



US Army Corps
of Engineers
Chicago District

The Chicago Shoreline Storm Damage Reduction Project

Andrew Benziger, Chicago District

2005 Tri-Service Infrastructure Systems Conference

St. Louis, Missouri August 2-4, 2005





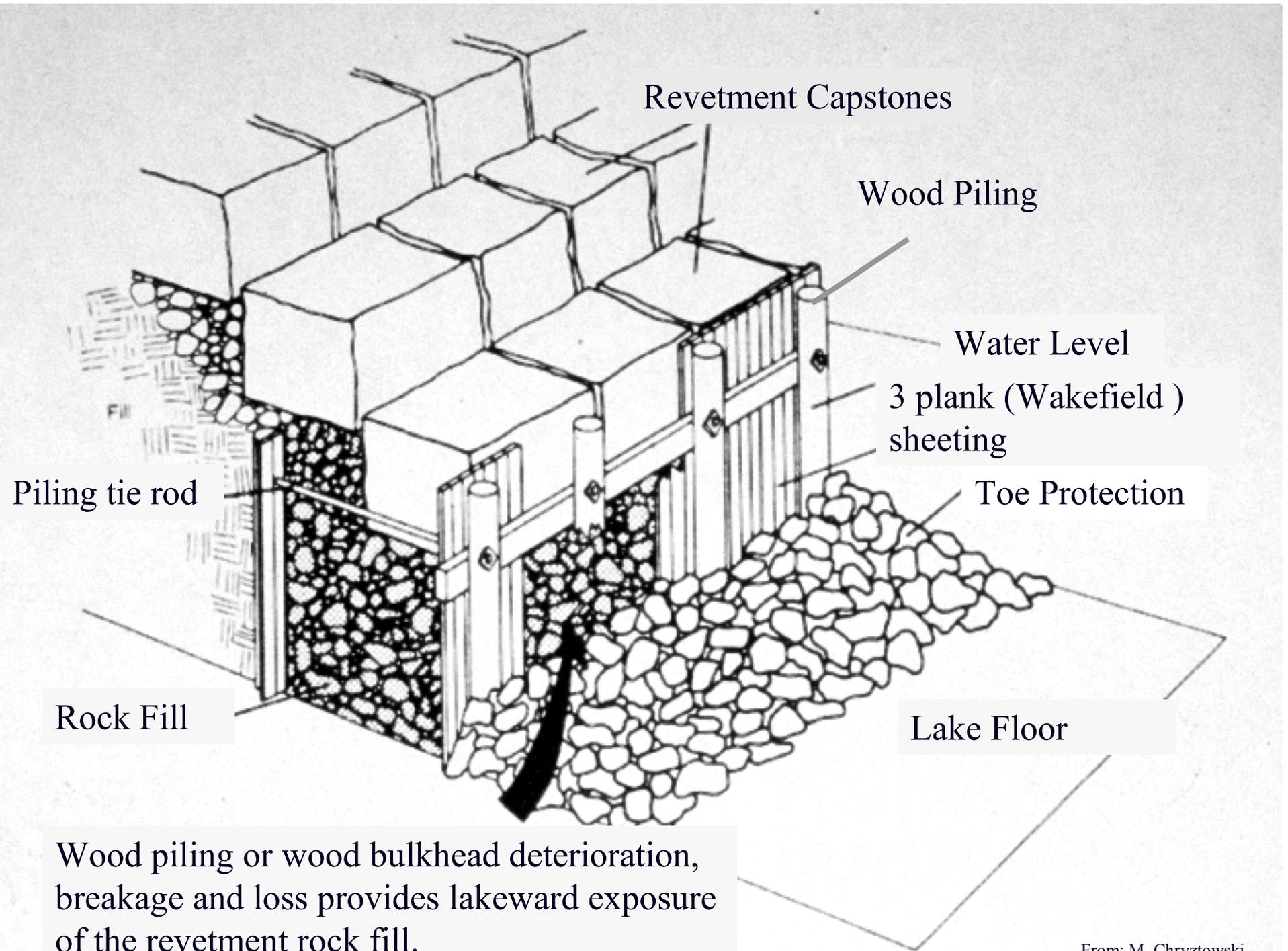
Photo by: V. Jurca



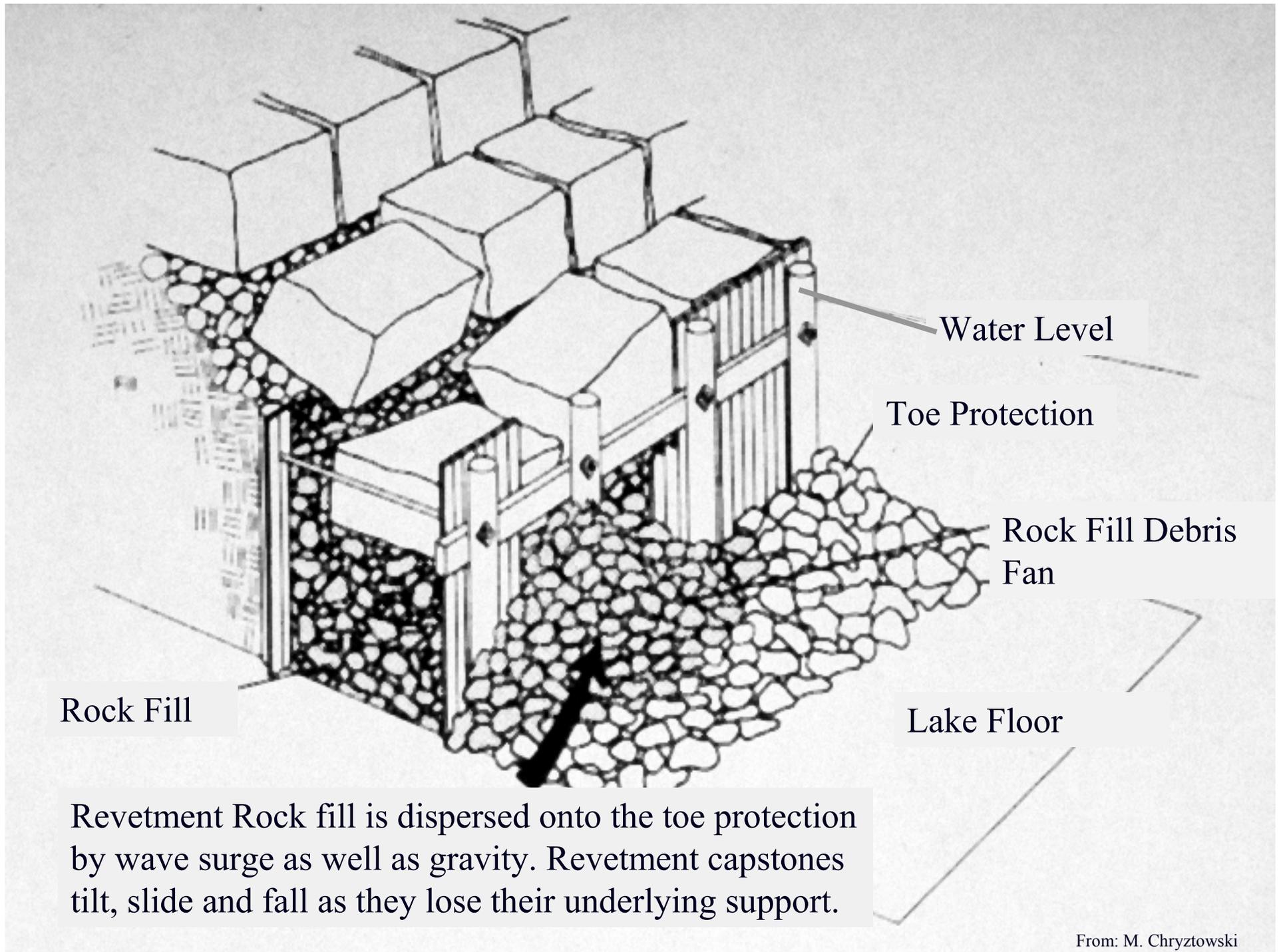
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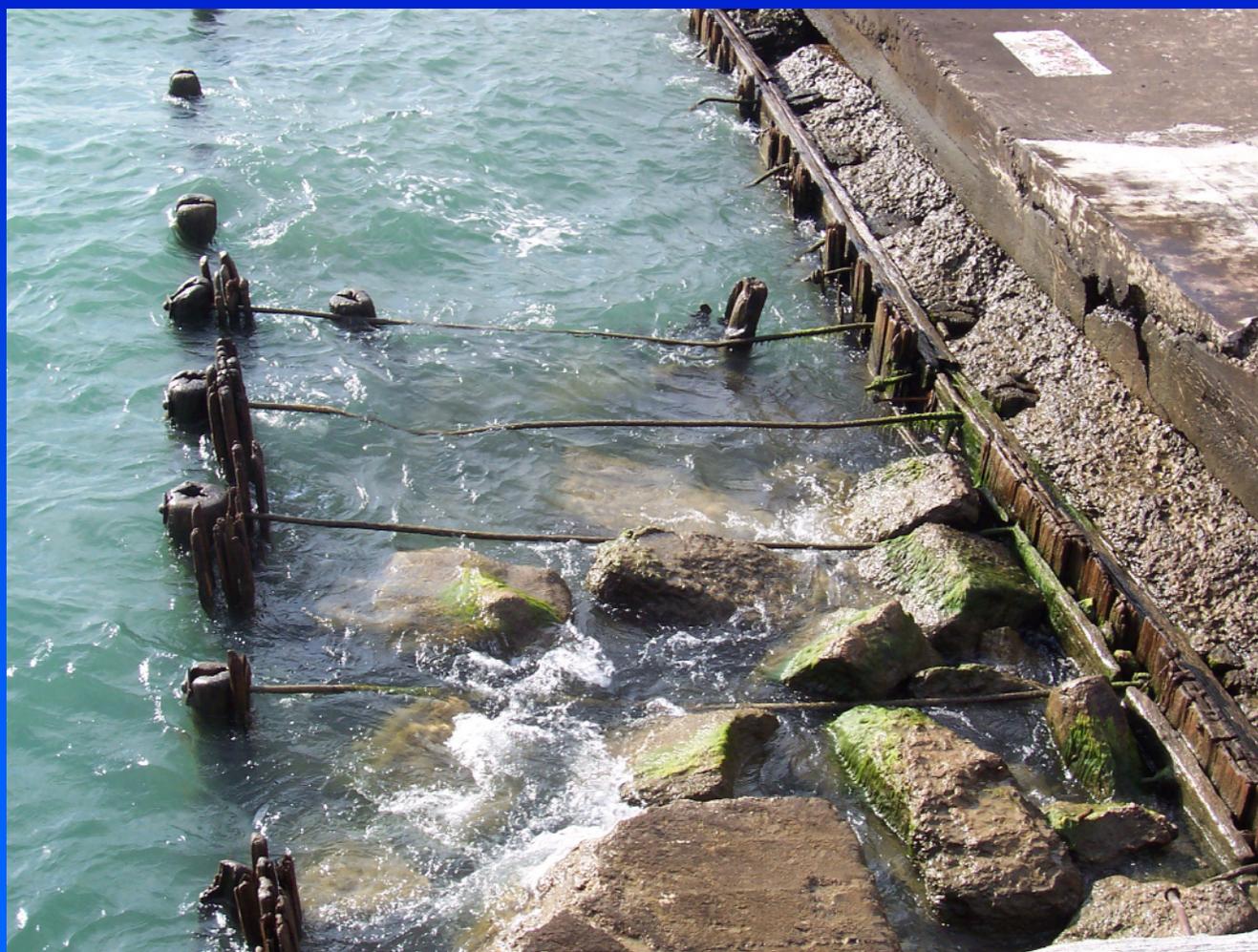
Wood piling or wood bulkhead deterioration, breakage and loss provides lakeward exposure of the revetment rock fill.



Revetment Rock fill is dispersed onto the toe protection by wave surge as well as gravity. Revetment capstones tilt, slide and fall as they lose their underlying support.



Failed Timber Crib



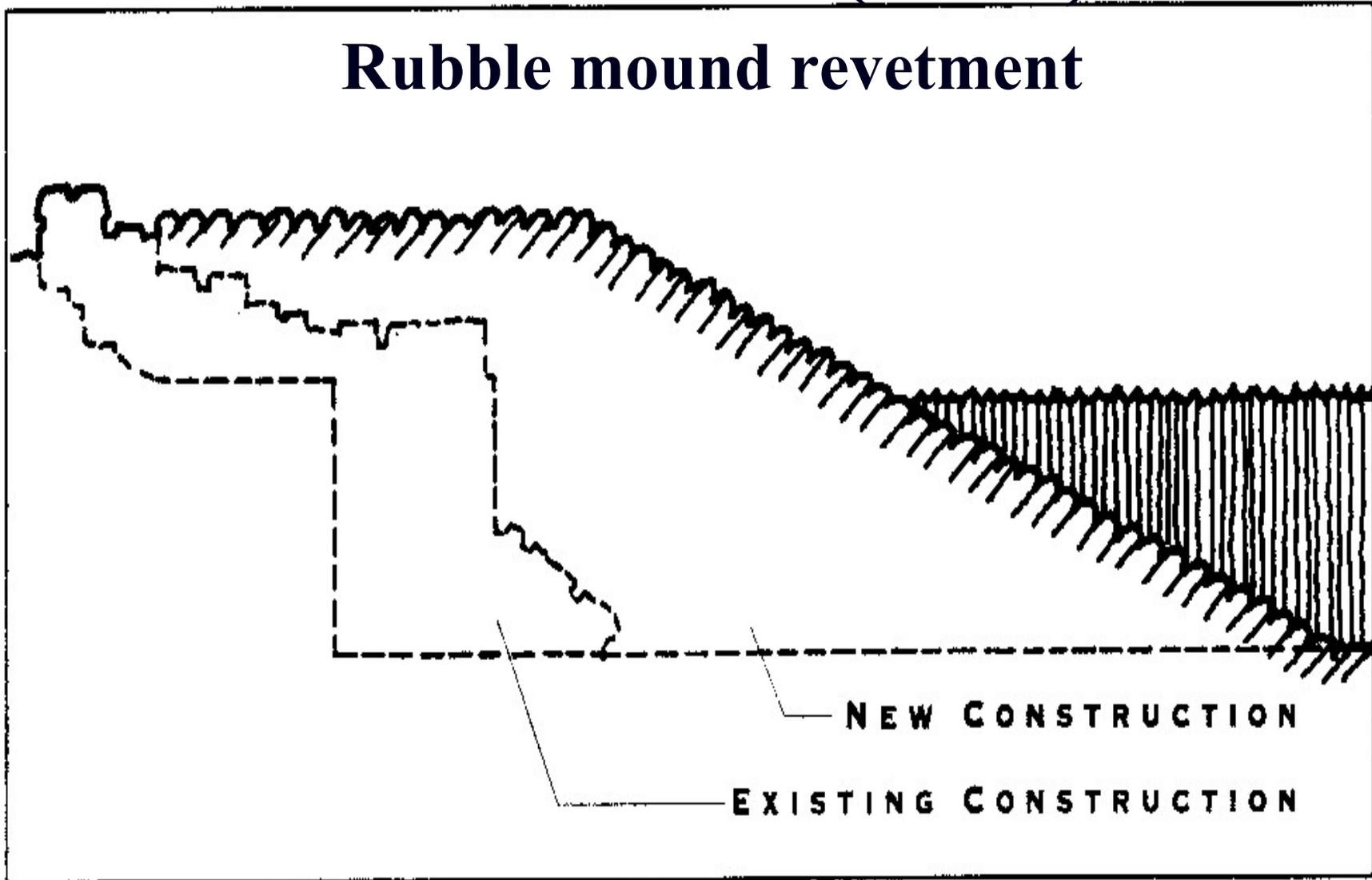






Federal Plan (NED)

Rubble mound revetment





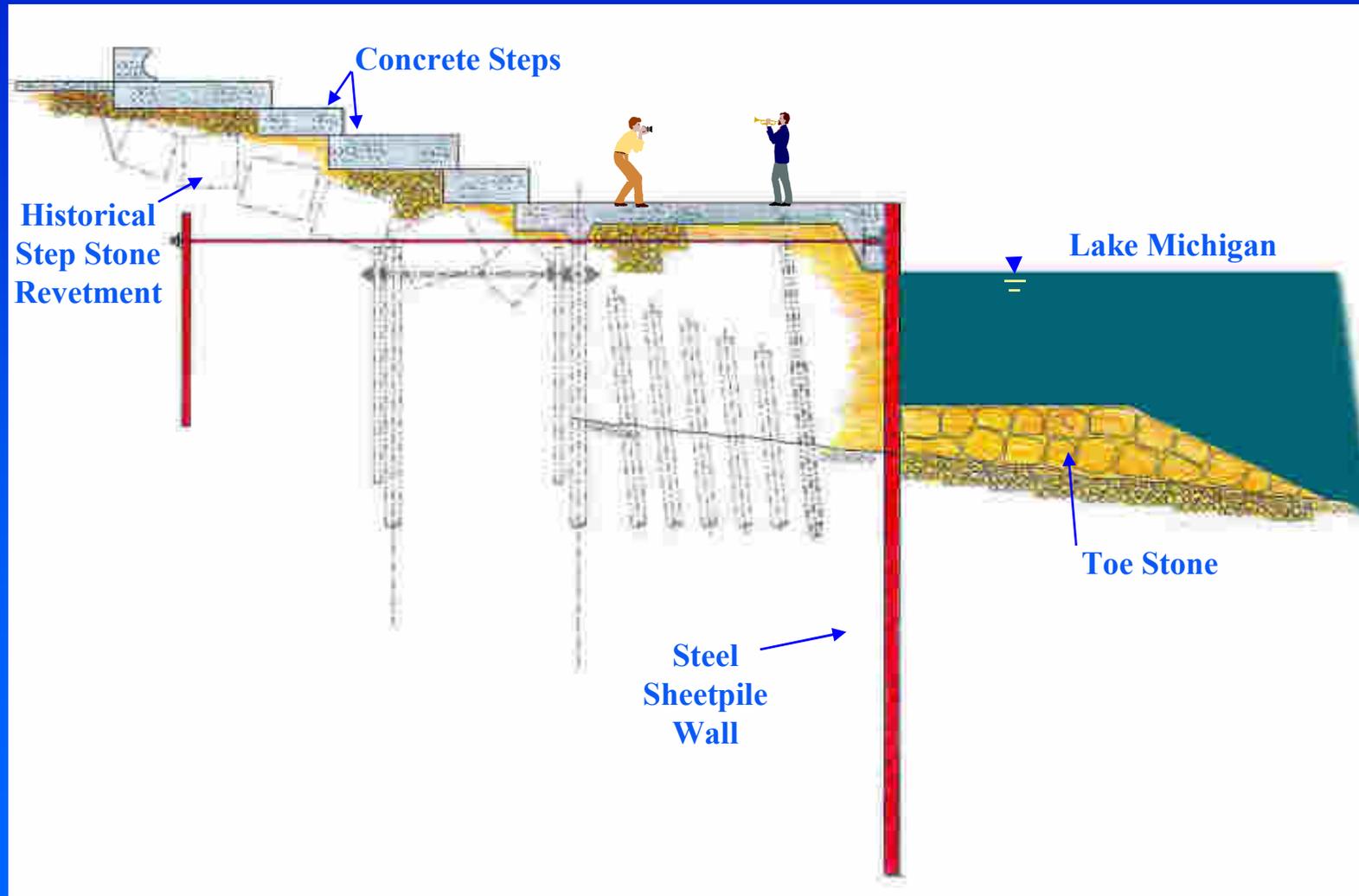
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Local Sponsor Requirements

- Provide safe access to the water's edge
- Provide and preserve an unobstructed view of Lake Michigan
- Provide universal access to all levels of the revetment
- Closely replicate original structure but use modern construction materials



Locally Preferred Proposal - Step Stone Revetment





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Design Analysis for Locally Preferred Plan

- **2-D Models for 18 different cross sections to quantify overtopping volume**
- **Optimize design crest elevation and overall structure width**
- **Developed an equation to predict overtopping rates for use in preliminary design efforts**





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Revetment Design Elements



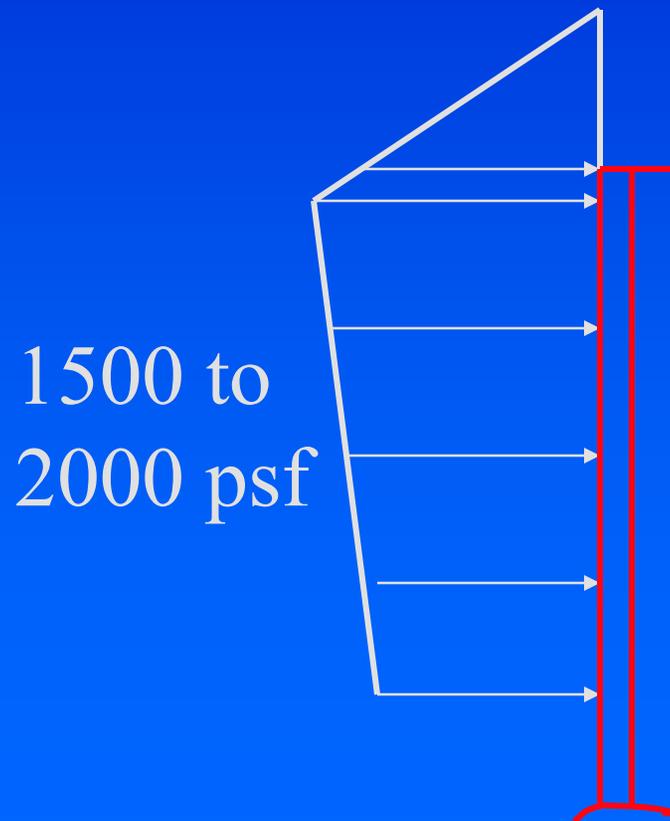




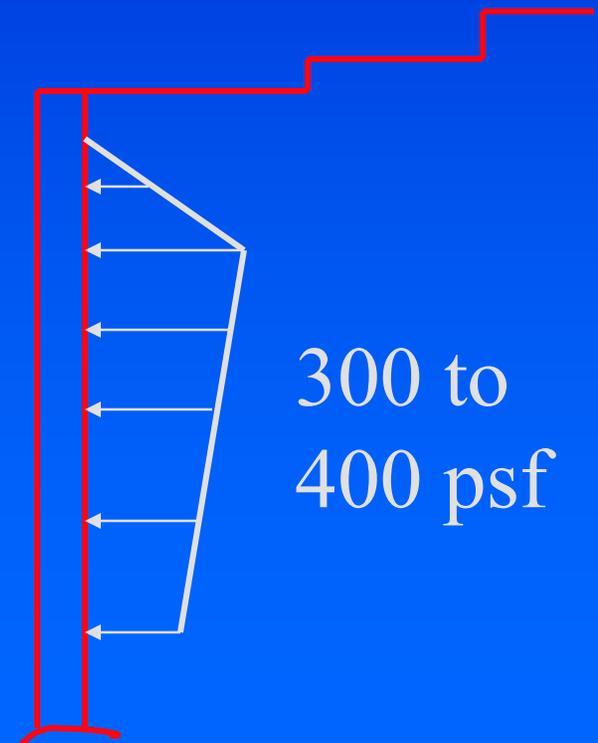
Photo by: M. Mohr

Wave Pressures

Wave Crest Load



Wave Trough Load





12 10:40 AM

Photo by: M. Mohr

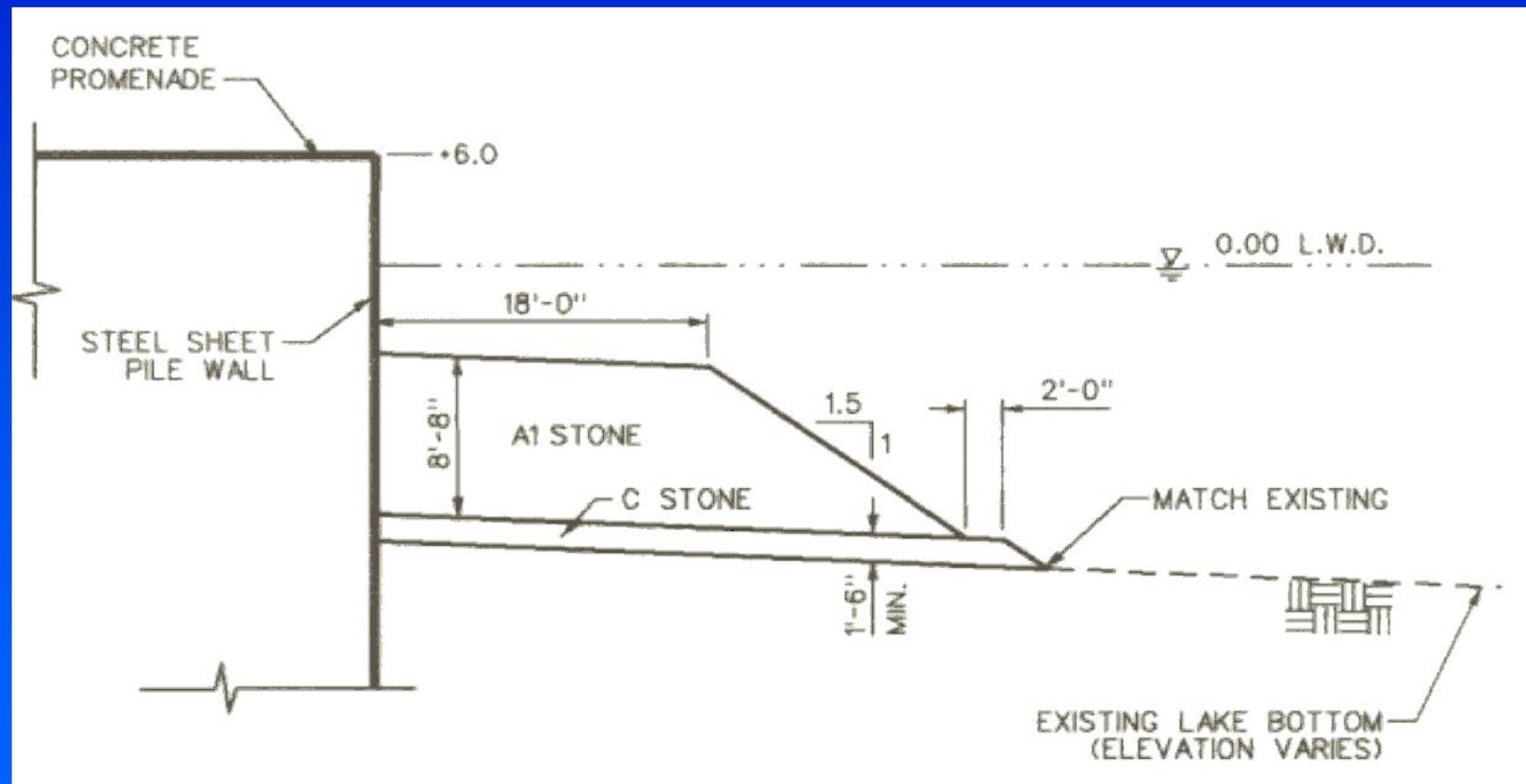


Photo by: M. Mohr



Gang Forms

Typical Toe Berm Section





Toe Stone Placement



Toe Berm at 33rd to 37th Street



Drainage Gap in the I-55 to 30th Street Revetment

Photo by: V. Jurca

I-55 to 30th Street Drainage Gap



Photo by: M. Mohr

View of 37th Street Drainage Gap





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Completed Projects





Montrose North Pre-Construction



Montrose North Post Construction

Photo by: V. Jurca



Pre-Project Conditions at Entrance to Belmont Harbor



Post Construction Entrance at Belmont Harbor

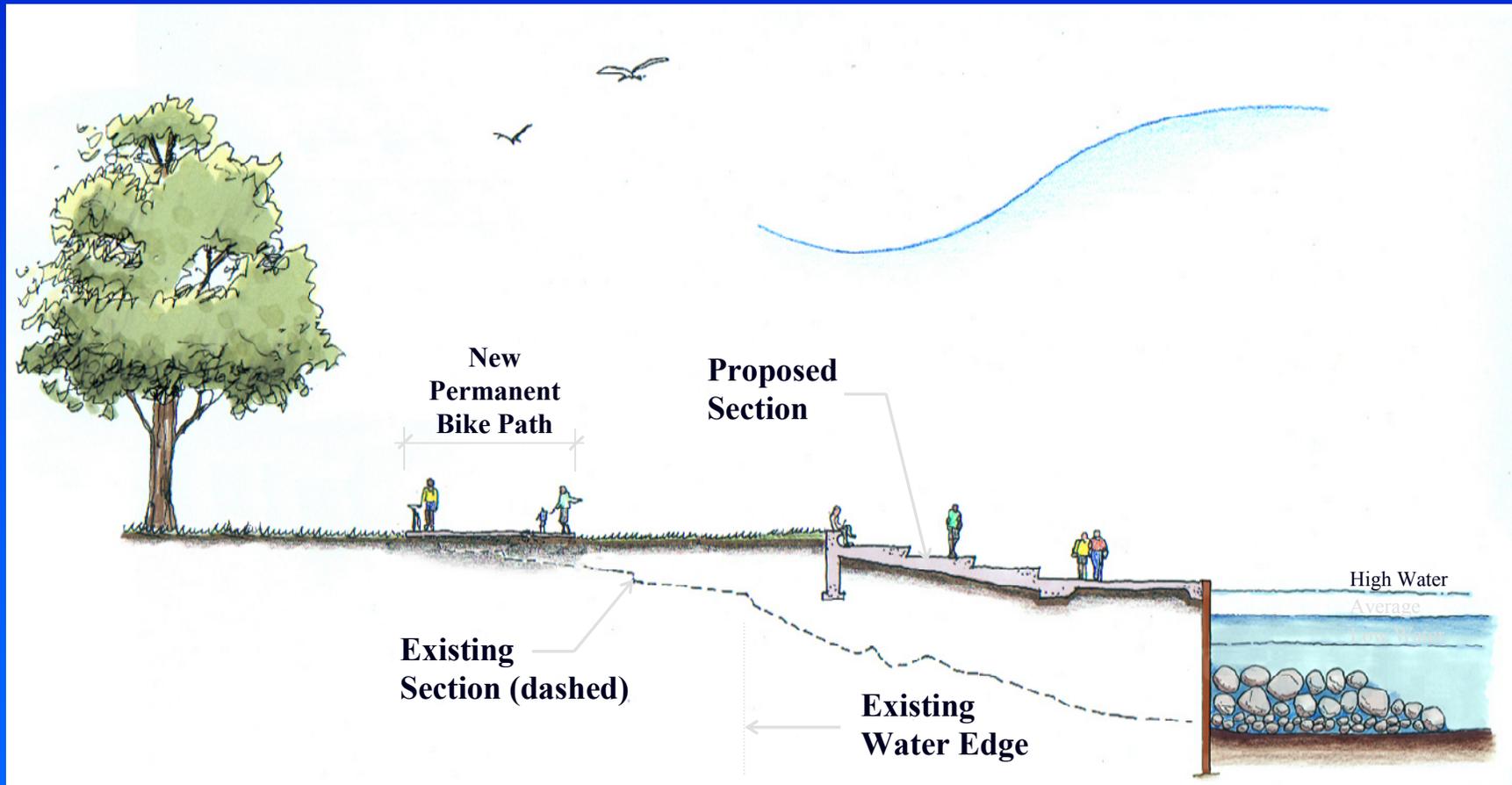


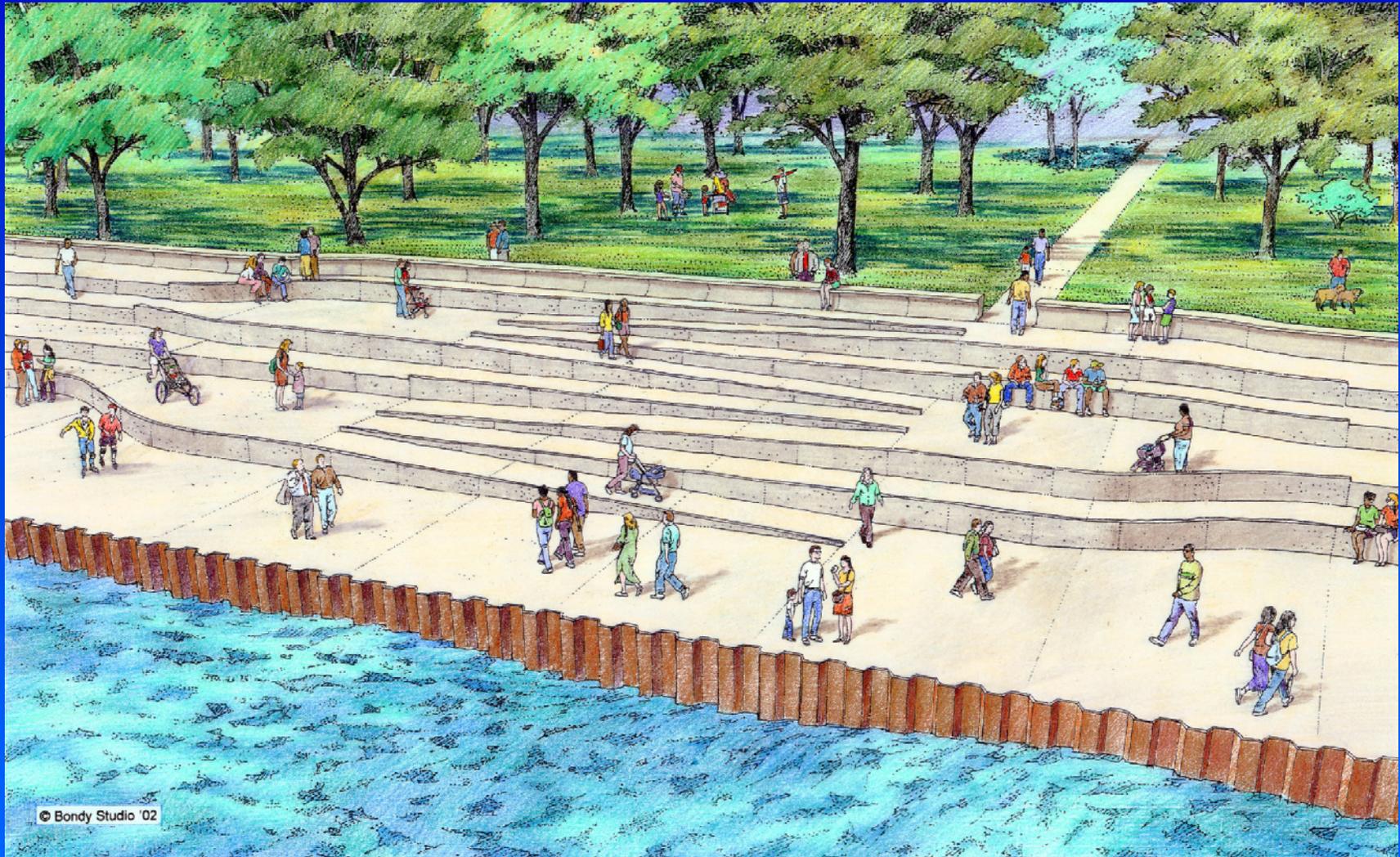
Solidarity Drive



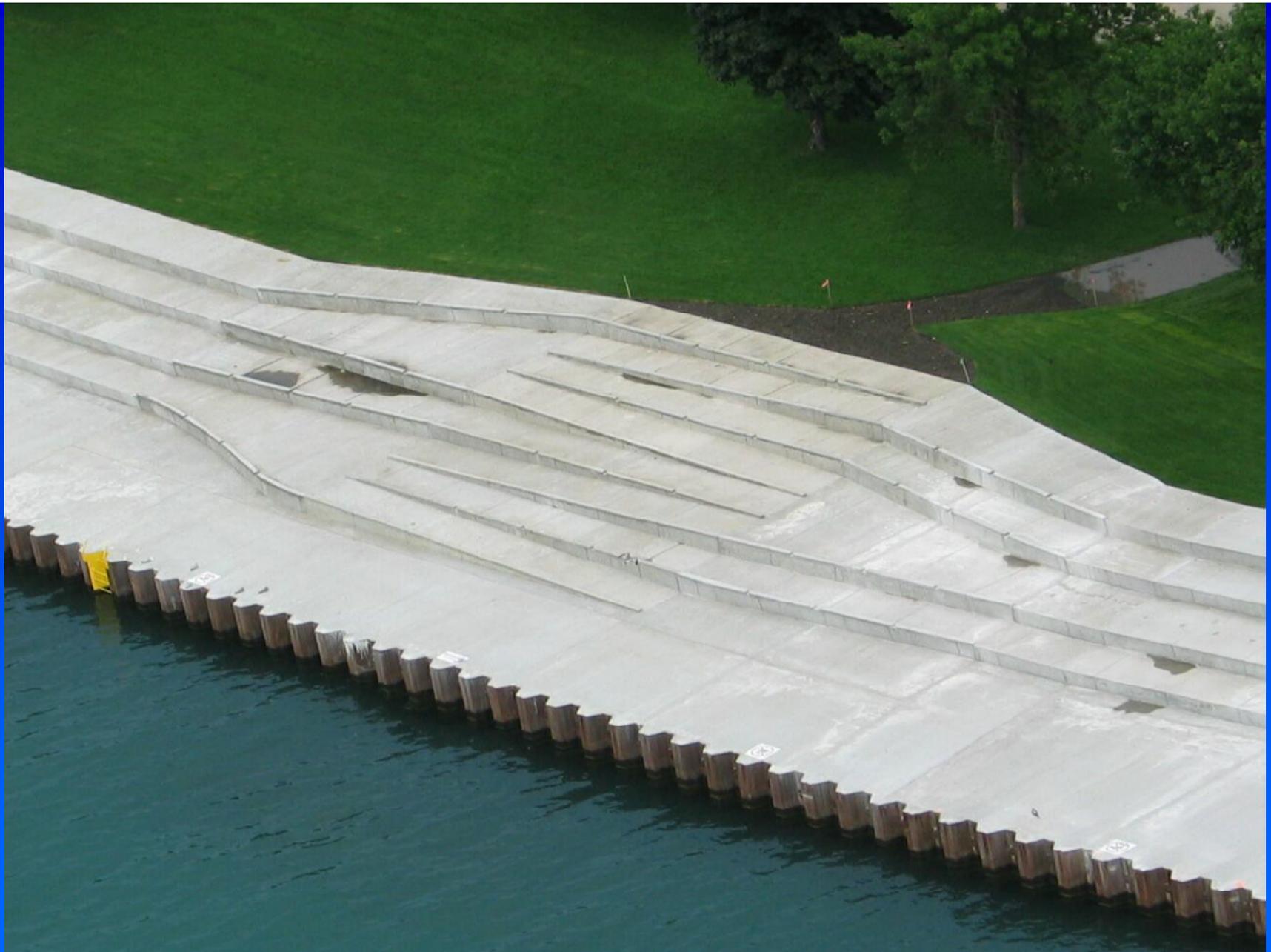
I-55 to 30th Street Revetment

Recreational Enhancements





Conceptual Design of Universal Access System



Universal Access Constructed on the Montrose Peninsula



Chicagoans Enjoying the Lakefront

37th to 40th Street



**3180 ft. Revetment and Land Expansion Creating
Approximately 15 Additional Acres of Parkland**

Construction and Land Expansion at 37th to 40th Street





Before



After



31st Street Beach

Photo by: V. Jurca

31st Street Beach



Before

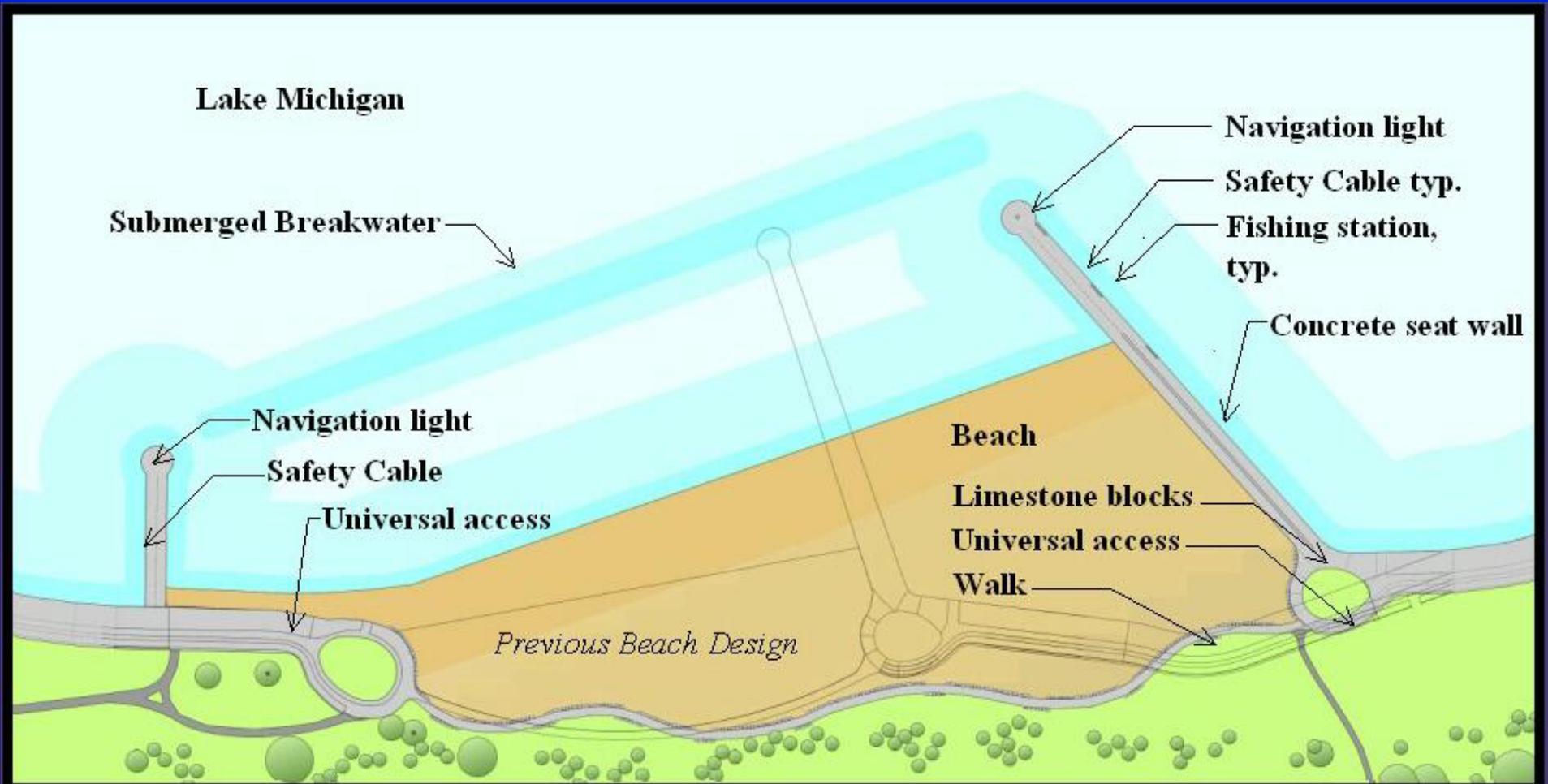


After



Pre-Project Conditions at 40th to 41st Street

Conceptual Beach Design for 40th to 41st Street



Morgan Shoals



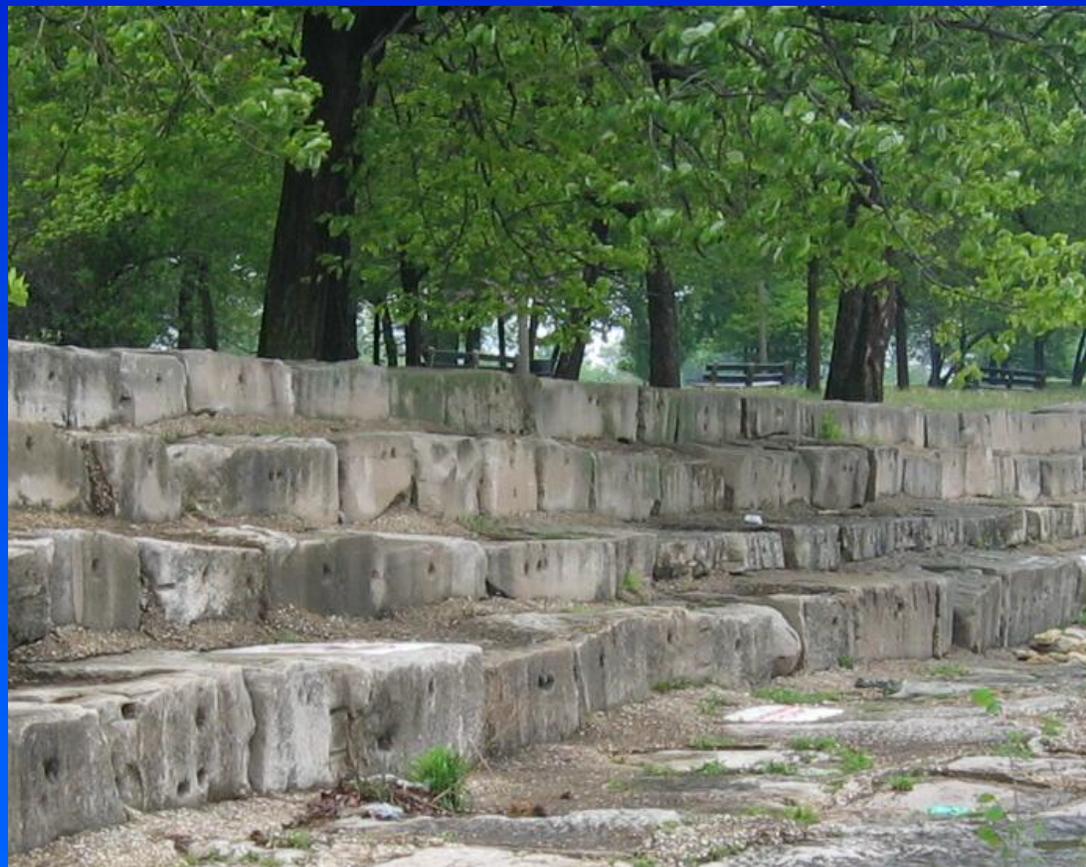
Conceptual Beach Design for Morgan Shoals





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Preserving the Historical Nature of the Chicago Shoreline



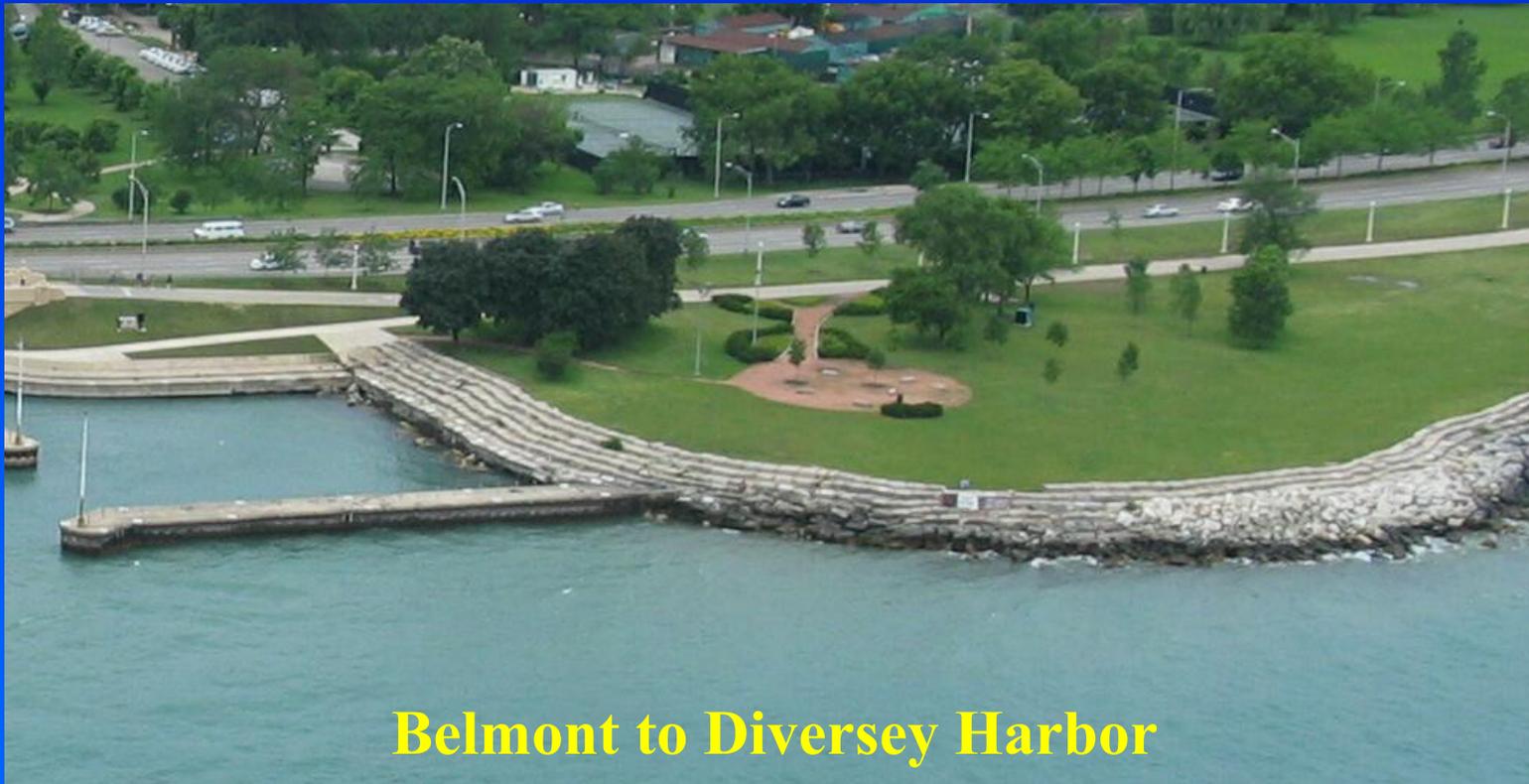


Preliminary Use of Form Liners



**Step Relief Detail for Test
Section Form Liners**

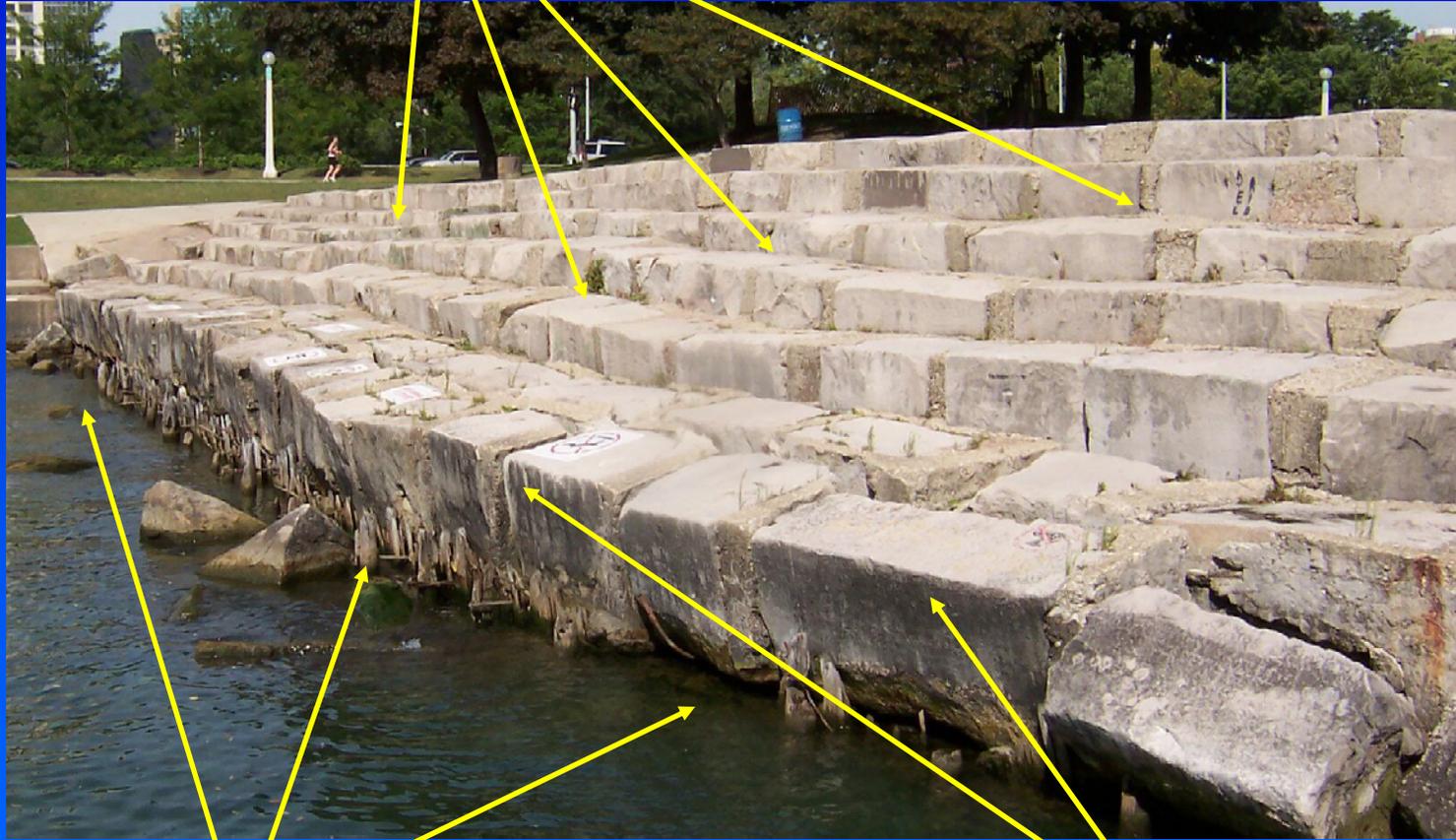
REVTMENT RESTORATION AND STEP STONE REPLACEMENT USING SHPO APPROVED FORM LINERS



Belmont to Diversey Harbor

Fill Voids with Low
Pressure/High
Viscosity Grout

REVTMENT RESTORATION



Raise Elevation of Toe
Stone

Reset Lowest Step



PROMONTORY POINT

- **Controversial Rehab Project**
- **Construction begins in 1920's with fill operations and shore protection consisting of stone filled bulkheads covered with capstones**
- **Revetment steps added in 1930's as part of WPA program**
- **Park landscaped by Alfred Caldwell**

"RESIDENTS OPPOSE CONCRETE SEA WALL"

**"City plan for Point
called far too pricey"**

Chicago Sun-Times

**"Promontory Point panel formed
Alderman aims at rehab dispute"**

Chicago Tribune

Chicago Tribune

"Promontory Point talks progressing"

Chicago Tribune

**"Report boosts opponents
of concrete lakefront wall"**

Chicago Tribune

**"55th Street promontory
project halted"**

Chicago Sun-Times

"Point talks collapse ..."

Hyde Park Herald

**"POINT REHAB WINS HOUSE
SUPPORT"**

Hyde Park Herald

"Between rock, hard place,

parks seek a compromise Point's top steps may be limestone"

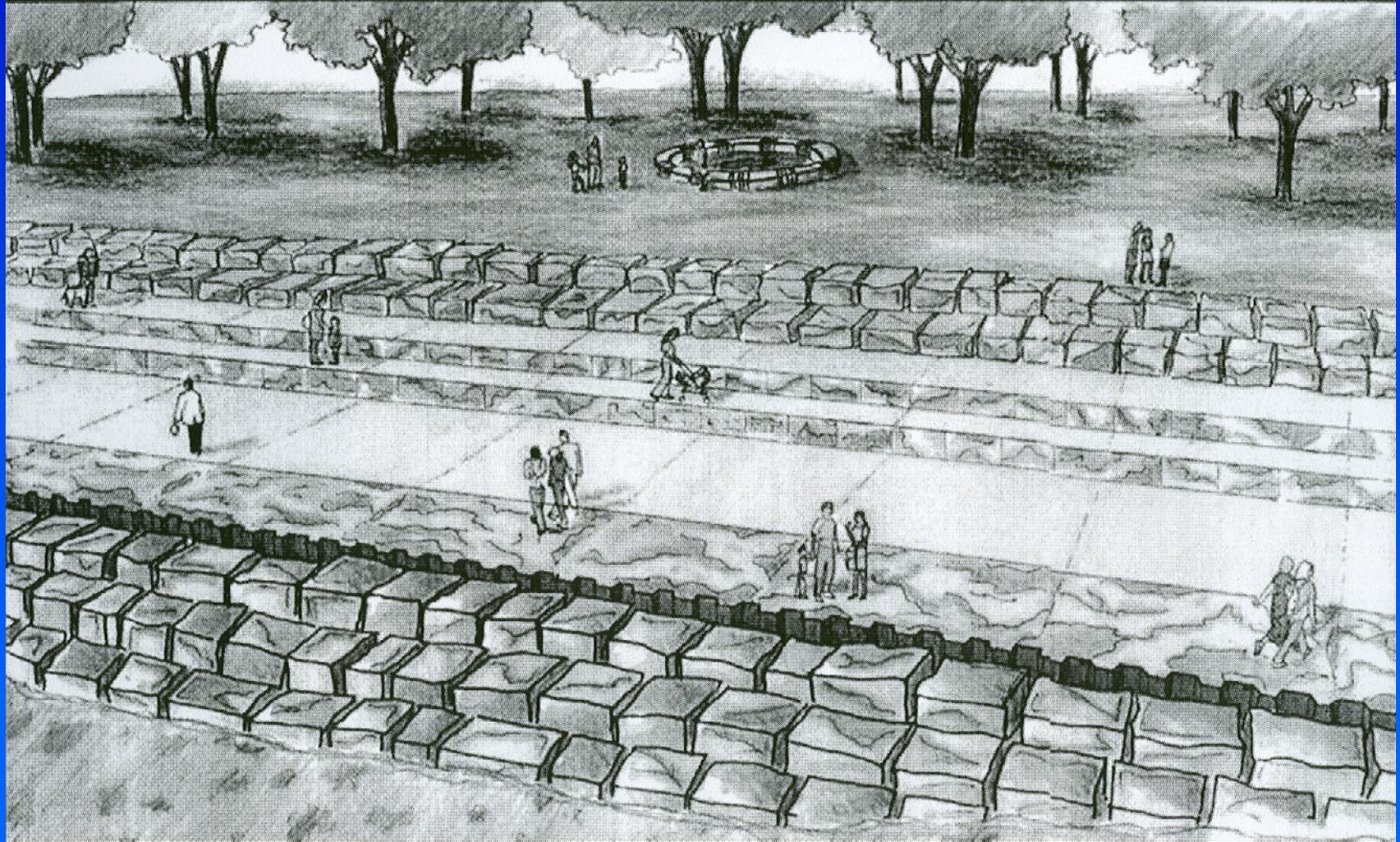
Chicago Tribune

"Promontory compromise floated"-Chicago Tribune















Questions ?