of works.
3. Chicago River Pumping Station
4. Widening and deepening of the Ship Canal
5. Reservoirs and channel improvements on the North Branch of the Chicago River.
6. Channel improvement and pumping station for the North Shore Channel.
7. Reservoir to control the upper Des Plaines River.
8. Reservoirs and channel improvements on Salt Creek
10. Reservoirs and channel improvements on Thorn Creek
11. A pumping station, new channels, and improvements for the Little Calumet River.
12. New sewer pumping stations at 125th and 95th Streets, and reservoirs on Tinley and Stony Creeks.

These items will be discussed individually, below.

Central Authority for Flood Control

The need for a central authority for flood control is so obvious that it needs no discussion. Water always runs down hill, without regard to any political lines. A comprehensive flood control plan must be devised on an area-wide basis; and the watersheds of the streams involved are items which must be considered, rather than the limits of the municipalities served. The most obvious agency, now in existence, to handle flood problems, is, of course, The Metropolitan Sanitary
• In existence on and off since 1957
• Consisted of representatives of:
  • Illinois Department of Public Works
  • Cook County
  • The City Chicago
  • District
• Created a Technical Advisory Committee in 1968 to review various plans and develop recommendations for course of action
Tunnel and Reservoir Plan (TARP)

- More than 50 Alternative Planes Developed and Evaluated Over a 7 Year Period
- TARP was the Composite of the 8 Best Alternatives
- Recommend by Flood Control Coordination Committee
- Adopted by MWRDGC on October 26, 1972 - eight days after the Clean Water Act was enacted.
What Was Constructed?

- 109.4 Miles of Deep Tunnels
  - 10’ - 35’ in Excavated Diameter
  - 150’ - 350’ Below Ground
- 264 Dropshafts 4’ – 25’ in Diameter
- 19 Construction Shafts 25’ -32’ in Diameter
- 3 Major Pumping Stations
- Over 600 Near-Surface Connecting and Regulating Structures
TARP or “Deep Tunnel”
TARP Reservoir
Majewski Reservoir: Completed 1998
Thornton Composite Reservoir: Completed 2015
McCook Reservoir, Stage 1: 2017
(Stage 2: Est. Completion 2029)
<table>
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<tr>
<th>Project</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Phase 1 Tunnels</td>
<td>$ 2.3 Billion</td>
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<tr>
<td>O’Hare CUP Reservoir</td>
<td>$ 45 Million</td>
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<td>Thornton Reservoir</td>
<td>$420 Million</td>
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<tr>
<td>McCook Reservoir</td>
<td>$800 Million</td>
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<tr>
<td><strong>Total TARP</strong></td>
<td><strong>$3.6 Billion</strong></td>
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Above Average Rainfall in Cook County
1990 - 2014

Average Annual Rainfall 36"
Mean Number of Fish Collected Below the Outfall

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<tr>
<td>O'Brien WRP</td>
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<td>North Shore Channel</td>
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<td>Touhy Ave.</td>
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<td>Stickney WRP</td>
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<td>Chicago Sanitary &amp; Ship</td>
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<td>Canal</td>
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<td>Harlem Ave.</td>
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<td>Calumet WRP</td>
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<td>Little Calumet River</td>
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<td>Halsted St.</td>
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Existing Flood Control Reservoirs

- 35 Existing Reservoirs
- Constructed from 1960s to 1990s in cooperation with NRCS, USACE, and other regional agencies
- Total Volume of 12,000 acre-feet
Flooding remains our #1 issue

- Stormwater Phase I Projects
  - Design and Construction of Regional Flood Control and Streambank Stabilization Projects

- Stormwater Phase II Projects
  - Funding of Shovel-Ready Projects
  - Design of Conceptual Projects

- Green Infrastructure
  - Partnerships with Local Communities

- Flood-Prone Property Acquisitions
  - Voluntary buyouts where no practical engineered solution exists
MWRD conveyed authority in November 2004 to plan, manage, implement, and finance activities relating to stormwater management in Cook County.

Cook County Stormwater Management Plan (CCSMP) adopted in 2007 establishing program framework.

Primary Stormwater Management Activities:

- Develop Capital Improvement Program (CIP) to address REGIONAL stormwater problems.
- Comprehensive uniform stormwater regulations to ensure future development and redevelopment does not exacerbate flooding.
Detailed Watershed Plan Development

- Poplar Creek
- Upper Salt Creek
- Lower Des Plaines River
- North Branch Chicago River
- Calumet-Sag Channel
- Little Calumet River
Regional Flooding or Streambank Stabilization Projects recommended in Detailed Watershed Plans

Projects previously approved by Federal or State Agencies
Recommended DWP Projects

15 Flood Control Projects to address overbank flooding

12 Streambank Stabilization Projects to address critical erosion

Prioritized based on Benefit-to-Cost Ratio and Distributed across Cook County
Streambank Stabilization Projects

- Address erosion threatening structures, roadways, utilities on regional waterways
- Natural channel design is our goal where practical
- Structural measures when necessary
  - Concrete walls
  - Sheet piles
  - Gabions
Regional Flood Control Projects

Heritage Park Flood Control Facility

- 150 Acre-feet of New Stormwater Storage
- Flood Control improvements integrated into Park District master plan
- Provides Compensatory Storage for USACE Levee 37 which protects 600 homes and businesses from flooding
- Tri-party IGA with MWRD, Wheeling and Wheeling Park District
Flood Control and Streambank Stabilization Project on Tinley Creek in Crestwood
Legislative Amendment to MWRD’s Stormwater Management Authority

Public Act 98-0652 enacted into Law June 2014

• Allowed the District to move forward on new initiatives under its **Phase II** program including partnering with local communities and agencies to address **local** drainage problems, and setting up a program for purchasing flood prone and flood damaged property on a voluntary basis.

• District-wide call for local projects/problem areas in 2013, future calls to be done on biennial basis starting in 2017

• Application process developed for flood-prone acquisitions
Phase II Projects

Shovel-ready and Conceptual projects
Distributed throughout county

Types of Projects include:

- Green infrastructure
- Localized detention
- Upsizing critical storm sewers/culverts
- Pump stations
- Establishing drainage ways
Shovel-Ready Example: Mayfair Reservoir Expansion

- 27 Acre-feet of New Stormwater Storage in Westchester
- 60 Structures Protected
- Village responsible for design, construction, and maintenance
- MWRD provided $2.1M for construction
- Project completed 201
Conceptual Example: Natalie Creek Flood Control Proj.

- Conveyance and Storage Improvements in Village of Midlothian (est. $8.3M)
- 237 structures to be protected
- MWRD to design and construct
- Village to own and maintain all new improvements
- Project to be constructed in 2017
Stormwater Project Hurdles

• For local projects to be eligible for MWRD funding assistance, communities must follow MWRD Procurement Rules, Diversity Requirements, and comply with Multi-Project Labor Agreement

• Local communities must own and maintain new improvements

• Locals must provide up-front construction funding (MWRD funding is reimbursement-based)

• Project benefits must be clearly defined and quantifiable

• Socio-economic challenged communities have stormwater issues that go beyond flooding
Flood-Prone Property Acquisition Program

• Policy adopted by Board of Commissioners August 2014 after PA 98-0652

• Three Distinct Components

  1. Local Sponsor Assistance Program
  2. District Initiated Program
  3. Local Government Application
Minimum Criterion

1. Property must be within 100-year floodplain and/or DWP inundation area.
2. The Project’s Benefit-to-Cost Ratio must be greater than 1.0.

Factors Applicable to Each Program

1. Local government agency must serve as a local sponsor
2. Duties of local sponsor include:
   • Local Sponsor will be party responsible for direct contact with the private property owners during the acquisition process
   • Accept ownership of acquired property
   • Remove existing structures
   • Place deed restrictions against future development
   • Maintain property upon return to open land
   • Provide regular reports certifying property meets terms and conditions
Program Progress

- Glenview - 17 homes purchased
- Des Plaines (Ph. 1) – 3 homes acquired 10 more in process (13 total)
- Riverside-Lawn – 17 homes acquired 22 more in process (39 total)
- Northlake – in process of acquiring 7 homes
- Des Plaines (Ph. 2) – in process of acquiring 47 homes
- Stone Park – finalizing agreement to acquire 35 homes
- Flossmoor – finalizing agreement to acquire 2 homes
- Franklin Park – In negotiation to acquire 32 homes
- Wheeling Township – facilitating Cook Co. partnership to acquire 6 homes.
Green Infrastructure

Program Components

• Rain Barrel Program
• Comprehensive Land Use Policy
• Community Assistance and Public Outreach
• Projects and Design Retention Capacity
The District’s Rain Barrel Program utilized three distribution networks

- Municipalities
- NGOs and community groups
- campus-type facilities

Through 2016, nearly 120,000 MWRD rain barrels have been distributed in 108 communities across Cook County
MWRD’s Comprehensive Land Use Policy requires public entities leasing MWRD property to provide GI based on the size of the leasehold and the desired use.

Private developers are required to comply with the terms of the Watershed Management Ordinance.

- Capture 1-inch of runoff from impervious surfaces using Green Infrastructure
- In 2014 and 2015 15, 119 permits issued requiring a total of 7,795,627 Gallons of GI retention volume
MWRD is committed to providing administrative and technical assistance to communities within its service area to facilitate the implementation of GI projects.

MWRD worked with numerous stakeholders to share and gain knowledge on the:

- Design
- Installation
- Maintenance of GI
Green Infrastructure Projects

Prioritize projects based on various criteria, including:

- The likelihood of flooding and/or basement backup reduction
- Number of benefitting structures
- Project cost
- Project location with consideration given to maintenance and educational opportunities
- Socio-economic considerations

Develop partnerships
Green Infrastructure Partnerships

Space to Grow

• Managed by Healthy Schools Campaign and Openlands
• Funding and technical assistance from
  • Chicago Public Schools
  • Chicago Dept. of Water Management
  • MWRDGC

Chicago Housing Authority

• Dearborn Homes Rainwater Harvesting

Local Municipalities

• Evanston, Blue Island, Kenilworth, Wilmette, Northbrook (complete)
• Skokie, Niles, Berwyn (under design)
Robbins Phase II Concept Project

- Preliminary engineering alternatives developed to address flooding along Midlothian Creek which affects ~100 structures in a 100-year storm event.

- Evaluation of alternatives with community revealed need to consider other issues such as:
  - Limited local capacity
  - Development limitations
  - Lack of coordinated planning

- Need to rethink approach
MWRD’s goal is to redefine the meaning of infrastructure investment by implementing solutions that not only promote resiliency, but also promote the economic growth, health, and “well being” of a community.