Metropolitan Water Reclamation District of Greater Chicago
History
Prior to Canal Construction

Chicago dumped sewage into the Chicago River, which drained into Lake Michigan.
Illinois and Michigan Canal
St. Louis filed an injunction to stop flow in the CSSC
Lockport Controlling Works

History
Bear Trap Dam (1900)
Main Channel Extension (1905)

History
Original Lock

Highest lift lock in the world at time of construction
Powerhouse Construction (1906)
Butterfly Dam (1907) - Open Position
Chicago Waterway System
North Shore Channel

Chicago Waterway System
Chicago River – North Branch

Chicago Waterway System
Chicago River

Chicago Waterway System
Chicago River – South Branch

Chicago Waterway System
Chicago River – S. Fork of S. Branch

Chicago Waterway System
Calumet River

Chicago Waterway System
Little Calumet River

Chicago Waterway System
Calumet Sag Channel

Chicago Waterway System
Chicago Sanitary and Ship Canal

Chicago Waterway System
Lockport Powerhouse

Chicago Waterway System
Diverted Portion of Lake Michigan Watershed
Waterway Control Structures
Wilmette Pump Station

- Gate
- 250 CFS Pump
- Submersible Pumps
Stickney Water Reclamation Plant

Design Average Flow – 1200 MGD

Waterway Control Structures
Calumet Water Reclamation Plant

Design Average Flow - 354 MGD
North Side Water Reclamation Plant

Design Average Flow – 333 MGD

Waterway Control Structures
Lockport Lock was part of a USACE project to deepen and straighten the Des Plaines and Illinois Rivers to improve navigation.
Illinois diverted up to 10,000 cfs from Lake Michigan. Other Great Lakes States took us to the Supreme Court to reduce or eliminate diversion.
Chicago River Controlling Works

- North – 4 Gates
- South – 4 Gates

Waterway Control Structures
O’Brien Lock and Controlling Works

Waterway Control Structures
Old Vertical Generator (1934)

Waterway Control Structures
Pit Gate Operators

Waterway Control Structures
Current Generator from Above

Waterway Control Structures
Centennial Fountain

Waterway Control Structures
Operation of
Chicago Area Waterways
Control Room

Operation of Chicago Area Waterways
Lake Michigan

Operation of Chicago Area Waterways
Treatment Plant Effluent

Makes up 70% of waterway flow during dry weather conditions

Operation of Chicago Area Waterways
ENCLOSURE 1

TITLE 33—NAVIGATION AND NAVIGABLE WATERS
CHAPTER II—CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY
PART 207—NAVIGATION REGULATIONS

Sec. 207.420 Chicago River, Ill.; Sanitary District controlling works, and the use, administration, and navigation of the lock at the mouth of River, Chicago Harbor.

(a) Controlling works. The controlling works shall be so operated that the water level in the Chicago River will be maintained at a level lower than that of the lake, except in times of excessive storm run-off into the river or when the level of the lake is below minus 2 feet, Chicago City Datum.

(1) The elevation to be maintained in the Chicago River at the west end of the lock will be determined from time to time by the U.S. District Engineer, Chicago, Illinois. It shall at no time be higher than minus 0.5 feet, Chicago City Datum, and at no time lower than minus 2.0 feet, Chicago City Datum, except as noted in the preceding paragraph.

(b) Lock- (1) Operation. The lock shall be operated by the Metropolitan Sanitary District of Chicago under the general supervision of the U.S. District Engineer, Chicago, Illinois. The lock gates shall be kept in the closed position at all times except for the passage of navigation.

Sec. 207.425 Calumet River, Ill.; Thomas J. O’Brien Lock and Controlling Works and the use, administration and navigation of the lock.

(a) Controlling Works. (1) The controlling works shall be so operated that the water level at the downstream end of the lock will be maintained at a level lower than that of Lake Michigan, except in times of excessive storm run-off into the Illinois Waterway, or when the lake level is below minus 2 feet, Chicago City Datum.

(2) The elevation to be maintained at the downstream end of the lock shall at no time be higher than minus 0.5 feet, Chicago City Datum, and at no time lower than minus 2.0 feet, Chicago City Datum, except as noted in paragraph (a)(1) of this section.

(b) Lock- (1) Operation. The Thomas J. O’Brien Lock and Dam is part of the Illinois Waterway which is a tributary of the Mississippi River. All rules and
Dispatcher Roles

- Monitor Rain Gauges, Elevation Gauges
- Meteorological Service Monitoring

Operation of Chicago Area Waterways
Storm Relief - Variables

- Ground Conditions
  - Frozen
  - Saturated

- Intensity of Rain
  - Short
  - Long, Steady

- Status of TARP
- Status of Tributaries
  - Full
  - Low

- Location of Storm
  - North Area
  - Central Area
  - South Area

- Capacity at WRPs

Operation of Chicago Area Waterways
Racine Avenue Pump Station

Operation of Chicago Area Waterways
Operation of Chicago Area Waterways

Tunnel and Reservoir Plan

TUNNELS (Pollution Control)

RESERVOIRS (Flood Control)

Storage Reservoir

Rock Stratum (Dolomite Limestone)

Niagara

Combined Sewer

Overflow

Drop Shaft

Pumping Station

Deep Tunnel

River

Water Reclamation Plant

M.W.R.D. Interceptor

320 ft
Operation of Chicago Area Waterways
Combined Sewer Overflow

Operation of Chicago Area Waterways
Lockport Controlling Works

Operation of Chicago Area Waterways
Rain Gauges

Operation of Chicago Area Waterways
Elevation Gauges

Elevations at Wilmette, CRCW and O’Brien are key to our operations.
Storm Relief – Reversing to Lake

Last Resort

Notification
- Drinking Water
- Coast Guard

Effects of Not Reversing
- Flooding
- Low DO, Odors

Operation of Chicago Area Waterways
Diversion Water

- Elevate Dissolved Oxygen (DO) of Waterways
- Flow to stagnant areas above treatment plants
- Governed by consent decree and Memo of Understanding
Dispatcher Roles

- Performs Electrical Switching
- Liaison to ComEd for all Electrical Switching
- Practice Lockout/Tagout Procedures to Ensure Safety
Dispatcher Roles

- Manned 24/7/365
- JULIE calls
- Flood, Odor, Other Complaints
- Call Logging

Operation of Chicago Area Waterways
Summary: Control of the CWS

Why we do it.
How we do it.
Small Streams Maintenance Program
Prior to 2006

- 3 Crews
  - North
  - Central
  - South
- 1 Dump truck for all crews
- Limited jurisdiction and scope
  - 101 miles of total stream segments
Crawler Carrier

Small Streams Maintenance Program
Gradall

Small Streams Maintenance Program
Additional Equipment

Small Streams Maintenance Program
Beaver Dam

Small Streams Maintenance Program
Thorn Creek Blockage - Before

Small Streams Maintenance Program
Thorn Creek Blockage - After
Winter Work

Small Streams Maintenance Program
## Removal Quantities

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<tr>
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<tbody>
<tr>
<td>Little Calumet River</td>
<td>7,640</td>
<td>10,310</td>
<td>9,330</td>
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<tr>
<td>Calumet-Sag Channel</td>
<td>5,260</td>
<td>7,910</td>
<td>9,890</td>
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<td>Lower Des Plaines River</td>
<td>3,160</td>
<td>5,290</td>
<td>11,065</td>
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<td>North Branch Chicago River</td>
<td>1,730</td>
<td>2,170</td>
<td>11,460</td>
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<tr>
<td>Upper Salt Creek</td>
<td>0</td>
<td>3,300</td>
<td>370</td>
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<tr>
<td>Poplar Creek</td>
<td>0</td>
<td>2,320</td>
<td>2,650</td>
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<td><strong>Total</strong></td>
<td><strong>17,790</strong></td>
<td><strong>31,300</strong></td>
<td><strong>44,765</strong></td>
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</tbody>
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Current Technology

Small Streams Maintenance Program
Future Technology - GIS

Small Streams Maintenance Program
Channel Maintenance
Debris Boat

Channel Maintenance
Debris Boat

Channel Maintenance
Pontoon Boats

Channel Maintenance
WAVEs

Channel Maintenance
WAVEs

Channel Maintenance
Rain Barrels

Channel Maintenance
Asian Carp
In Mississippi River Since 1970s

Eat 20% of weight

Only one live Asian carp caught
In the CAWS – below barrier

Extensive fishing and poisoning
Over last 3 months – no Asian carp

Nearest viable population is in the Dresden Pool - 41 miles from Lake

Can they establish in Lake Michigan
  • Unknown
    • 90% of invasions fail
      • Feeding
      • Spawning
      • Temperatures
    • Proven to be good at adapting
Asian Carp
**Barriers**

**Barrier I (Demonstration):**
- In continuous operation since 2002 @ 1 Volt/in, 5 hz, 4 ms
- Rehabilitated in Oct 2008

**Barrier I (Permanent):**
- Upgrade to a permanent barrier authorized; plan activation by 2013 if funded

**Barrier IIB:**
- Site prep completed
- Building construction contract NTP issued 3 Dec
- Electronics design ongoing
- Construction to be completed 30 Sep 10

**Barrier IIA:**
- Activated @ 1 Volt/in, 5 hz, 4 ms in APR 09.
- Increased to 2 Volt/in, 15 hz, 6.5 ms in AUG 09
- Maintenance shutdown completed 3 – 4 Dec w/rotenone support by State

Asian Carp
eDNA

Positive eDNA Detections Above Barriers

Asian Carp
Modified Structures and Operations

- Closing locks in conjunction with other activities (USACE)
- Installing bar screens on sluice gates (MWRD)
- Pumping at Wilmette PS (MWRD)
- Adjusting flows for other activities (MWRD)
Fishing

- Electrofishing (IDNR)
- Netting (FWS)
- Rotenone (IDNR)
  - O’Brien Lock: 100,000 lbs
  - No Asian carp
- Commercial Fishing (IDNR)
Other Measures

• Ballast Water Study (USCG)
• Establishing safety zones (USCG)
Long Term

- Biological Bullets (USGS)
- GLMRIS – Great Lakes Mississippi River Interbasin Study
  - Long-term solutions for all invasive species
  - Multiple Agencies