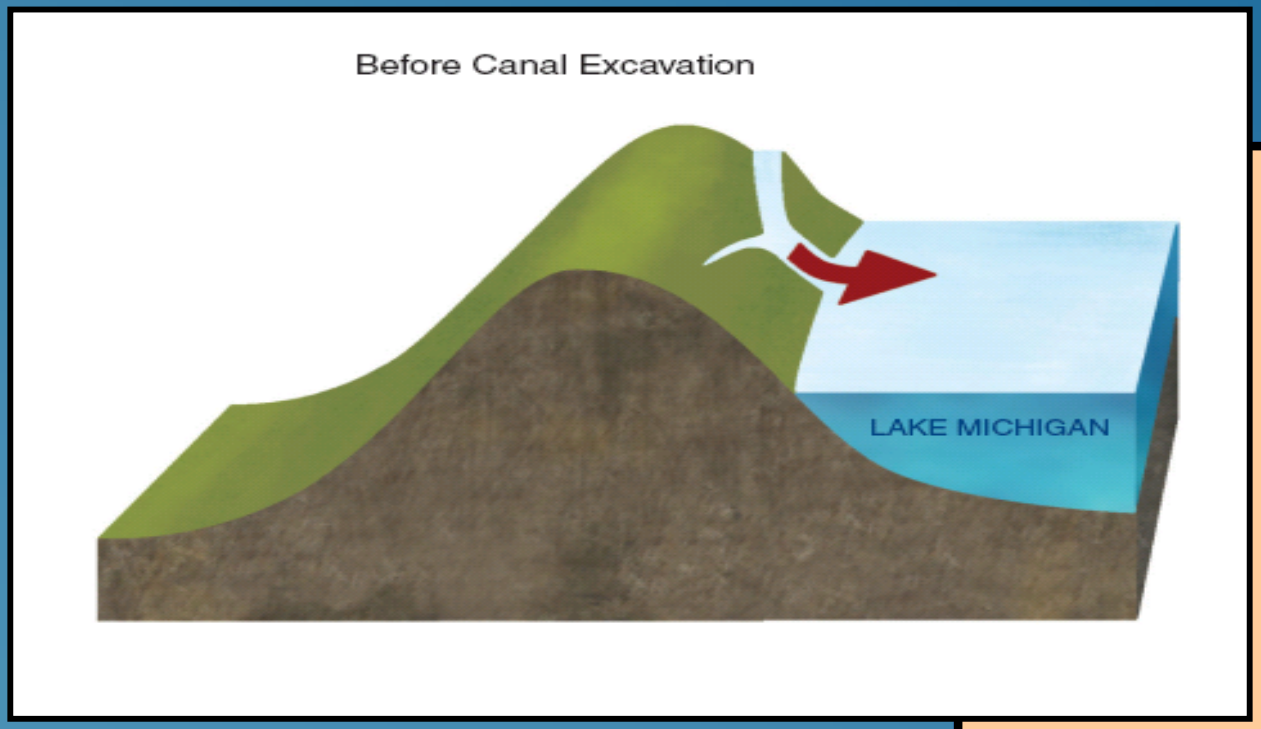
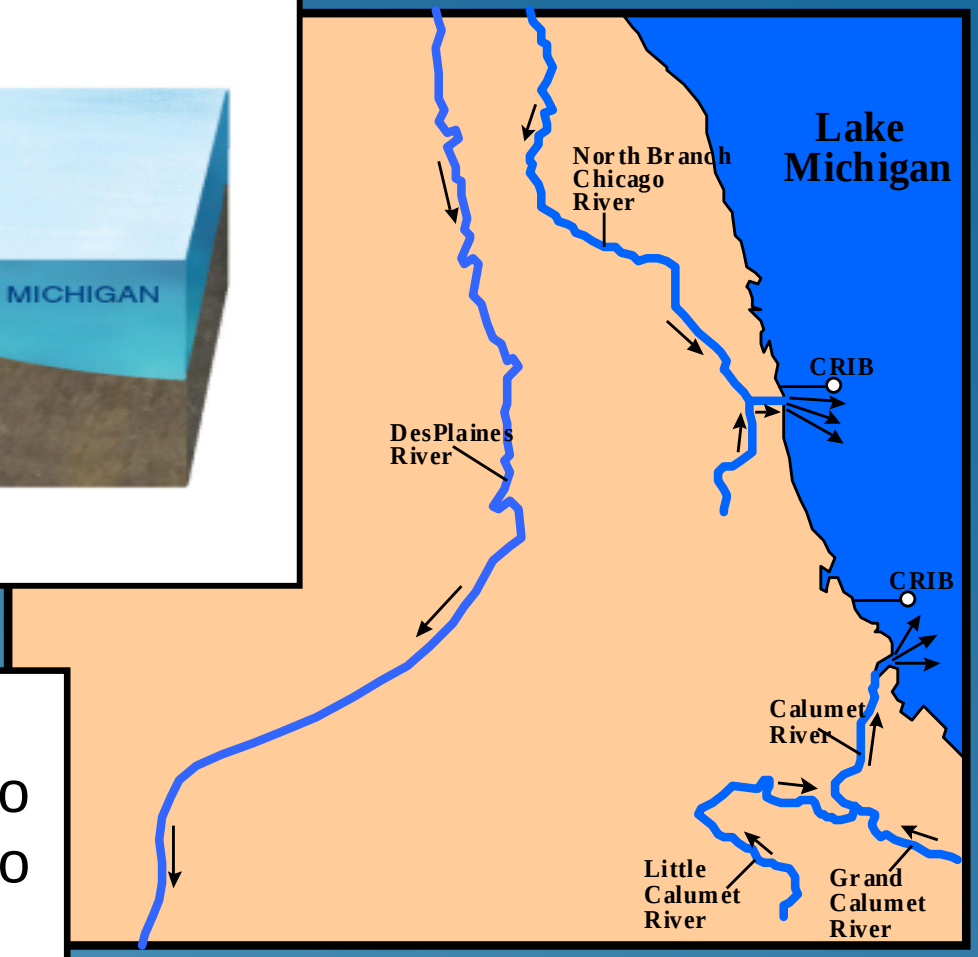
Metropolitan Water Reclamation District of Greater Chicago

History


METROPOLITAN WATER RECLAMATION DISTRICT
OF GREATER CHICAGO
CHICAGO
LAKE MICHIGAN
SPRINGFIELD
ST. LOUIS
CAIRO

Prior to Canal Construction



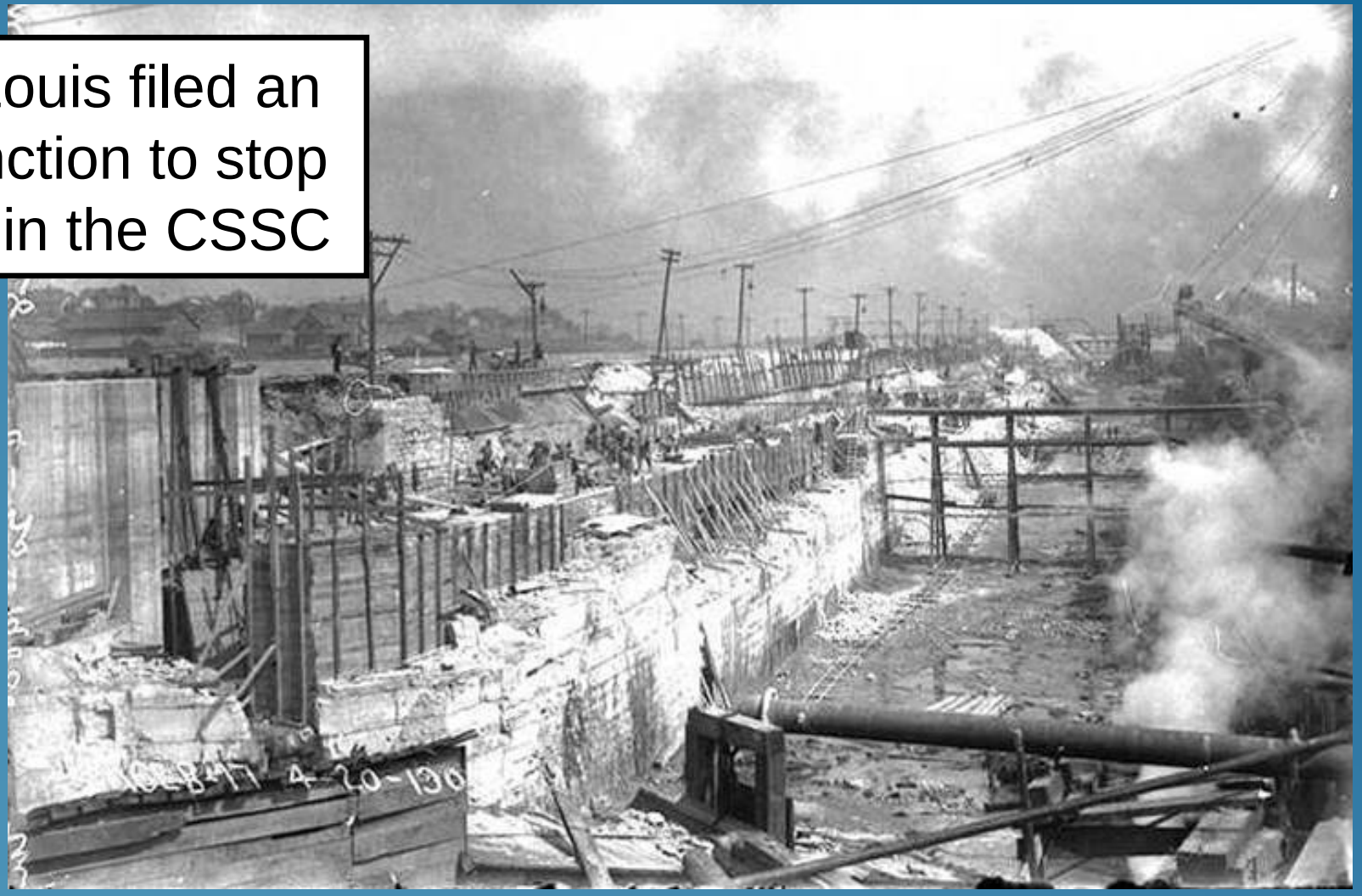


Chicago dumped sewage into the Chicago River, which drained into Lake Michigan

Illinois and Michigan Canal

Sanitary and Ship Canal Construction

St. Louis filed an injunction to stop flow in the CSSC

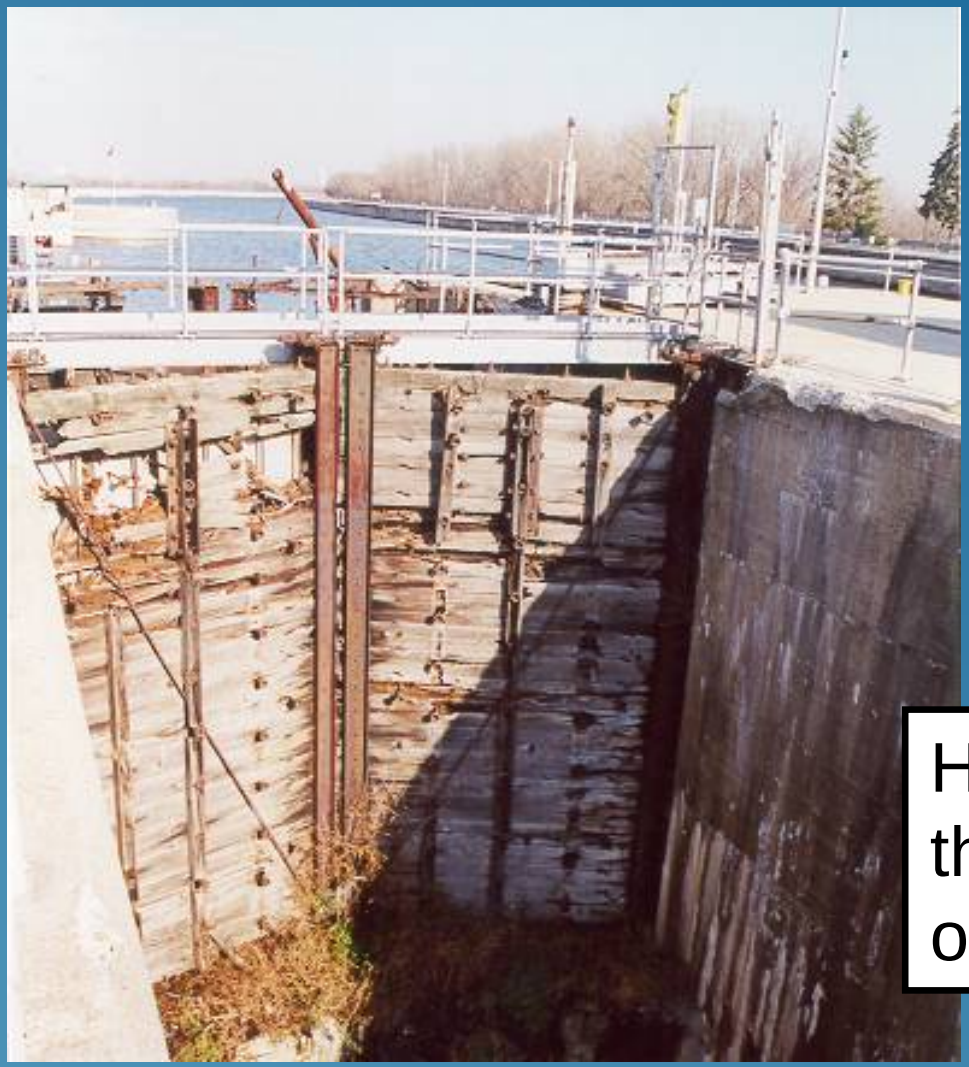


Lockport Controlling Works

Bear Trap Dam (1900)

Main Channel Extension (1905)

Original Lock



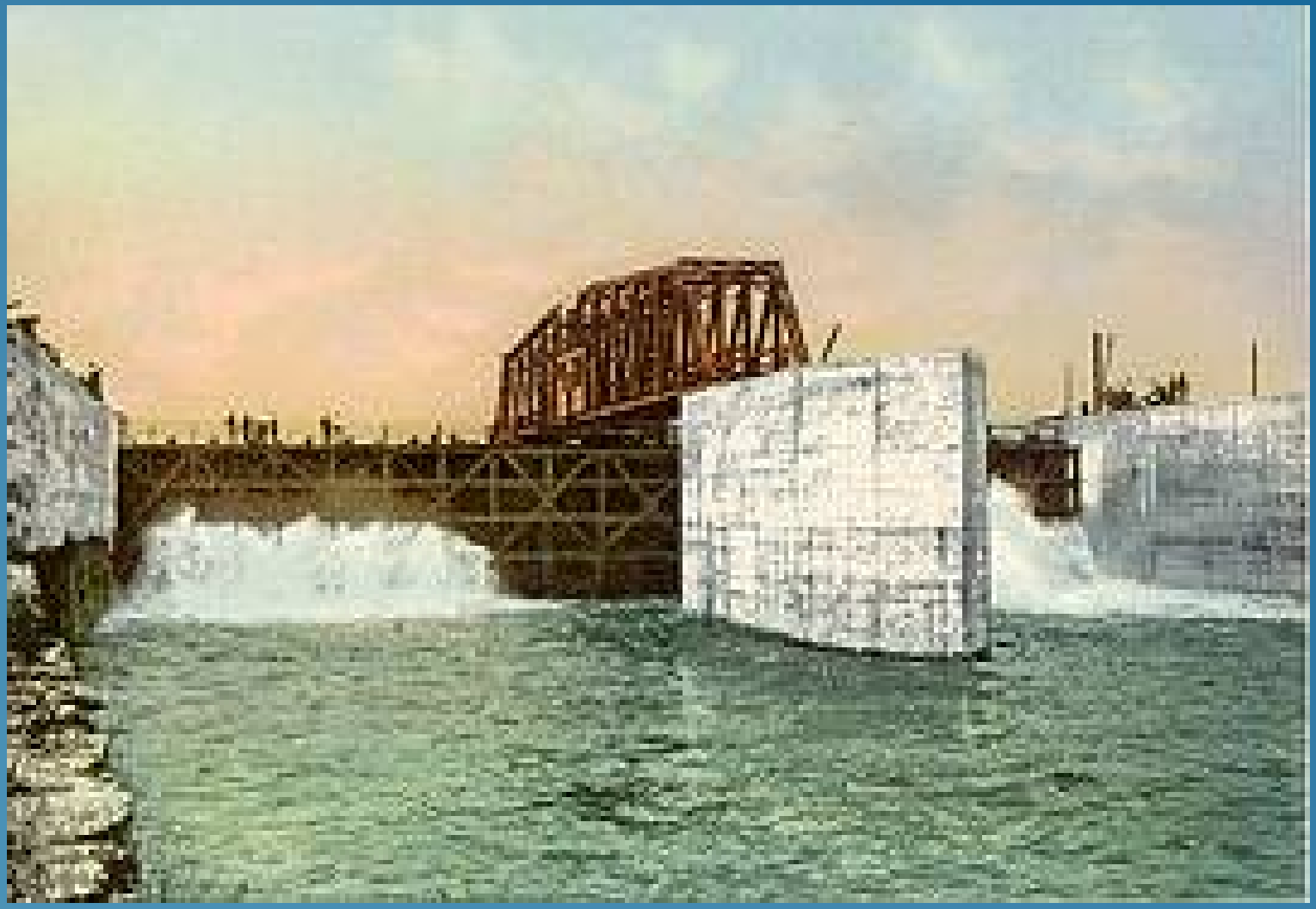
Highest lift lock in the world at time of construction

Powerhouse Construction (1906)

Horizontal Generators

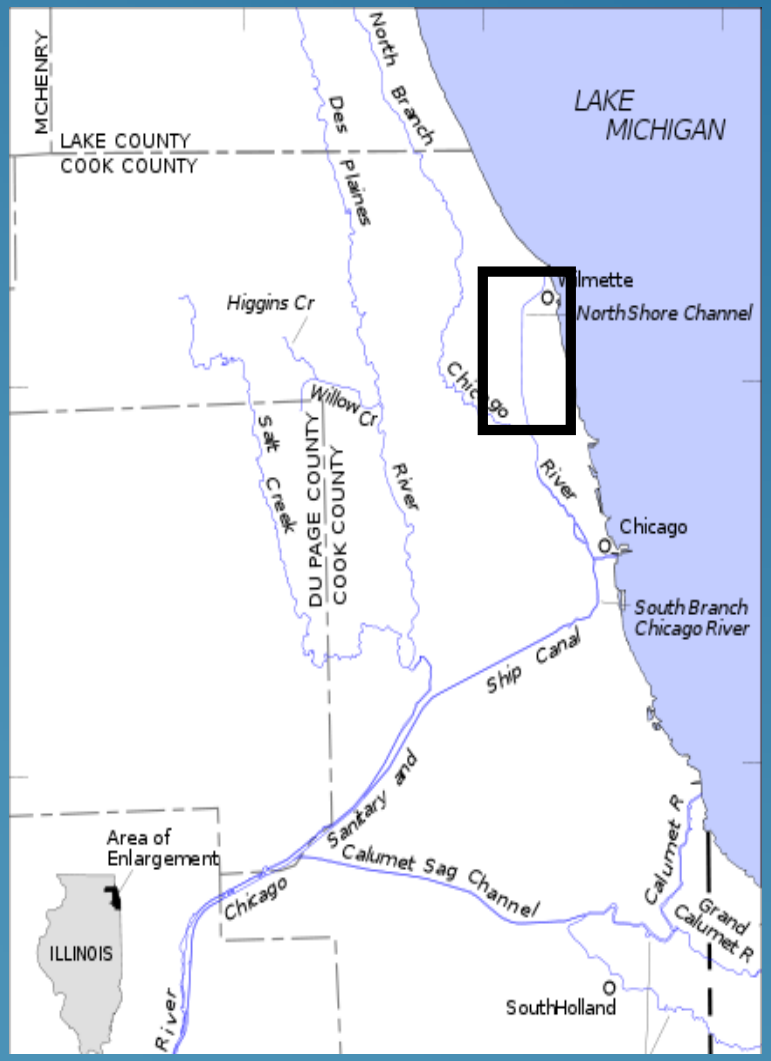
Butterfly Dam (1907) - Open Position

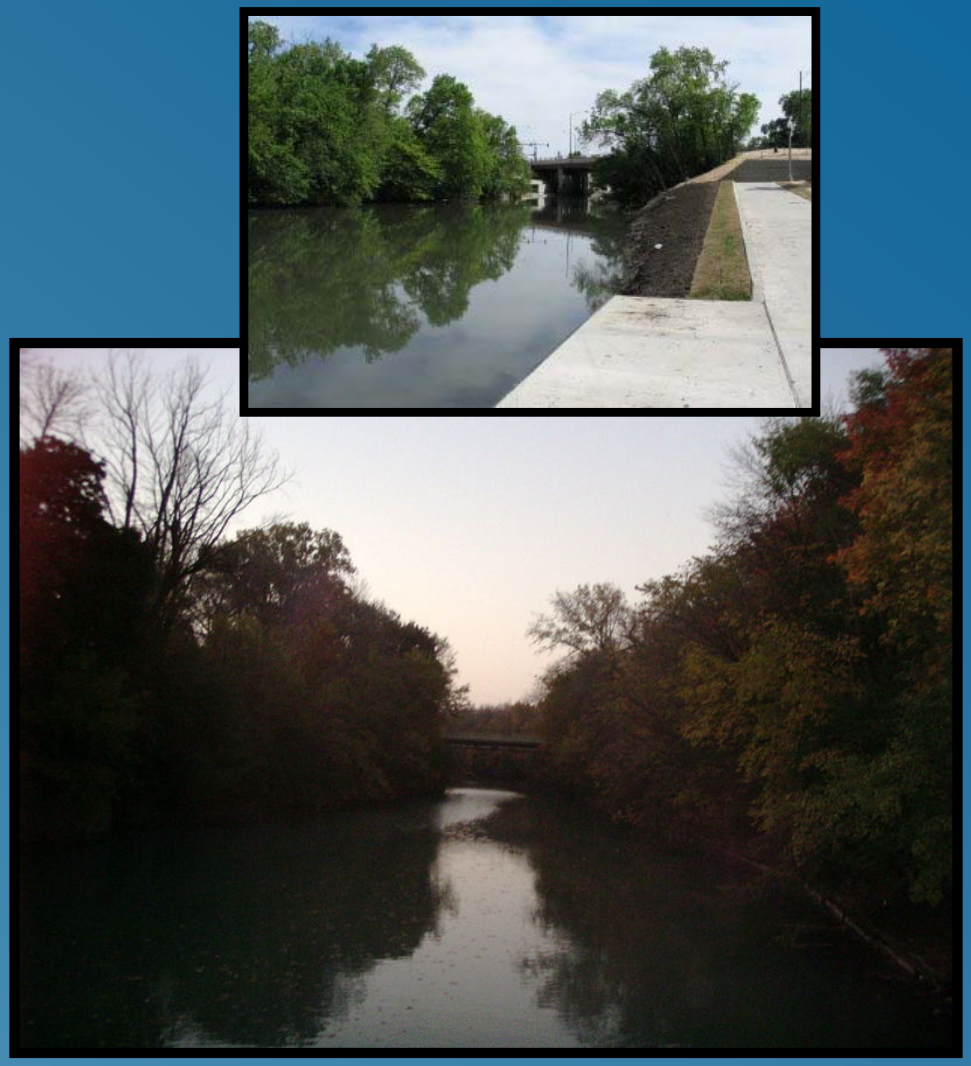
Butterfly Dam (1907) - Closed Position



Chicago Waterway System

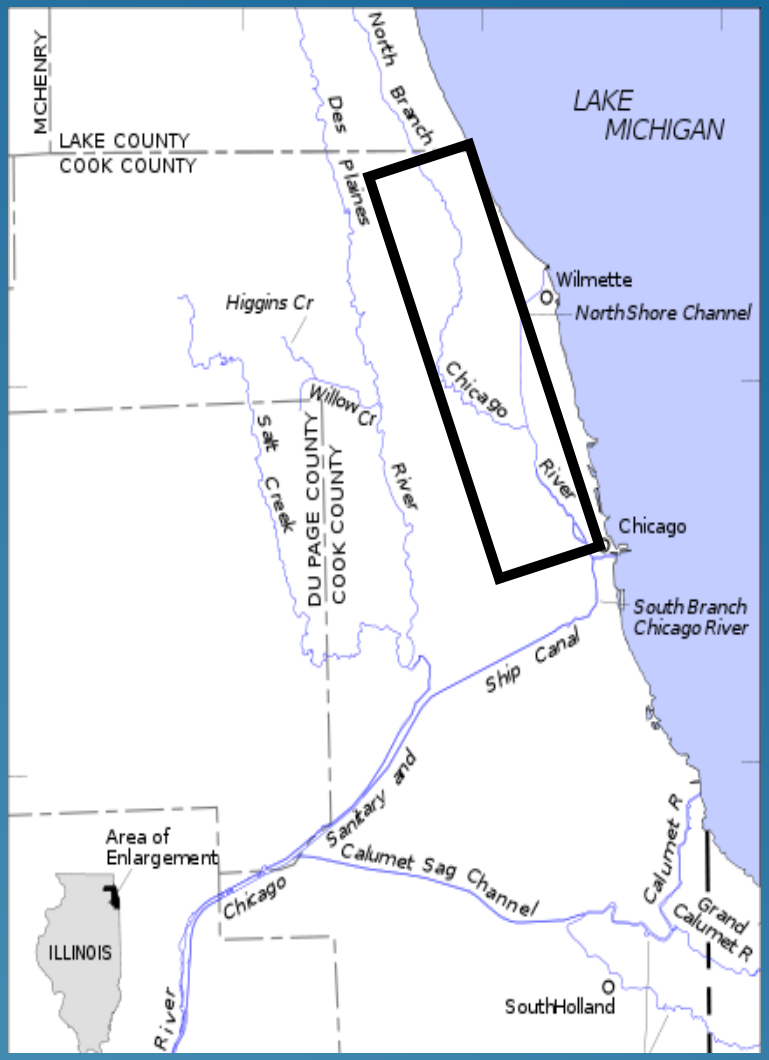
North Shore Channel





Chicago Waterway System

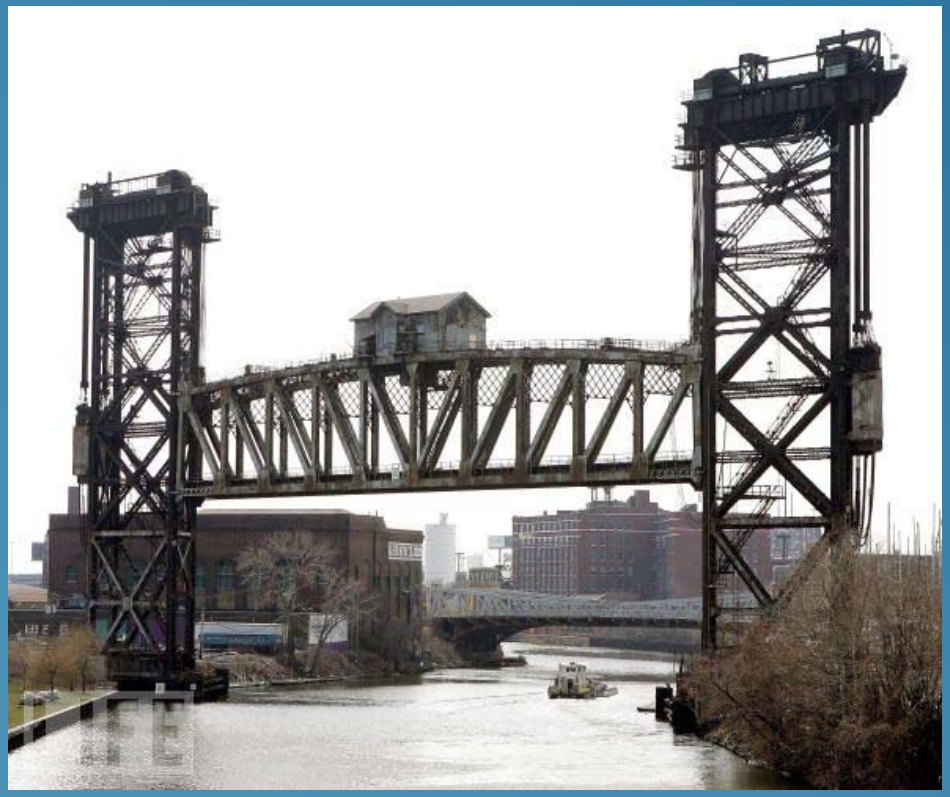
Chicago River – North Branch



Chicago River

Chicago Waterway System

Chicago River – South Branch

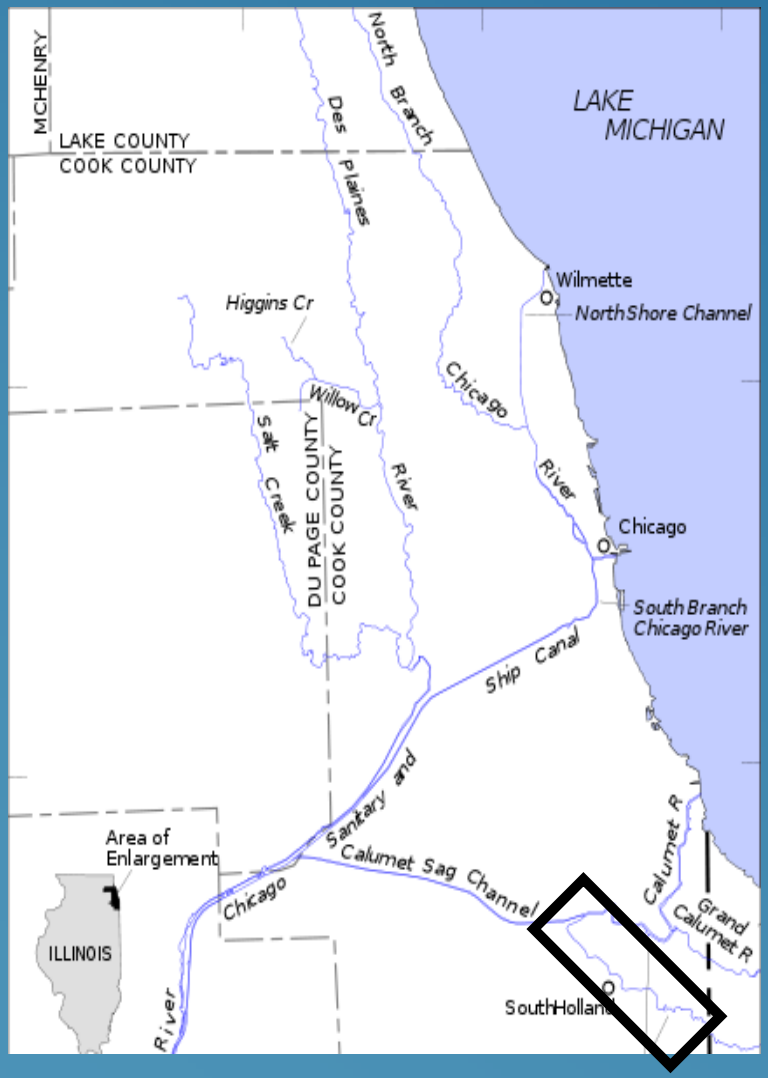


Chicago River – S. Fork of S. Branch

Chicago Waterway System

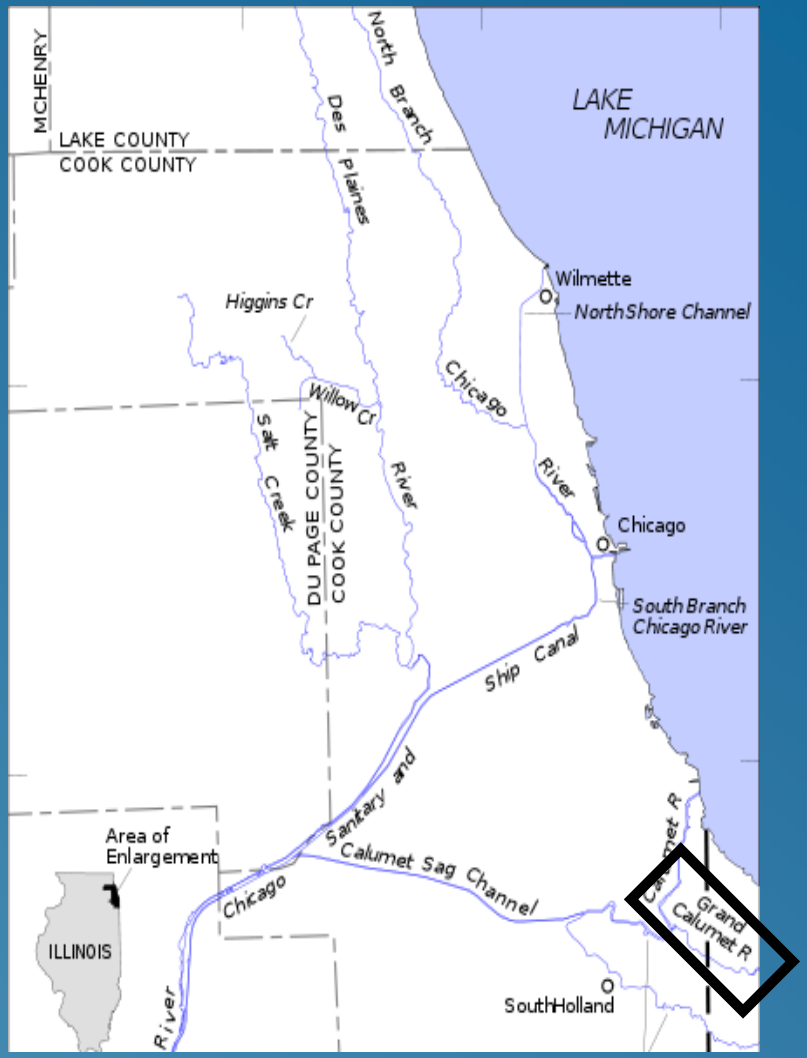
Calumet River

Little Calumet River

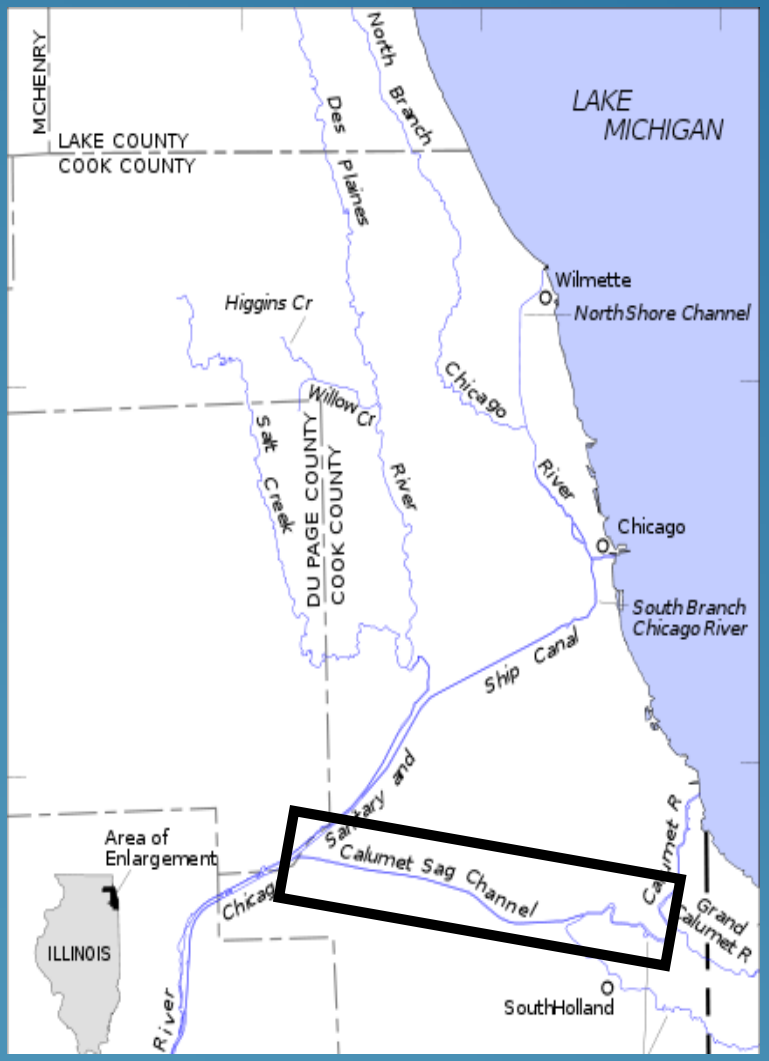


Chicago Waterway System

Grand Calumet River

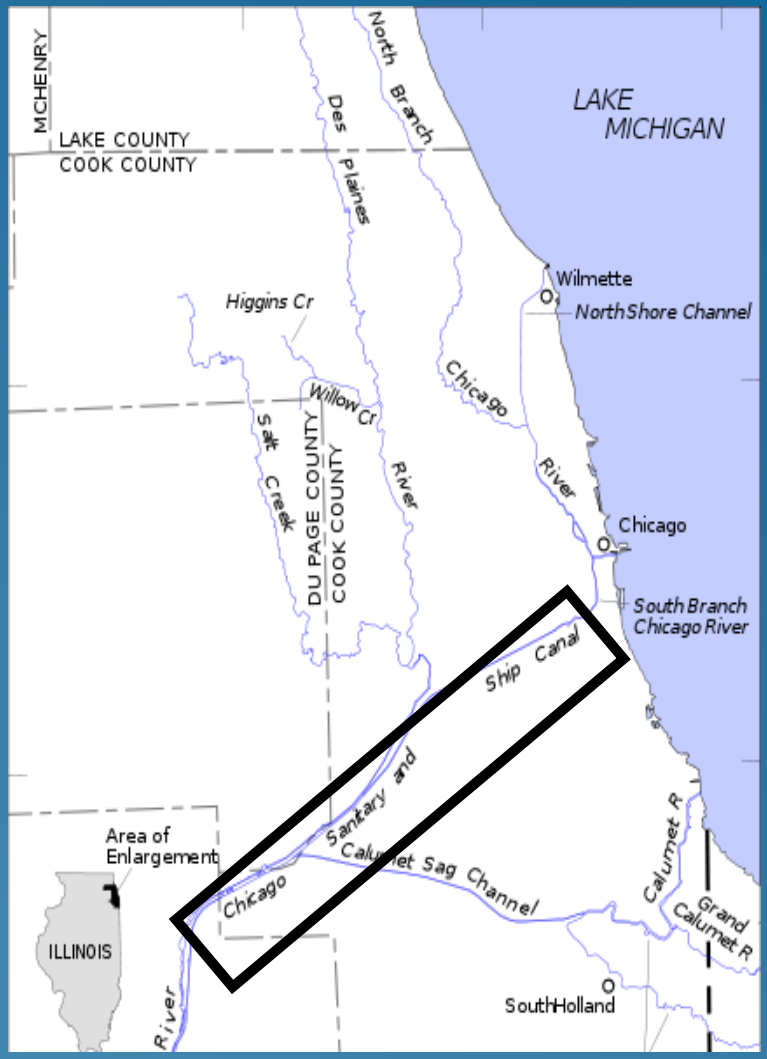


Calumet Sag Channel



Chicago Waterway System

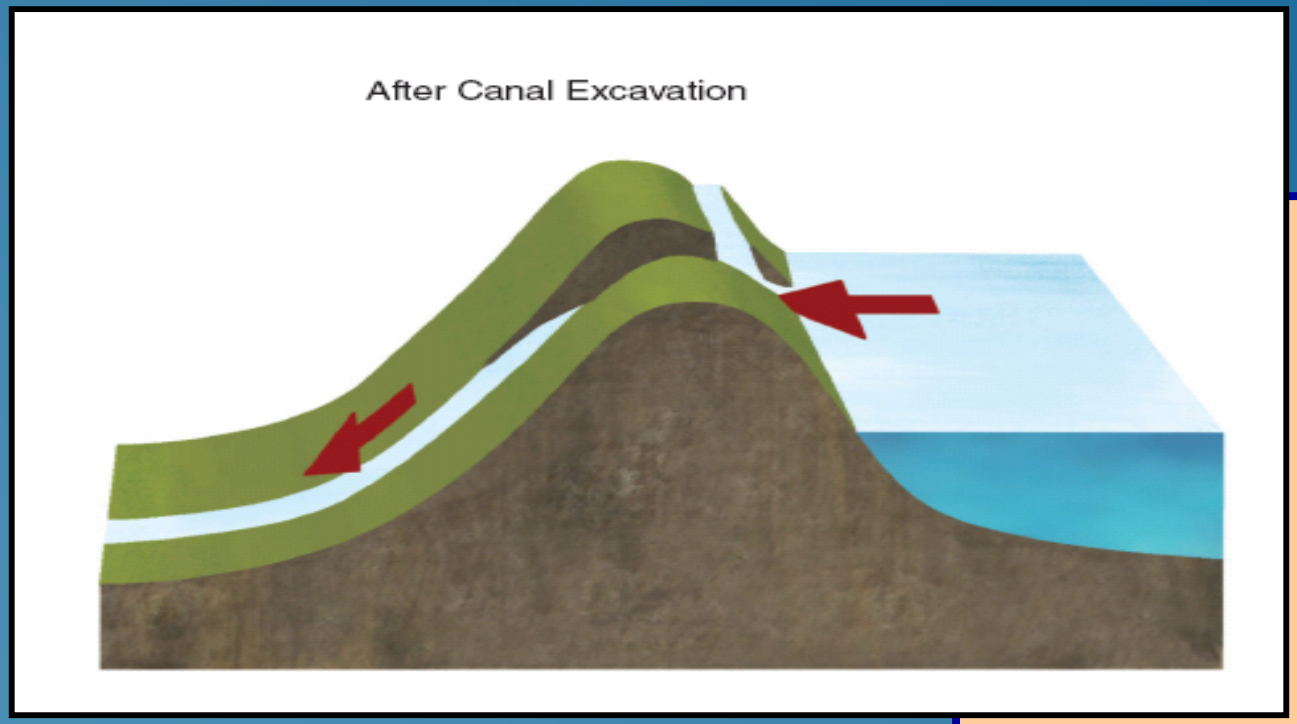
Chicago Sanitary and Ship Canal

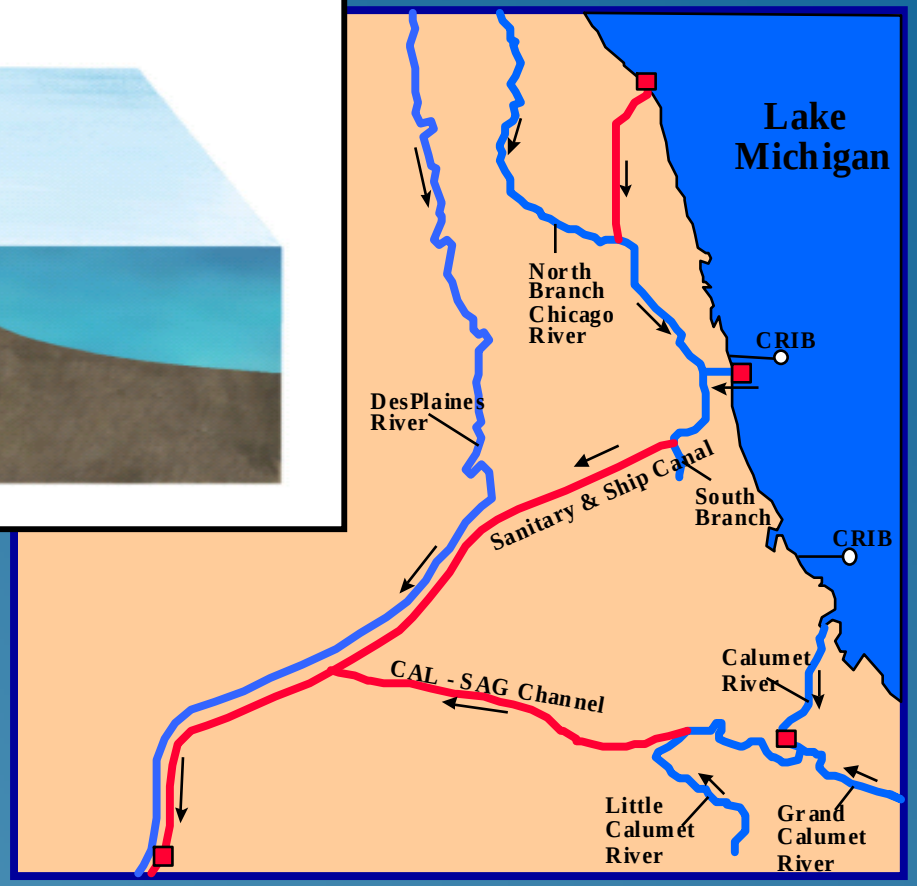


Chicago Waterway System

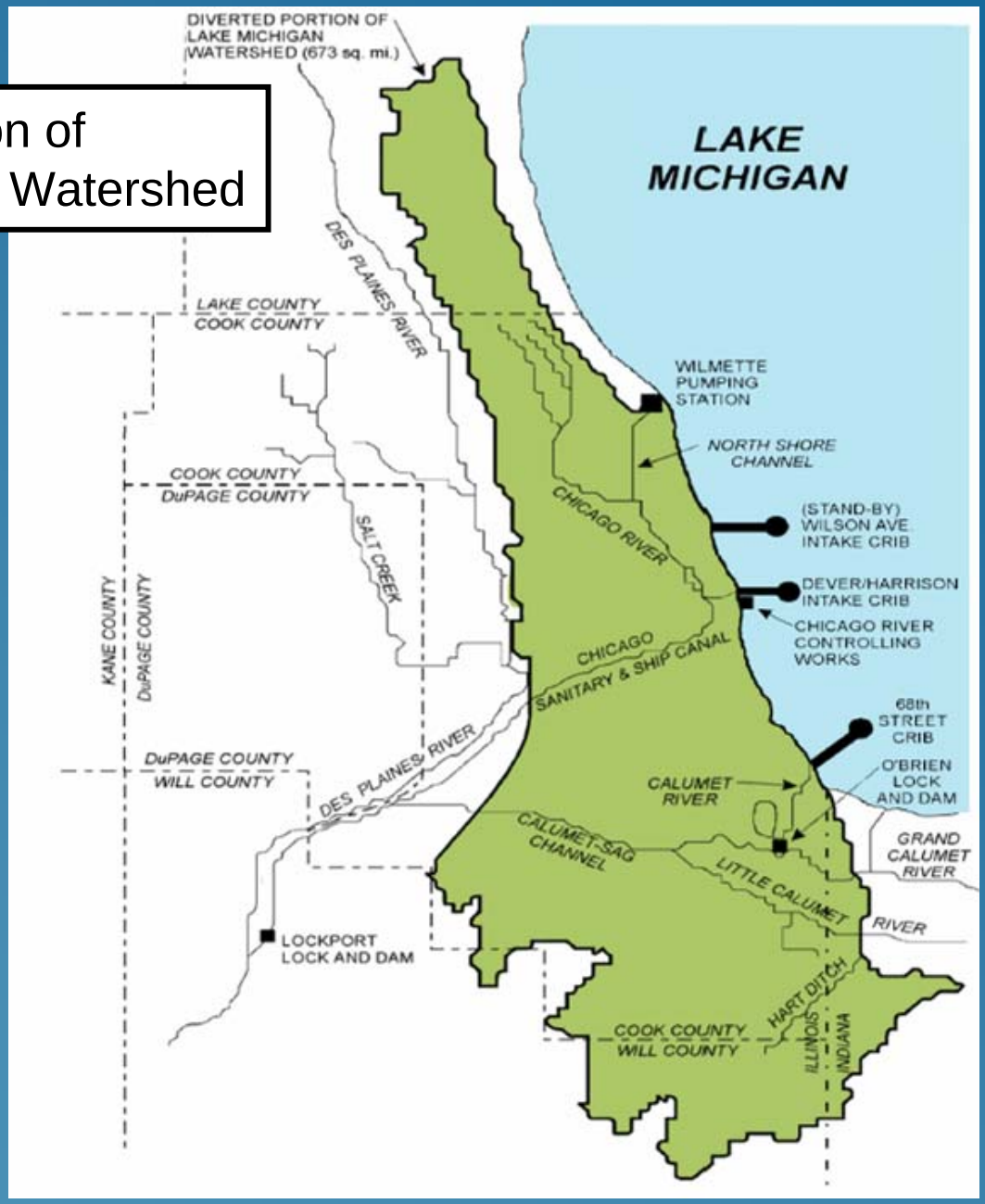
Lockport Powerhouse

After Canal Construction





Diverted Portion of
Lake Michigan Watershed



Waterway Control Structures

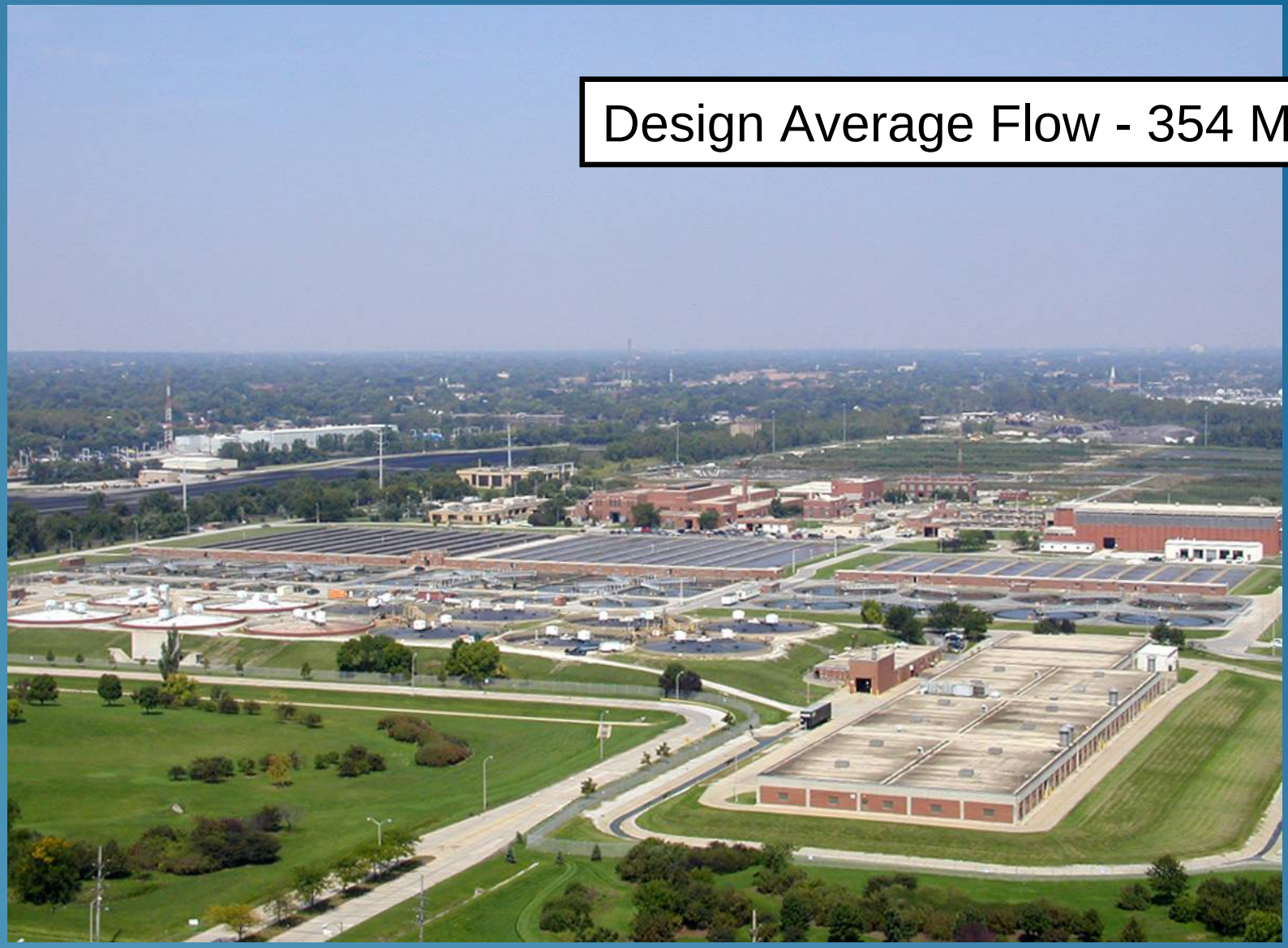
Wilmette Pump Station

- Gate
- 250 CFS Pump
- Submersible Pumps

Stickney Water Reclamation Plant

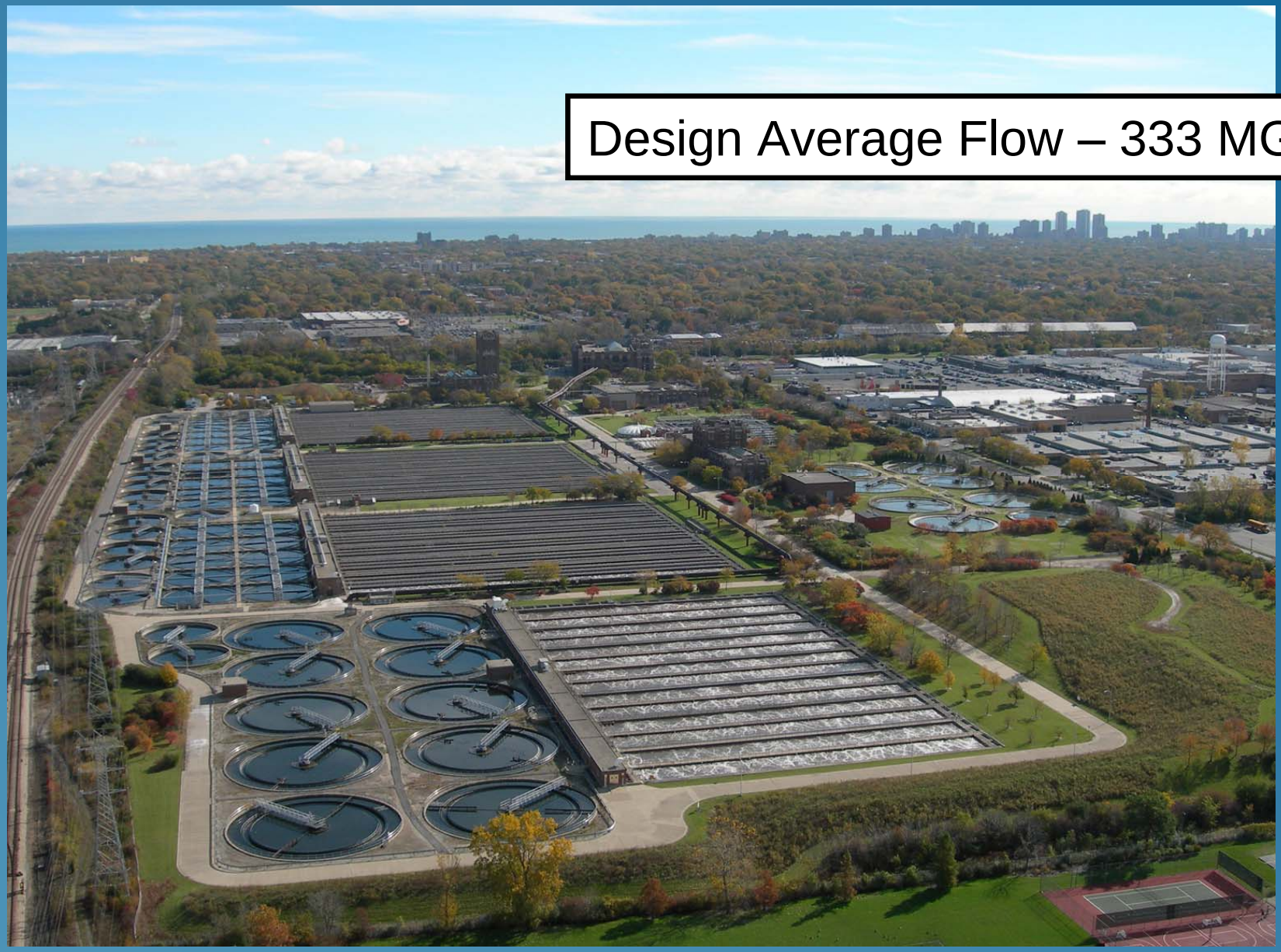
Design Average Flow – 1200 MGD

Calumet Water Reclamation Plant



Design Average Flow - 354 MGD

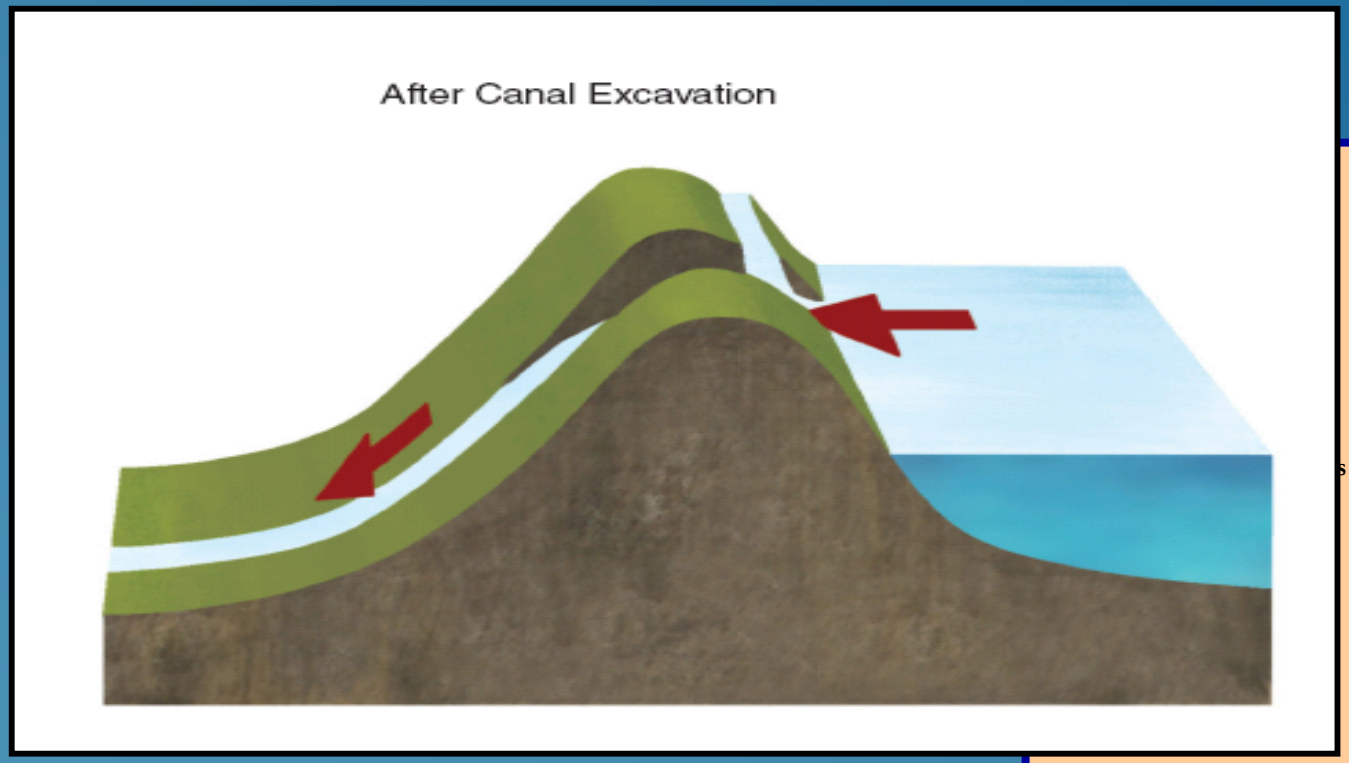
North Side Water Reclamation Plant

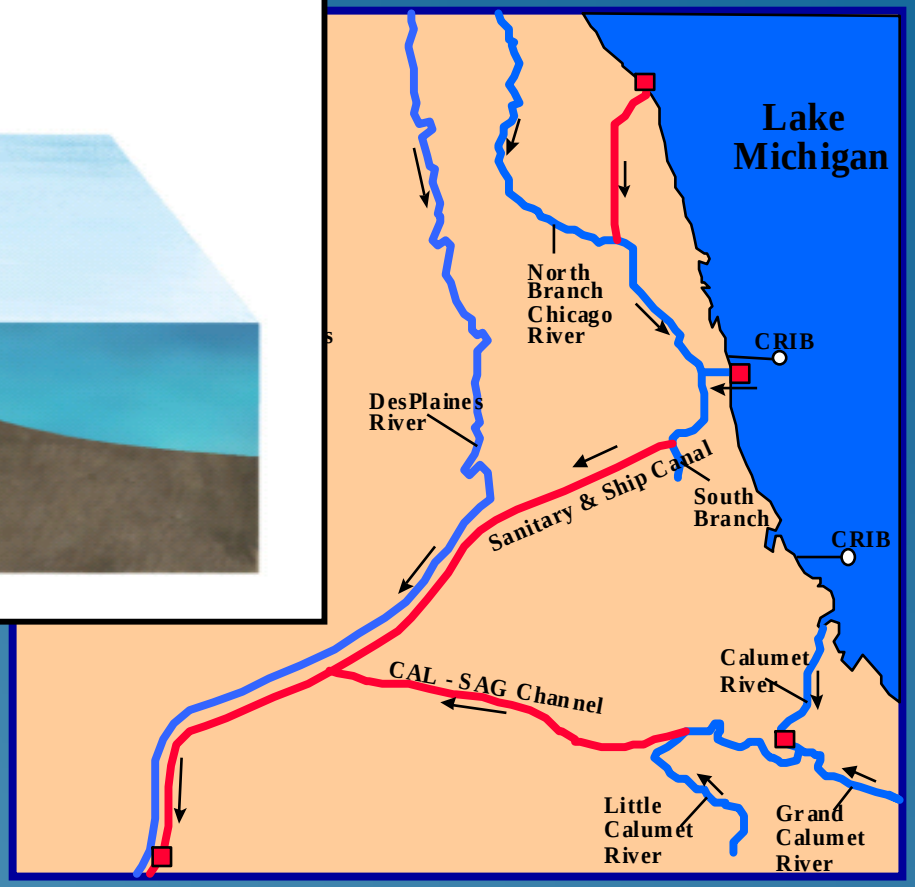


USACE Lock – North view

Lockport Lock was part of a USACE project to deepen and straighten the Des Plaines and Illinois Rivers to improve navigation

Diversion from Lake Michigan





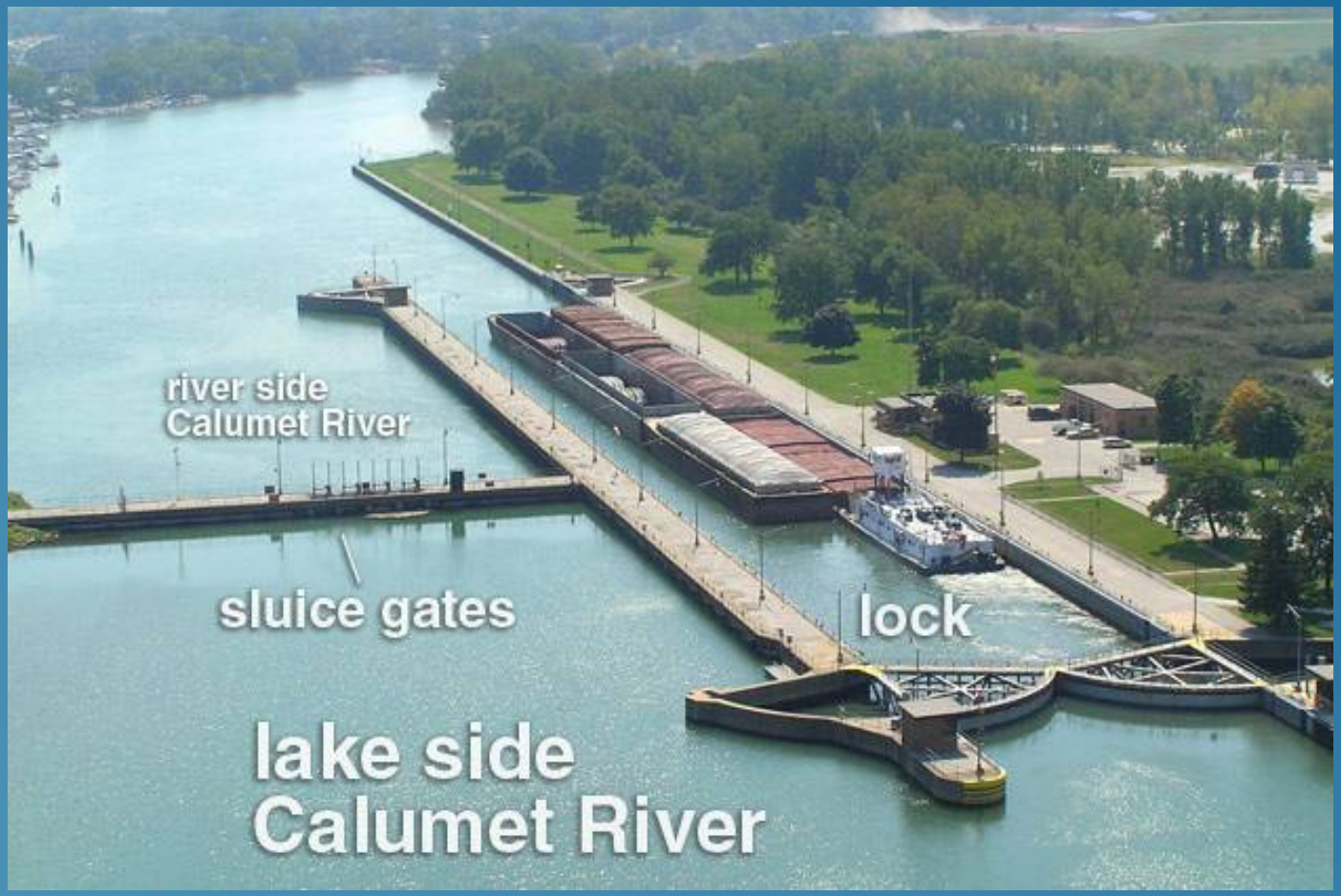
Illinois diverted up to 10,000 cfs from Lake Michigan. Other Great Lakes States took us to the Supreme Court to reduce or eliminate diversion.

Waterway Control Structures

Chicago River Controlling Works

- North – 4 Gates
- South – 4 Gates

O’Brien Lock and Controlling Works

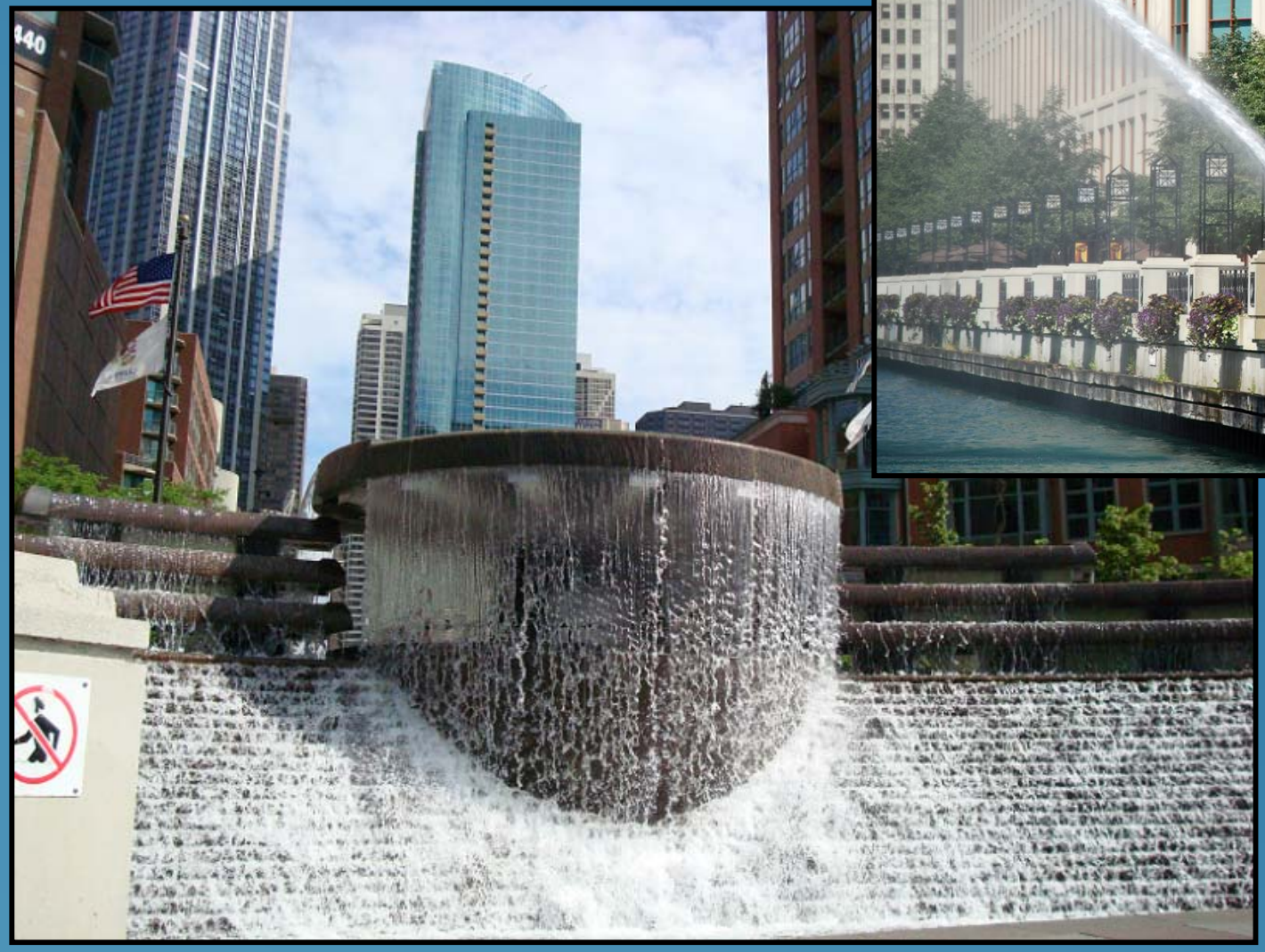


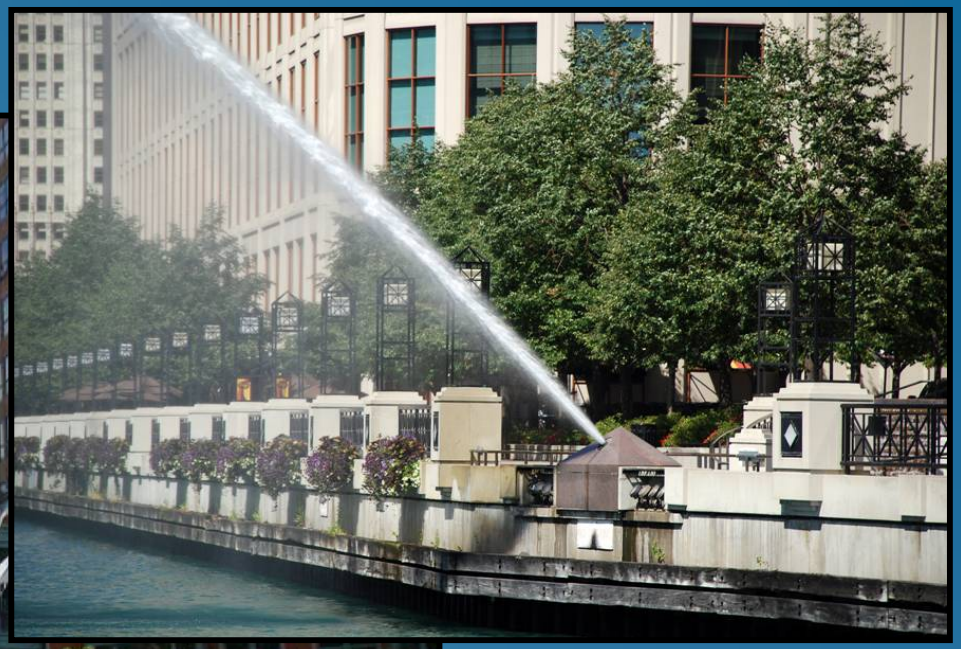
Old Vertical Generator (1934)

Pit Gate Operators

Current Generator from Above

Centennial Fountain





Operation of Chicago Area Waterways

Control Room

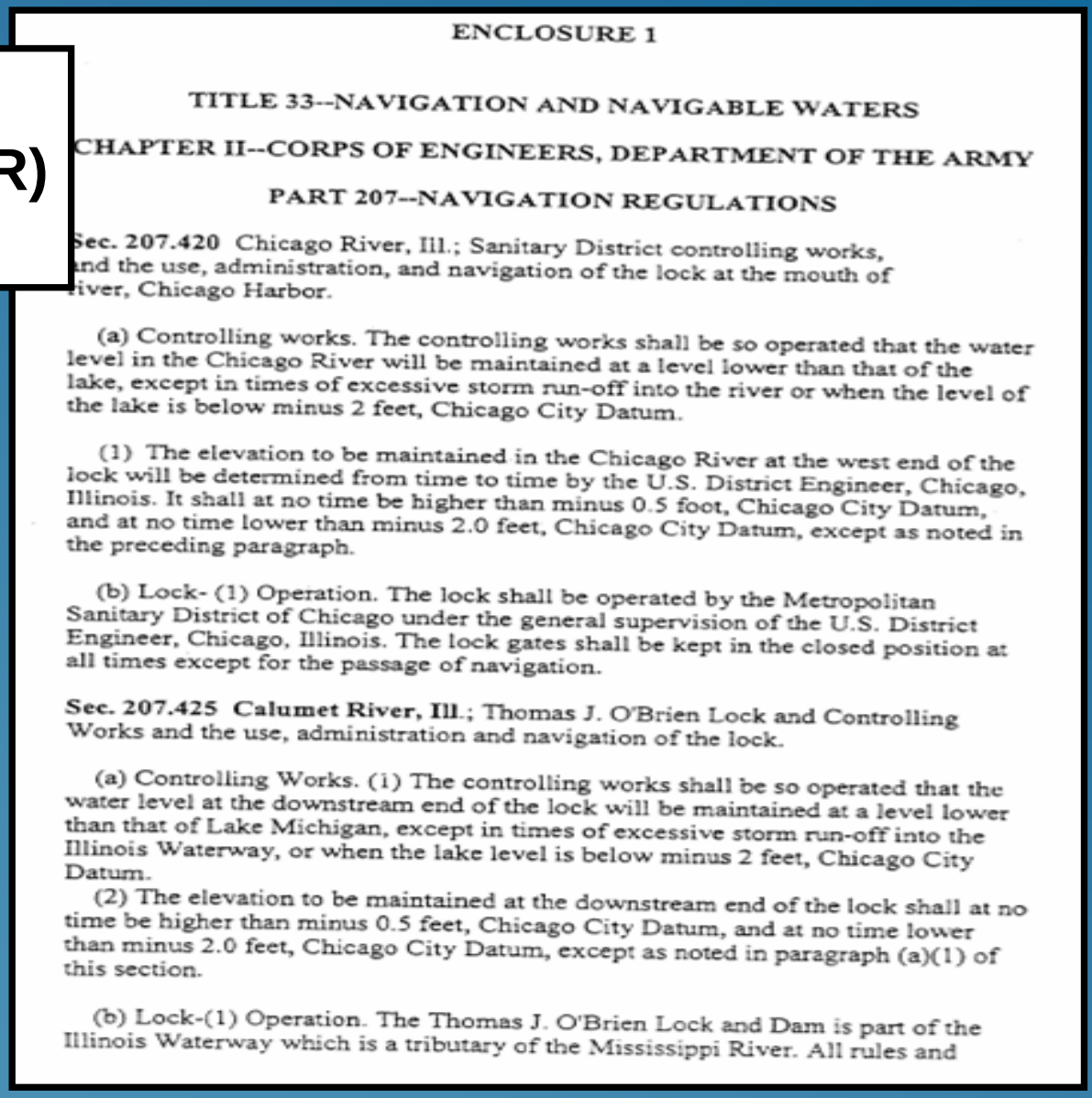
Lake Michigan

Treatment Plant Effluent

Makes up 70% of waterway flow during dry weather conditions

Navigation

Code of Federal Regulations (CFR)
•Part 207



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 foot, 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.

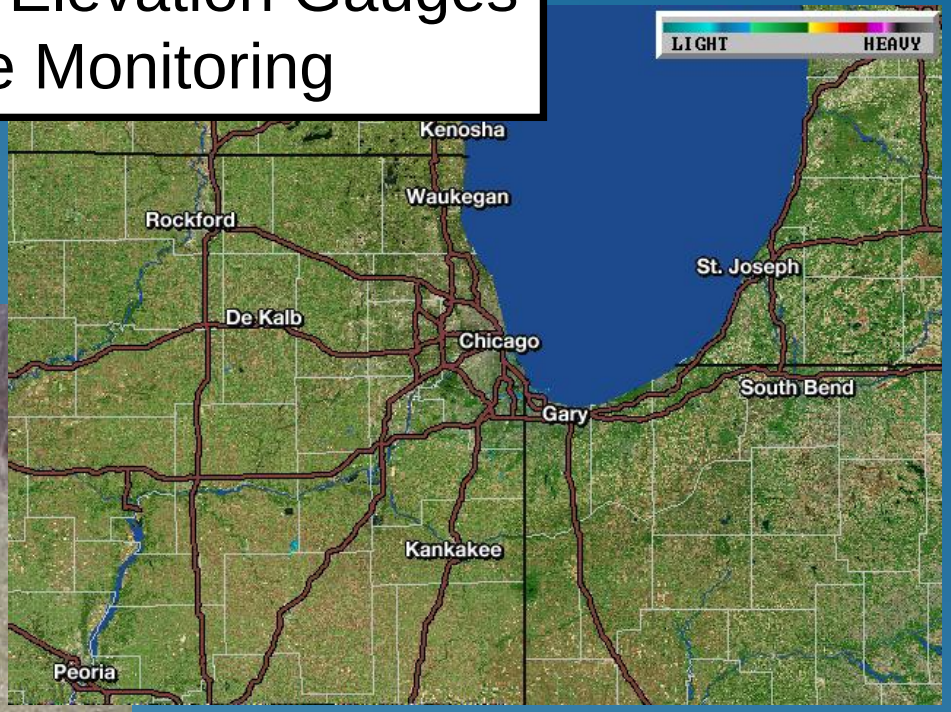
(2) The elevation to be maintained at the downstream end of the lock shall at no time be higher than minus 0.5 feet, Chicago City Datum, and at no time lower than minus 2.0 feet, Chicago City Datum, except as noted in paragraph (a)(1) of this section.

(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

Lockport Powerhouse - Headrace

Dispatcher Roles

- Monitor Rain Gauges, Elevation Gauges
- Meteorological Service Monitoring



Storm Relief - Variables

Ground Conditions
- Frozen
- Saturated

Intensity of Rain
- Short
- Long, Steady

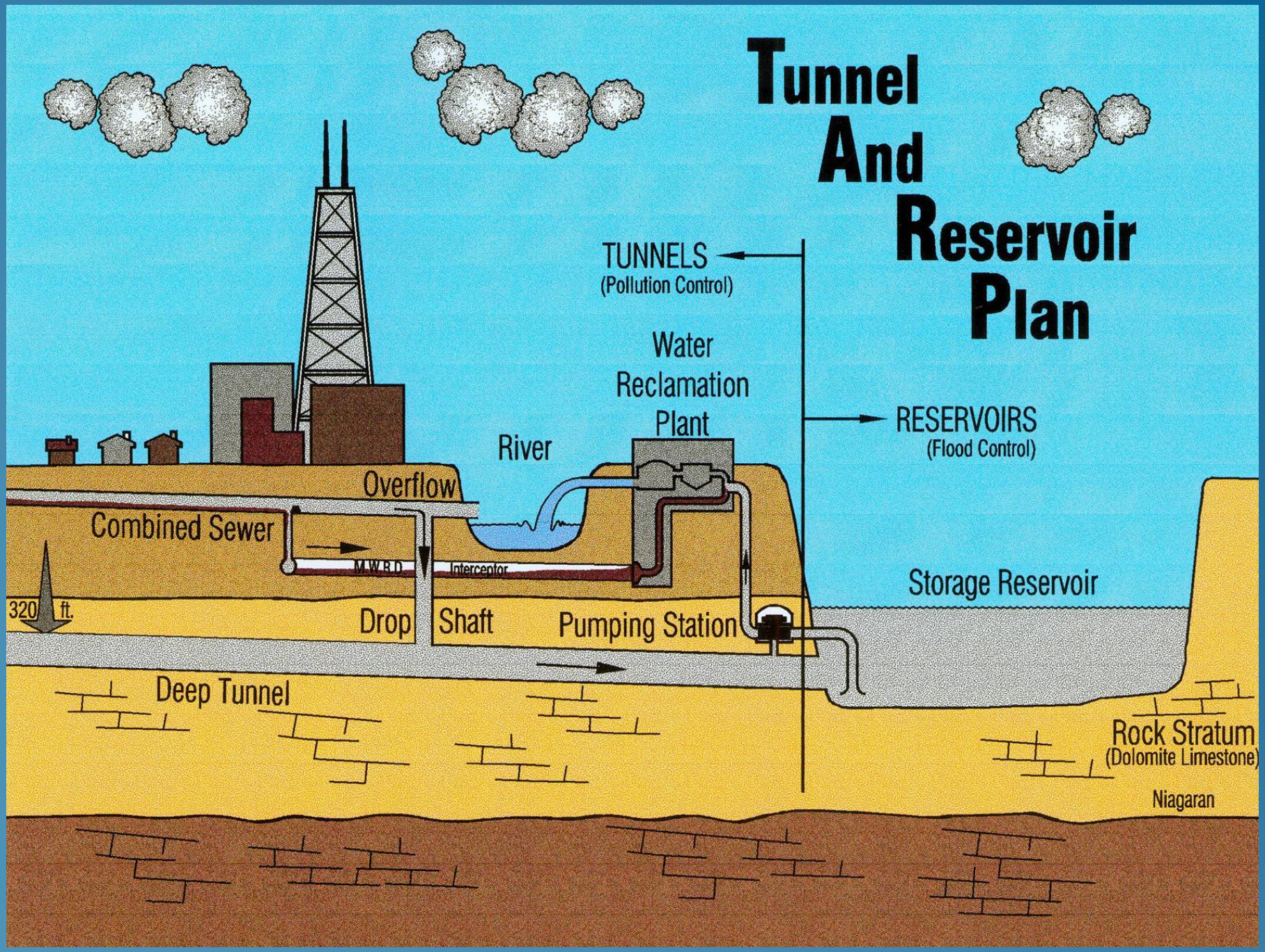
Status of TARP

Status of Tributaries
- Full
- Low

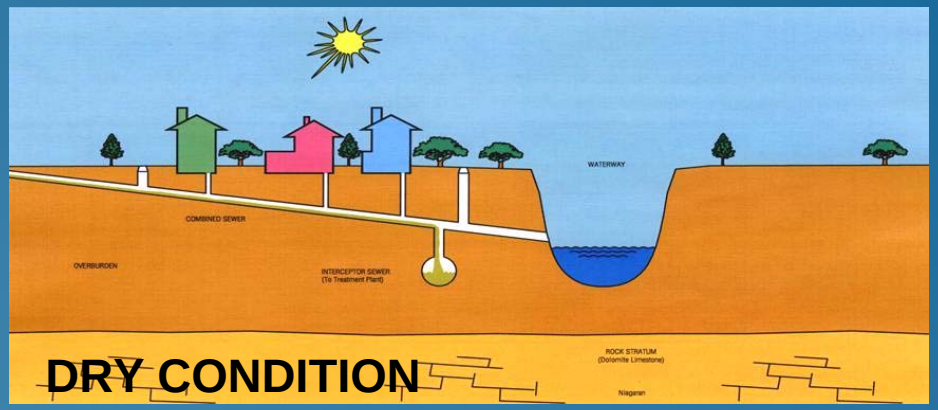
Location of Storm
- North Area
- Central Area
- South Area

Capacity at WRPs

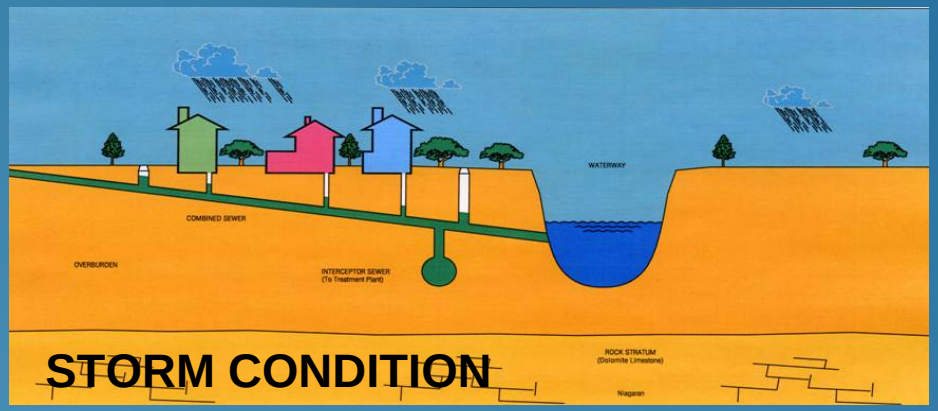
Racine Avenue Pump Station



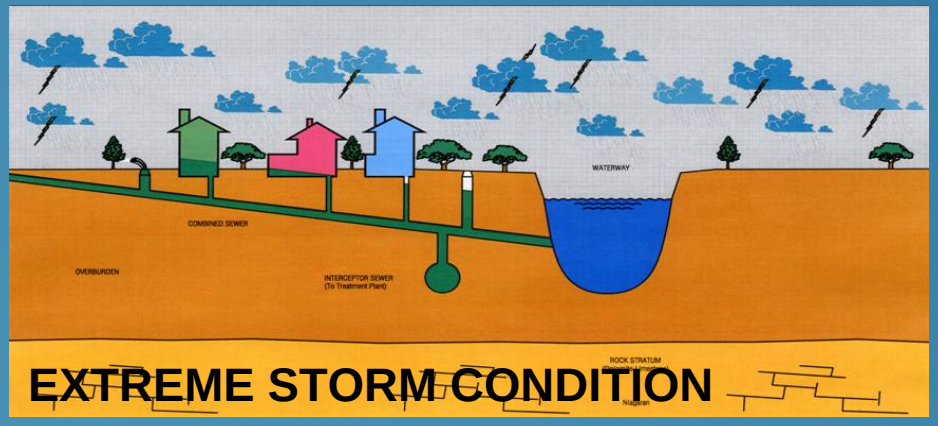
Operation of Chicago Area Waterways



DRY CONDITION

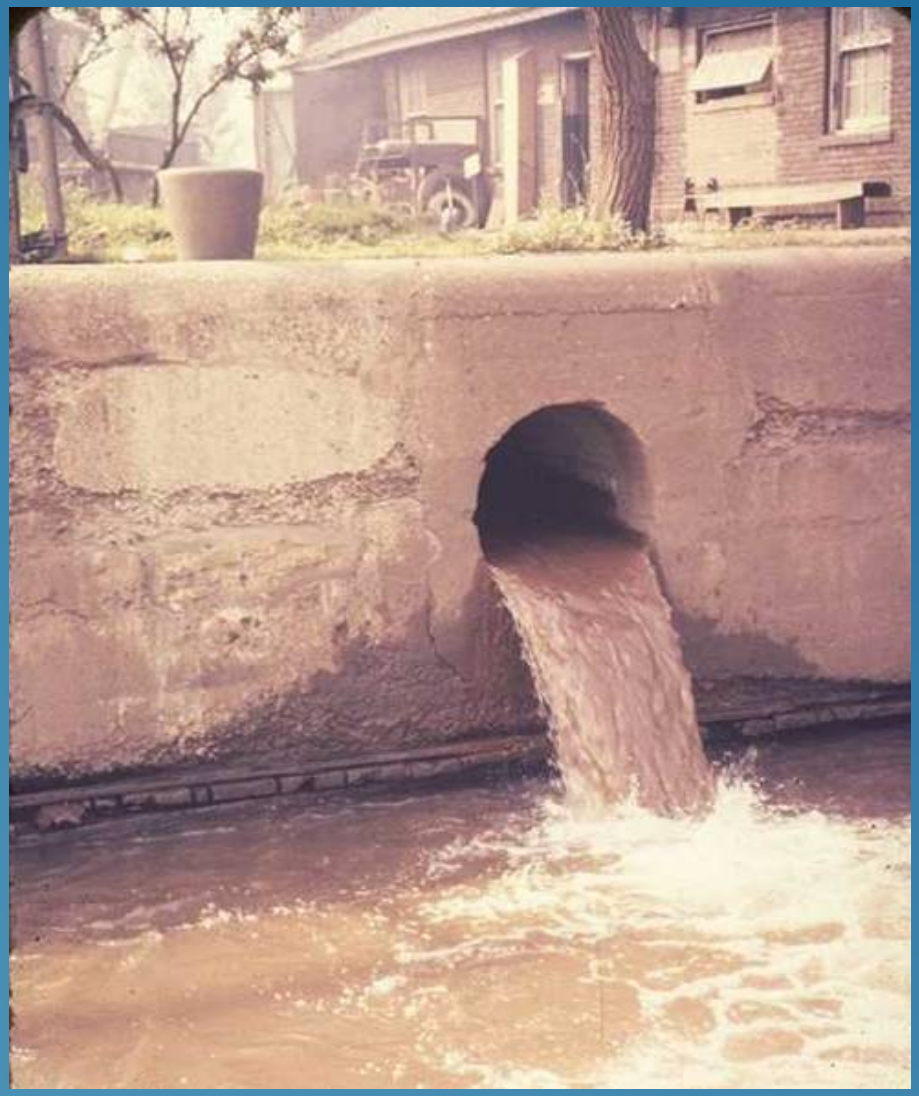


STORM CONDITION



EXTREME STORM CONDITION

Combined Sewer Overflow



Lockport Controlling Works

Rain Gauges


PRECIPITATION GAUGES
GLENVIEW
0.65
STICKNEY WRP
0.69
MELVINA P S
0.90
BARRINGTON
AURORA
HAZELCREST
0.55
N SIDE WRP
0.72
SPRINGFIELD
0.59
87 & WESTERN
0.94
KIRIE WRP
0.67
LEMONT
MONEE
NORTH BRANCH
0.70
RACINE P S
0.74
CALUMET T W
0.57
HANOVER
0.91
LOCKPORT
0.52
SAUK VILLAGE
0.75
WILMETTE
100 E ERIE
0.50
95th ST P S
MORTON
0.72
JOLIET
0.26
SPARE
AVERAGE PRECIPITATION
NORTH
0.00
CENTRAL
0.00
SOUTH
0.00
OVERALL
0.00
RAIN EVENT #
15
ENTER
RESET COUNTERS

Elevation Gauges

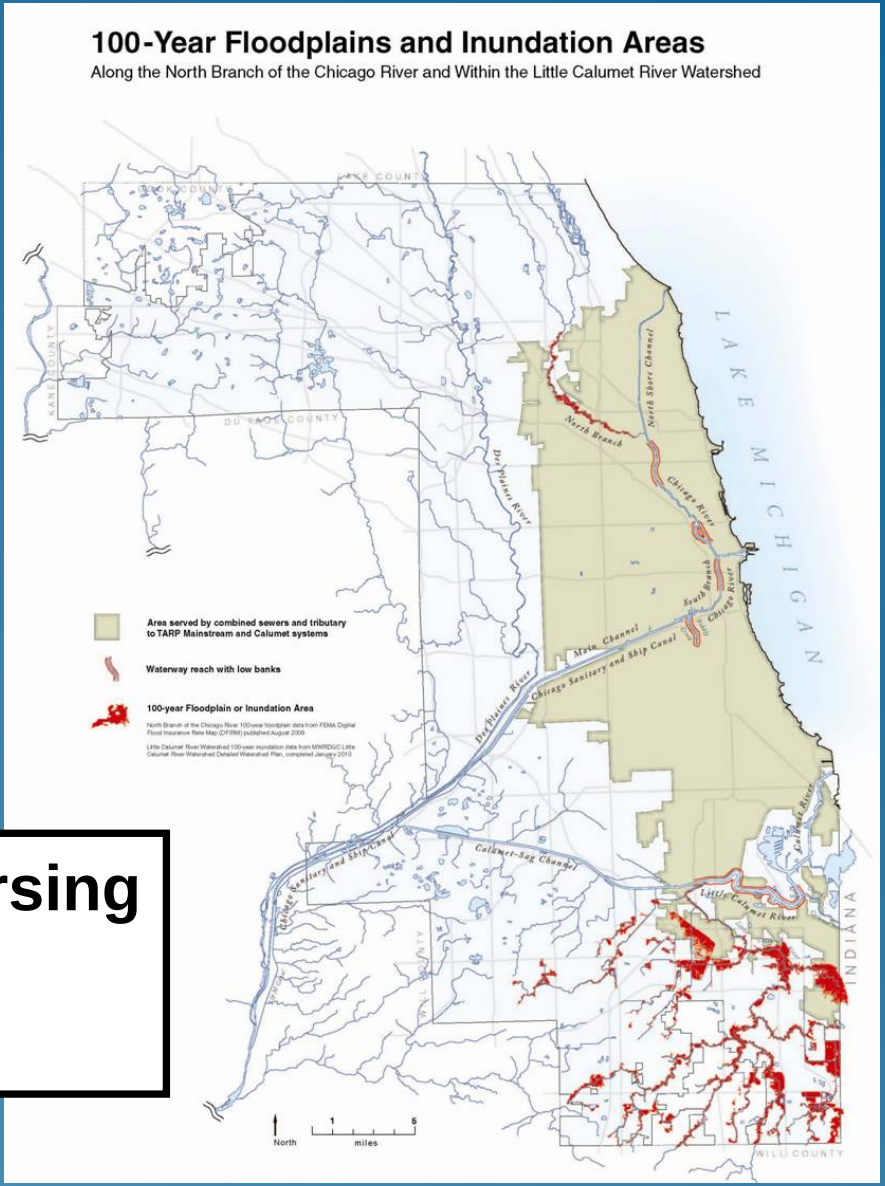
Elevations at Wilmette, CRCW and O'Brien are key to our operations

Storm Relief – Reversing to Lake

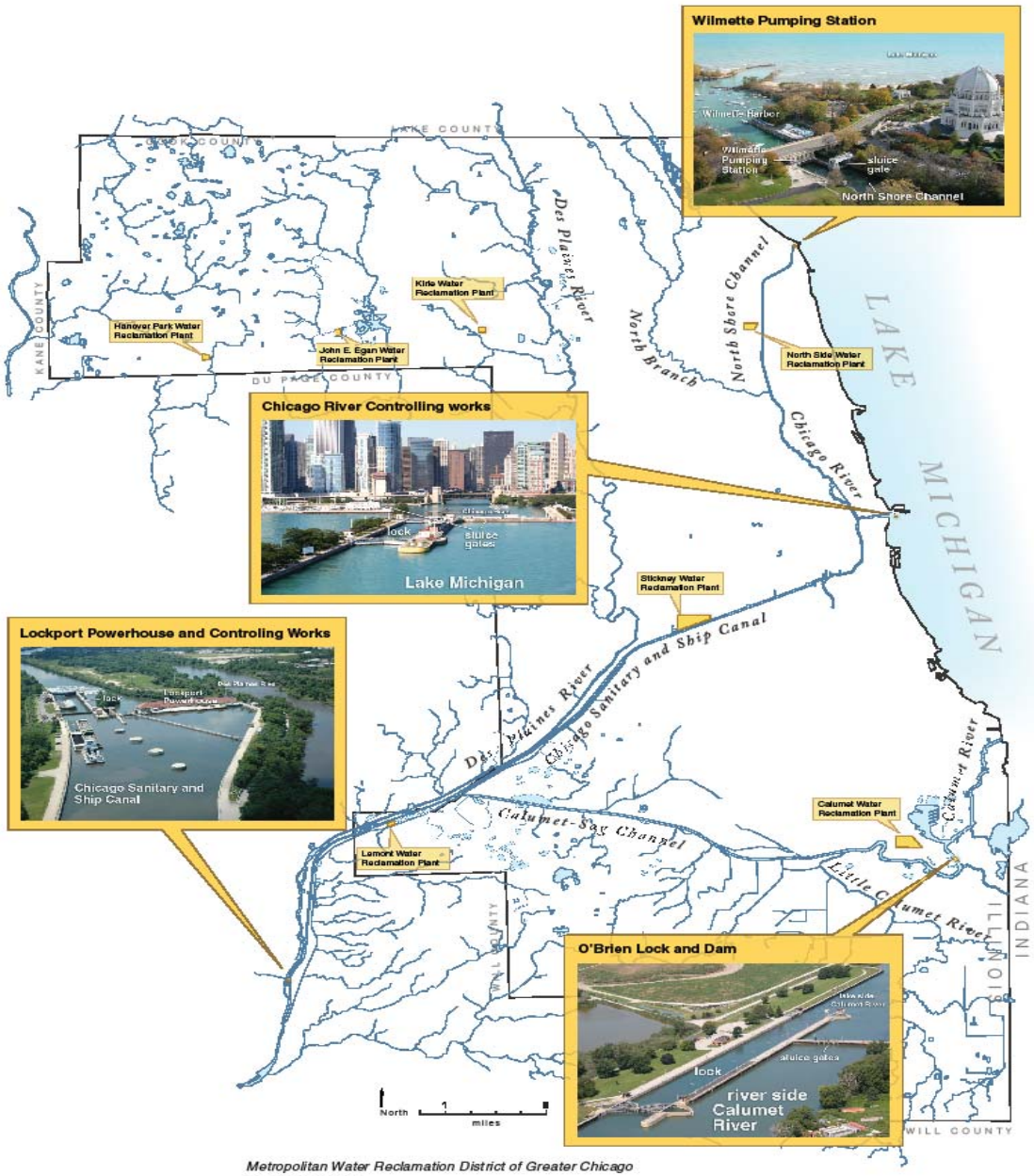
Last Resort

Notification
- Drinking Water
- Coast Guard

Effects of Not Reversing
- Flooding
- Low DO, Odors



Chicago Area Waterway System



Metropolitan Water Reclamation District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611-3154

The Metropolitan Water Reclamation District of Greater Chicago (MWRD) is a 121-year-old special purpose government agency responsible for wastewater management for an 883 square mile area including Chicago and 124 suburban municipalities. It is also the stormwater management for all 946 square miles of Cook County. The $1.7 billion agency services ten million residents and commercial/industrial users. MWRD manages and sustains the 76 miles of the Chicago Area Waterway System's navigable waterways and 1,000 miles of small streams. MWRD facilities include one of the largest wastewater treatment plants in the world in Stickney, Illinois, in addition to six other plants and 23 pumping stations. They clean an average flow of 1.4 billion gallons each day producing 98% clean effluent, and 200,000 dry tons of solids each year. Ninety-seven percent of these biosolids are dispersed into beneficial reuse in land application, horticulture, and turf maintenance. MWRD's 554 miles of intercepting sewer mains are linked to approximately 10,000 local connections. MWRD oversees one of the largest civil engineering projects ever undertaken - the Tunnel and Reservoir Plan, known as the "Deep Tunnel." Over one hundred miles of tunnels (9 to 33 feet in diameter), 300 feet below ground provides extensive flood mitigation and pollution control for the region. Proud of its Triple-A bond rating, MWRD is vigilant in protecting the environment while making sure that the public health and safety of its taxpaying citizens remains a priority. MWRD and its 2,100 employees regularly receive awards and honors for best management practices in maintenance & operations, research and development, public outreach, and engineering vision and execution.

MWRD Office of Public Affairs 10 0210

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
- Toxic Spills, Illegal Dumping, Police and Legal Issues, General Questions, Etc.
- Call Logging

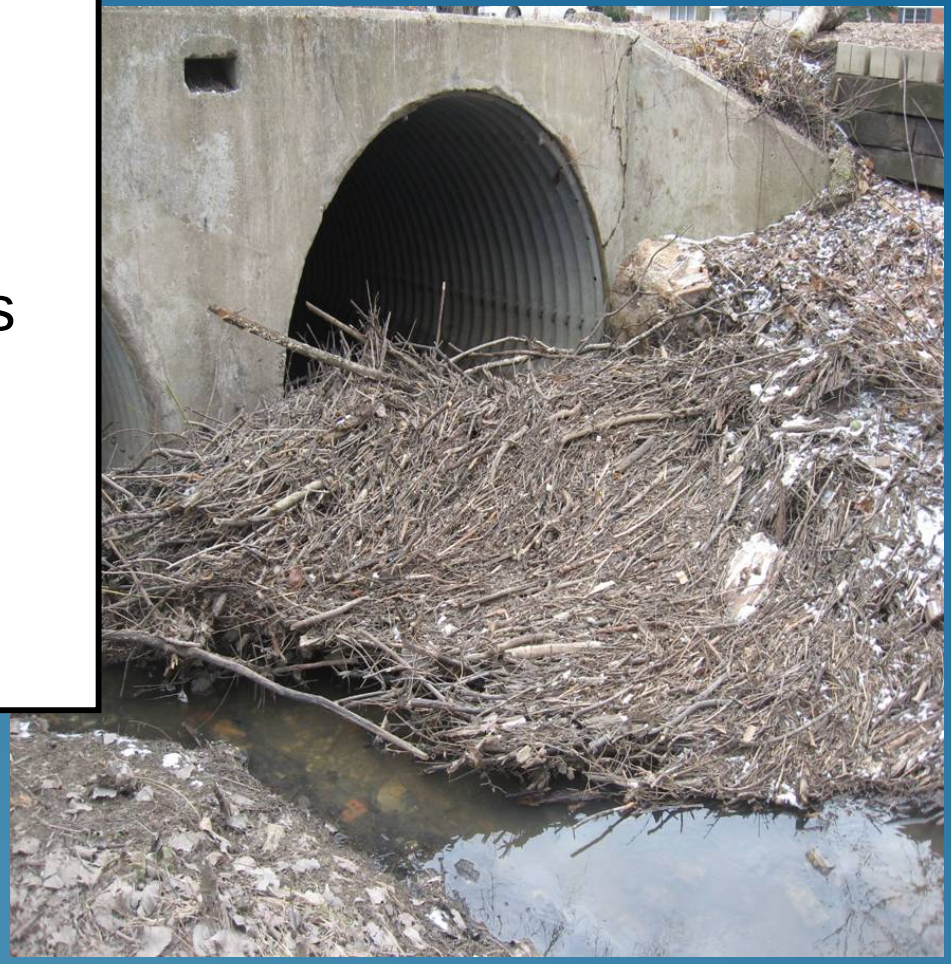
Summary: Control of the CWS

Why we do it.
How we do it.

Small Streams Maintenance Program

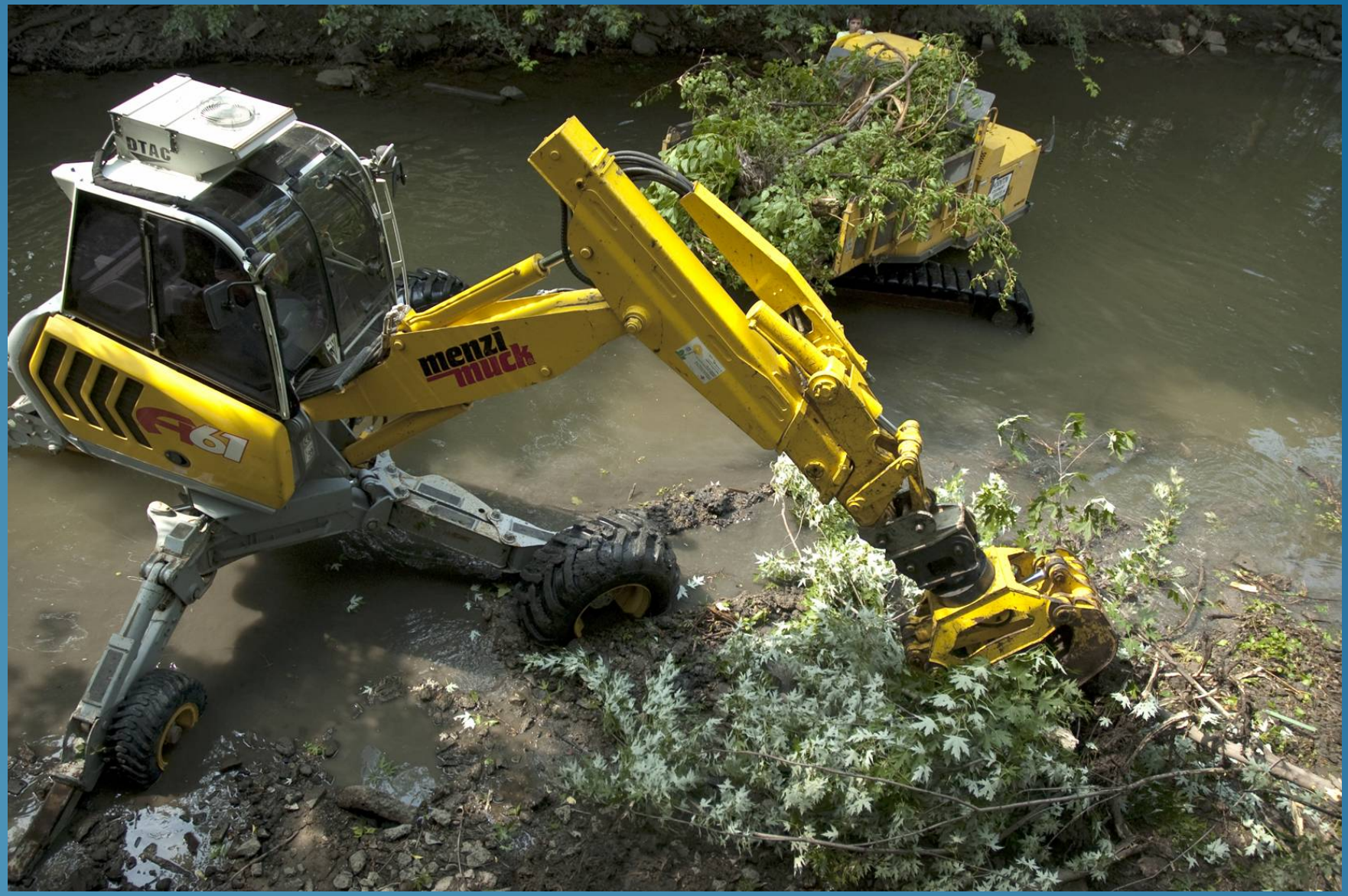
Prior to 2006

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



SSMP 2006 and Beyond

Menzi Muck Machine



Crawler Carrier

Gradall

Additional Equipment

Beaver Dam

Thorn Creek Blockage - Before

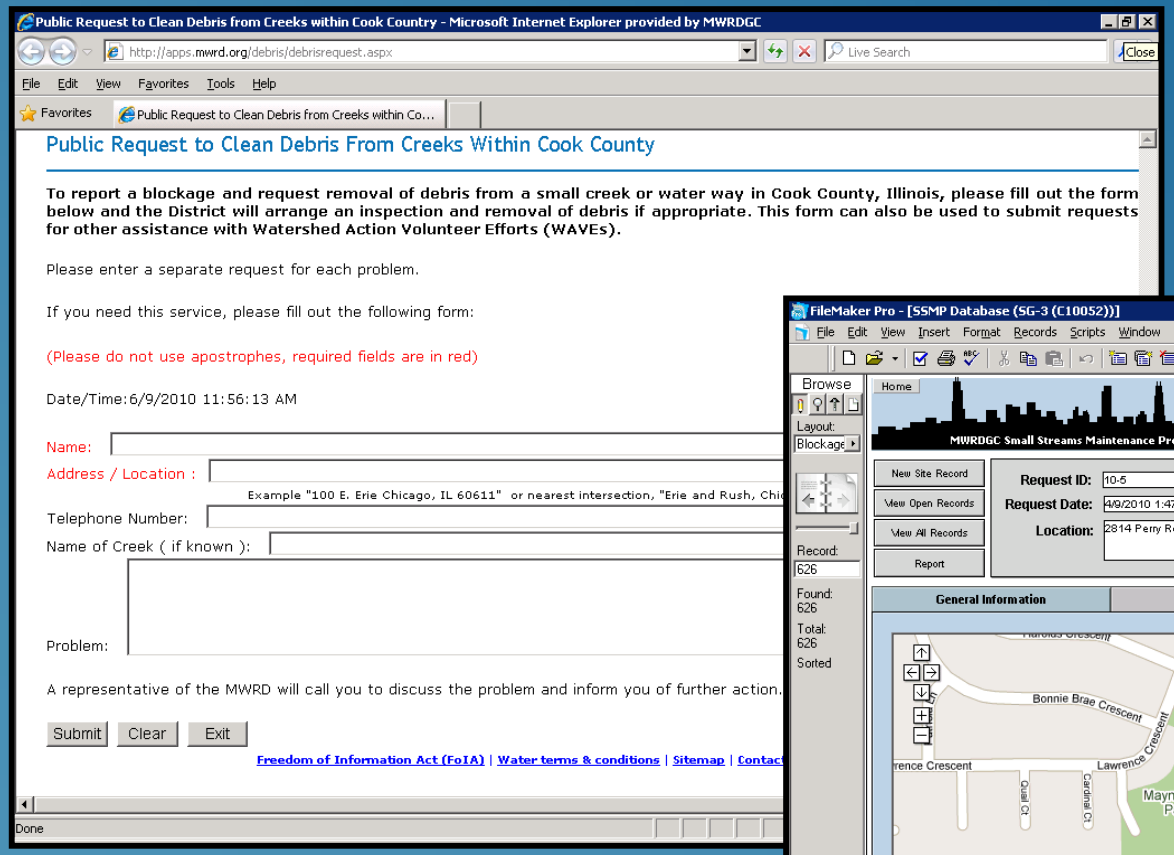
Thorn Creek Blockage - After

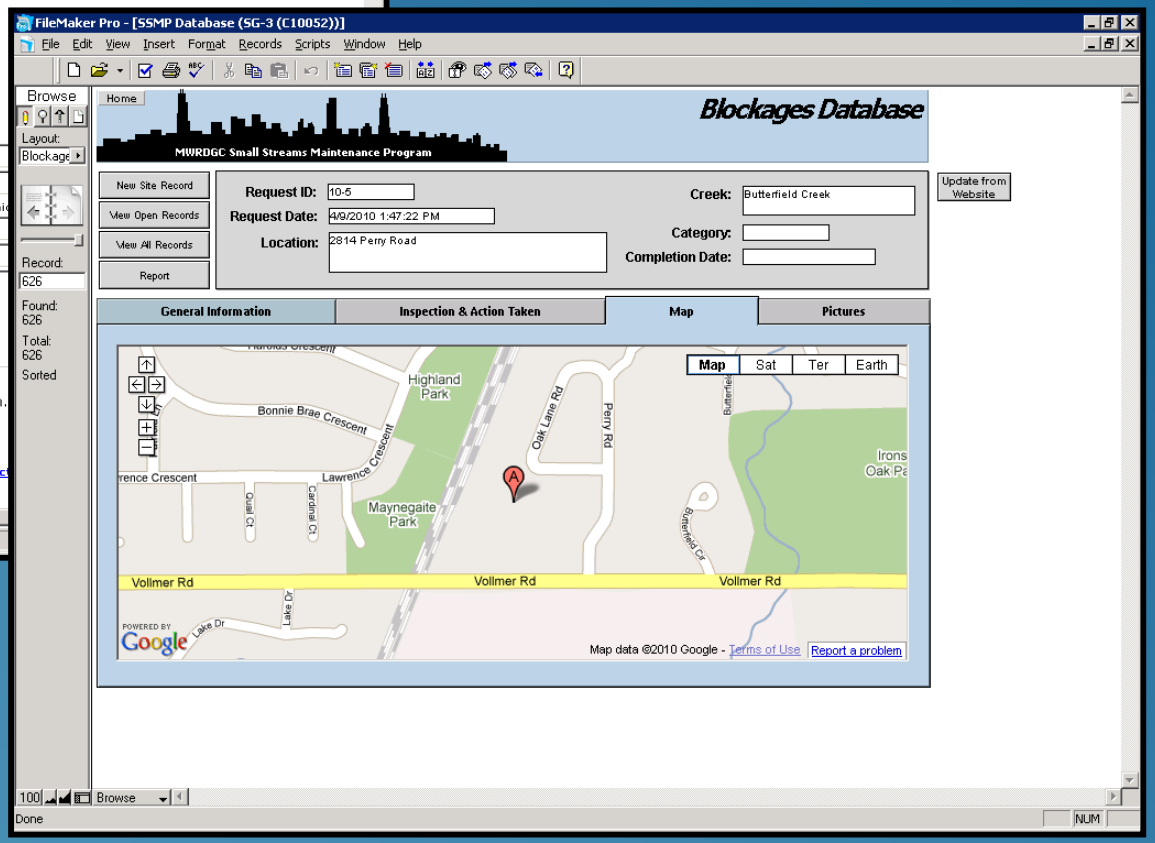
Winter Work

Removal Quantities

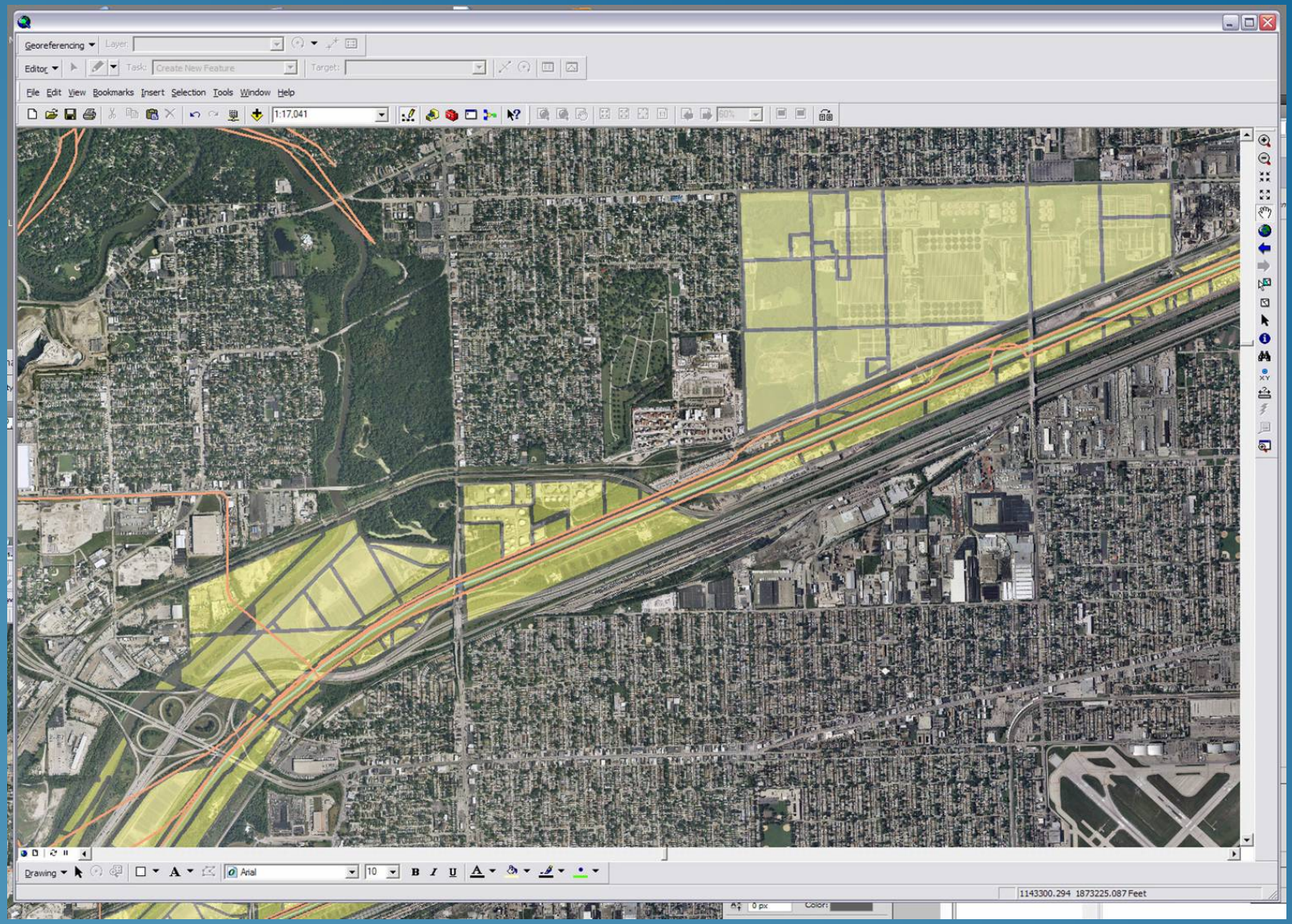
Watershed	2007 Cubic Yards Removed	2008 Cubic Yards Removed	2009 Cubic Yards Removed
Little Calumet River	7,640	10,310	9,330
Calumet-Sag Channel	5,260	7,910	9,890
Lower Des Plaines River	3,160	5,290	11,065
North Branch Chicago River	1,730	2,170	11,460
Upper Salt Creek	0	3,300	370
Poplar Creek	0	2,320	2,650
Total	**17,790**	**31,300**	**44,765**

Current Technology





Future Technology - GIS



Channel Maintenance

Debris Boat

Debris Boat

Pontoon Boats

WAVEs

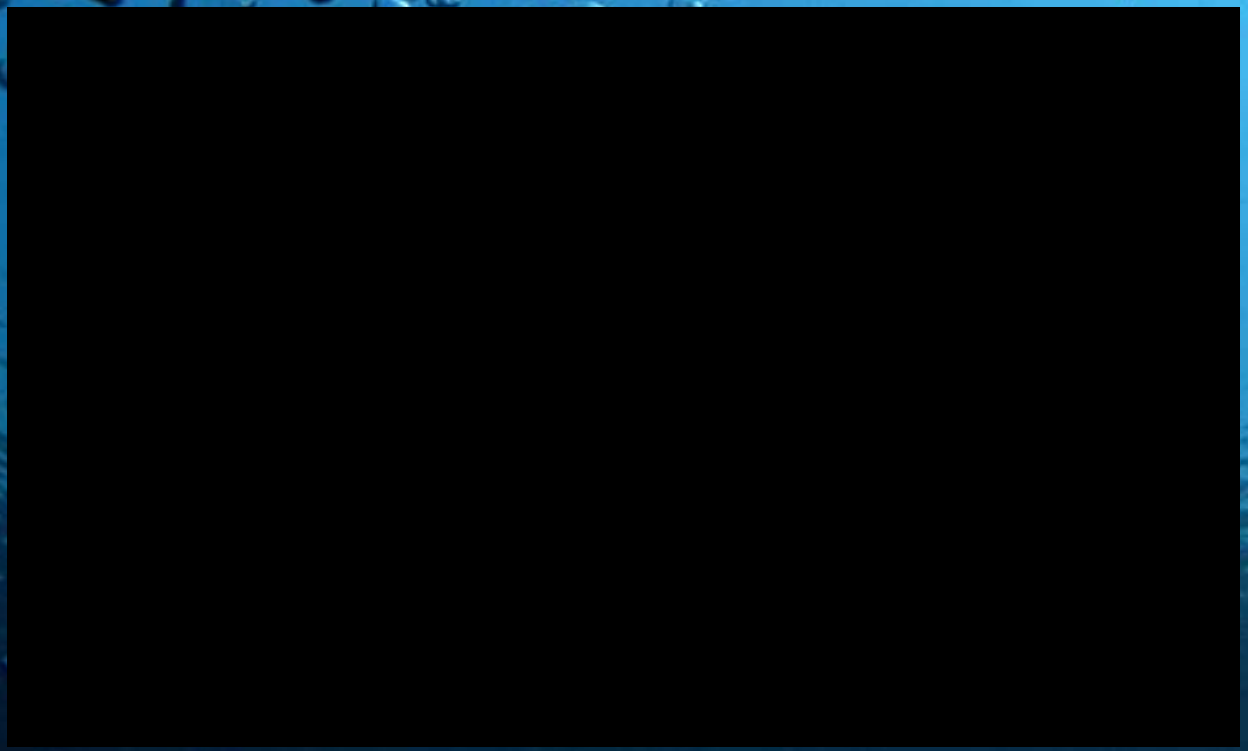
Channel Maintenance

WAVEs

Channel Maintenance

Rain Barrels

Asian Carp



Brief Facts

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

=

13-Mile Bypass Barrier (USACE)

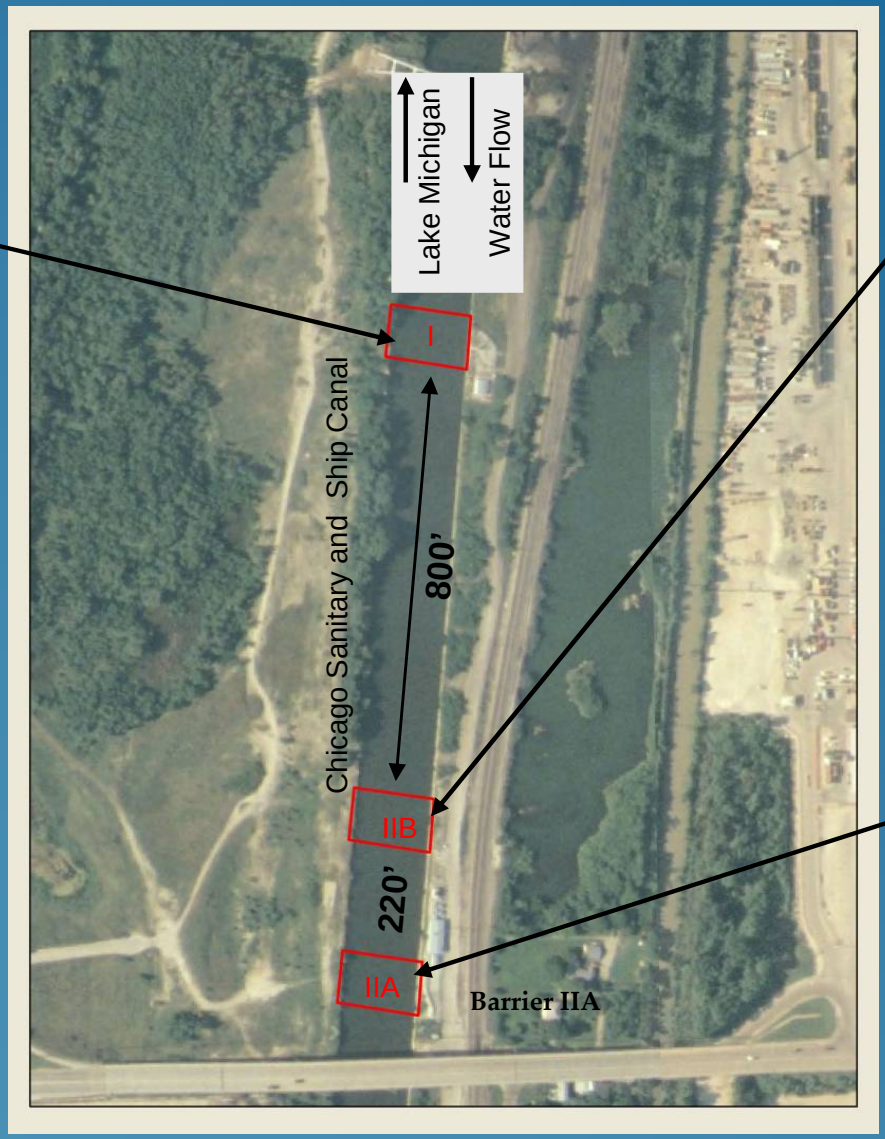
Barriers

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:

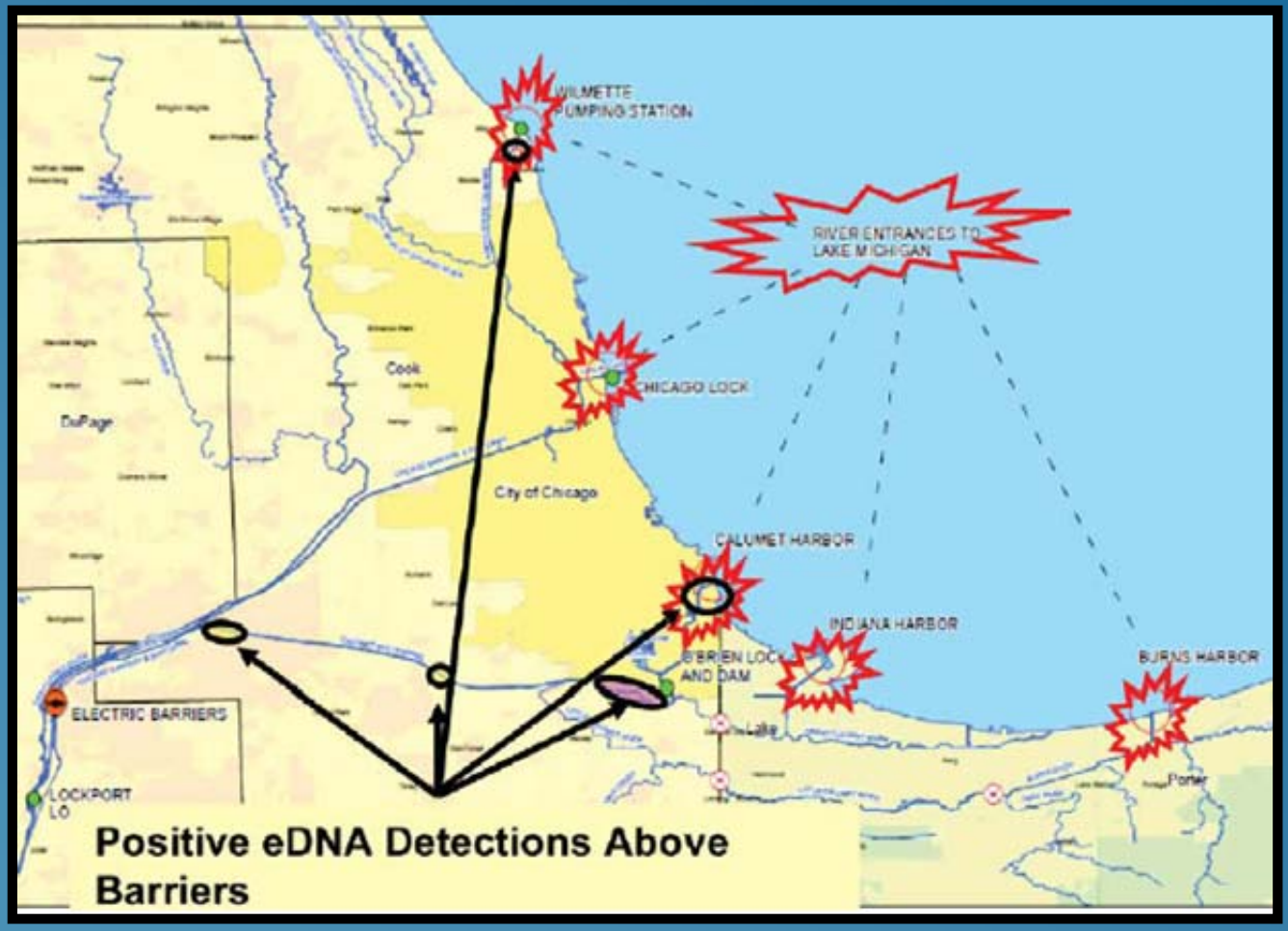
- Site prep completed
- Building construction contract NTP issued 3 Dec
- Electronics design ongoing
- **Construction to be completed 30 Sep 10**

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

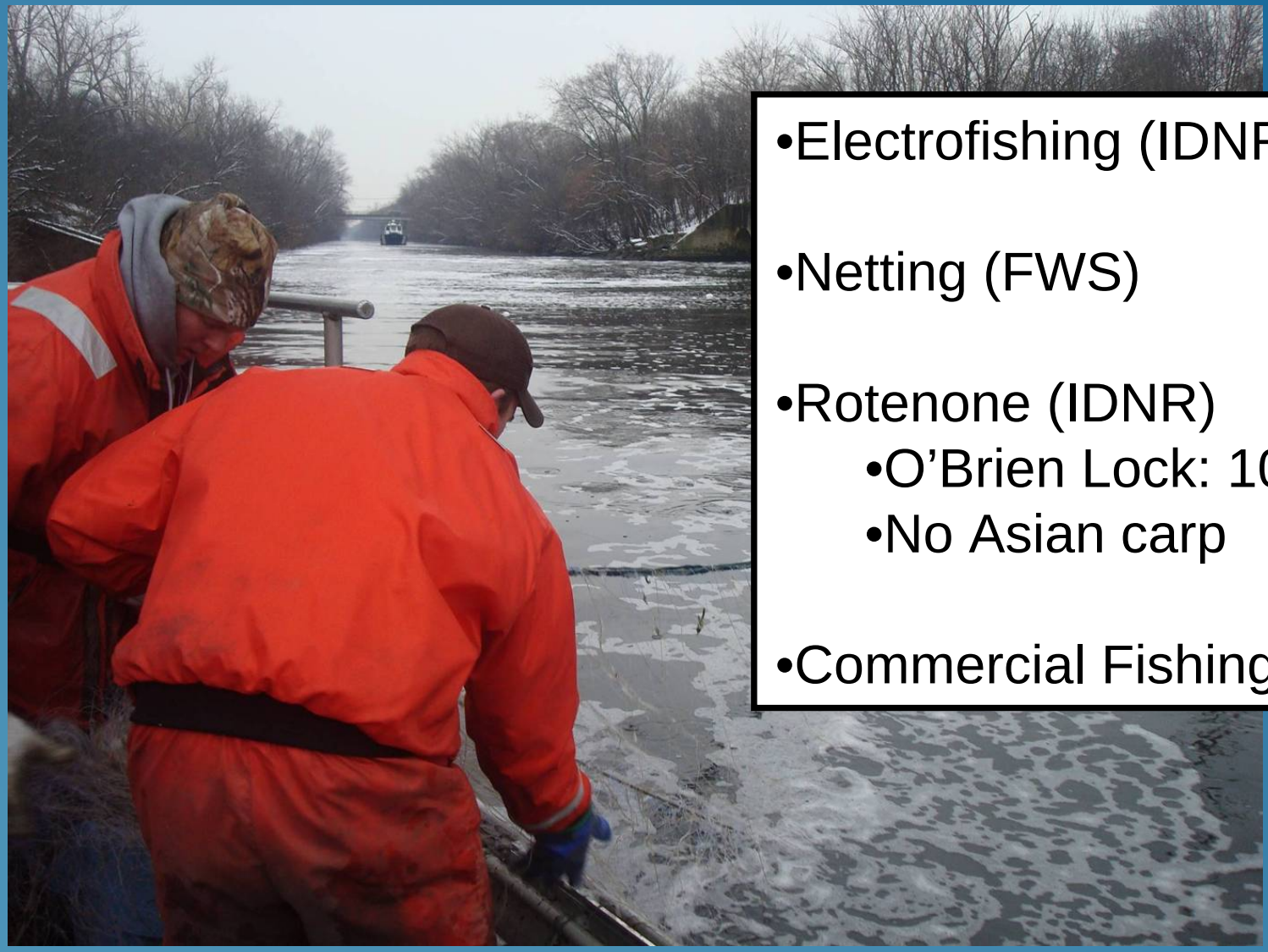
eDNA


WILMETTE PUMPING STATION
RIVER ENTRANCES TO LAKE MICHIGAN
CHICAGO LOCK
Cook
DuPage
City of Chicago
CALUMET HARBOR
INDIANA HARBOR
BURNS HARBOR
ELECTRIC BARRIERS
LOCKPORT LO
Positive eDNA Detections Above Barriers

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



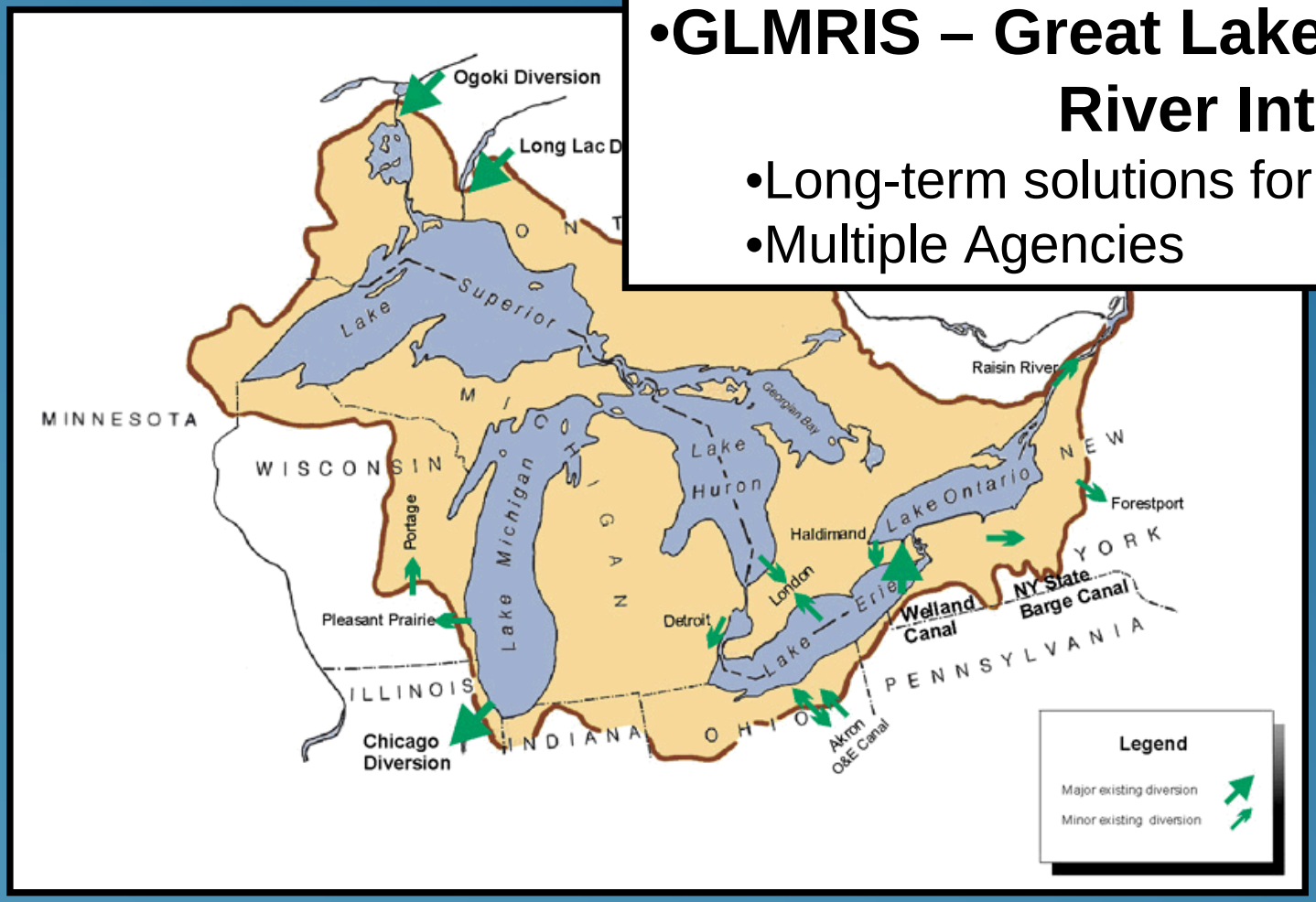
- Electrofishing (IDNR)
- Netting (FWS)
- Rotenone (IDNR)
  - O’Brien Lock: 100,000 lbs
  - No Asian carp
- Commercial Fishing (IDNR)

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



Questions/Comments?

Special Thanks to:

Matt McGregor
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Justin Brown