



**Shabica & Associates, Inc.**  
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Federal Consistency Coordinator  
Illinois Coastal Management Program  
Illinois Department of Natural Resources  
160 N. LaSalle Street, Suite 700  
Chicago, IL 60601

RECEIVED  
SEP 14 2015

OFFICE OF WATER RESOURCES  
DIVISION OF RESOURCE MANAGEMENT

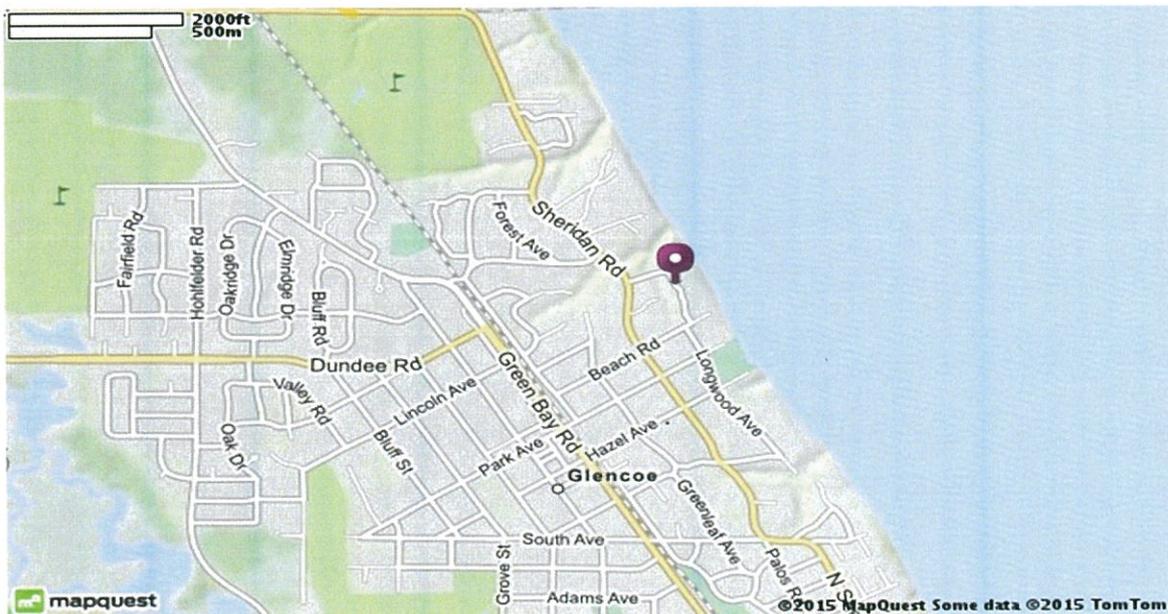
To Whom It May Concern:

September 10, 2015

In compliance with the Illinois Coastal Management Federal Consistency Review Procedures, we provide the following information for a proposed quarystone breakwater-protected beach for the property located at 45 Lakewood Drive, Glencoe, Illinois 60022, owned by Robert Berman.

#### Location of Project

The proposed quarystone breakwater-protected beach will be built on the lakefront of the property located at 45 Lakewood Drive, Glencoe, Illinois 60022, owned by Robert Berman.



**Project Start Date and Duration**

Work will not begin until all necessary permits have been received. It is anticipated that the project can begin by June 1, 2016. This work will require approximately 8 weeks to complete.

**Extent of Work to be Conducted**

The shoreline stabilization will be comprised of installation of a 95' steel sheet wall, a 90' quarystone breakwater (toe to toe), completion of the quarystone revetment, and placement of premitigational sandfill. No work will be done further than 125' east of the bluff toe (measured as the Ordinary High Water Mark on the revetment). The steel sheetpile wall will have a crest of 588' landward tapering to 584' at the lakeward end. The steel wall will extend east perpendicular to existing shoreline for 80' then angle to the north for the final 15'. The quarystone breakwater will be 90' long toe to toe. It will have a crest elevation of 584' south tapering to 583' north. The slope of the breakwaters will be 1v:1.5h. There is an existing revetment along the shoreline that terminates approximately 10' north of the south property line. A new section of revetment will be constructed to complete the revetment and connect it to the steel groin. Approximately 1,800 cu. yds. of clean sand will be placed as required by the IDNR.

The proposed system is designed to help retain a sandy beach, move the locus of wave energy further offshore, help reduce lakebed downcutting, and provide safe access for pedestrians to and from Lake Michigan.

**Contact Information**

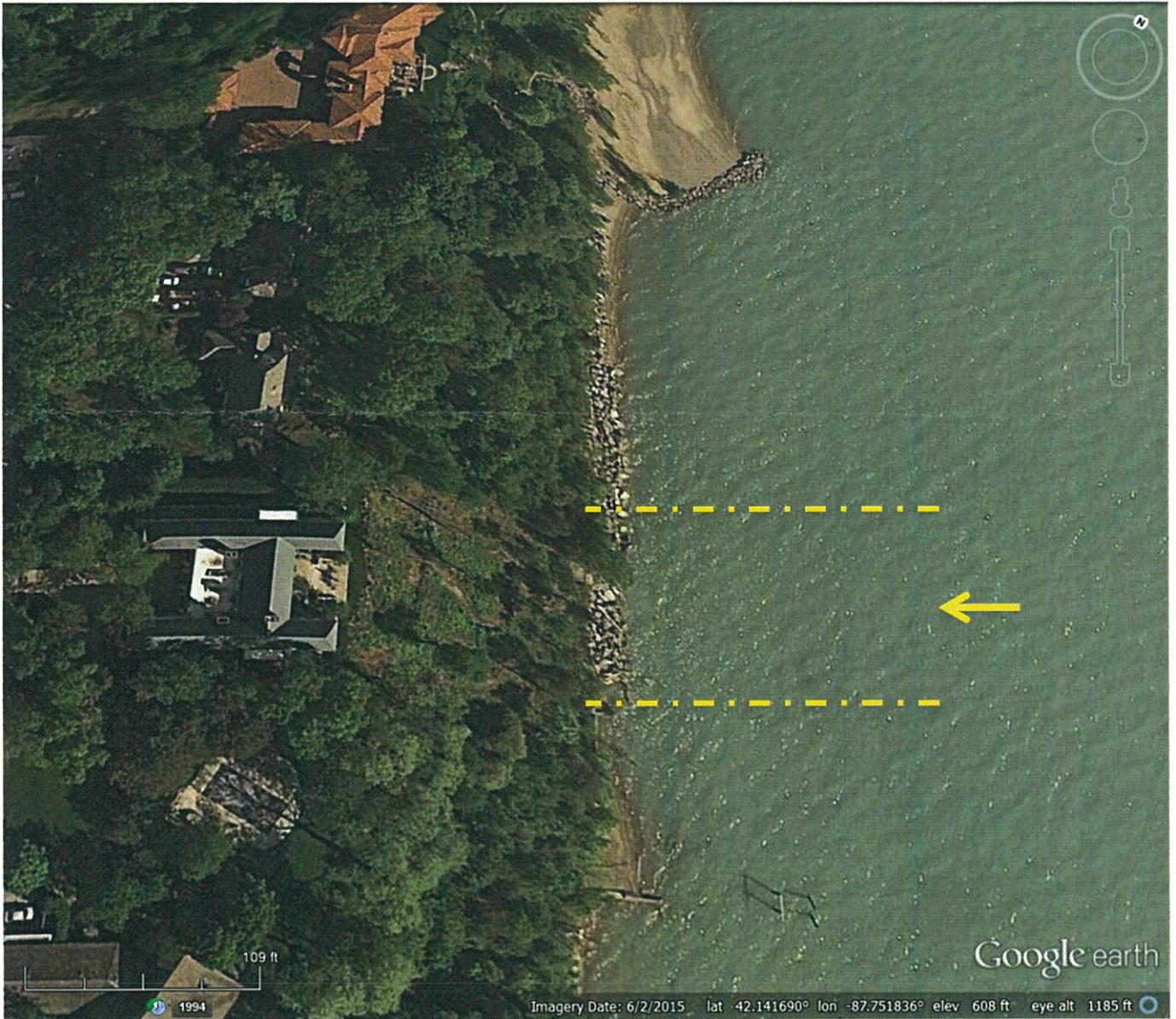
All questions pertaining to this project can be submitted to:

Jon Shabica  
Shabica & Associates, Inc.  
550 Frontage Road, Suite 3735  
Northfield, IL 60093  
[jon@shabica.com](mailto:jon@shabica.com)  
847-446-1436 Tel  
847-716-2007 Fax

The proposed activity complies with Illinois' approved Coastal Management Program and will be conducted in a manner consistent with such policies.

Sincerely,

JON SHABICA  
Vice President



2015 Google Earth Image (Approximate Property Lines in Yellow)



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RECEIVED  
MAY 26 2016

Mr. James P. Casey, Chief  
IDNR/OWR  
Lake Michigan Management Section  
160 N. LaSalle Street, Suite S-703  
Chicago, IL 60601

OFFICE OF WATER RESOURCES  
DIVISION OF RESOURCE MANAGEMENT

Dear Mr. Casey:

Rev. May 23, 2016 from September 10, 2015

Per your request, please find enclosed a modified permit application for shore protection for the property located at 45 Lakewood, Glencoe, Illinois 60022, owned by Mr. Robert Berman. The shoreline stabilization will be comprised of a new quarystone breakwater extending north from the eastern end of a new steel groin along the south property line. The breakwater will be installed extending 125' offshore from the existing concrete seawall to help dissipate wave energy. The quarystone breakwater is designed to help reduce incident wave energy from eroding the sand and clay lakebed, to create a sustainable sand cover over the clay lakebed which helps reduces lakebed downcutting (deepening of the water) and to help improve water quality caused by colloidal fines from the eroding clay being suspended in the water during storms. Additionally, a deteriorated boat lift on the property to the south, 21 Lakewood, will be removed from the lakebed.

A *Design of Shoreline Erosion Protection* report has been attached to this cover letter as the coastal design specifications component of this permit. All references and figures referred to in the cover letter and the following report can be found in the Appendix.

The proposed activity complies with the approved Illinois Coastal Management Program and will be conducted in a manner consistent with such policies.

#### **Project Purpose Statement**

Mr. Berman has retained Shabica & Associates (SA) to help protect the bluff and revetment at the Lake Michigan coastline at 45 Lakewood, Glencoe, IL. The property currently has an older, deflated quarystone revetment. During extreme low lake levels there was a sandy beach present at this property; however, during most lake levels there is no exposed beach. At the time of the bathymetric survey, the lakebed elevation was 578' IGLD 1985). During large lake storms, the existing revetment is overtopped by waves.

#### **Project Description**

The shoreline stabilization will be comprised of the installation of a 95' steel sheet wall, a 90' quarystone breakwater (toe to toe), completion of the existing quarystone revetment at the south property line, and placement of premitigational sandfill. No work will be done further than 125' east of the bluff toe (measured as the more restrictive of the bluff toe or seawall, see plan view and report from CNM Development - Attachment 1). The steel sheetpile wall will have a crest of 588' landward tapering to 584' at the lakeward end. The steel wall will begin 15' north of the property for the first 12', then jog south toward the property (creating an area for quarystone steps for pedestrian access) and the continue east perpendicular to existing shoreline to 80' east of the seawall, then angle to the north for the final 15'. The quarystone breakwater will be 90' long toe to toe. It will have a crest elevation of 584' south tapering to 583' north. The slope of the breakwaters will be 1v:1.5h.

There is an existing revetment along the shoreline that terminates approximately 10' north of the south property line. A new section of revetment will be constructed to complete the revetment south of the new sheetpile wall. Approximately 1,800 cu. yds. of clean sand will be placed as required by the IDNR. The deteriorated steel boat lift on the property to the south will be removed. This structure consists of 4 steel piles that extend to approximately 127' offshore.

The proposed system is designed to help retain a sandy beach, move the locus of wave energy further offshore, help reduce lakebed downcutting, and provide safe access for pedestrians to and from Lake Michigan. At average or above Lake Michigan water levels, there is no safe access for walking the regional shoreline.

### **Coastal Geology**

This section of coastline has historically lost sand due to lakebed downcutting especially during prolonged periods of low lake levels. Nearshore sand deposits are thin and less than one foot in some locations at this site (Figure 1, Appendix) and scientists estimate that the rate of lakebed erosion averages 6 inches per year (Nairn, 1997). The net result is similar to the effects of global warming and rising sea level on marine coasts. This includes deeper water nearshore, larger stormwaves and progressively narrower beaches as the nearshore lakebed continues to erode.

One of the largest factors in determining the scope of a project is analyzing current lake levels and climactic conditions. Over the past year, larger-than-normal stormwaves have impacted the shoreline of Lake Michigan, despite the lower lake levels that have been seen in the past few years. Changes in weather patterns and lake levels affect the intensity of storms. Unfortunately, it is not possible to predict future Lake Michigan lake levels and how the changing lake levels will impact the shoreline. The **Illinois State Water Survey, Prairie Research Institute** report on *Potential Impacts of Climate Change on Water Availability* ([http://www.isws.illinois.edu/iswsdocs/wsp/climate\\_impacts\\_012808.pdf](http://www.isws.illinois.edu/iswsdocs/wsp/climate_impacts_012808.pdf)) states that:

*“Scientists cannot predict future Illinois climatic conditions with confidence. The historical climate and hydrological records since the nineteenth century show that climate has changed significantly in the past and, even without human interference, could change significantly in the future.”*

The Illinois State Water Survey goes on to graph future precipitation models, illustrating conditions that are wetter or drier than previous historic extremes. Either scenario is likely to cause loss of property due to stormwave erosion from either lakebed downcutting and/or larger stormwaves. Currently, Lake Michigan has risen over 4' since January of 2013 leading to a significant loss of nearshore sand.

### **Design Options**

The site at 45 Lakewood, Glencoe has been inspected and options for shore protection were determined using desktop coastal engineering, bathymetric surveys, and more than 2 decades of observations of the shoreline conditions at this site. Given the conditions at this site and lack of beach under most scenarios, it is prudent to engineer and design systems that will anticipate greater lakebed downcutting, higher amounts of erosion, more extreme storm events with larger waves, and potential land erosion. These five options were considered:

#### **OPTION 1**

##### ***Do Nothing –***

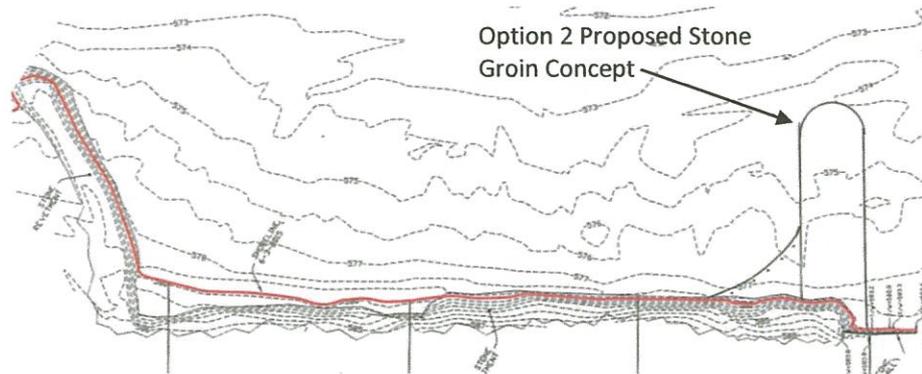
The first option of “Do Nothing” results in leaving the currently eroding beach in its existing state. The lakefront at this site is vulnerable to lakebed downcutting as well as bluff toe erosion above the existing revetment. Additionally, after the extended period of low lake level, lakebed downcutting was exacerbated and the toe stone on many revetments is failing causing instability of the revetment.

Continued downcutting of the lakebed will allow larger stormwaves to impact and overtop the existing revetment and will cause increased vulnerability of the revetment to failure in the near future.

**OPTION 2**

*Stone Groin Only –*

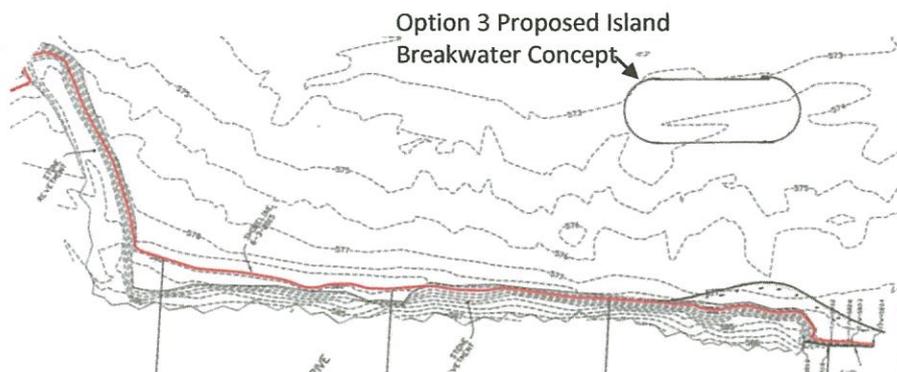
By installing only a stone groin with no shore parallel extension, the sand retention capacity is not enough to reduce lakebed downcutting to protect the bluff and revetment. The cost does not justify the end result. *See illustration below.*



**OPTION 3**

*Breakwater Island Only –*

This option includes installing one shore parallel breakwater island extending to 125' east of the revetment at the OHWM. As this section is very open and does not hold much sand, a breakwater island in these conditions will likely not maintain a tombolo and the sand will not be stable due to wash through during average to high lake levels. As the sand will not be as stable, the shoreline will not be as protected as it would with a shore connected breakwater to reduce the size of the beach cell. *See illustration below.*



**OPTION 4**

*Proposed Option: Steel and Quarrystone Breakwater Beach System –*

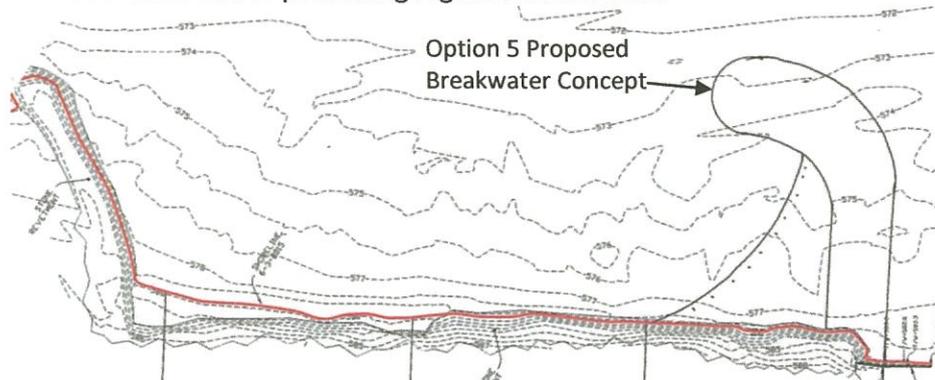
The preferred option is to install a steel sheetpile wall extending east from the south property line 80 feet then angling north into the proposed quarrystone breakwater. The quarrystone breakwater will curve to the north being 90' long toe to toe. This design covers less of the lakebed than if all of the structures were constructed of quarrystone. The beach cell will be reduced helping to retain sand in the area. The system will then be filled with premitigational sand. The system will not extend beyond 125' lakeward of the existing seawall. The proposed plan will help protect the glacial clay lakebed, as well as the beach and bluff, while allowing safe access to Lake Michigan. Pedestrian access will be accommodated with a jog in the steel sheetpile wall to provide room for quarrystone steps in the

revetment for pedestrians to move over the structure. This option will help stabilize the sand on the adjacent beaches by reducing wave energy in the immediate area.

#### OPTION 5

##### *Quarrystone Breakwater Beach System –*

This option has a shore connected quarrystone breakwater that extends further lakeward than the IDNR guidelines allow. This system would hold the largest beach to protect the lakebed and the property. This option was not selected due to permitting regulations and cost.



#### **Benefits of Sandy Beaches**

The Great Lakes represent the most important natural resource in the United States. Sandy beaches play an important role in maintaining water quality and safe access. Furthermore, a sandy beach makes a better ecotone (transitional environment) for flora and fauna than seawalls and revetments. Summary arguments supporting a sandy beach system include:

- 1) Beaches are filters for non-point source runoff.
- 2) Beaches reduce lakebed downcutting, a source of fine clay pollutants.
- 3) Beaches support endangered species such as sea rocket, marram grass, and seaside spurge.
- 4) Beaches make better wildlife habitat than actively eroding bluffs or seawalls.
- 5) Stone headlands make better fish habitat than eroding lakebed clay.
- 6) Beaches protect the lakebed from erosion that causes larger stormwaves to impact the shore.
- 7) Beaches are far safer for swimmers and boaters than a coast lined with seawalls or revetments, especially in an emergency.

On urban coasts, more than 35 years of system monitoring (Shabica et al, 2011) has shown that engineered pocket beaches (aka bay-beaches or attached-breakwater beaches), pre-nourished with sand, have shown a great resilience to changing lake-levels and decreased sediment-supply. After an intense storm such as the storm on Halloween, 2014, pocket beach recovery is fast. Further, net sand loss and renourishment costs are lower than for unprotected beaches on open Great Lakes coasts. And finally, a diverse coastal ecosystem dominated by American Beach Grass and native species like Sea-Rocket has been surprising resilient after severe shore erosion events. Planting of native species on the new beaches further improves the decreasing terrestrial habitat regionally. And with each beach, thousands of tons of new sand is brought in, not only to initially nourish the pocket beach but also to add 20% overfill sand to the adjacent lakeshore. Periodic sand re-nourishment has proven to be a successful management tool and provides additional sand for the entire Illinois coastal ecosystem.

### **Impact to Littoral Drift System**

The proposed plan for this site includes construction of a breakwater-protected beach system and placement of mitigational sandfill, as required for permit. The design of the proposed system, including the mitigational sandfill, will help assure no negative impact to the littoral drift system. The existing section of Lake Michigan shoreline at 45 Lakewood, Glencoe is completely engineered. This section of the coastline consists of breakwater-held beaches, groins and revetments. Sand mitigation (as required by the IDNR) will be placed on the property immediately to the south with a 20% overfill as required.

The proposed quarystone breakwater will extend less than 125' offshore. The proposed structures that have been designed fall under the IDNR guidelines regarding distance offshore. Three properties to the north, the stone breakwater at 81 Lakewood extends approximately 130' offshore and about 1/3 of a mile south of the project, the Glencoe municipal pier extends almost 300' offshore. The littoral drift system should remain at an equilibrium once the mitigational sand is placed (anticipated quantity plus 20% overfill).

IDNR regulations for structures that will retain sand require pre- and post-construction surveys, as well as surveys at the one and five-year intervals. This requirement will help assure that a sand equilibrium is met and that the new project is gaining and losing sand at a similar rate to neighboring properties or mitigation may be required at the owner's expense.

### **Impact on Public Uses**

The beach will provide a safe place for boaters and swimmers in distress. Fishing will not be impacted negatively, as the underwater area of the quarystone protection will create an improved fish habitat. Additionally, navigation of water craft will not be impacted, as the proposed construction will not extend further east than the existing nearby structures. Public access over the steel wall will be provided with quarystone steps up the revetment from the south and then down to the beach on the north side of the steel wall. The steel sheetpile wall will jog north at the landward end to accommodate the revetment and stairs on the subject property.

### **Impact on Natural Resources**

Quarystone structures in the nearshore waters of Lake Michigan and sandy beaches improve native species habitat. The LandOwner Resource Centre with support from the Canadian Wildlife Service and the Ontario Ministry of Natural Resources states that, "unstable shorelines can release silt that can choke nearby aquatic habitats." Additionally, underwater structures such as artificial reefs constructed of large boulders and clean riprap material "in large water bodies, such as the Great Lakes . . . are often the best method of creating habitat." As stated above, according to Meadows, et al., 2005, "a nearshore area with 100% sand cover support[s] a species rich community." As the design does not impact the bluff and vegetation, the local terrestrial wildlife will continue to inhabit this property.

### **Type of Permit**

The scope of this project requires an individual permit.

### **Description and Schedule of Proposed Activity**

This project will be completed via marine construction with a barge and crane delivering all materials and equipment to the site. The proposed work will be completed using a backhoe that will work from the beach to place the materials unless the lake level prohibits this method of construction. If the water is too deep, some of the work may be completed using a crane from the barge. Work will not begin until all necessary permits have been received. This work will require approximately 8 weeks to complete.

**Type and Quantity of Fill/Measures Taken to Avoid Impact/Erosion and Sediment Control Plan**

All material will be clean and from inland quarries. Approximately 600 cubic yards of clean quarried stone will be placed to construct the breakwater. Approximately 1,800 cubic yards of clean sand will be placed as sandfill in and around the system. Clay removed from the lakebed for proper toe placement will be removed from the site via barge. The steel boat lift will be removed from the site.

The amount of fill to be placed below the Ordinary High Water Mark (581.5 feet, IGLD 1985) is +/- 0.078 acres.

**Summary**

All of the above described activities and plans will follow IPP terms and conditions. All of the proposed work adheres to the guidelines prescribed by the Illinois Environmental Protection Agency and its Anti-Degradation Assessment. U.S. Fish & Wildlife Service and the Illinois Historic Preservation Association will be updated on all relevant correspondence.

If you have any questions please feel free to call me at the phone number below.

Sincerely,

Jon Shabica  
Vice President

C: USACE (Hall)  
IEPA (Gove)

## DESIGN OF SHORELINE EROSION PROTECTION

### Introduction

The following report summarizes assumptions and design criteria for a steel and quarrystone breakwater system and sandfill to help retain a beach, provide lake access, and better protect the property located at 45 Lakewood, Glencoe. The design is based on the drawings included in the permit application to the U.S. Army Corps of Engineers dated September 10, 2015.

The site lies within a fully-engineered section of urban lakeshore that is typically protected with steel sheetpile groins, revetments and breakwater-protected beaches. This section of coast is sand-starved due to municipal structures (littoral barriers) constructed over the past 100 years that extend east past the littoral zone and reduce sand bypass, as well as armoring of the shoreline reducing erosion of the glacial clay bluffs. According to the Illinois State Geological Survey, there is almost no sand moving along this section of coast. All structures in the area have been steadily losing their effectiveness at holding beach sand. This problem is exacerbated by lakebed erosion. In many cases where all the sand has been lost, the adjacent bluffs have begun to erode. To provide adequate protection for the upland property, solutions have typically been of two types: breakwater- or groin-anchored beaches to protect the bluffs, or a lower-cost system with a lower level of protection in the form of quarrystone revetments placed against the toe of the bluff that prevents stormwave erosion but at the expense of the beach and pedestrian access.

### Project Description

The proposed design includes designing a headland bay beach with one quarrystone breakwater extending north from a new steel groin. The project will include sandfill mitigation that fulfills the design requirements of 20-year stormwave erosion protection. While the revetment at this site continues to provide shore protection for the bluff, continued erosion of the beach and lakebed downcutting could undermine the integrity of the revetment. Now that the lake level is rising, stormwaves may cause overtopping of the revetment, severe icing problems and impacts to the property, as well as cause deeper water in the nearshore. The breakwater-protected pocket beach is designed to help retain and enhance the beach that occurs on this property.

### Summary Specifications

Using the Army Corps of Engineers Shore Protection Manual (1984), performance of nearby prototypes and other sources, the following specifications were developed for this site (elevations are based on IGLD 1985):

#### Breakwater Specifications

Lakeward Crest Elevation:	583 ft
Toe of Breakwater:	573 ft
Crest Width:	7 ft
Average Armor Size:	3.5 tons
"B" Stone	400 - 1000 lbs
Slope:	1:1.5
Tons/linear ft:	15.6 tons

#### Assumptions

- Design High Water (DHW): 582.5 ft \*
- Design Water Level: 580.0 ft
- Design Low Water (DLW): 577.5 ft \*
- Existing clay till elevation at groin toe: 573.0 ft
- 20-yr lakebed erosion at toe of groin: 3 ft\*\*

- Design wave height: Hs = 9 ft
- Nearshore Slope: 1:50
- Design Wave Period (T): 9.9 s \*\*
- Depth at Structure Toe DHW (Ds): 9.5'
- Design Deepwater Wave (Ho): 18.0'
- Design Wave Length (Lo): 501.8'
- Stone Porosity: 37%

\* DHW includes 2 ft storm setup, DLW is equivalent to Low Water Datum

\*\* Resio & Vincent, 1976

### Shoreline/Bathymetry

Bathymetric surveying was performed on June 3, 2015. More than 8 survey lines with data points stored at a horizontal spacing of 7 feet were completed in the project area and on adjacent properties (minimum of 3 survey lines per 100 feet of lot frontage). The survey data points were taken to approximately 900 feet east from the existing shoreline. The shoreline portion of survey was performed using a robotic total station, with control established by GPS observations. The water portion of the survey is performed from a boat using a single beam echo sounder (Hydrolite TM) tied in with a Trimble R8 receiver. All data points are collected in NAVD88 datum and then converted to IGLD85.

### Water Levels

The following table summarizes water level data representing daily highest extremes measured at Calumet Harbor, Illinois, approximately 28 miles to the south of Glencoe. Note: Low water datum LWD = 577.5 ft (IGLD 1985).

Lake Level	LWD	IGLD 1985
Record High	+5.5	583.0
Record Low	-1.4	576.1

### Project Supporting Data

To help facilitate project review, Shabica & Associates offers the following supporting data based on standard coastal engineering practices:

#### 1. Sediment transport around structure

The structure is designed to lie within the surf zone (zone of breaking waves), therefore allowing sediment transport around the structure. The range of breaking wave heights is from 8.3 ft based on a 6-second wave with a wave length of 184 ft (using  $1/25 L_o$ ) to 18 ft based on a 9.9-second wave with a wave length of 501.8 ft (Resio and Vincent, 1976). The commonly accepted zone of sediment transport is to 18 ft (depth of closure) in this section of Lake Michigan, which is a function of the design wave parameters. Based on this data, once the structure has been filled with sand, it will continue to bypass littoral drift sand. Survey monitoring will be conducted, as required by the IDNR, to assure that the system performs as designed.

The IDNR requires sandfill in areas where sediment will be trapped by the new system. Sand volume quantities have been calculated as shown in the permit drawings. As required by the IDNR, a 20% overfill will be added to the calculated volume. Additionally, the new pre- and post-construction monitoring will be performed and submitted to the IDNR to verify the impacts to the system.



Quartzite armorstone is recommended as it is highly durable and is locally available in most gradations under 6 tons. Hudson's formula was used to estimate armorstone size. An armorstone of 4.4 tons is predicted for 2-layer random placement armorstone based on the design conditions. As the majority of the breakwater will be built special placement with some areas of the lakeward face random placement, the armorstone gradation selected for this project is 2 – 5 tons.

**Project Monitoring**

As the performance of shore protection structures cannot be predicted with absolute certainty, the shore protection system for 45 Lakewood, Glencoe, will be inspected as required by IDNR guidelines. This includes topographic and hydrographic surveys beginning at an elevation of 581.5 feet (IGLD 1985) and progressing to 300 feet lakeward of the lakeward end of the project within the north and south property lines. Additionally, all structures should be inspected to assure that they continue to meet design specifications.

## References

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W.F Baird & Associates and Warzyn Engineering, 1986, *Shoreline Development at Forest Park, Lake Forest, Illinois, Model Studies*, Unpublished Final Report to the City of Lake Forest.

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Johnson, Charles, 1997, USACE, Chicago, personal communication.

LandOwner Resource Centre, Canadian Wildlife Service, Ontario Ministry of Natural Resources, 1999, *Improving Fish Habitat*, Extension Notes: Ontario, LRC 45.

Meadows, Guy; Mackay, S.; Goforth, R.; Mickelson, D.; Edil, T.; Fuller, J.; Guy, D.; Meadows, L.; Brown, E.; Carman, S.; Liebenthal, D.; 2005, *Cumulative Habitat Impacts of Nearshore Engineering*, Journal of Great Lakes Research; vol.31, Supplement 1, 2005, pp.90-112.

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Resio, Donald T. and Charles L. Vincent, 1976, *Design Wave Information For The Great Lakes: Technical Report 3, Lake Michigan*.

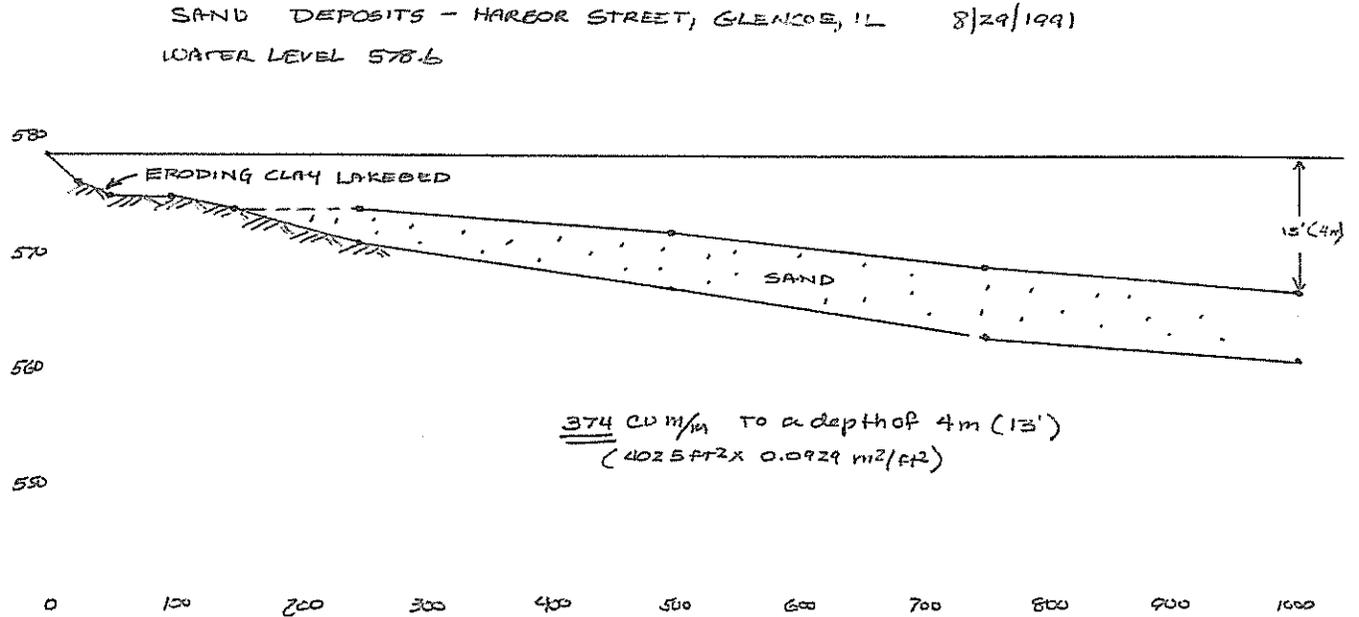
Shabica, C.W., F. Pranschke and M. Chrzastowski. 1991, *Survey of Littoral Drift Sand deposits Along the Illinois Shore of Michigan from Fort Sheridan to Evanston*, Illinois/Indiana Sea Grant Program, IL-IN-SG-R-91-3.

Shabica, C.W., F. Pranschke, 1994, *Survey of Littoral Drift Sand Deposits Along the Illinois and Indiana Shores of Lake Michigan*, U.S. Geological Survey Symposium Volume, Journal of Great Lakes Research, vol. 20, no.1, pp 61-72.

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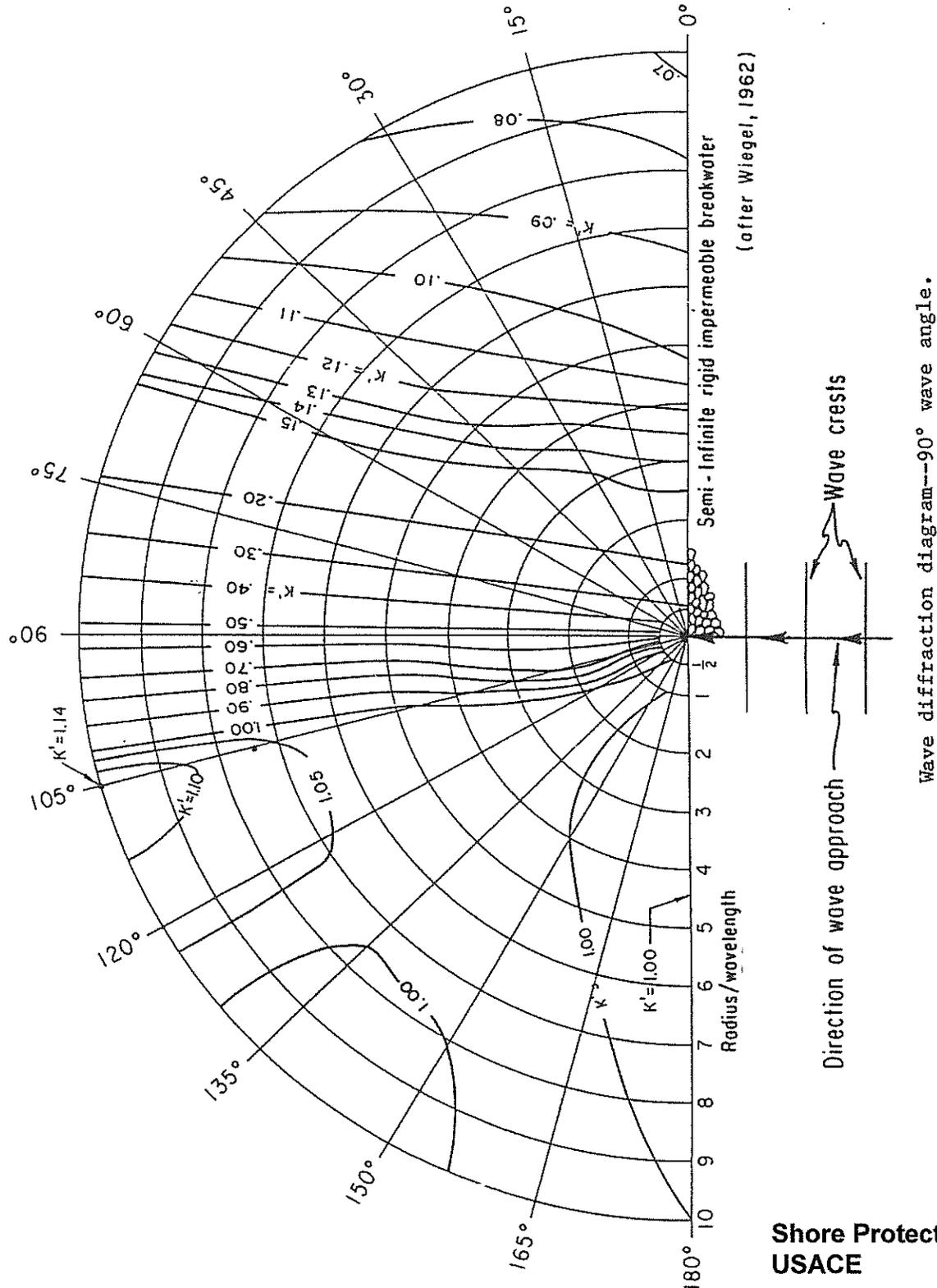
US Army Corps of Engineers, 1984, *Shore Protection Manual*, Coastal Engineering Research Center, Vicksburg, Mississippi.

# FIGURE 1



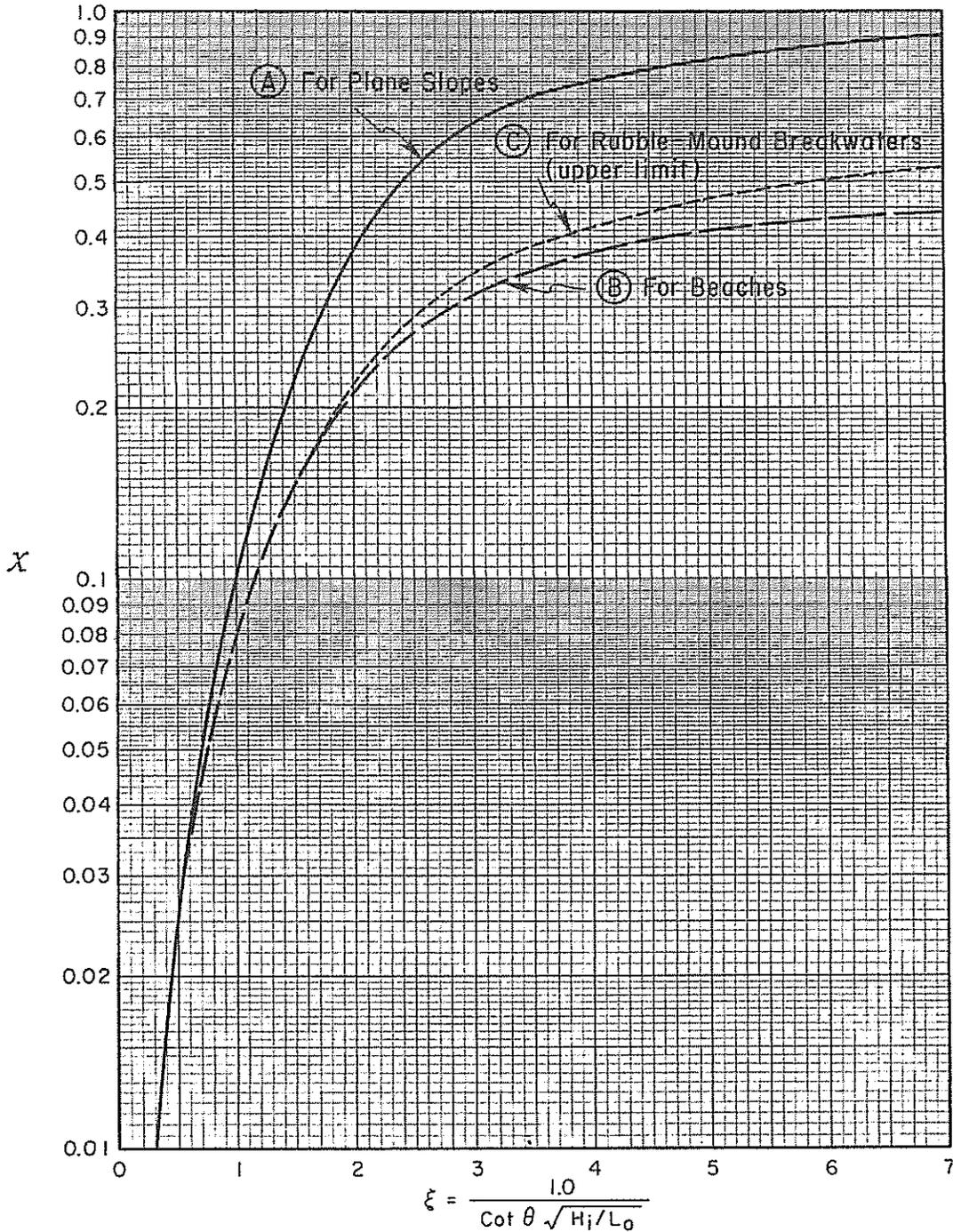
Typical cross-section of Glencoe lakebed and sand cover  
(From Shabica et al., 1991)

FIGURE 2



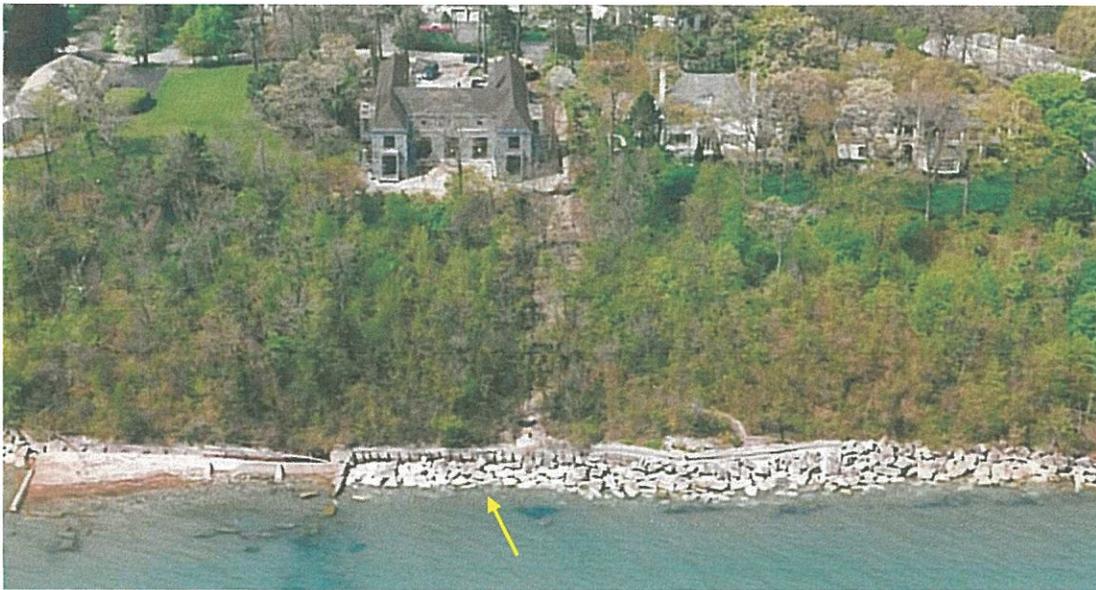
Shore Protection Manual  
USACE

**FIGURE 3**



Wave reflection coefficients for slopes, beaches, and rubble-mound breakwaters as a function of the surf similarity parameter  $\xi$ .

**Shore Protection Manual  
 USACE**



1997 Aerial Photograph showing a deteriorating revetment (arrow)



2015 Google Earth Photo; see approximate property lines (yellow)  
Boat lift to be removed shown by yellow arrow



Steel Boat Lift to be removed

## ATTACHMENT 1 – Page 1 of 2



Stefanie Nagelbach, CPESC  
Managing Director  
Shabica & Associates, Inc.  
We Build Beaches  
550 Frontage Road, Suite #3735  
Northfield, IL 60093

May 9, 2016

Stefanie,

Per your request, we have visited the subject property to take field measurements as requested to confirm the actual location of the existing bluff toe which is considered to be the concrete sea-wall.

*The following are our observations are based on comparing previous photos with the current field conditions;*

The shoreline/sea wall as at this site is **not** a straight line. Based on field measurements, the bluff toe extends 10' further east under the revetment and it appears that the revetment extends further east under the sand than it show on shows on the survey as provided by CSA.

By comparing the photographs taken prior to the installation of revetment to the existing conditions, it appears the bluff toe extends 10' further east from the visible remaining concrete seawall.

For reference, both photographs are referring to location "A".

### PRE-REVEMENT CONDITIONS

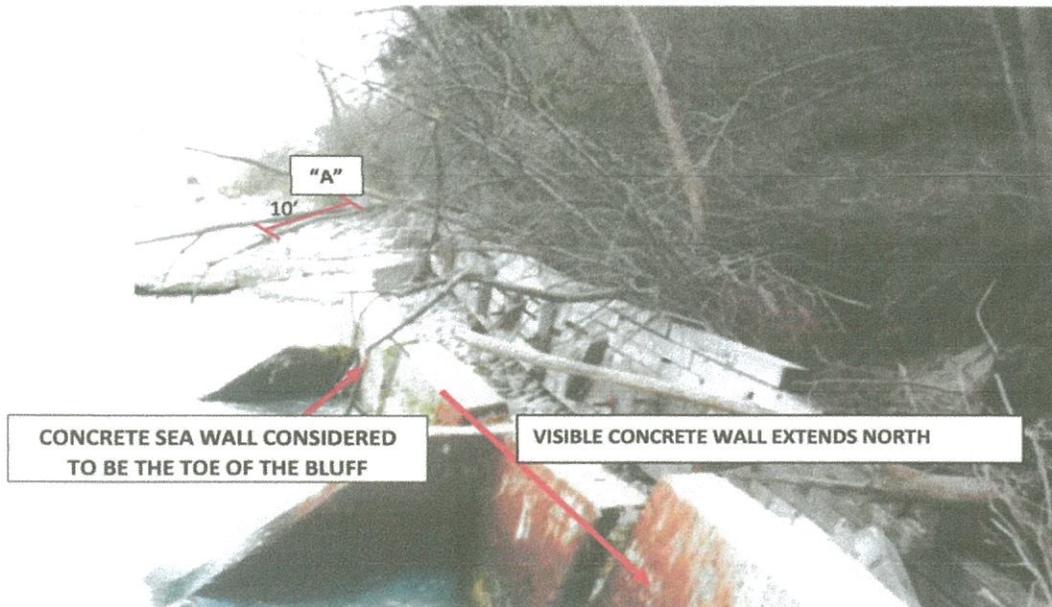


Figure 1: 45 Lakewood South Property line Looking South

1896 Techny Ct., Northbrook, IL 60062  
C 847-602-2327 F 858-923-1125  
[jeff@cnmdevelopment.com](mailto:jeff@cnmdevelopment.com)  
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## ATTACHMENT 1 – Page 2 of 2



### CURRENT CONDITIONS

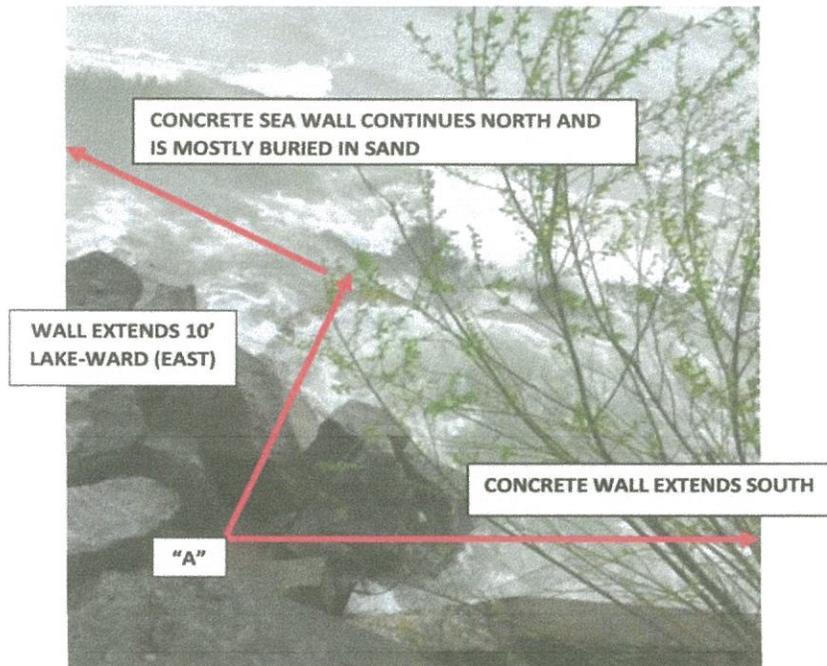


Figure 2: 45 Lakewood looking down at South Property Line

*Respectfully Submitted,*

*Jeff Tondola, Owner*  
CNM Development LLC

1896 Techy Ct., Northbrook, IL 60062  
C 847-602-2327 F 858-923-1125  
[jeff@cnmdevelopment.com](mailto:jeff@cnmdevelopment.com)  
cnmdevelopment.com

# JOINT APPLICATION FORM FOR ILLINOIS

ITEMS 1 AND 2 FOR AGENCY USE

1 Application Number	2. Date Received
----------------------	------------------

**3. and 4. (SEE SPECIAL INSTRUCTIONS) NAME, MAILING ADDRESS AND TELEPHONE NUMBERS**

<p>3a. Applicant's Name <b>Robert Berman</b> Company Name (if any)  Address: <b>1 North Breakers Row Apt. 224 Palm Beach, Florida 33480</b>  Email Address:</p>	<p>3b. Co-Applicant/Property Owner Name (if needed or if different from applicant):  Company Name (if any):  Address:   Email Address:</p>	<p>4. Authorized Agent (an agent is not required): <b>Shabica &amp; Associates, Inc.</b> Company Name (if any): <b>Shabica &amp; Associates, Inc.</b> Address: <b>550 Frontage Road Suite 3735 Northfield, IL 60093</b>  Email Address:</p>
<p>Applicant's Phone Nos. w/area code Business: Residence: Cell: Fax:</p>	<p>Applicant's Phone Nos. w/area code Business: Residence: Cell: Fax:</p>	<p>Agent's Phone Nos. w/area code Business: Residence: Cell: Fax:</p>

**STATEMENT OF AUTHORIZATION**

I hereby authorize, Shabica & Associates, Inc. to act in my behalf as my agent in the processing of this application and to furnish, upon request, s \_\_\_\_\_

Date 7/22/15

**5. ADJOINING PROPERTY OWNERS (Upstream and Downstream of the water body and within Visual Reach of Project)**

Name	Mailing Address	Phone No. w/area code
a. see attached list		
b.		
c.		
d.		

**6. PROJECT TITLE:**  
**Breakwater-Protected Beach**

**7. PROJECT LOCATION:**  
45 Lakewood Dr., Glencoe, Illinois 60022

LATITUDE: 42.14281 °N	°N °W	UTMs	
LONGITUDE: -87.75261 °W		Northing: 4665906.79	Easting: 16T437810.42

STREET, ROAD, OR OTHER DESCRIPTIVE LOCATION <b>Lakewood Drive, Glencoe</b>	LEGAL DESCRIPT	QUARTER <b>SE</b>	SECTION <b>6</b>	TOWNSHIP NO. <b>42N</b>	RANGE <b>13E</b>
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<input checked="" type="checkbox"/> IN OR <input type="checkbox"/> NEAR CITY OF TOWN (check appropriate box)	WATERWAY	RIVER MILE (if applicable)
Municipality Name <b>Glencoe</b>	<b>Lake Michigan</b>	

COUNTY <b>Cook</b>	STATE <b>IL</b>	ZIP CODE <b>60022</b>
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8. PROJECT DESCRIPTION (Include all features):

The shoreline stabilization will be comprised of installation of a 95' steel sheet wall, a 90' quarystone breakwater (toe to toe), completion of the quarystone revetment, and placement of premitigational sandfill. No work will be done further than 125' east of the bluff toe (measured as the Ordinary High Water Mark on the revetment). The steel sheetpile wall will have a crest of 588' landward tapering to 584' at the lakeward end. The steel wall will extend east perpendicular to existing shoreline for 80' then angle to the north for the final 15'. The quarystone breakwater will be 90' long toe to toe. It will have a crest elevation of 584' south tapering to 583' north. The slope of the breakwaters will be 1v:1.5h. There is an existing revetment along the shoreline that terminates approximately 10' north of the south property line. A new section of revetment will be constructed to complete the revetment and connect it to the steel groin. Approximately 1,800 cu. yds. of clean sand will be placed as required by the IDNR. The deteriorated steel boat lift on the property to the south will be removed. This structure consists of 4 steel piles that extend to approximately 127' offshore.

9. PURPOSE AND NEED OF PROJECT:

To maintain a stable beach, protect the clay lakebed and the toe of the bluff

**COMPLETE THE FOLLOWING FOUR BLOCKS IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED**

10. REASON(S) FOR DISCHARGE:

To provide adequate shore protection on a sediment starved section of lakeshore

11. TYPE(S) OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS FOR WATERWAYS:

TYPE: Stone and sand  
 AMOUNT IN CUBIC YARDS:  
 Stone: 600 cu. yds; Sand: 1800 cu. yds.

12. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED (See Instructions)

Stone will cover +/- 0.078 acres

13. DESCRIPTION OF AVOIDANCE, MINIMIZATION AND COMPENSATION (See instructions)

The coverage of the lakebed has been minimized by installing a steel sheetpile wall in place of a stone structure for the shore perpendicular portion of the breakwater.

14. Date activity is proposed to commence

June 1, 2016

Date activity is expected to be completed

8 weeks

15. Is any portion of the activity for which authorization is sought now complete?  Yes  No  
 Month and Year the activity was completed

NOTE: If answer is "YES" give reasons in the Project Description and Remarks section. Indicate the existing work on drawings.

16. List all approvals or certification and denials received from other Federal, interstate, state, or local agencies for structures, construction, discharges or other activities described in this application.

<u>Issuing Agency</u>	<u>Type of Approval</u>	<u>Identification No.</u>	<u>Date of Application</u>	<u>Date of Approval</u>	<u>Date of Denial</u>
-----------------------	-------------------------	---------------------------	----------------------------	-------------------------	-----------------------

17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HEREBY GRANTED.

Yes  No

18. APPLICATION VERIFICATION (SEE SPECIAL INSTRUCTIONS)

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief, such information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities

\_\_\_\_\_  
 Signature of Applicant or Authorized Agent

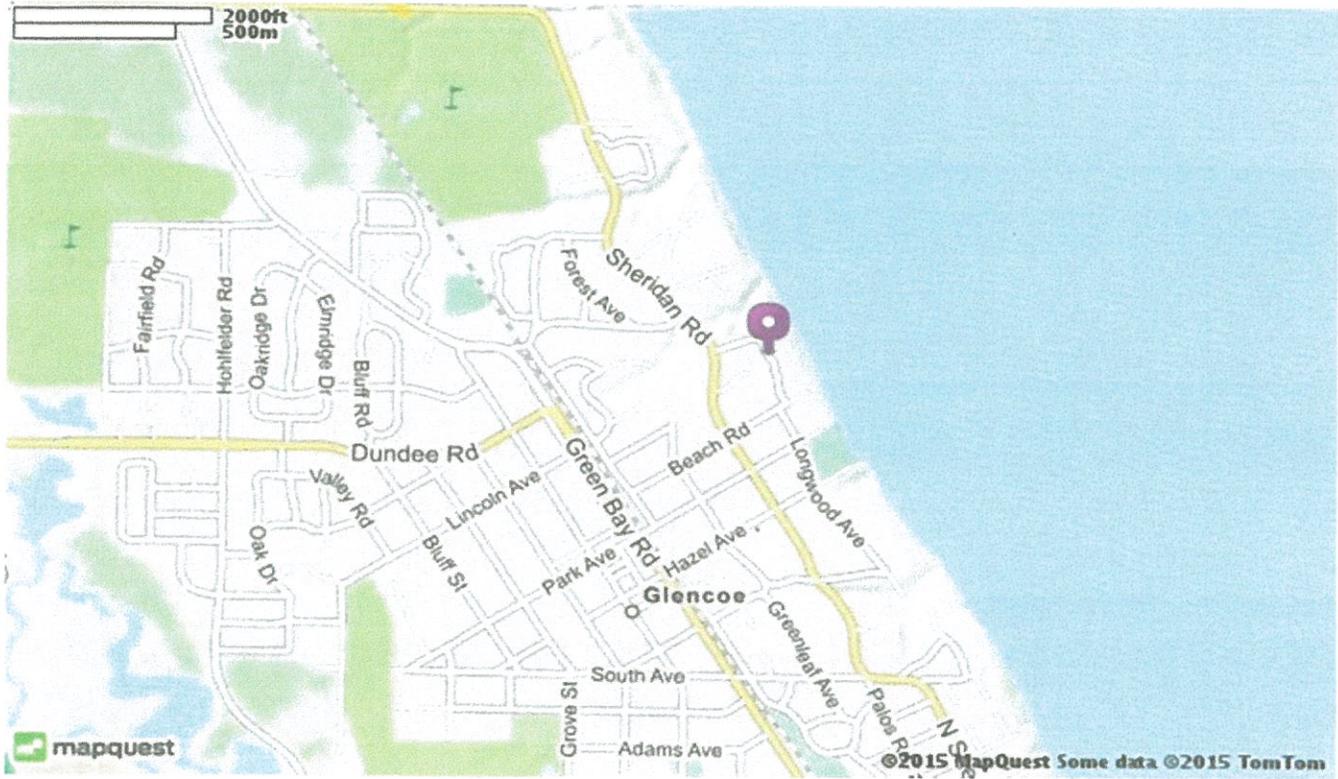
5/17/16  
 Date

\_\_\_\_\_  
 Signature of Applicant or Authorized Agent

\_\_\_\_\_  
 Date

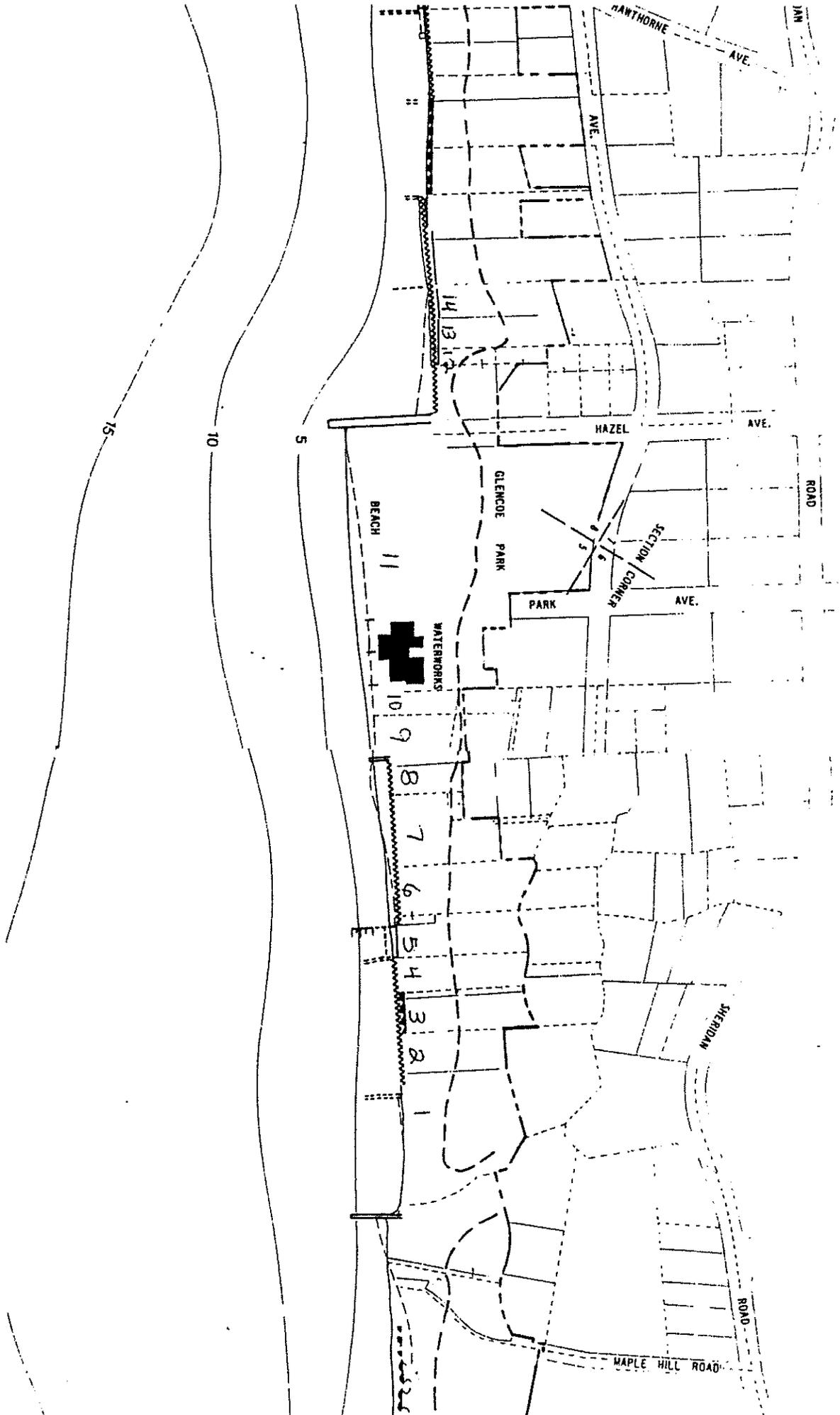
- Corps of Engineers Revised 2010     IL Dep't of Natural Resources     IL Environmental Protection Agency     Applicant's Copy

## Vicinity Map



Breakwater-Protected Beach

45 Lakewood  
Glencoe, IL 60022



BOAT LIFT REMOVAL



Google earth

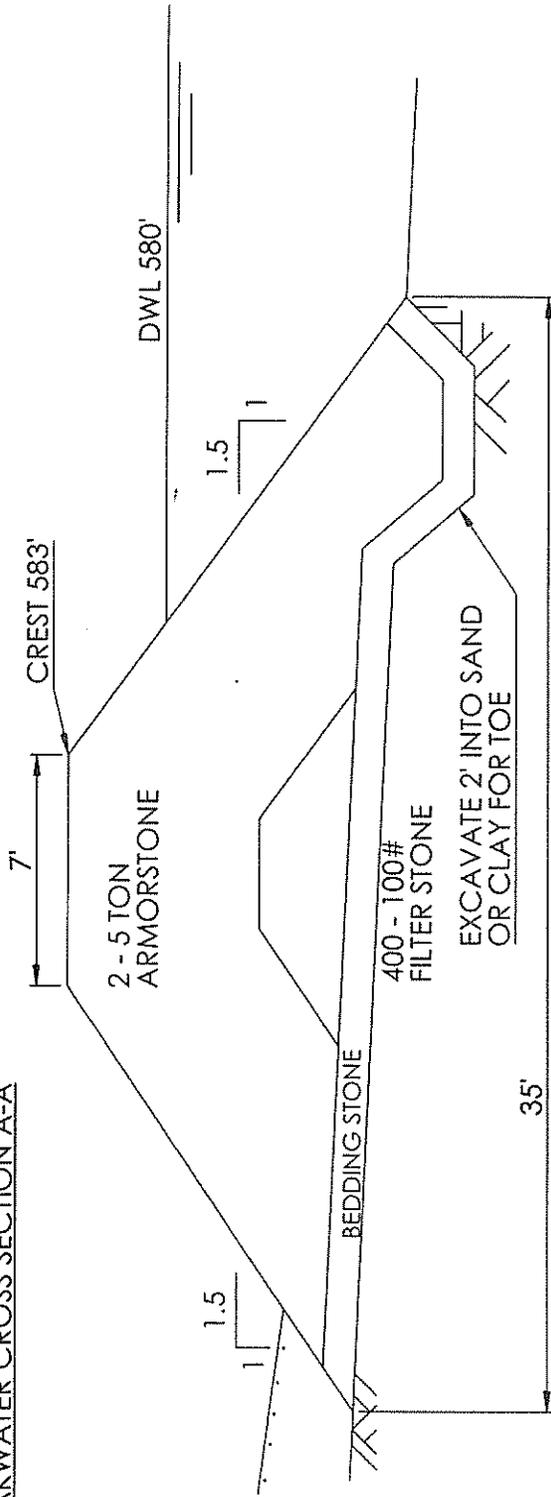
feet  
meters

45 LAKEWOOD  
GLENCOE

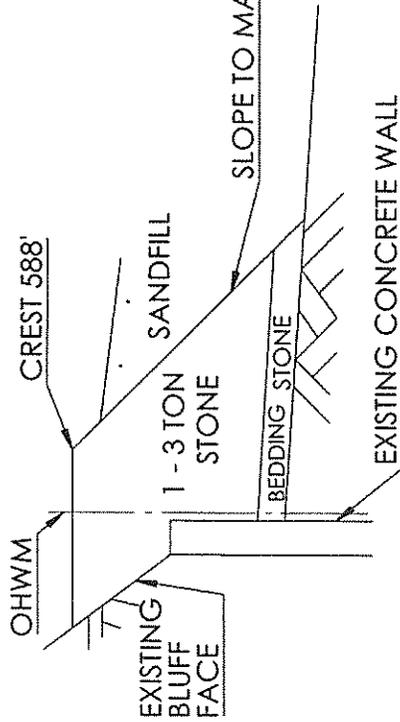
21 LAKEWOOD  
GLENCOE

SHABICA 2016

BREAKWATER CROSS SECTION A-A



REVETMENT ENHANCEMENT - SOUTH END



5 FEET  
SCALE

Project location:  
 NAME DATE  
 DRAWN SN 8/26/15 45 LAKEWOOD, GLENCOE, IL  
 REVISED



**Shabica & Associates, Inc.**  
 550 Frontage Rd., Suite 3735  
 Northfield, Illinois 60093  
 www.shabica.com

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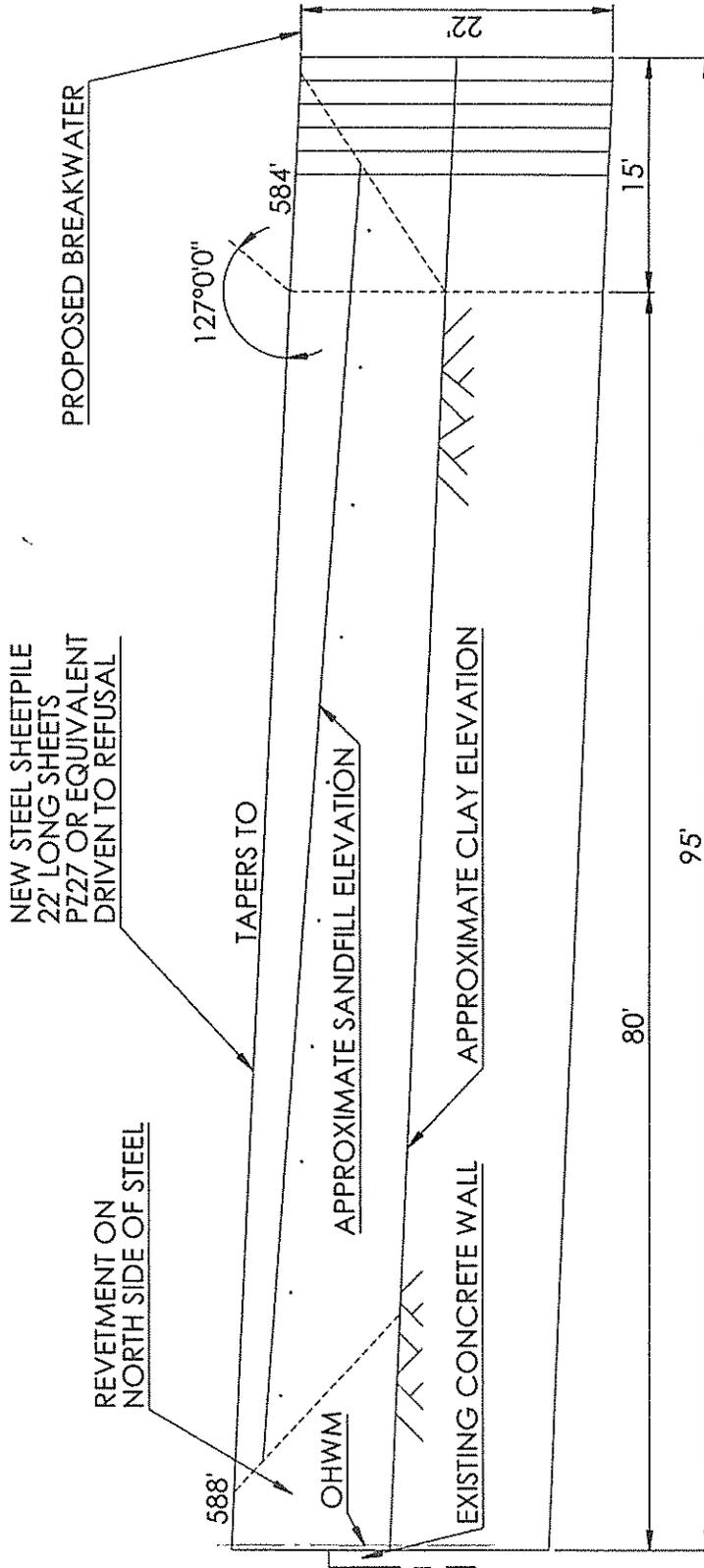
COMMENTS:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES: +.5, -.10"  
 ALL ELEVATIONS IN IGLD1985

CROSS SECTIONS

1 2 3 4 5

REV SHEET 2 OF 5

PROFILE THROUGH STEEL SHEETPILE AND BREAKWATER B-B



10 FEET  
SCALE

NAME SN DATE 8/26/15 Project Location: 45 LAKEWOOD, GLENCOE, IL



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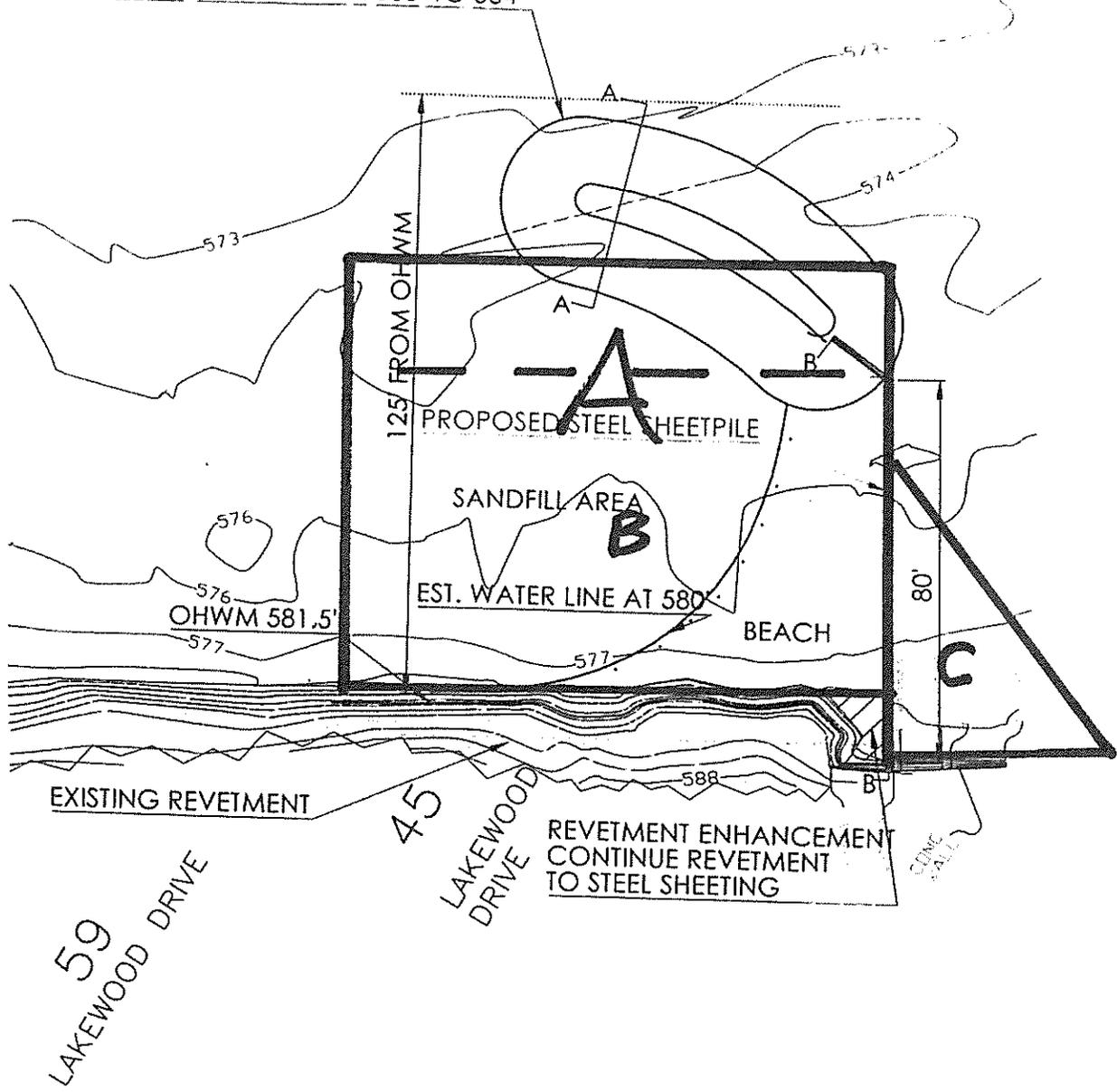
STEEL PROFILE  
REV SHEET 3 OF 5

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COMMENTS:  
DIMENSIONS ARE IN INCHES  
TOLERANCES: ±.5" -1.0"  
ALL ELEVATIONS IN IGLD1985

1 2 3 4 5

PROPOSED BREAKWATER  
CREST TAPERS FROM 583' TO 584'



NAME	DATE	Project Location:
DRAWN SN	8/28/15	45 LAKEWOOD, GLENCOE, IL
CHECKED		

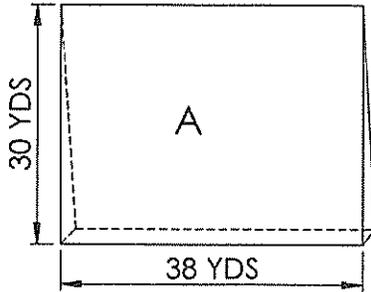
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COMMENTS  
DIMENSIONS ARE IN FEET  
TOLERANCES: +.5, -.1  
ALL ELEVATIONS IN IGLD 1985

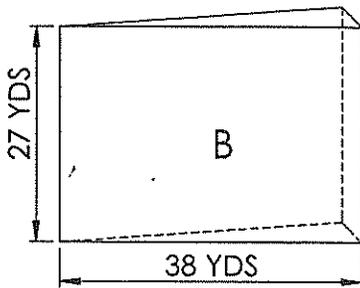
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550 Frontage Rd., Suite 3735  
Northfield, Illinois 60093  
847-446-1436  
www.shabica.com

SIZE **A** SAND PLAN VIEW  
SCALE 1"=5'  
SHEET # OF 3

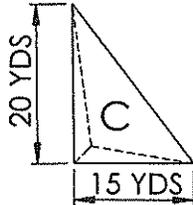
SAND CALCULATIONS



$$\frac{30 \times 38 \times 1.33}{2} = 758 \text{ CU YDS}$$



$$\frac{27 \times 38 \times 1.33}{2} = 682 \text{ CU YDS}$$



$$\frac{20 \times 15 \times 1.33}{6} = 66.5 \text{ CU YDS}$$

$$758 + 682 + 66.5 = 1506.5 \text{ CU YDS}$$

$$1506.5 \text{ CU YDS} \times 1.25 \text{ CU YDS/TON} = 1883 \text{ TONS}$$

$$1883 \text{ TONS} \times 20\% \text{ OVERFILL} = 377 \text{ TONS}$$

$$1883 \text{ TONS} + 377 \text{ TONS OVERFILL} = 2260$$

**PLACE 2300 TONS CLEAN QUARRIED SAND**

NAME DATE Project location  
 DRAWN: SN 8/28/15 45 LAKEWOOD GLENCOE, IL  
 CHECKED

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COMMENTS  
 DIMENSIONS ARE IN FEET  
 TOLERANCES: +.5 -1  
 ALL ELEVATIONS IN  
 IGLD 1985



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SIZE **A** SAND CALCULATIONS  
 SCALE 1"=5'

REV.

SHEET 5 OF 5

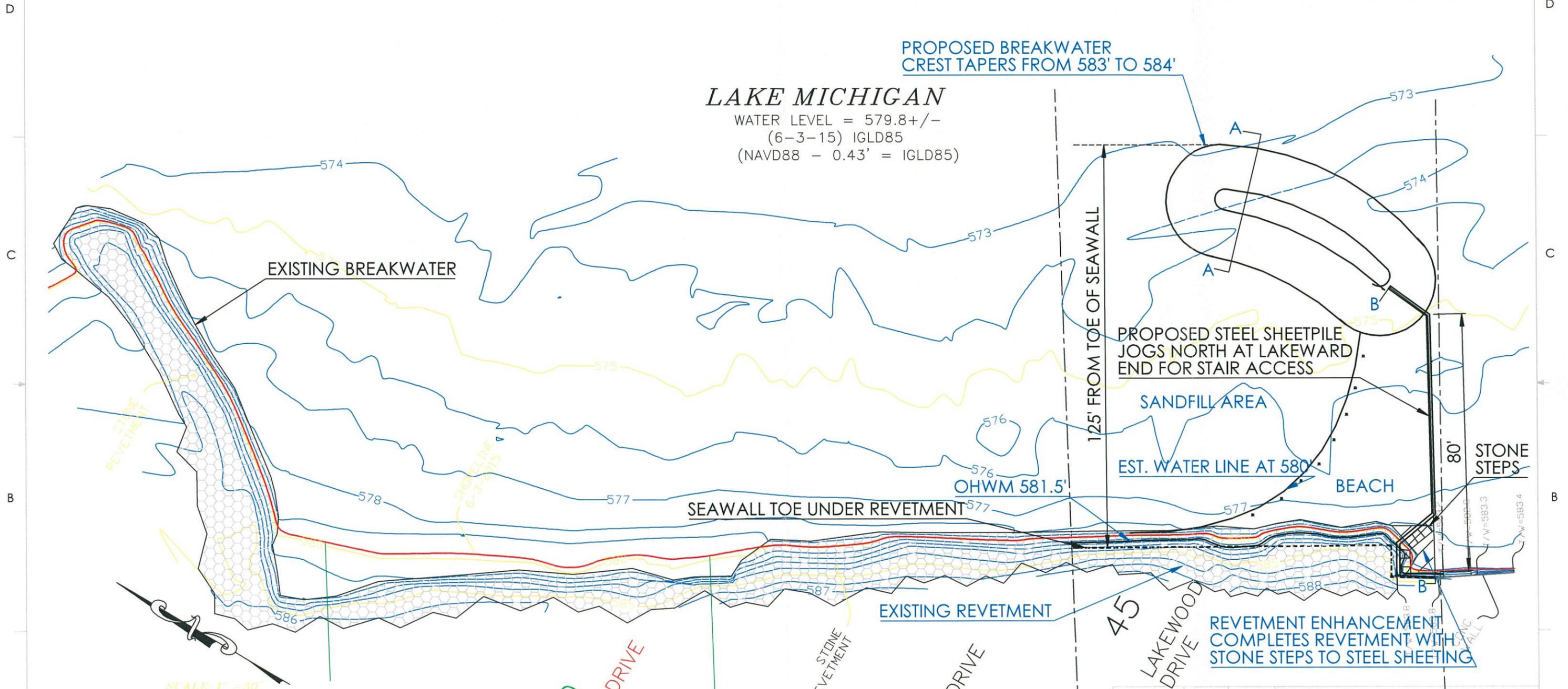
8 7 6 5 4 3 2 1

The amount of fill to be placed below the Ordinary High Water Mark (581.5 feet, IGLD 1985) is +/- 0.078 acres

**LAKE MICHIGAN**

WATER LEVEL = 579.8+/-  
(6-3-15) IGLD85  
(NAVD88 - 0.43' = IGLD85)

**PROPOSED BREAKWATER  
CREST TAPERS FROM 583' TO 584'**



SCALE 1" = 30'  
GRAPHIC SCALE



( IN FEET )  
1 inch = 30 ft.

69  
LAKEWOOD DRIVE

59  
LAKEWOOD DRIVE

45  
LAKEWOOD DRIVE

Project Location:  
45 LAKEWOOD, GLENCOE, IL

NAME	DATE
DRAWN	SN 8/26/15
REVISED	SN 11/19/15
REVISED	SN 12/14/15
REVISED	SN 5/17/16
REVISED	SN 5/23/16

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COMMENTS:  
DIMENSIONS ARE IN FEET  
TOLERANCES: +.5', -.1'  
ALL ELEVATIONS IN IGLD 1985

SIZE	REV
<b>B</b>	PLAN VIEW