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Ms. Teralyn Pompeii
Chief, Regulatory Branch
U.S. Army Corps of Engineers, Chicago District
231 S. LaSalle Street, Suite 1500
Chicago, IL 60604

Dear Ms. Pompeii: December 4, 2023

Please find enclosed a permit application for a breakwater protected beach, steel sheet pile bulkhead, boardwalk, ADA access ramp and sand nourishment for the Elder Lane Beach Shoreline Improvements located at 299 Sheridan Road, Winnetka, Illinois 60093, owned by the Winnetka Park District. The beach at Elder Lane is currently in an erosive state and needs updating to its infrastructure to provide a stable more sustainable shoreline amenity for the public. The project design is in-line with the Park District's completed *Winnetka Waterfront 2030 Master Plan* (WW 2030).

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
The Winnetka Park District has retained RED BARN Design & Engineering and Shabica & Associates (SA) to consult on improvements to Elder Lane Beach in accordance with the *Winnetka Waterfront 2030 Master Plan* (WW 2030). The WW 2030 was officially adopted in 2016 after significant community engagement (beginning in 2014) in the form of public meetings, public open houses, surveys and focus groups, as well as the formation of the Lakefront Advisory Committee (a citizens advisory committee). Community engagement has continued in an ongoing manner.

The property owners to the north and south of the project are aware of and support this project (see attached letters of support).

The beach has functioned typically between average to high water levels but the extreme increase in Lake Michigan water levels from 2013 to 2020 severely damaged the beach and park district infrastructure. Due to shoreline damage and beach stability concerns, the beach has been closed for three years and has now been prioritized by the park district for restoration starting spring of 2024.

The Winnetka Park District website and discussion of the WW 2030 for Elder/Centennial Beach states that the following work will be completed for shore stabilization:

> *"**New breakwater system:** a new breakwater system will be installed to reduce wave action near the shoreline, reduce bluff erosion, and make the beach better for patrons. The new system will also hold sand more effectively, maintaining a usable beach during high and low lake levels.*

Based on the needs and input from the community, this project will help to provide a higher level of shore protection for the bluff, Park District infrastructure, and lakebed. The property currently has an eroding beach with an exposed steel seawall and gabions (that were buried for decades) and two steel groins (north groin is currently failing at the lakeward end). The proposed system is designed to help improve these issues, provide greater and more stable public access to Lake Michigan waters, offer recreational activities to beach-goers, and provide a sustainable shoreline for the community.

Project Description (All the lengths noted below are toe to toe, all elevations are referenced to IGLD 85)
The northernmost breakwater is a shore perpendicular shore-connected rubble mound breakwater that projects east 219' from the existing bulkhead at the bluff toe. The intent of the breakwater is to provide for sand retention at the site beach. While providing some reduction in wave energies approaching the shoreline, the primary shore protection for the site will be provided by the existing and proposed steel sheet pile bulkhead as discussed below. The breakwater crest height will be 586' at the bulkhead tapering to 585' at the lakeward end. The quarry stone breakwater structure will encapsulate two 36" diameter HDPE pipes (for future connection of existing upland storm sewer discharge relocation) that discharge at the lakeward end of the breakwater. The breakwater will be constructed with a 4 stone crest width, and side slopes of 1.5H:1V, and 8' wide toe stone bench.

The existing northern steel groin will be removed.

The existing concrete modular pier/storm sewer outfall structure will remain. A 16' by 16' concrete pier deck set on piles, crest elevation 585', will be constructed at the east end of the pier. The intent of the proposed concrete deck is to provide public access to the lake.

The existing steel sheet pile groin at the south property line will remain. The north side of the steel will be revetted with rubble mound quarry stone to a crest elevation of 585' landward tapering to 583' lakeward with side slopes of 1.5H:1V, and 8' wide toe stone bench.

Sand fill of approximately 7,800 tons, will be placed in accordance with IDNR regulations within the system.

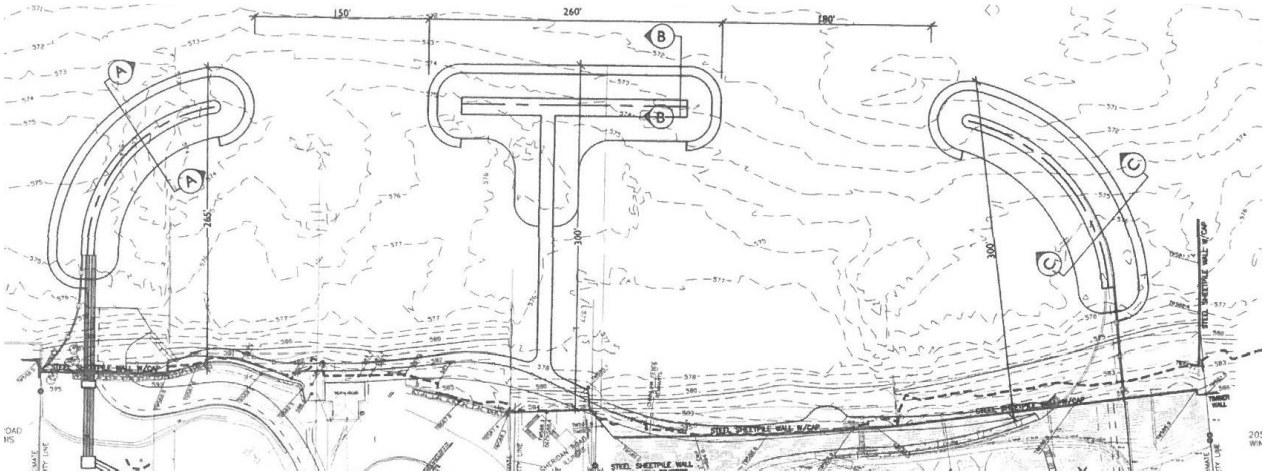
At the toe of the bluff, south of the existing steel sheet pile bulkhead, a proposed steel sheet pile bulkhead will be constructed extending to the south property line of the site. The proposed bulkhead will provide the primary shore protection for the stabilization of the bluff and protection from wave attack. The bulkhead crest elevation will match the elevation of the existing sheet pile bulkhead (el. 589') at the north end of the site. To add additional height to the bulkhead improvements, the proposed bulkhead will be backed with a concrete wave wall, crest height 591', the length of the shoreline. West of the sheet pile there will be an ADA access ramp to the beach, a boardwalk and a public plaza. The ADA access ramp will taper from 589' to 580'. The boardwalk and public plaza will be at elevation 589'. See attached plans for layout.

As necessary, sand nourishment, up to 1,000 tons annually, is requested for 10 years to help maintain the proposed beach contours.

Design Options
Design Options were reviewed by the Winnetka Park District (WPD) Board. Following are three options considered by the WPD Board.

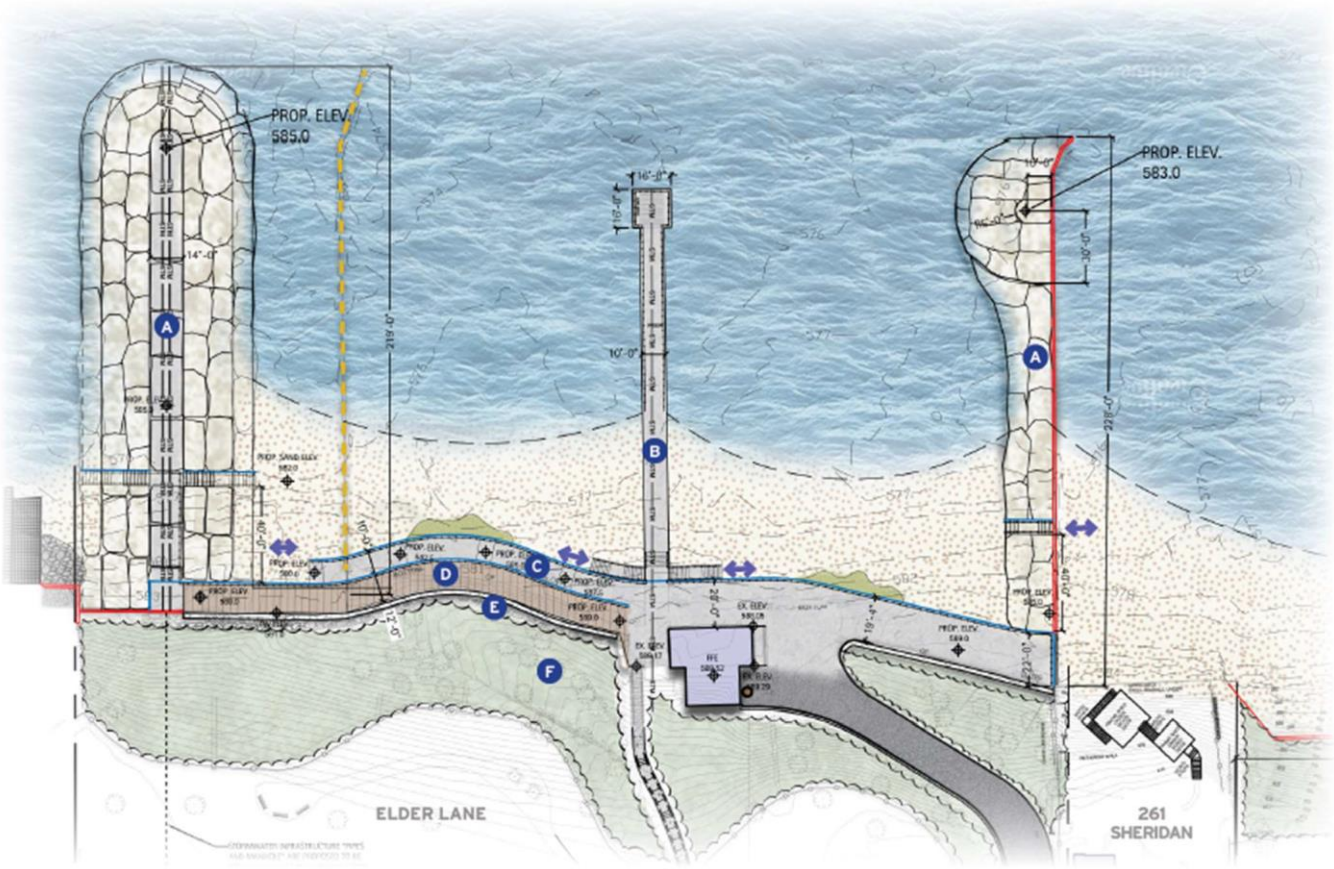
The first option is to do nothing. As this public beach has been closed for the past few years since the record high lake level, the "do nothing" approach leaves the beach is a sand starved condition, vulnerable to erosion from storm waves, especially when Lake Michigan is at higher water levels. There is a historic public beach house that has been damaged by storm waves. Additionally, concrete platforms to support boat racks were destroyed during storms during the higher lake levels. The lakeward end of the existing concrete modular pier has been damaged over the years.

The second option, previously submitted for permit review, and then withdrawn, was to construct a system of breakwaters and sand beaches. The previously submitted permit (2022) was withdrawn based on community concerns/feedback.



Option 2 - 2022 Elder + Centennial Plan

The third option, included herein this submittal, is to construct two shore perpendicular quarry stone breakwaters, reconstruct the lakeward end of the existing concrete modular pier, and install a steel sheet pile bulkhead with a boardwalk and other amenities for shore protection and pedestrian access.



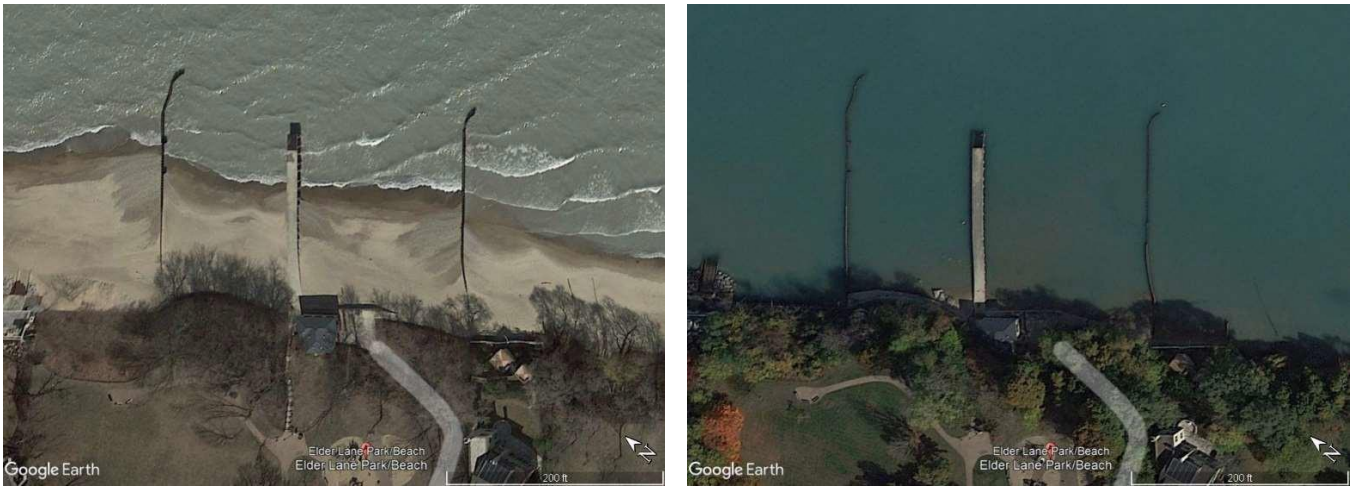
Option 3 - Proposed 2023 Elder Lane Beach Plan

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 (Figures 1a-c, Appendix) and scientists estimate that the rate of lakebed erosion up to 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 storm waves, and progressively narrower beaches as the nearshore lakebed continues to erode.

The effect of lakebed downcutting is very evident at Elder Lane shown by the significant loss of beach recently due to above average water levels. Historically, this beach has held a small beach at times of high-water levels. The loss of beach from the record low 2013 water levels to near record high water levels in 2020 took almost all of the sand out of the steel groin held system at Elder leaving the site without a sandy beach and damage to the existing boathouse. The effects of lakebed downcutting are evident with the large storm waves breaking onshore as observed in the 2014 Halloween storm, the 2015 October storm, 2020 May storm, 2021 January storm, and ongoing Lake Michigan storms.

The Illinois Lake Michigan shoreline is considered "sediment starved" by coastal scientists. This is in contrast to East Coast and Gulf Coast open ocean shores where tens of thousands of tons of sand are found in the nearshore system that provides a primary line of defense against storm waves. On most Great Lakes shores including southern Lake Michigan, natural sand beaches are not able to protect the lakeshore (exceptions may be during very low lake levels like 1964 or 2004-13). Large quantities of sand have been trapped or diverted offshore by municipal structures that extend 900 feet or more into the lake. Today, the main sand supply is wave erosion of the nearshore glacial clay lakebed that contains only about 10% sand (Shabica and Pranschke, 1994). The result is that groins and piers are losing their effectiveness at holding a sandy beach during average to high lake levels. To retain a sand covering of the shallow lakebed (where downcutting is most active) as well as to protect the bulkhead, SA has modified the design of this beach system to better hold sand as necessary and protect the lakebed and bluff during variable lake levels.



2013 Google Earth image at record low Lake Michigan water levels (left) compared to 2020 high water levels (right)

If beach and nearshore sand is lost, degradation of the nearshore ecosystem will result. Meadows et al., (2005) reports an increase in zebra mussels *Dreissena polymorpha*, and a decrease in native zooplankton in waters where the lakebed is eroding clay and rocks. In comparison, a nearshore area with 100% sand cover supports a species-rich community. The report concludes, "it [is] nonetheless clear that sand-based areas were characterized by sufficient shallow water fish CPUE and species richness to suggest that these are important habitats within the context of the Great Lakes Basin and not simply 'wet deserts' as they are often considered."

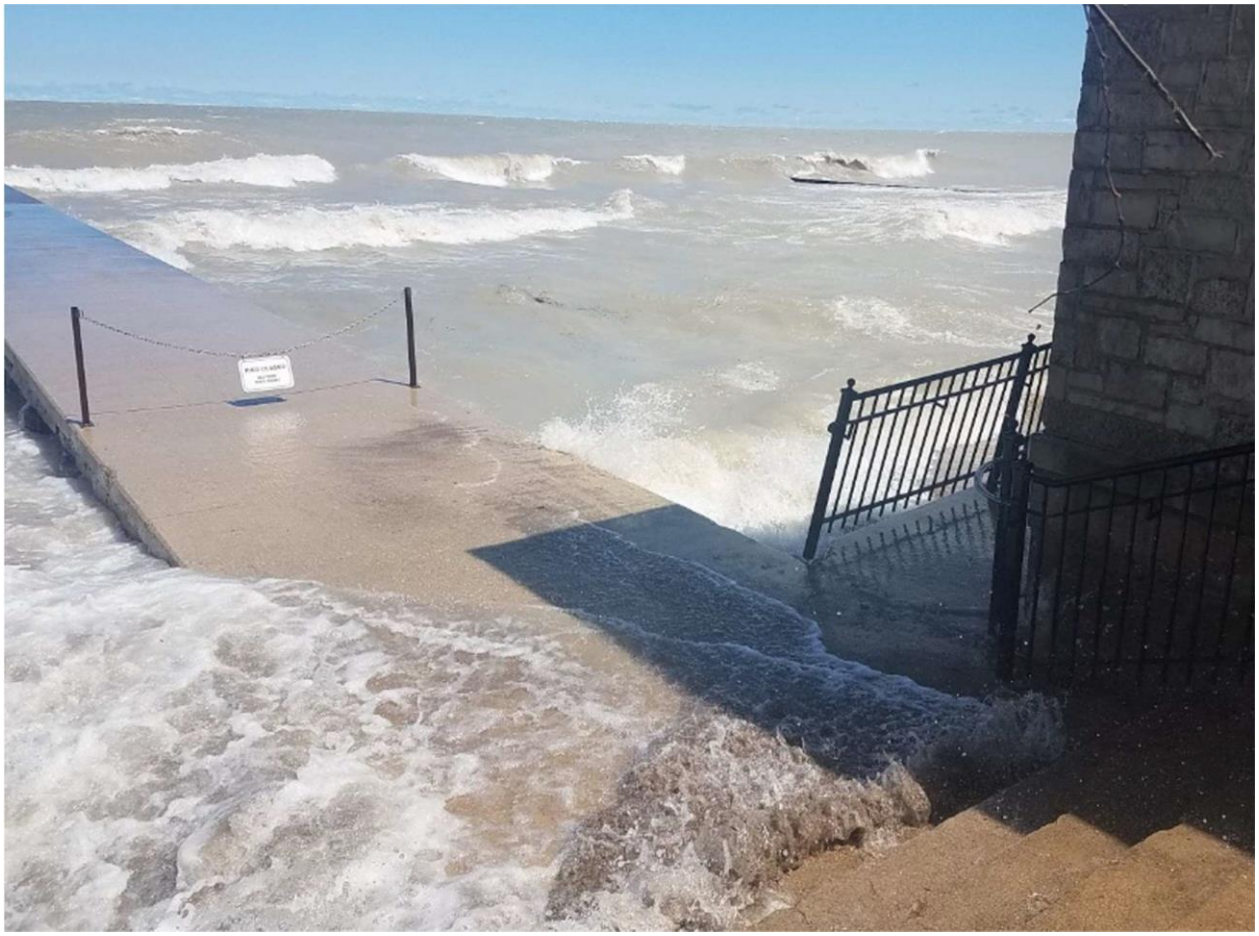
Coastal Climate

One of the largest factors in determining the scope of a project is analyzing current as well as historic Lake Michigan water levels and climatic conditions. Over the past several years, larger-than-normal storm waves have impacted the shoreline of Lake Michigan. The shoreline presented in this application has been impacted by the recent extreme increase in water level and effects of lakebed downcutting evidenced by waves eroding the sand and destroying concrete boat storage racks and infrastructure. These storm waves, in combination with a severe rebound in Lake Michigan water levels, have exacerbated the nearshore erosion along the lakefront. One thing most Great Lakes hydrologists agree upon: with climate change, lake storms will continue to get more intense and destructive.

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) 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 storm wave erosion from either lakebed downcutting and/or larger storm waves. Currently, Lake Michigan is around 579.5', ~2.5 feet lower than the record high in 2020, and ~3.5 feet higher than the record low in 2013. The rapid increase in water level from 2013 to 2020 led to a significant loss of nearshore sand. US Army Corps of Engineers forecasts predict that Lake Michigan water levels will continue to fluctuate.



May 8, 2020 Storm damaged the shoreline and beach house even as Lake Michigan water levels start to recede

2020 photo looking north at the damaged non-motorized storage pads and gabion baskets, existing steel groin and north shoreline structures

Benefits of Sandy Beaches

The Great Lakes represent the one of the most important natural resources in the United States. Sandy beaches play an important role in maintaining water quality while helping to provide safe access to Lake Michigan. Furthermore, a sandy beach makes a better ecotone (transitional environment) for flora and fauna than seawalls and revetments. As the permit application is for the public benefit, it is crucial that the beach remain available and usable for the public. 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 storm waves to impact the shore.
7) Beaches are far more appropriate 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 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 and littoral drift system. Periodic sand re-nourishment has proven to be a successful management tool for breakwater protected beaches 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 including 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. This region of the Lake Michigan shoreline around the project site is completely engineered. The shoreline north and south of the Elder Lane Beach is privately owned residential property that is protected by revetments, steel groins and breakwater protected beaches. Sand mitigation (as required by the IDNR) will be placed on the subject property and on the property immediately to the north with a 20% overfill as required.

The proposed quarry stone breakwaters for the beach will extend to same lakeward extent as the existing steel groins, approximately 219' (north) and 228'(south) offshore. The littoral drift system is designed to remain at a dynamic equilibrium once the mitigational sand is placed (anticipated quantity plus 20% overfill).

The proposed beach at Elder is on a relatively straight section of shoreline.

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.

Impact on Public Uses
This beach has been closed for the past several years due to loss of sand from the record high lake level. The breakwaters and beach will help to provide a more stable shoreline environment for boaters and swimmers with easier access to the water. Fishing will not be impacted negatively, as the underwater area of the quarry stone breakwater protection will create an improved fish habitat. Open water navigation will not be impacted as the proposed construction extends to the same lakeward extent as the current structures.

Impact on Natural Resources
Quarry stone 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. In many nearshore areas in Illinois where the sand is less than 3 feet thick, lakebed erosion of glacial clay results in large suspended plumes of clay fines in the water during storm wave events. An eroding clay lakebed is not considered good aquatic habitat.

Type of Permit
We ascertain that the scope of this project requires an Individual Permit.

Description and Schedule of Proposed Activity
Installation of the breakwaters will start soon after the permits are issued as the beach is not currently usable for residents. The breakwaters will be built by a combination of marine and land-based access (pending lake level and conditions at the time of construction). This project is anticipated to be completed within a single year.

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 8,960 tons of clean quarried stone will be placed to construct the breakwater system. Approximately 6,217 cubic yards of clean sand will be placed as sandfill in and around the system. The area of fill to be placed below the Visual Ordinary High Water Mark is 0.46 acres.

Ongoing Maintenance
The Winnetka Park District is requesting a 10-year sand nourishment permit. The Winnetka Park District would like to have the ability to deliver and place up to 1,000 tons of sand annually if and when necessary to help maintain a stable beach and a metastable equilibrium.

Mitigation
This project covers 0.46 acre of the lakebed below the Visual OHWM with fill. The fill does improve the quality of the lakebed and water with the quarry stone breakwaters creating habitat for fish. As this system will be monitored annually for 5 years north of and south of the proposed system, sand removed from the littoral drift system can be better quantified for replacement, if necessary. Additionally, this permit calls for up to 1,000 tons of sand to be placed annually or as needed pending conditions for beach nourishment. Based on this information, we offer no additional mitigation unless specified by the USACE or IDNR.

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 will be updated on all relevant correspondence.

If you have any questions, please feel free to contact us at the phone number below.

Sincerely,

Matthew Wright, PE
President
RED BARN Design & Engineering, SC
608.849.2042

Jon Shabica
Vice President
Shabica & Associates, Inc.
847.446.1436

C: IDNR/OWR
Illinois EPA, Bureau of Water, Permit Section
U.S. Fish & Wildlife Service
Winnetka Park District (Peterson)

Letters of authorization attached:
Peter Lee, 261 Sheridan Road – Temporary mobilization of equipment
John Edwardson, 301 Sheridan Road – Placement of sand

DESIGN OF SHORELINE EROSION PROTECTION

Introduction

The following report summarizes assumptions and design criteria for a quarry stone breakwater system and sandfill, along with other recreational improvements to help retain a beach, provide lake access, and better protect the property located at 299 Sheridan Road, Winnetka. The design is based on the drawings included in this submission dated November 3, 2023.

The entire reach of shoreline within the project limits, and including areas north and south of these limits, has been modified by the construction of groins, seawalls, revetments and breakwater-protected beaches. This section of coast is sand-starved due to municipal structures (littoral barriers) constructed over the past 130 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 quarry stone revetments or steel seawalls placed at the toe of the bluff that helps to prevent storm wave erosion but at the expense of the beach and pedestrian access.

Project Description

The proposed design includes two quarry stone breakwaters, a steel bulkhead and sandfill. The project will include sandfill mitigation that fulfills the design requirements of 20-year storm wave erosion protection. The current public beach is suffering from erosion as well as is unstable for users including the summer programming for the community with the current site conditions. Additionally, with the higher lake levels, there has been damage and destruction to lakefront structures in addition to storm waves causing erosion of the bluff toe, as well as severe icing problems and impacts to the 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:	585 ft
Toe of Breakwater:	572 ft
Crest Width:	14 ft
Average Armor Size:	5 tons
Slope:	1.5H:1V
Tons/linear ft:	29.5 tons

Assumptions

- Design High Water (DHW): 582 ft *
- Design Water Level: 580.0 ft
- Design Low Water (DLW): 577.5 ft *
- Existing clay elevation: 570 - 572 ft
- 20-yr lakebed erosion at toe of groin: 3 ft
- Design wave height: Hs = 9.5’ ft
- Nearshore Slope: 30H:1V – 100H:1V
- Design Wave Period (T): 9.9 s **
- Depth at Structure Toe DHW (Ds): 10’
- Design Deepwater Wave (Ho): 20.0’***
- 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
*** US Army Corps of Engineers 1982 Draft Reconnaissance Report

Shoreline/Bathymetry

A full topographic/bathymetric survey was performed in June 2023. Survey notes: Lake conditions at the time of survey were waves of 1 foot or less. Bathymetric survey was performed using a Trimble R10 GPS Receiver along with a Hydrolite-TM Single Beam Echosounder. Survey was performed tied to Trimble’s VRS Now Network, data points were collected in NAV88 datum and converted to IGLD1985. Cross sections were cut from a surface created from actual survey points.

Water Levels

The following table summarizes water level data representing daily highest extremes measured at Calumet Harbor, Illinois, approximately 26 miles to the south of Winnetka. 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, SA 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 Lo) 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 retained 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.

2. **Effect on Adjacent Shorelines**
   The property to the north will benefit from being immediately updrift of a new 219' long breakwater. The area north of the breakwater will be nourished with 1,537 tons of sand. The sand cover on the lakebed will help reduce lakebed downcutting (which causes deeper water and larger waves) as well as to break wave energy farther offshore. The property to the south will have negligible impacts as the steel groin at the south property line will not be modified on the south side.

3. **Wave Reduction in Rubble-Mound Structures**
   The Iribarren number (ξ), or surf similarity number, is used to determine the wave reflection coefficient. For rubble-mound structures, wave reflection (and wave energy) is reduced by one half or more (0.2 to 0.53) (Figure 2, Appendix). For example, a wave reflection of 0.25 means that the wave energy is reduced by 75%. The range of wave reflection for beaches peaks at about 0.44. The range for plane slopes, however, quickly rises to 0.5 and peaks at .91. This illustrates that rubble-mound structures reduce wave energy almost as well as beaches.

Lakebed Erosion

Lakebed erosion, active in water depths of 10 ft or less, is a design component of this plan. This section of the Winnetka lakeshore is considered sediment starved. Sand deposits were measured at this site (Elder Lane Beach, Winnetka) from the backshore to a depth of 6.7 m (22 ft) in 1989. In 1989, the nearshore sand deposits averaged 1.6 to 2.0 ft thick from shore to 50 ft offshore and thinned to 0 feet thickness at 100 ft, and then thickening to 4.5 ft at 250 ft offshore. At 1,000 ft offshore, no sand was present through the end of the transect. Farther offshore, the sand ranged from 1.8 to 2.9 ft thick (Shabica & Pranschke, 1994). In July of 2010, the clay depth and sand cover were resurveyed to a depth of 2m (6.3 ft). In 2010, the nearshore sand deposits were typically 1 foot thick with the exception of a sandbar that averaged 2 feet thick. The site is underlain by highly-erodible, cohesive glacial clay-till. During the period from 1989 to 2010, erosion of the clay lakebed varied from negligible to 2.3 ft. The 2.3 ft of erosion occurred in the location where there was no sand cover in 1989. See Shabica survey data and cross-section (Figures 1 a-c, Appendix) showing loss of lakebed sand from 1975 to 1989. Calculated sand deposits at this site in 1989 were 161 cubic meters per meter of lakeshore to a depth of 4 meters. According to Robert Nairn, approximately 200 m^3 of sand cover per meter of lakeshore (out to a depth of 4 m) is necessary to protect the underlying cohesive profile from lakebed erosion under most conditions. Sand and coarser sediments represent typically less than 15% of the material eroding from the lakebed and bluffs.

Using the historic rate of lakebed downcutting of 0.15 ft/yr, an irreversible lowering of the nearshore lakebed clay of approximately 3.0 ft over a 20-year period is predicted in unprotected areas. With the breakwater and sandfill installed, the lakebed erosion will be reduced.

Stone Stability, Armor Stone

The proposed quarry stone breakwater has two layers 3 – 7 ton armor stone built on a 1.5H:1V slope. Overtopping of the structure is expected during storms and higher water levels.

Design conditions include:

* Lakeward breakwater crest elevation 3 ft above DHW, 7.5 ft above DLW
* Depth-limited breaking waves will break on the stone revetment, stone breakwaters and sand beach
* Depth at the toe of the structure is 10 ft (572) at design high water
* Incident wave directions: NE, E and SE
* Wave period for DHW T = 9.9 seconds
* Wave period for average conditions T = 6 seconds

Quartzite, granite or limestone armor stone is recommended as it is highly durable and is locally available in most gradations under 7 tons. Hudson's formula was used to estimate armor stone size. An armor stone of 5.3 tons is predicted for 2-layer random placement armor stone based on the design conditions. Based on experience and prototype structures, an average stone size of 4.5 tons is being specified for this project, and the armor stone gradation selected for this project is 3 – 7 tons.

Project Monitoring

As the performance of shore protection structures cannot be predicted with absolute certainty, the shore protection system for Elder Lane Beach at 299 Sheridan Road, Winnetka 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 and from the south property line to 100' north of the north property line. Additionally, all structures should be inspected to assure that they continue to meet design specifications.

PHOTO 1
Existing beach house to be protected

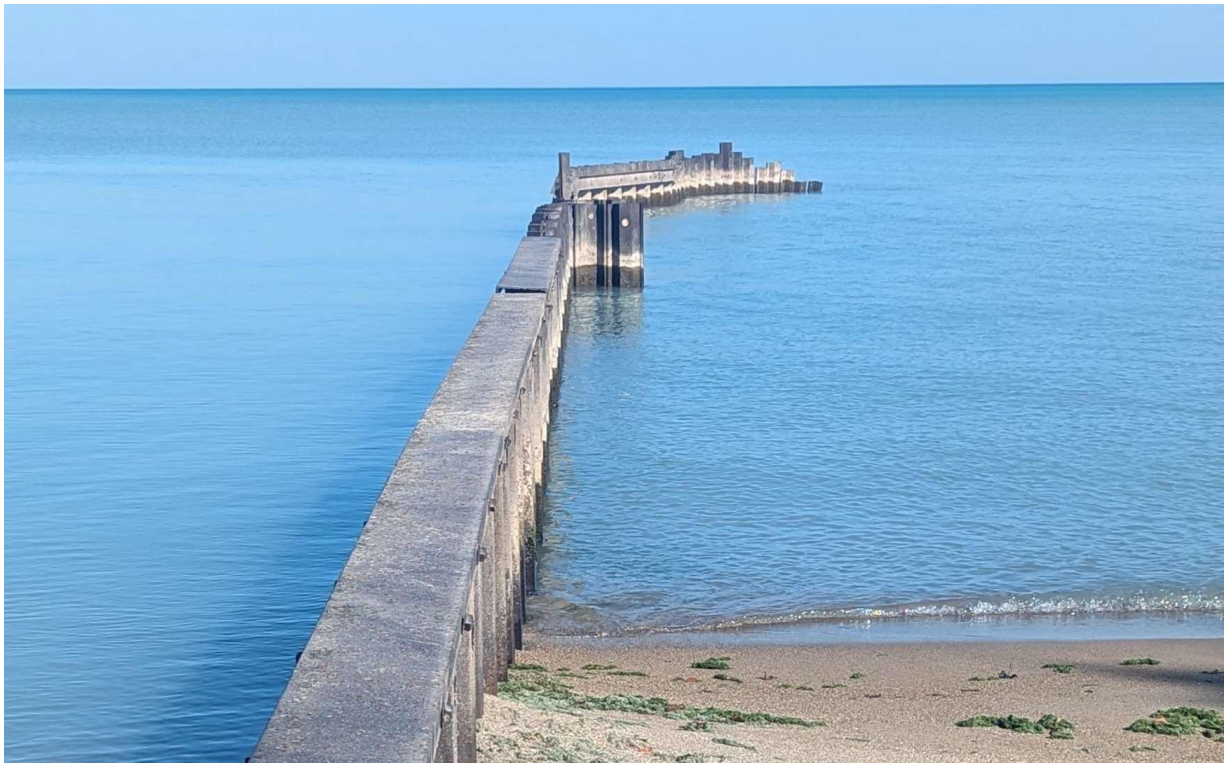


PHOTO 2
North failing steel groin to be removed

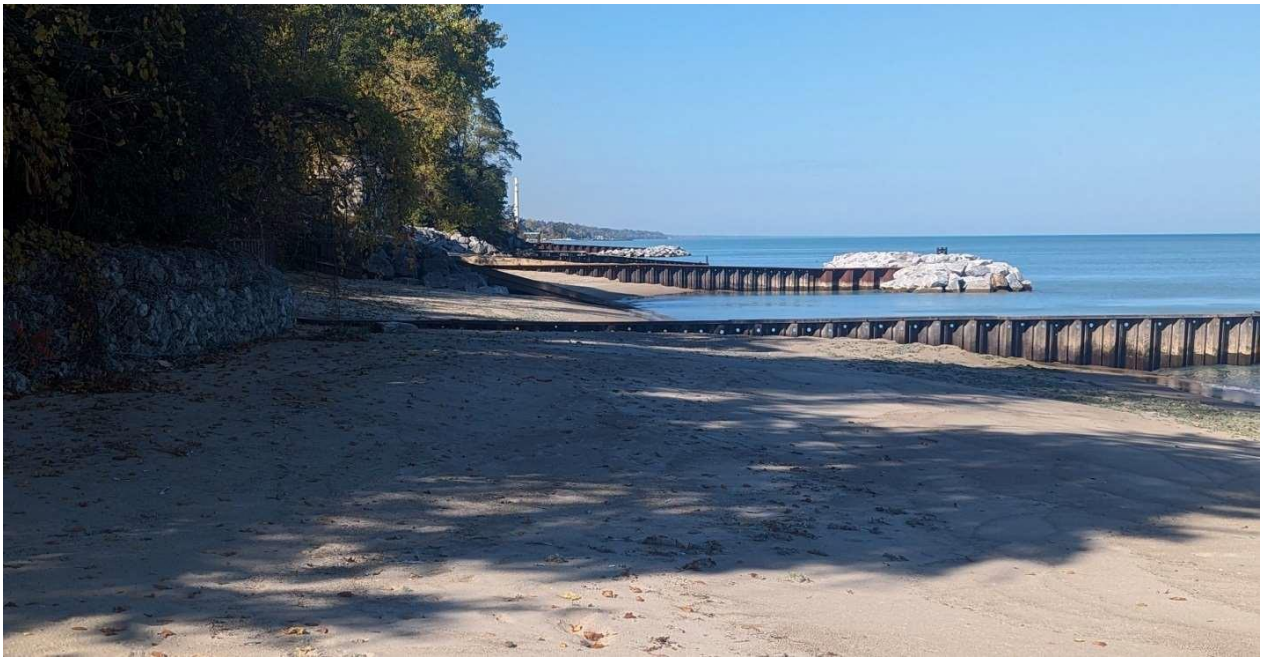
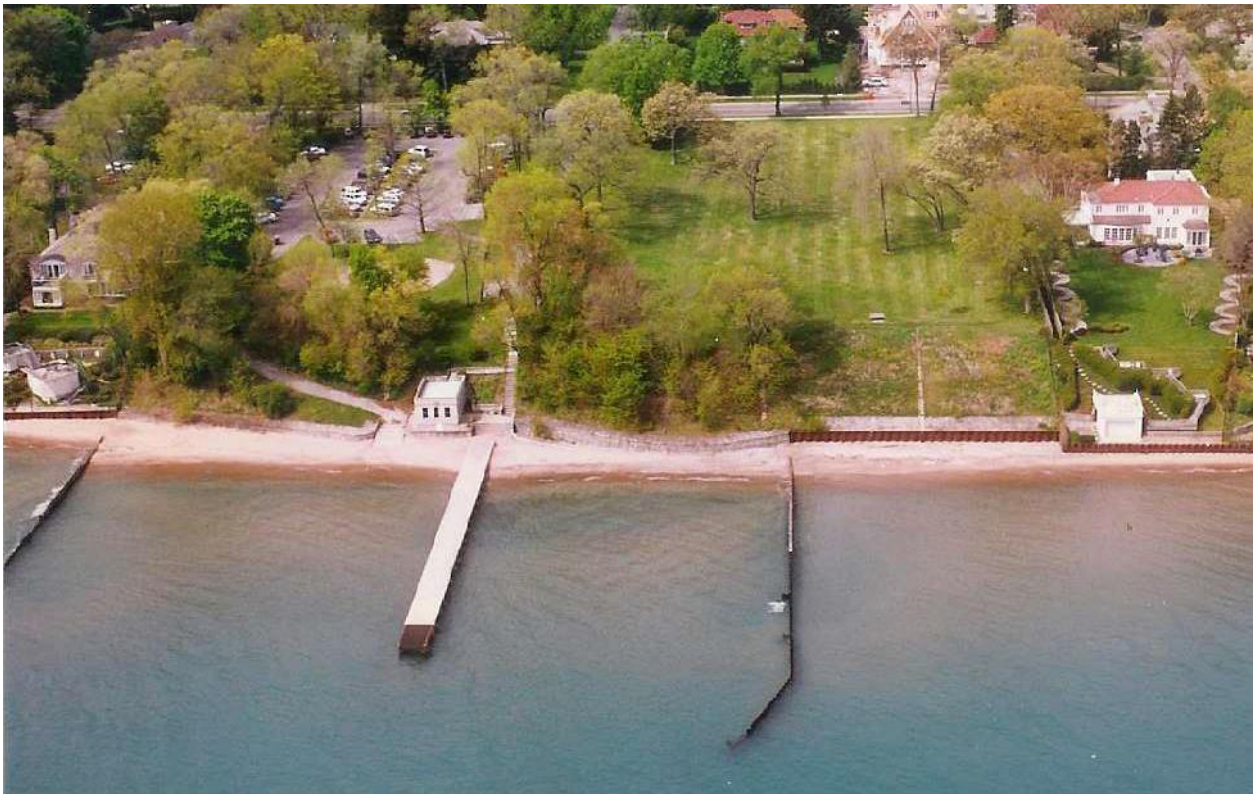


PHOTO 3
Photo looking north along the adjacent shoreline

PHOTO 4
Existing modular concrete pier to repaired



References

Anglin, C.D., and K. J. Macintosh, *Southport Marina, Kenosha, Wisconsin: Design and Construction of Breakwaters, in Coastal Engineering for the Great Lakes*, a short course, University of Wisconsin, March 11-13, 1991.

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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Chrzastowski, M.J. and C.B. Trask, 1996, *Review of the City of Lake Forest Final Report for the 1995 beach and nearshore monitoring program, Forest Park Beach, Lake Forest, Illinois*: Illinois State Geological Survey, Open File Series, 1996-6, 57 p. plus eight appendices.

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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.

US Army Corps of Engineers *Reconnaissance Report on Beach Erosion at Lloyd Park Beach*, 1982

FIGURE 1a

Winnetka - Elder Lane Date:06/27/89 Time:

Enter lake surface 578.90 elevation for time of survey

Enter Graph: DATA A DATA B DATA C

Enter Dist. From Shore	Enter Water Depth	Enter Sand Thickness	Top of Sand Elev. 1990	Bottom of Sand Elev. 1990	Enter Sand Thick. 1975	Top of of sand 1975	Enter Hard-pan Type	Sand Volume Cu.Yd. Per ft. 1975	1990
-10.0	-1.0	2.0	579.9	577.9	10.0	587.9		1.9	0.4
0.0	0.0	1.8	578.9	577.1	10.0	587.1		6.5	1.2
25.0	0.8	1.6	578.1	576.5	10.0	586.5		9.3	1.5
50.0	1.9	1.9	577.0	575.1	10.0	585.1		13.9	2.6
100.0	3.3	0.0	575.6	575.6	10.0	585.6		18.5	0.0
150.0	5.9	0.7	573.0	572.3	10.0	582.3		27.8	1.9
250.0	6.5	4.5	572.4	567.9	10.0	577.9		64.8	29.2
500.0	9.8	2.9	569.1	566.2	7.0	573.2		64.8	26.9
750.0	13.3	1.0	565.6	564.6	5.0	569.6		46.3	9.3
1000.0	15.0	0.0	563.9	563.9	4.0	567.9		37.0	0.0
1250.0	15.9	2.6	563.0	560.4	3.0	563.4		27.8	24.1
1500.0	16.9	2.9	562.0	559.1	3.0	562.1		27.8	26.9
1750.0	20.3	1.8	558.6	556.8	2.0	558.8		18.5	16.7
2000.0			578.9	578.9		578.9		0.0	0.0
0.0			578.9	578.9		578.9		0.0	0.0
0.0			578.9	578.9		578.9		0.0	0.0
0.0									
							TOTAL	364.8 CuYd/ft 1975	140.5 CuYd/ft 1990

Note all measurements in feet

All Elevations IGLD 1955

Field Worksheet from 1991 USGS Lakefront Sand Thickness Survey at Elder Lane Beach, Winnetka (Shabica et al., 1991)

FIGURE 1b

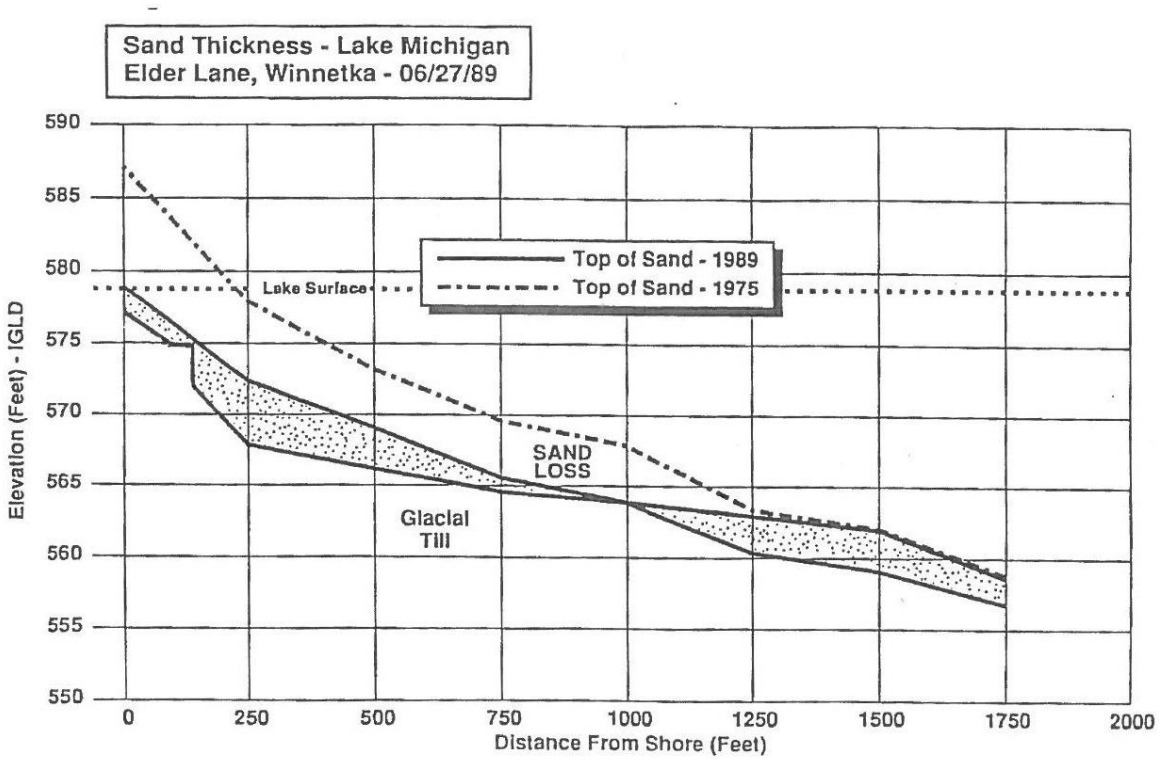

Sand Thickness - Lake Michigan
Elder Lane, Winnetka - 06/27/89
Top of Sand - 1989
Top of Sand - 1975
Lake Surface
SAND LOSS
Glacial Till
Elevation (Feet) - IGLD
590
585
580
575
570
565
560
555
550
0
250
500
750
1000
1250
1500
1750
2000
Distance From Shore (Feet)

FIGURE 1c

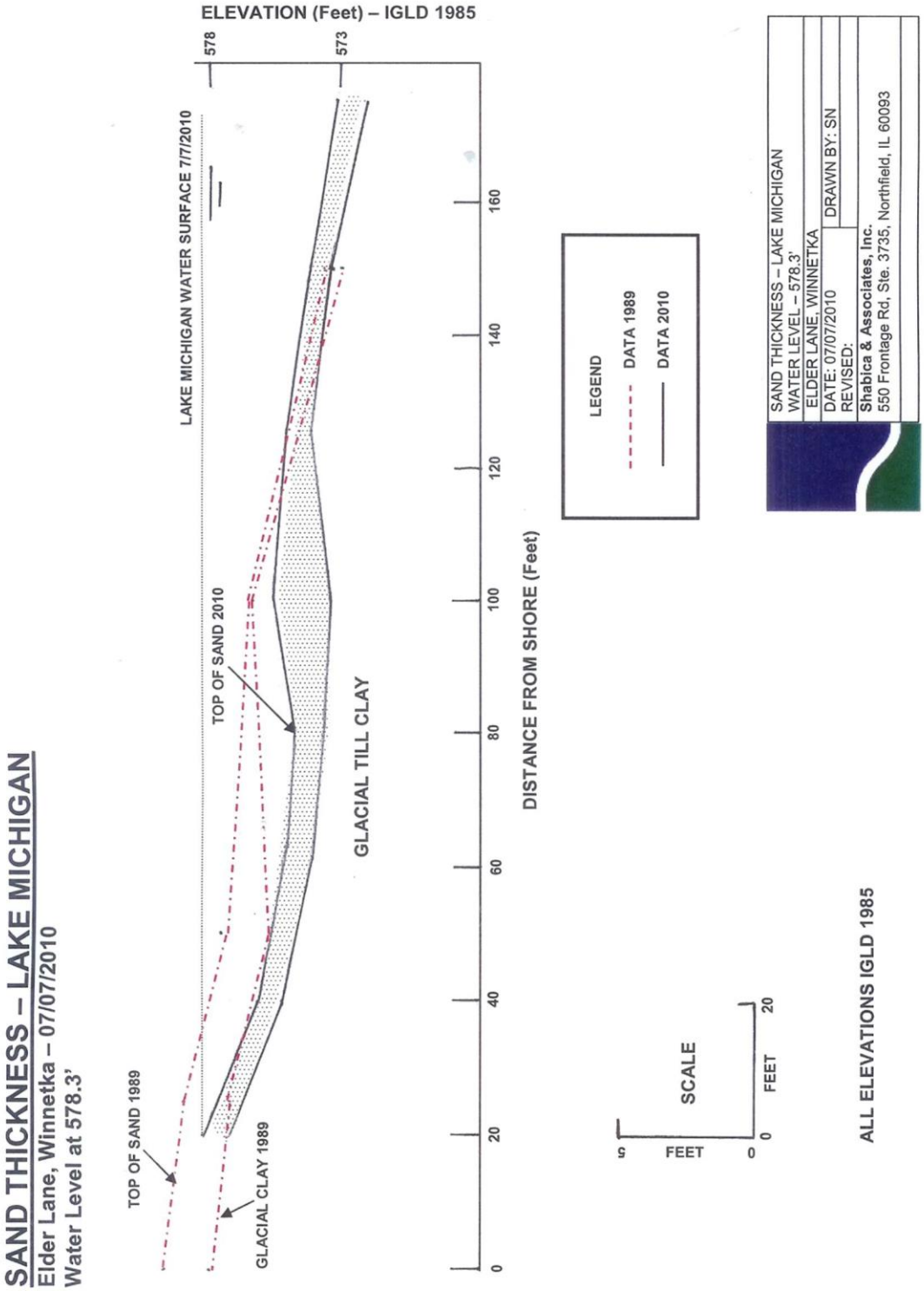
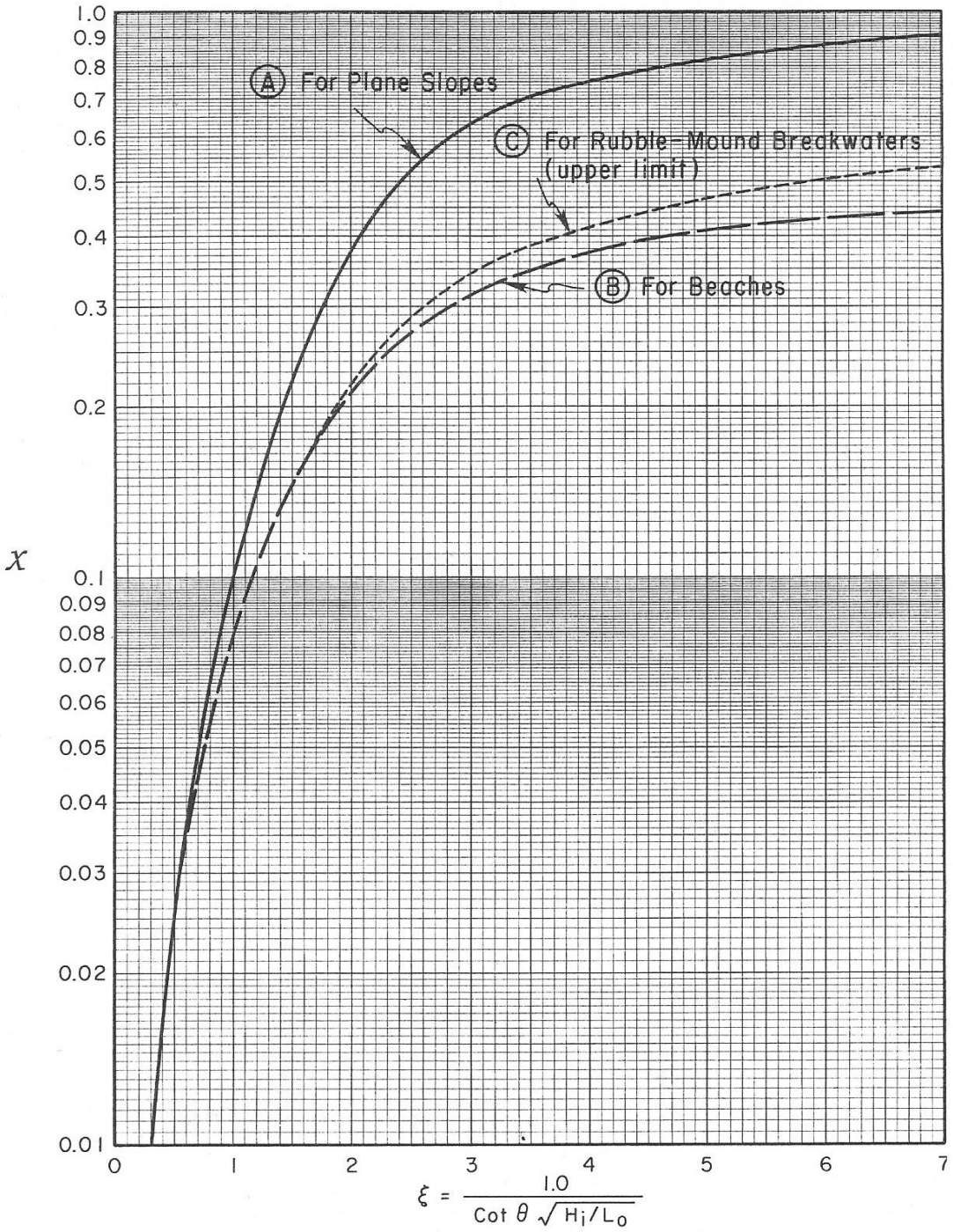

SAND THICKNESS – LAKE MICHIGAN
Elder Lane, Winnetka – 07/07/2010
Water Level at 578.3'
ELEVATION (Feet) – IGLD 1985
578
573
LAKE MICHIGAN WATER SURFACE 7/7/2010
TOP OF SAND 1989
GLACIAL CLAY 1989
TOP OF SAND 2010
GLACIAL TILL CLAY
0
20
40
60
80
100
120
140
160
DISTANCE FROM SHORE (Feet)
LEGEND
DATA 1989
DATA 2010
SCALE
5
FEET
0
0
FEET
20
ALL ELEVATIONS IGLD 1985
SAND THICKNESS – LAKE MICHIGAN
WATER LEVEL – 578.3'
ELDER LANE, WINNETKA
DATE: 07/07/2010
DRAWN BY: SN
REVISED:
Shabica & Associates, Inc.
550 Frontage Rd, Ste. 3735, Northfield, IL 60093

FIGURE 2



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

Shore Protection Manual
USACE

Additional Resources: Elder Design Development – Renderings

ALL ILLUSTRATIONS ARE FOR DEPICTING THE CONCEPT ONLY AND ARE NOT FOR REPRESENTATION OF THE REQUIREMENTS OF THE CONTRACT. REFER TO THE PERMIT DRAWINGS AND DOCUMENTS FOR CONTRACT DOCUMENT REQUIREMENTS, INCLUDING BUT NOT LIMITED TO, COMPONENT LOCATIONS, GEOMETRY, MATERIALS AND FINISHES.

John Edwardson
301 Sheridan Road
Winnetka, IL 60093

U.S. Army Corps of Engineers - Chicago District Regulatory Branch
231 South LaSalle Street, Suite 1500
Chicago, Illinois 60604

November 1, 2023

Dear Sir or Madam,

I authorize the placement of sand on my property at 301 Sheridan Road as part of the Winnetka Park District lakefront project at Elder Lane Beach, 299 Sheridan Road, Winnetka. If additional information is required, please contact me at the address above.

Sincerely,

John Edwardson

C: Illinois Department of Natural Resources
Illinois Environmental Protection Agency
RED BARN Design & Engineering, S.C.
Shabica & Associates, Inc.

Orchard 2020 Revocable Trust
c/o Peter Lee, Trustee
335 N. Clark St., Floor 27
Chicago, Illinois 60654

U.S. Army Corps of Engineers - Chicago District Regulatory Branch
231 South LaSalle Street, Suite 1500
Chicago, Illinois 60604

November 1, 2023

Dear Sir or Madam,

I authorize the placement of a temporary haul road across the lakefront of the property at 261 Sheridan Road as part of the Winnetka Park District lakefront project at Elder Lane Beach, 299 Sheridan Road, Winnetka. If additional information is required, please contact me at the address above.

Sincerely,

Peter Lee, Trustee

C: Illinois Department of Natural Resources
Illinois Environmental Protection Agency
RED BARN Design & Engineering, S.C.
Shabica & Associates, Inc.

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

3a. Applicant's Name:	3b. Co-Applicant/Property Owner Name (if needed or if different from applicant):	4. Authorized Agent (an agent is not required):
John Peterson, Executive Director		Shabica & Associates, Inc.
Company Name (if any) : Winnetka Park District	Company Name (if any):	Company Name (if any): Shabica & Associates, Inc.
Address: 540 Hibbard Road Winnetka, IL 60093	Address:	Address: 550 Frontage Road Suite 3735 Northfield, IL 60093
Email Address: JPeterson@winpark.org	Email Address:	Email Address: jon@shabica.com
Applicant's Phone Nos. w/area code Business: 847-501-2074 Residence: Cell: Fax:	Applicant's Phone Nos. w/area code Business: Residence: Cell: Fax:	Agent's Phone Nos. w/area code Business: 847-446-1436 Residence: Cell: Fax:

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, supplemental information in support of this permit application.

Applicant's Signature _____ Date _____

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:
Elder Lane Beach Shoreline Improvements

7. PROJECT LOCATION:
299 Sheridan Road, Winnetka, Illinois 60093

LATITUDE: 42.09914 °N	UTMs Northing: 4661032.70 m Easting: 16T440846.49 m

STREET, ROAD, OR OTHER DESCRIPTIVE LOCATION	LEGAL DESCRIPT	QUARTER	SECTION	TOWNSHIP NO.	RANGE
Sheridan Road		SE	21	42N	13E

☒ IN OR ☐ NEAR CITY OF TOWN (check appropriate box) Municipality Name Winnetka	WATERWAY Lake Michigan	RIVER MILE (if applicable)

COUNTY	STATE	ZIP CODE
Cook	IL	60093

Revised 2010

☐ Corps of Engineers ☐ IL Dep't of Natural Resources ☐ IL Environmental Protection Agency ☐ Applicant's Copy

8. PROJECT DESCRIPTION (Include all features):

The northernmost breakwater is a shore perpendicular shore-connected rubble mound breakwater that projects east 219' from the existing bulkhead at the bluff toe. The intent of the breakwater is to provide for sand retention at the site beach. While providing some reduction in wave energies approaching the shoreline, the primary shore protection for the site will be provided by the existing and proposed steel sheet pile bulkhead as discussed below. The breakwater crest height will be 586' at the bulkhead tapering to 585' at the lakeward end. The quarry stone breakwater structure will encapsulate two 36" diameter HDPE pipes (for future connection of existing upland storm sewer discharge relocation) that discharge at the lakeward end of the breakwater. The breakwater will be constructed with a 4 stone crest width, and side slopes of 1.5H:1V, and 8' wide toe stone bench. The existing northern steel groin will be removed. The existing concrete modular pier/storm sewer outfall structure will remain. A 16' by 16' concrete pier deck set on piles, crest elevation 585', will be constructed at the east end of the pier. The intent of the proposed concrete deck is to provide public access to the lake. The existing steel sheet pile groin at the south property line will remain. The north side of the steel will be revetted with rubble mound quarry stone to a crest elevation of 585' landward tapering to 583' lakeward with side slopes of 1.5H:1V, and 8' wide toe stone bench. Sand fill of approximately 7,800 tons, will be placed in accordance with IDNR regulations within the system. At the toe of the bluff, south of the existing steel sheet pile bulkhead, a proposed steel sheet pile bulkhead will be constructed extending to the south property line of the site. The proposed bulkhead will provide the primary shore protection for the stabilization of the bluff and protection from wave attack. The bulkhead crest elevation will match the elevation of the existing sheet pile bulkhead (el. 589') at the north end of the site. To add additional height to the bulkhead improvements, the proposed bulkhead will be backed with a concrete wave wall, crest height 591', the length of the shoreline. West of the sheet pile there will be an ADA access ramp to the beach, a boardwalk and a public plaza. The ADA access ramp will taper from 589' to 580'. The boardwalk and public plaza will be at elevation 589'. See attached plans for layout. As necessary, sand nourishment, up to 1,000 tons annually, is requested for 10 years to help maintain the proposed beach contours.

9. PURPOSE AND NEED OF PROJECT:

Stabilization of a public beach facility, as well as bluff toe protection

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

10. REASON(S) FOR DISCHARGE:

Stabilization of a public beach facility, as well as bluff toe protection

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: 3854 cu. yds; Sand: 6217 cu. yds.

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

Stone will cover +/- 0.46 acres

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

There will not be a loss of eroded sand from the bluff. The littoral drift system will continue to move around the end of the breakwaters that do not protrude further lakeward than the existing structures. Aquatic and terrestrial species will not suffer from habitat loss.

14. Date activity is proposed to commence: May 1, 2024

Date activity is expected to be completed: April 30, 2025

15. Is any portion of the activity for which authorization is sought now complete? Yes [ ] No [X]

NOTE: If answer is "YES" give reasons in the Project Description and Remarks section.

Month and Year the activity was completed

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.

Issuing Agency	Type of Approval	Identification No.	Date of Application	Date of Approval	Date of Denial

17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HEREBY GRANTED. Yes [X] 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 _____ Date _____

Signature of Applicant or Authorized Agent _____ Date _____

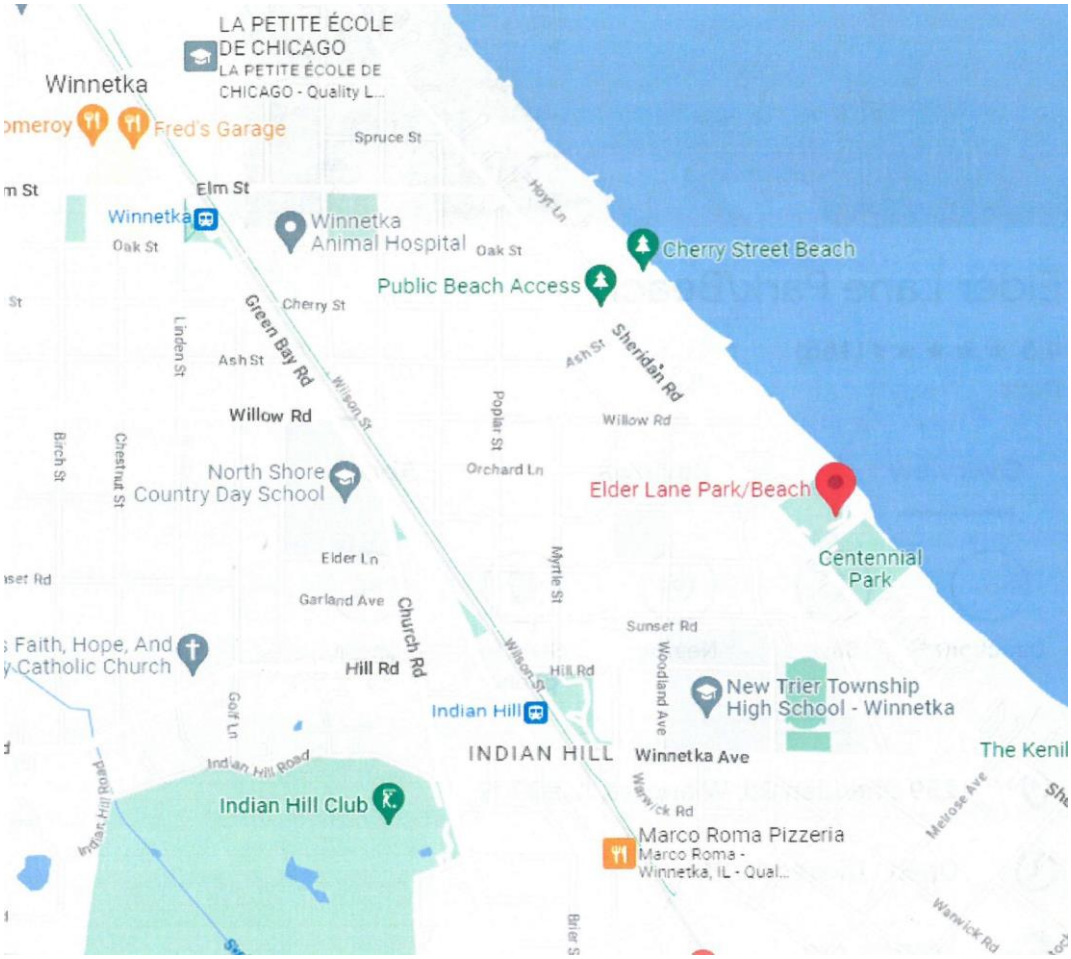
Signature of Applicant or Authorized Agent _____ Date _____

[ ] Corps of Engineers [ ] IL Dep't of Natural Resources [ ] IL Environmental Protection Agency [ ] Applicant's Copy

Revised 2010

SEE INSTRUCTIONS FOR ADDRESS

Vicinity Map



Shoreline Improvements

Elder Lane Beach
299 Sheridan Road
Winnetka, IL 60093

Shabica & Associates, Inc.

Location of Project: 299 Sheridan, Winnetka, IL 60093

List of property owners (from North to South):

1. Doug & Karen Kiersey, 335 Sheridan Road, Winnetka, IL 60093
2. Dmitry Godin, 319 Sheridan Road, Winnetka, IL 60093
3. John A. Edwardson, 301 Sheridan Road, Winnetka, IL 60093
   (mailing: 585 Bank Lane, Lake Forest IL 60045)
4. Subject Property: Elder Lane Beach, 299 Sheridan Road, Winnetka, IL 60093
   (mailing: Winnetka Park District, 540 Hibbard Road, Winnetka, IL 60093)
5. Orchard 2020 Revocable Trust, 261 Sheridan Road, Winnetka, IL 60093
   (mailing: 353 N. Clark Street, Floor 27, Chicago, IL 60654)
6. Centennial Park, 225 Sheridan Road, Winnetka, IL 60093
   (mailing: Winnetka Park District, 540 Hibbard Road, Winnetka, IL 60093)
7. Orchard 2020 Revocable Trust, 209 Sheridan Road (to be known as 205 Sheridan Road), Winnetka, IL 60093
   (mailing: 353 N. Clark Street, Floor 27, Chicago, IL 60654)
8. Walton 2019 Revocable Trust, 203 Sheridan Road (to be known as 205 Sheridan Road), Winnetka, IL 60093
   (mailing: 353 N. Clark Street, Floor 27, Chicago, IL 60654)
9. Orchard 2020 Revocable Trust, 195 Sheridan Road (to be known as 205 Sheridan Road), Winnetka, IL 60093
   (mailing: 353 N. Clark Street, Floor 27, Chicago, IL 60654)
10. Nancy Santi, 191 Sheridan Road, Winnetka, IL 60093
11. Joint Management LLC, 181 Sheridan Road, Winnetka, IL 60093
    (mailing: 309 W. Chicago Avenue, #1R, Chicago, IL 60654)
12. Robert & Carol Rasmus, 175 Sheridan Road, Winnetka, IL 60093
13. Richard Tinberg, 159 Sheridan Road, Winnetka, IL 60093
14. Jason Hanold, 151 Sheridan Road, Winnetka, IL 60093
    (mailing: 207 Cumberland Avenue, Kenilworth, IL 60043)

Elder Lane Beach Shoreline Improvements
Permit Application
Winnetka, IL

LOCATION MAP
NTS

SOURCE : GOOGLE EARTH

PROJECT SITE
NTS

DRAWING LIST:

ENGINEER:

RED BARN Design & Engineering, SC
6750 Woodland Drive
Waunakee, Wisconsin 53597
Ph: (608) 849-2042
Attn: Matthew Wright, P.E.

Shabica & Associates
550 Frontage Road Unit 3735
Northfield, IL 60093
Ph: (847) 446-1436
Attn: Jon Shabica

OWNER:

Winnetka Park District
540 Hibbard Road
Winnetka, IL 60093
Ph: (847) 501-2040
Attn: Costa Kutulas

RED BARN
Design & Engineering, S.C.
6750 Woodland Drive
Waunakee Wisconsin 53597
p. 608.849.2042
c. 608.843.1870
redbarnde@tds.net

Consultants

Issued for	Rev.	Date
Review		10/27/23
WPD Board Review		11/03/23
Permit Submittal		12/04/23

Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

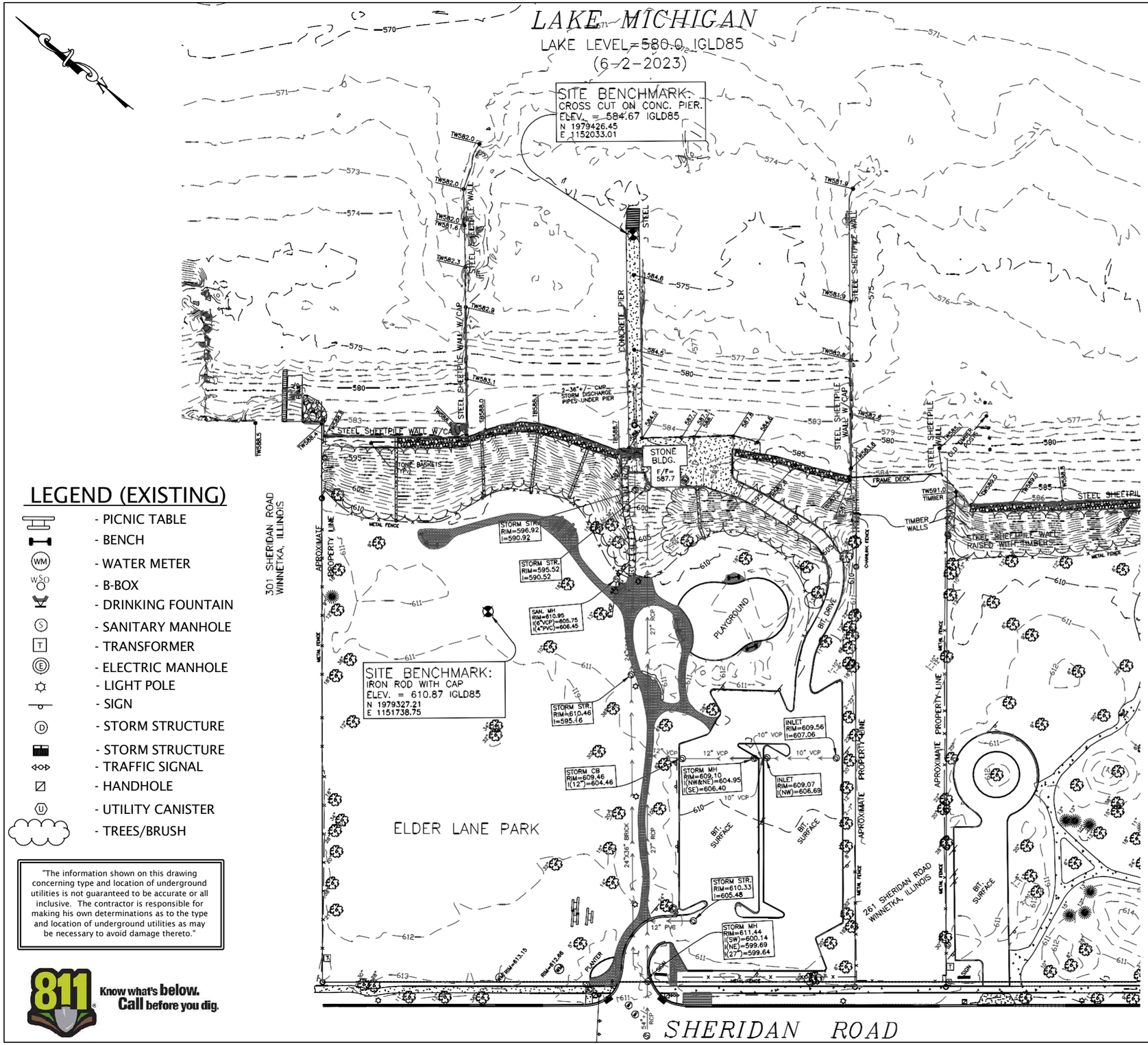
None

Scale : None

Drawing Title :

Title Sheet

Sheet No. T101



LEGEND (EXISTING)

- PICNIC TABLE
- BENCH
- WATER METER
- B-BOX
- DRINKING FOUNTAIN
- SANITARY MANHOLE
- TRANSFORMER
- ELECTRIC MANHOLE
- LIGHT POLE
- SIGN
- STORM STRUCTURE
- STORM STRUCTURE
- TRAFFIC SIGNAL
- HANDHOLE
- UTILITY CANISTER
- TREES/BRUSH

"The information shown on this drawing concerning type and location of underground utilities is not guaranteed to be accurate or all inclusive. The contractor is responsible for making his own determinations as to the type and location of underground utilities as may be necessary to avoid damage thereto."

811 Know what's **below.** **Call** before you dig.

NOTES:

1. BASEMAP, TOPOGRAPHIC AND BATHYMETRIC INFORMATION PREPARED FROM SURVEYS PERFORMED IN JUNE 2023.
2. HORIZONTAL DATUM IS BASED ON ILLINOIS STATE PLANE COORDINATE SYSTEM. NAD 83 EAST ZONE 1201 - ESTABLISHED USING TRIMBLE VRS NOW NETWORK .
3. VERTICAL DATUM IS IGLD85 (NAVD88 - 0.51' = IGLD85)
4. TOPOGRAPHIC AND BATHYMETRIC SURVEYS GENERATING CONTOURS AT ONE (1) FOOT INTERVALS.
5. UNDERGROUND UTILITIES ARE BASED ON FIELD OBSERVATIONS.
6. UNDERGROUND UTILITIES ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY, AND ARE NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR/OWNER IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTRACTOR/OWNER SHALL CALL FOR A JUNE LOCATE PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES..

CONTROL POINTS/BENCHMARKS

CROSS CUT ON CONC. PIER
ELEV. = 584.67 IGLD 85
N 1979426.45
E 1152033.01

IRON ROD WITH CAP
ELEV. = 610.87 IGLD 85
N 1979327.21
E 1151738.75

RED BARN
Design & Engineering, S.C.

6750 Woodland Drive
Waunakee Wisconsin 53597
p. 608.849.2042
c. 608.843.1870
redbarnde@tds.net

Consultants

TERRA TECHNOLOGY LAND SURVEYING, INC.

Issued for	Rev.	Date
Review		10/27/23
WPD Board Review		11/03/23
Permit Submittal		12/04/23

Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

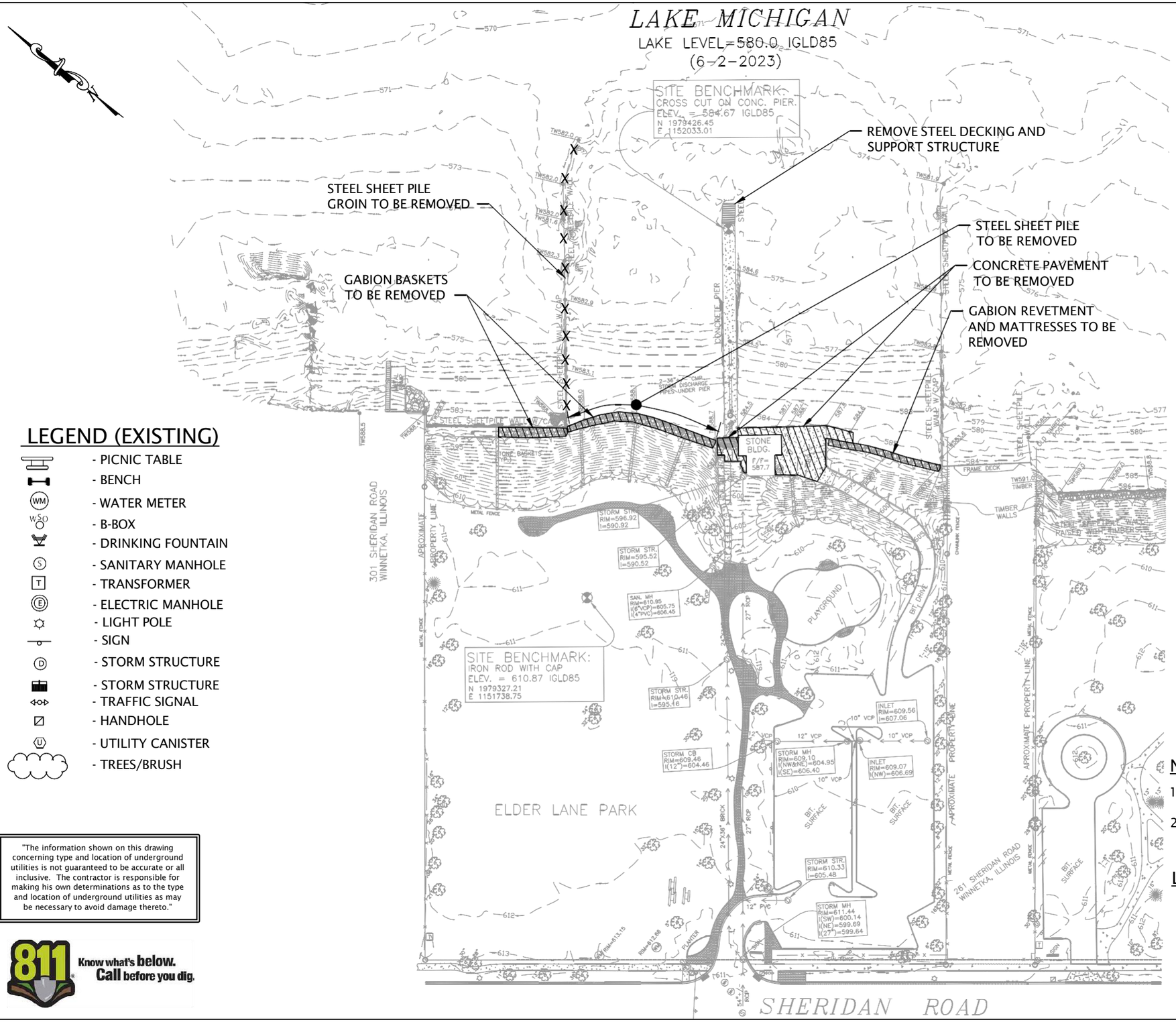
0' 40' 80'
(In Feet)

Scale : 1 Inch = 80 Ft.

Drawing Title :

Existing Conditions Plan

Sheet No. C100



LEGEND (EXISTING)

- PICNIC TABLE
- BENCH
- WM - WATER METER
- WSO - B-BOX
- DRINKING FOUNTAIN
- S - SANITARY MANHOLE
- T - TRANSFORMER
- E - ELECTRIC MANHOLE
- LIGHT POLE
- SIGN
- D - STORM STRUCTURE
- STORM STRUCTURE
- TRAFFIC SIGNAL
- HANDHOLE
- U - UTILITY CANISTER
- TREES/BRUSH

"The information shown on this drawing concerning type and location of underground utilities is not guaranteed to be accurate or all inclusive. The contractor is responsible for making his own determinations as to the type and location of underground utilities as may be necessary to avoid damage thereto."

811 Know what's below. Call before you dig.

NOTES:

1. SEE SHEET C100 FOR LEGEND OF EXISTING CONDITIONS.
2. LIMITS OF CONSTRUCTION ARE AS SHOWN UNLESS OTHERWISE NOTED.

LEGEND (PROPOSED)

- STEEL SHEET PILE GROIN TO BE REMOVED
- SHORELINE STRUCTURE TO BE REMOVED

RED BARN
Design & Engineering, S.C.
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Waunakee Wisconsin 53597
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redbarnde@tds.net

Consultants

Issued for	Rev.	Date
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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

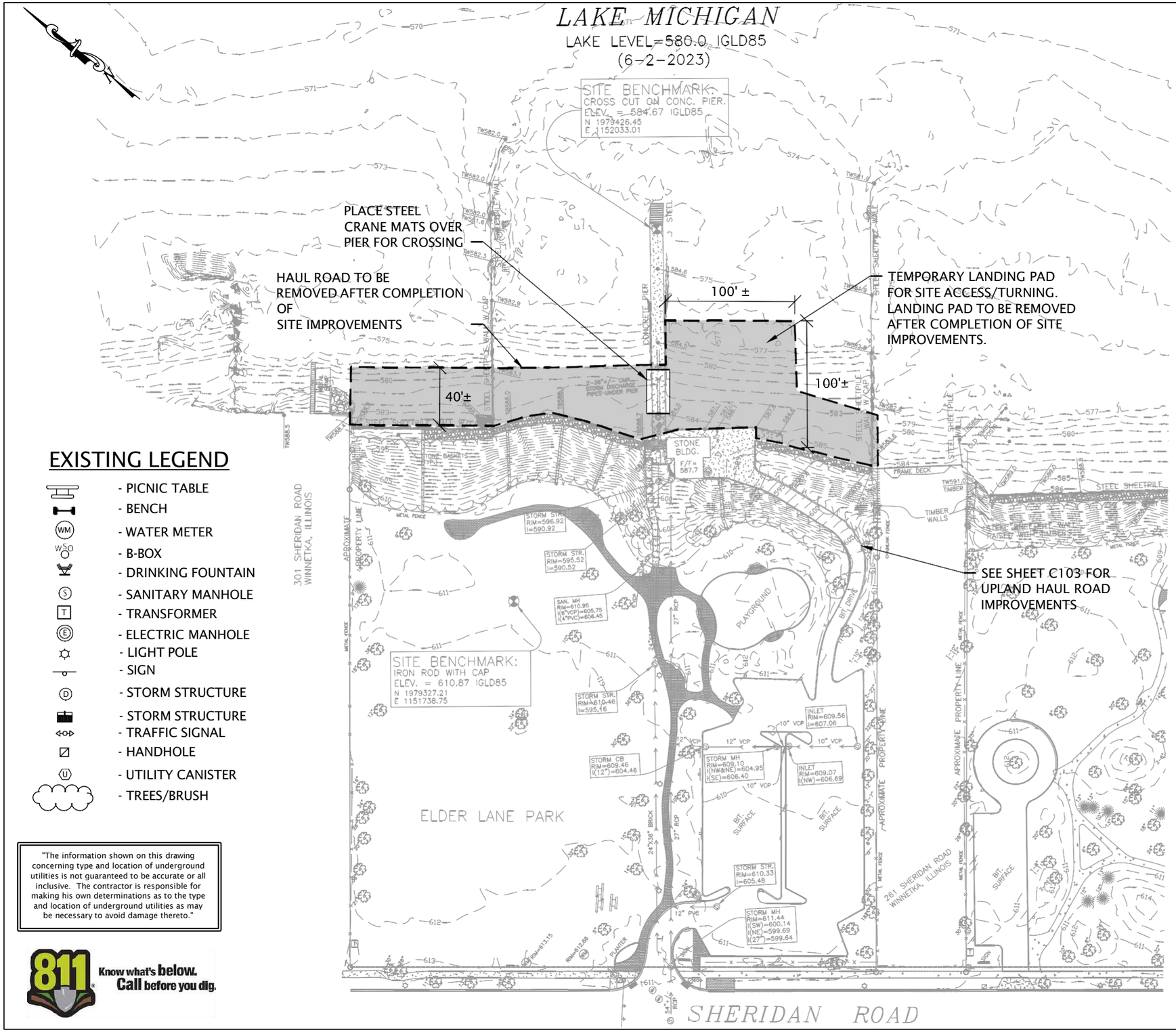
0' 40' 80'
(In Feet)

Scale :1 Inch = 80 Ft.

Drawing Title :

Site Preparation Plan

Sheet No. C101



EXISTING LEGEND

- PICNIC TABLE
- BENCH
- WATER METER
- B-BOX
- DRINKING FOUNTAIN
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NOTES:

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2. LIMITS OF CONSTRUCTION ARE AS SHOWN UNLESS OTHERWISE NOTED.

LEGEND (PROPOSED)

- TEMPORARY HAUL ROAD

RED BARN
Design & Engineering, S.C.
6750 Woodland Drive
Waunakee Wisconsin 53597
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c. 608.843.1870
redbarnde@tds.net

Consultants

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Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

0' 40' 80'
(In Feet)

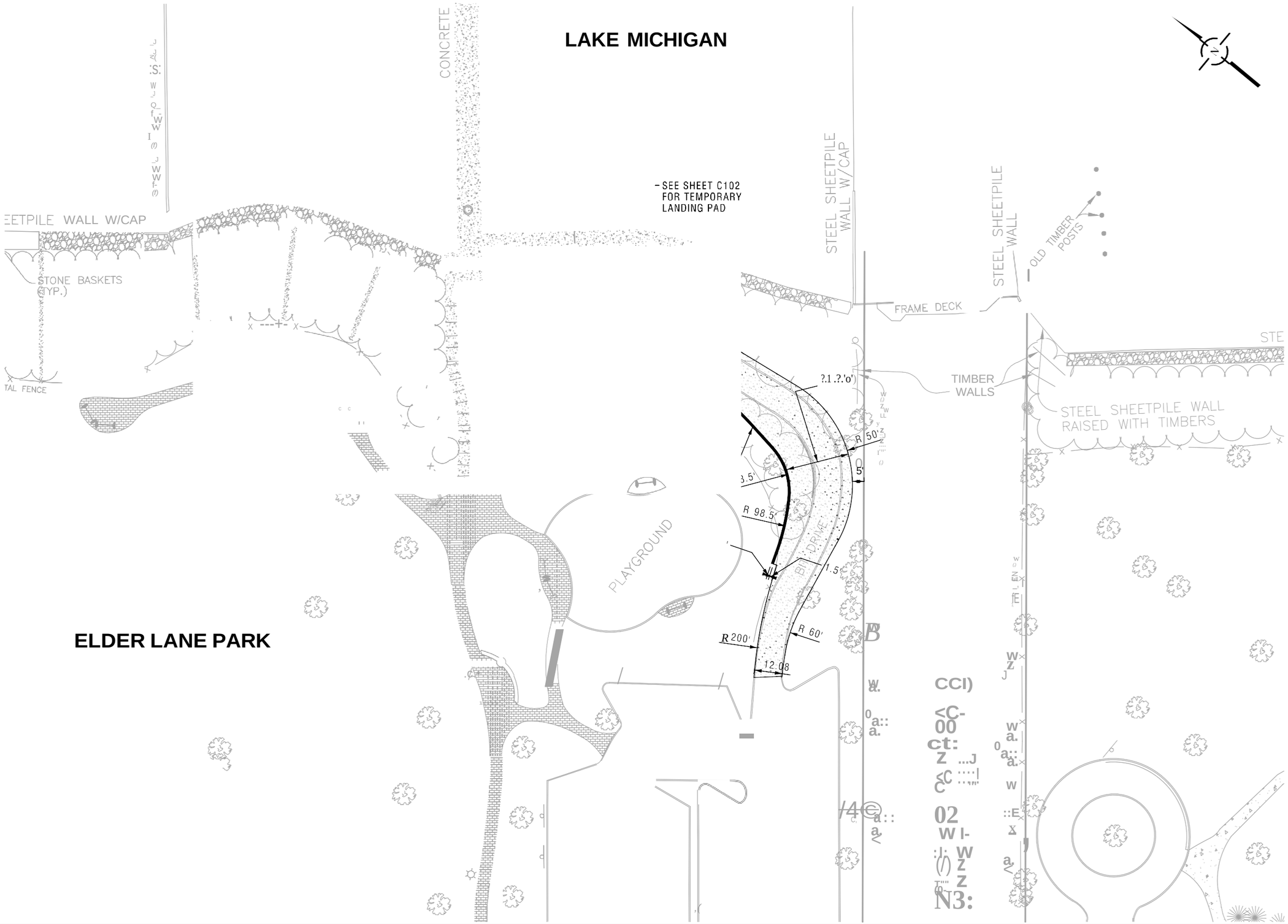
Scale : 1 Inch = 80 Ft.

Drawing Title :

Temporary Construction Haul Road Layout Plan

Sheet No. C102

LAKE MICHIGAN



ELDER LANE PARK

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Design & Engineering, S.C.

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Consultants

9575 W. Higgins Road, Suite 700,
Rosemont, Illinois 60018
Phone: (847) 696-4060 Fax: (847) 696-4065

Issued for Review	Rev. Date
	/03/23
WPD Board Review	/09/23
Permit Submittal	2/04/23

Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

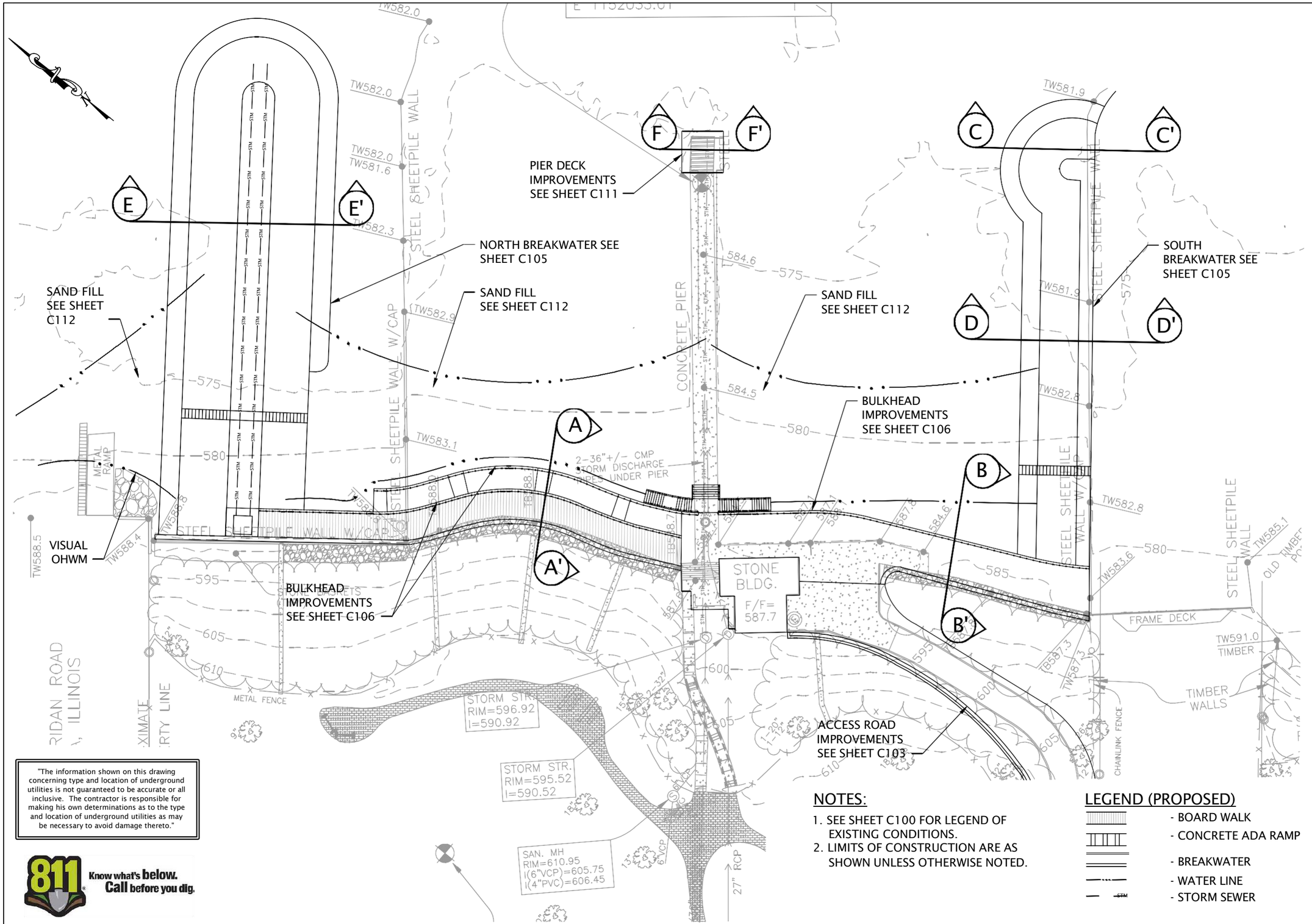
Graphic Scale :
SCALE 1" = 40'
0 40

Scale : 1"=40'

Drawing Title :

TEMPORARY UPLAND CONSTRUCTION HAUL ROAD LAYOUT PLAN

Sheet No. CI03



"The information shown on this drawing concerning type and location of underground utilities is not guaranteed to be accurate or all inclusive. The contractor is responsible for making his own determinations as to the type and location of underground utilities as may be necessary to avoid damage thereto."

811 Know what's below. Call before you dig.

NOTES:

1. SEE SHEET C100 FOR LEGEND OF EXISTING CONDITIONS.
2. LIMITS OF CONSTRUCTION ARE AS SHOWN UNLESS OTHERWISE NOTED.

LEGEND (PROPOSED)

- BOARD WALK
- CONCRETE ADA RAMP
- BREAKWATER
- WATER LINE
- STORM SEWER

RED BARN
Design & Engineering, S.C.

6750 Woodland Drive
Waunakee Wisconsin 53597
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c. 608.843.1870
redbarnde@tds.net

Consultants

Issued for	Rev.	Date
Review		10/27/23
WPD Board Review		11/03/23
Permit Submittal		12/04/23

Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

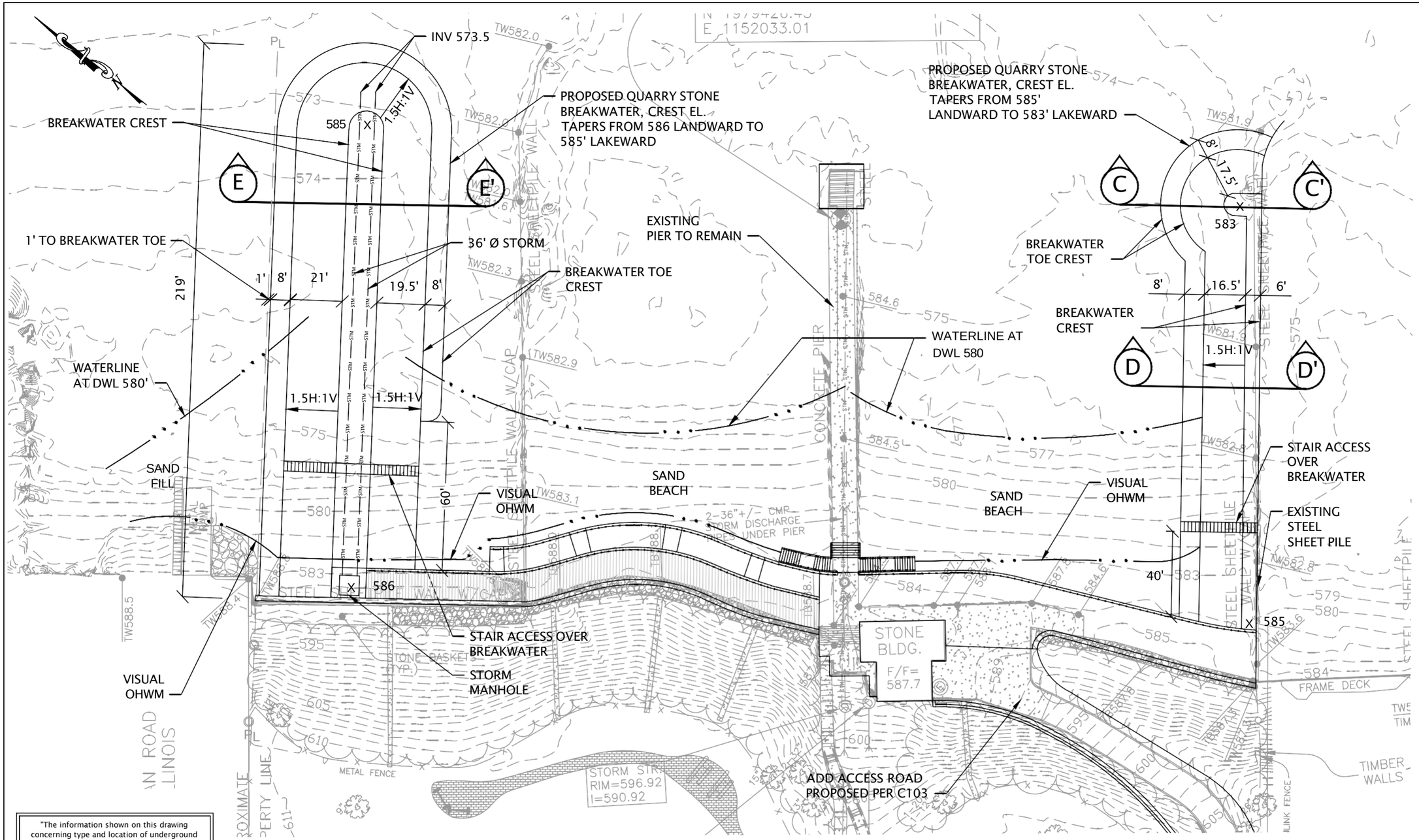
0' 20' 40'
(In Feet)

Scale : 1 Inch = 40 Ft.

Drawing Title :

Site Improvements Layout Plan

Sheet No. C104



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NOTES:

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2. LIMITS OF CONSTRUCTION ARE AS SHOWN UNLESS OTHERWISE NOTED.

LEGEND (PROPOSED)

- BOARD WALK
- CONCRETE ADA RAMP
- BREAKWATER
- WATER LINE
- STORM SEWER

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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

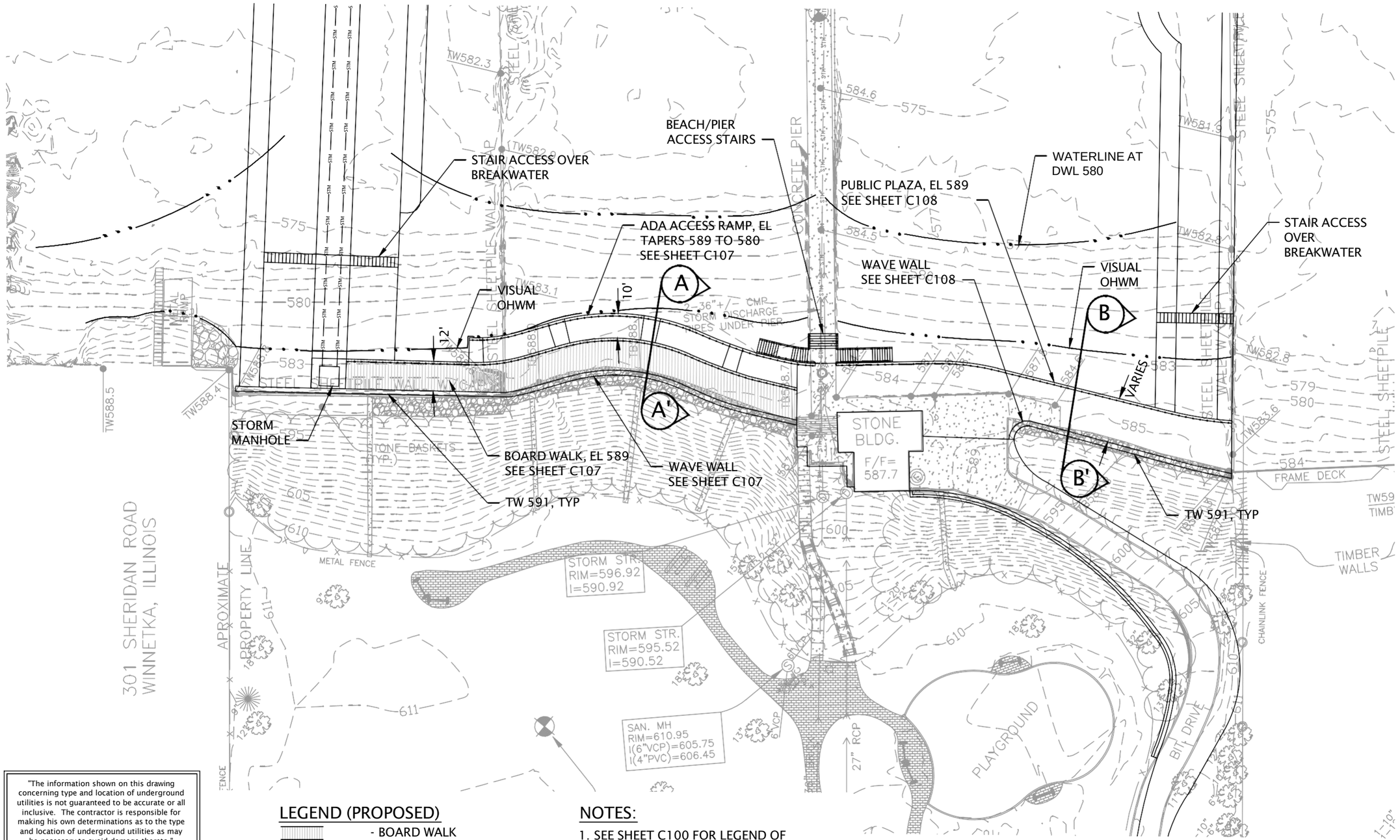
0' 20' 40'
(In Feet)

Scale : 1 Inch = 40 Ft.

Drawing Title :

North And South Breakwater Layout Plan

Sheet No. C105



301 SHERIDAN ROAD
WINNETKA, ILLINOIS

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LEGEND (PROPOSED)

- BOARD WALK
- CONCRETE ADA RAMP
- BREAKWATER
- WATER LINE
- STM — STORM SEWER

NOTES:

1. SEE SHEET C100 FOR LEGEND OF EXISTING CONDITIONS.
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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

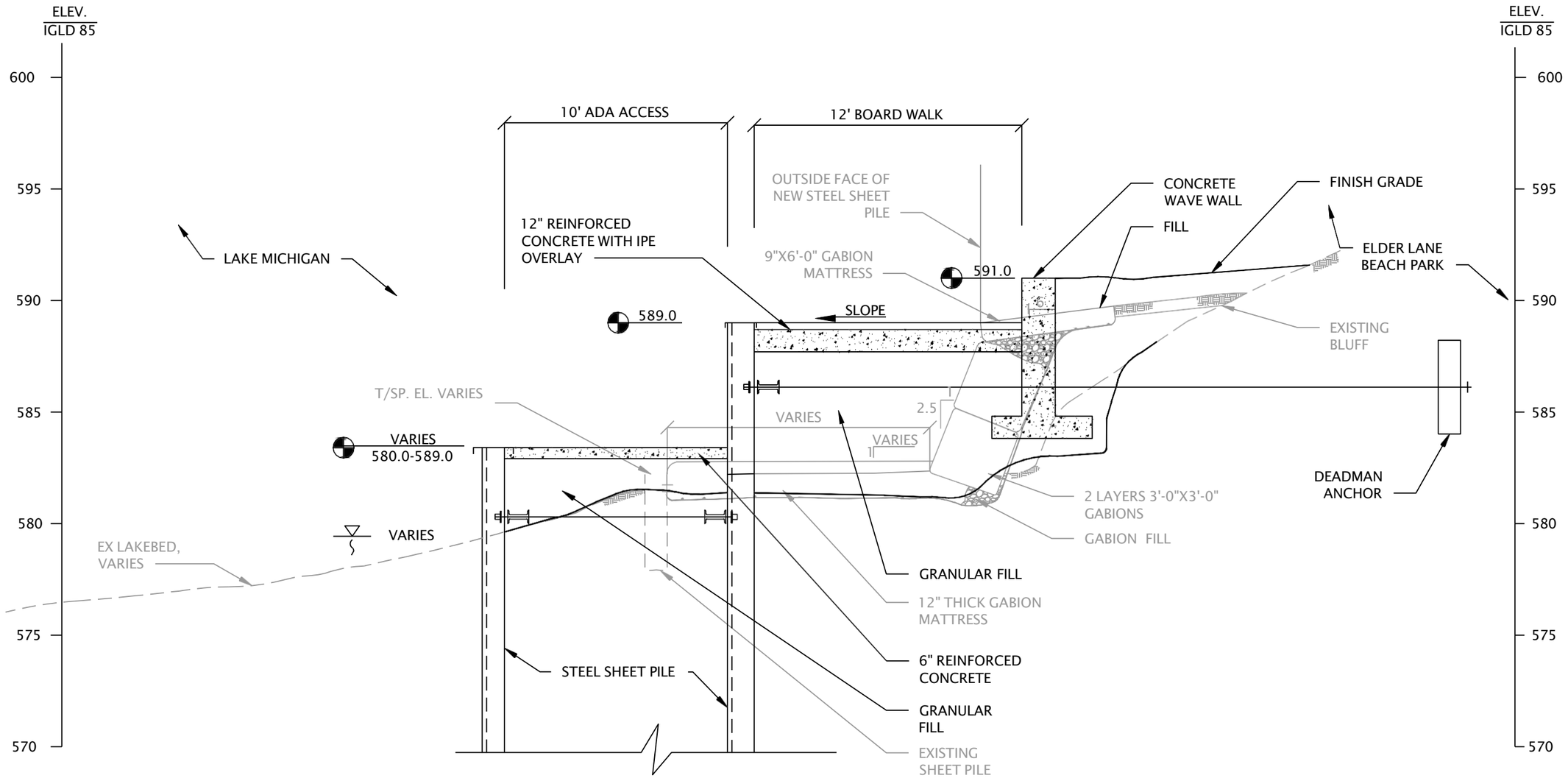
Graphic Scale :
0' 20' 40'
(In Feet)

Scale : 1 Inch = 40 Ft.

Drawing Title :

Sheet Pile Bulkhead/ Shoreline Layout Plan

Sheet No. C106



Sheet Pile Bulkhead Section A-A'

Scale: 0' 2.5' 5'

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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

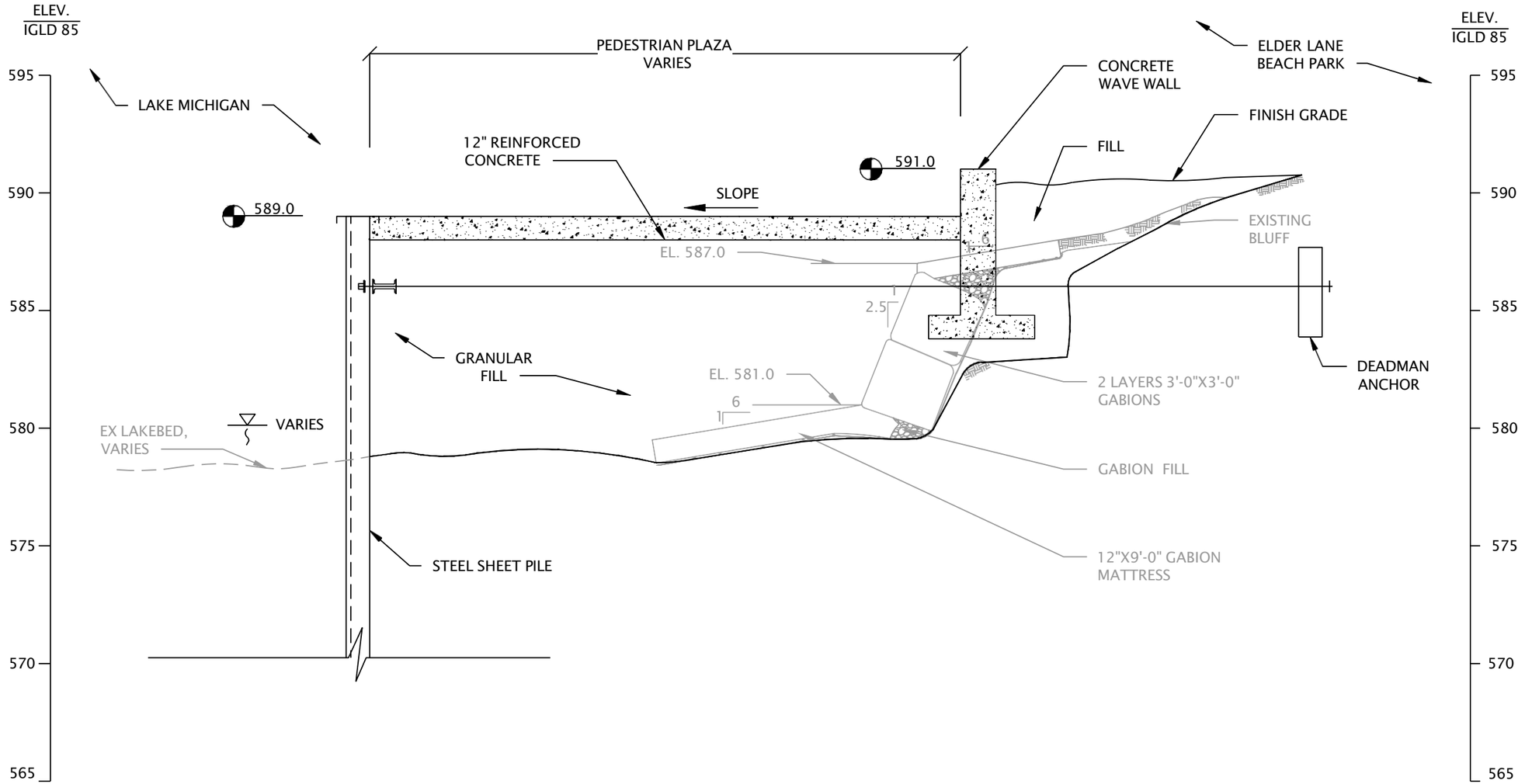
0' 2.5' 5'
(In Feet)

Scale : 1 Inch = 5 ft.

Drawing Title :

Sheet Pile Bulkhead
Section A-A'

Sheet No. C107



Sheet Pile Bulkhead Section B-B’

Scale: 0' 2.5' 5'

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811 Know what's **below.** **Call** before you dig.

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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

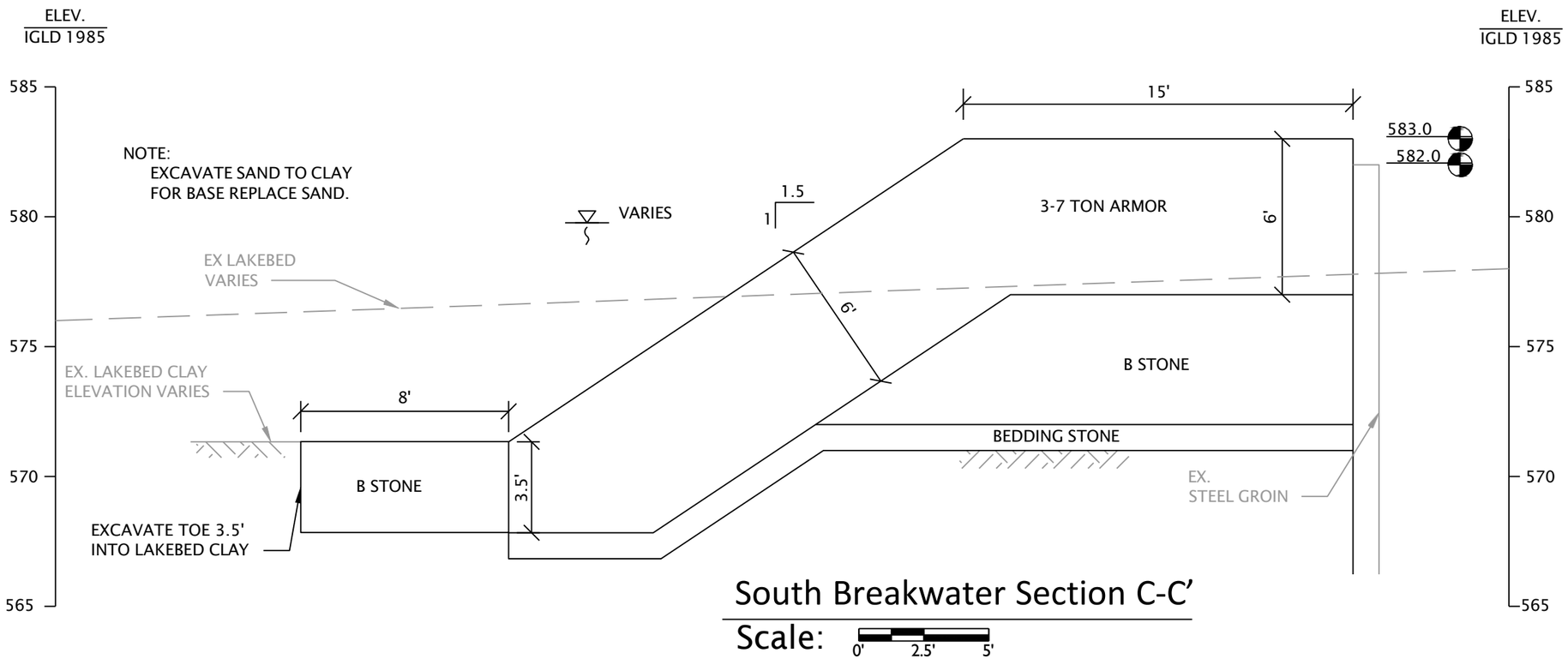
Graphic Scale :
0' 2.5' 5'
(In Feet)

Scale : 1 Inch = 5 Ft.

Drawing Title :

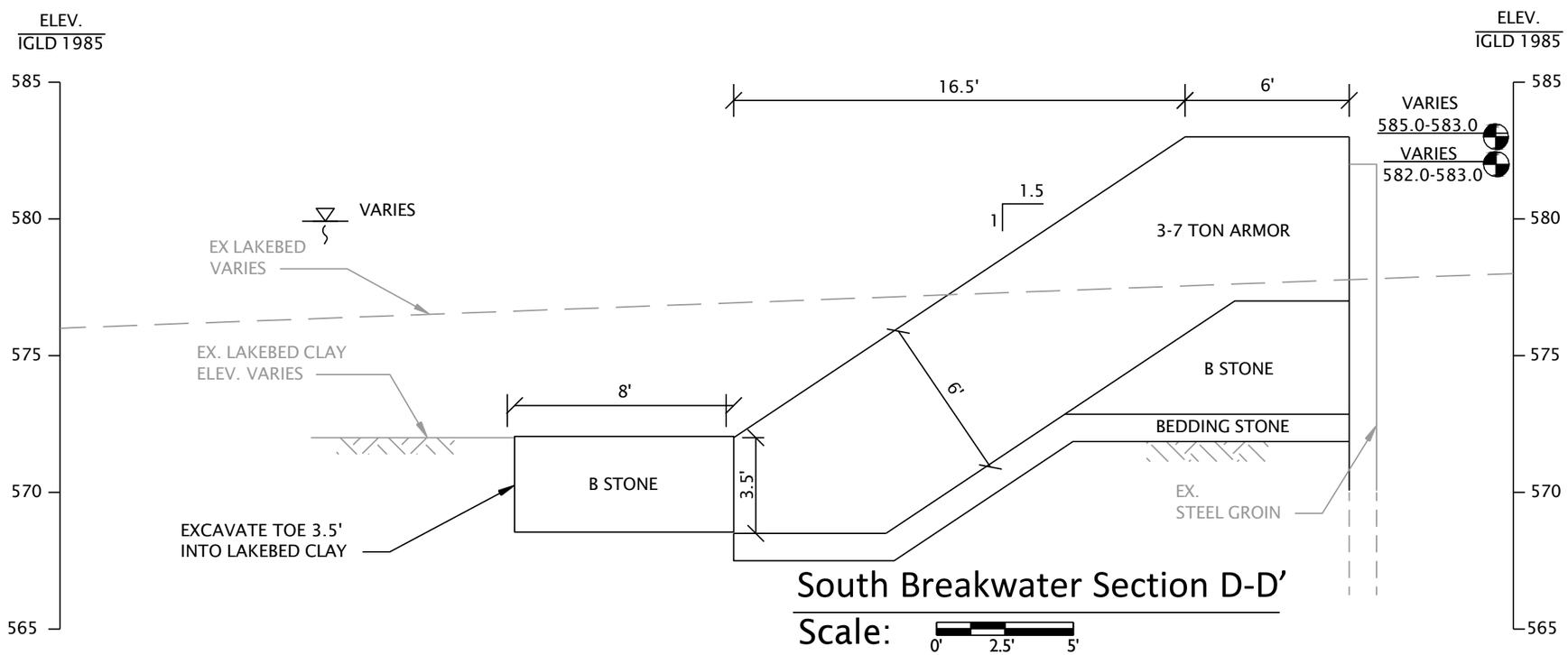
Sheet Pile Bulkhead
Section B-B'

Sheet No. C108



South Breakwater Section C-C'

Scale: 0' 2.5' 5'



South Breakwater Section D-D'

Scale: 0' 2.5' 5'

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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

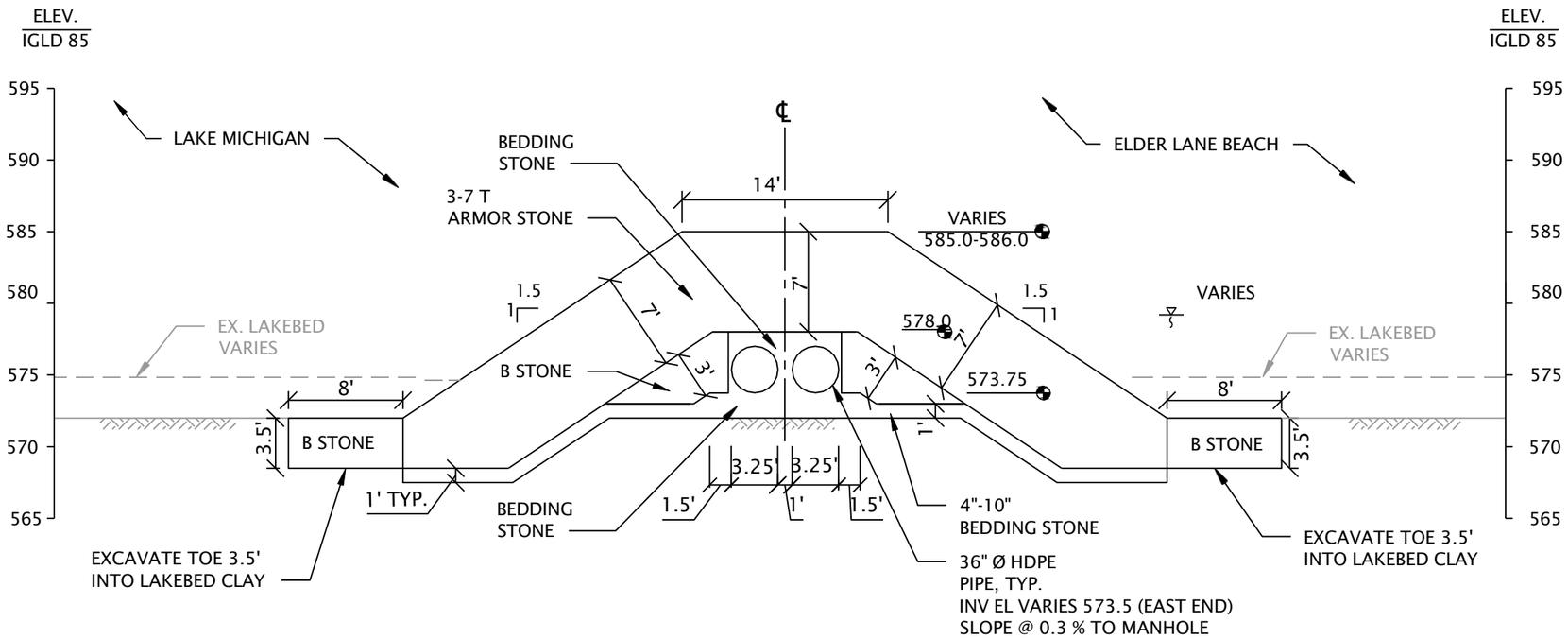
0' 2.5' 5'
(In Feet)

Scale : 1 Inch = 5 Ft.

Drawing Title :

South Breakwater
Section C-C' And D-D'

Sheet No. C109



NOTE:
REMOVE SAND FROM UNDER BREAKWATER FOOTPRINT. PLACE STONE ON CLAY LAKEBED. REPLACE SAND OVER BREAKWATER TOE AFTER STRUCTURE CONSTRUCTION

North Breakwater Section E-E'

Scale: 0' 5' 10'

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Elder Lane Beach
Shoreline Improvements
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Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

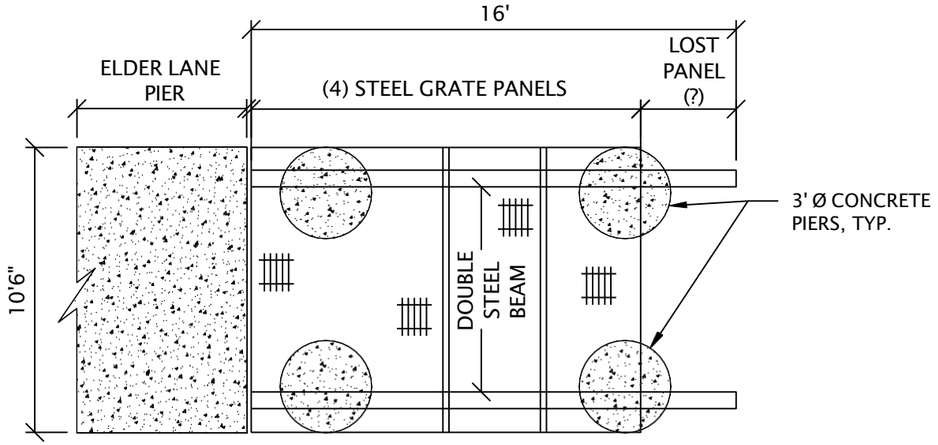
Graphic Scale :
0' 5' 10'
(In Feet)

Scale : 1 Inch = 10 Ft.

Drawing Title :

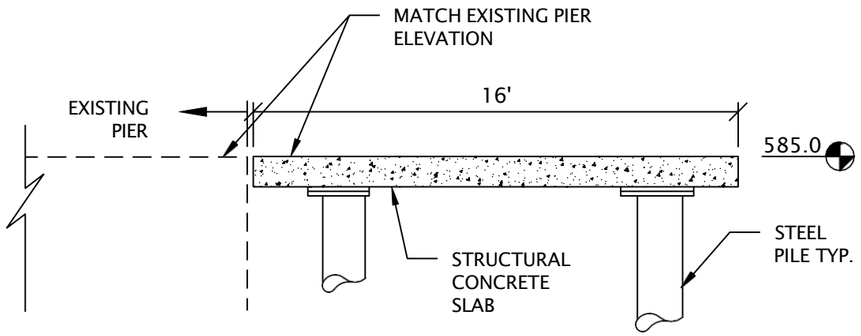
North Breakwater Section E-E'

Sheet No. C110



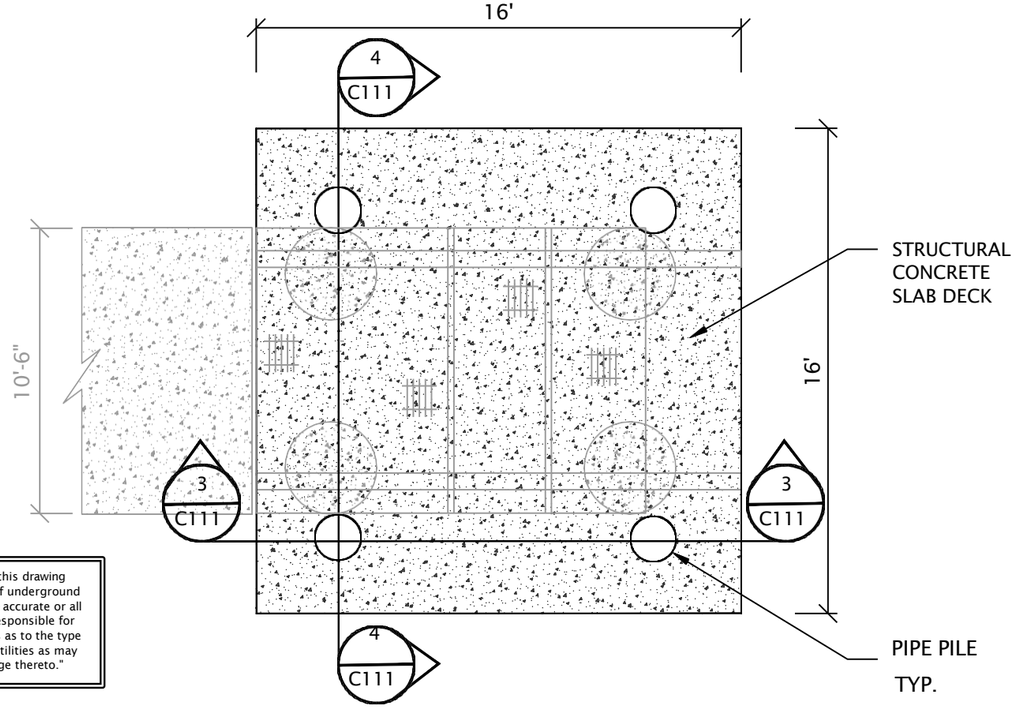
1 / C111 EXISTING CONDITIONS: PIER EAST END PLAN

Scale: 0' 3/4" 3/8"



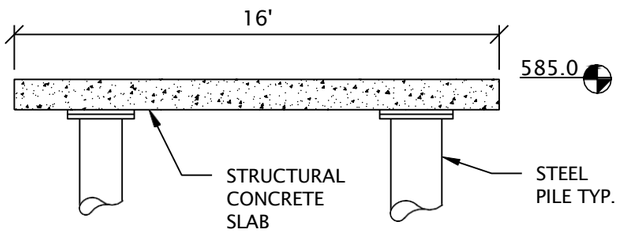
3 / C111 LONGITUDINAL SECTION

Scale: 0' 2.5' 5'



2 / C111 DECK LAYOUT PLAN

Scale: 0' 2.5' 5'



4 / C111 TRANSVERSAL SECTION

Scale: 0' 2.5' 5'

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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

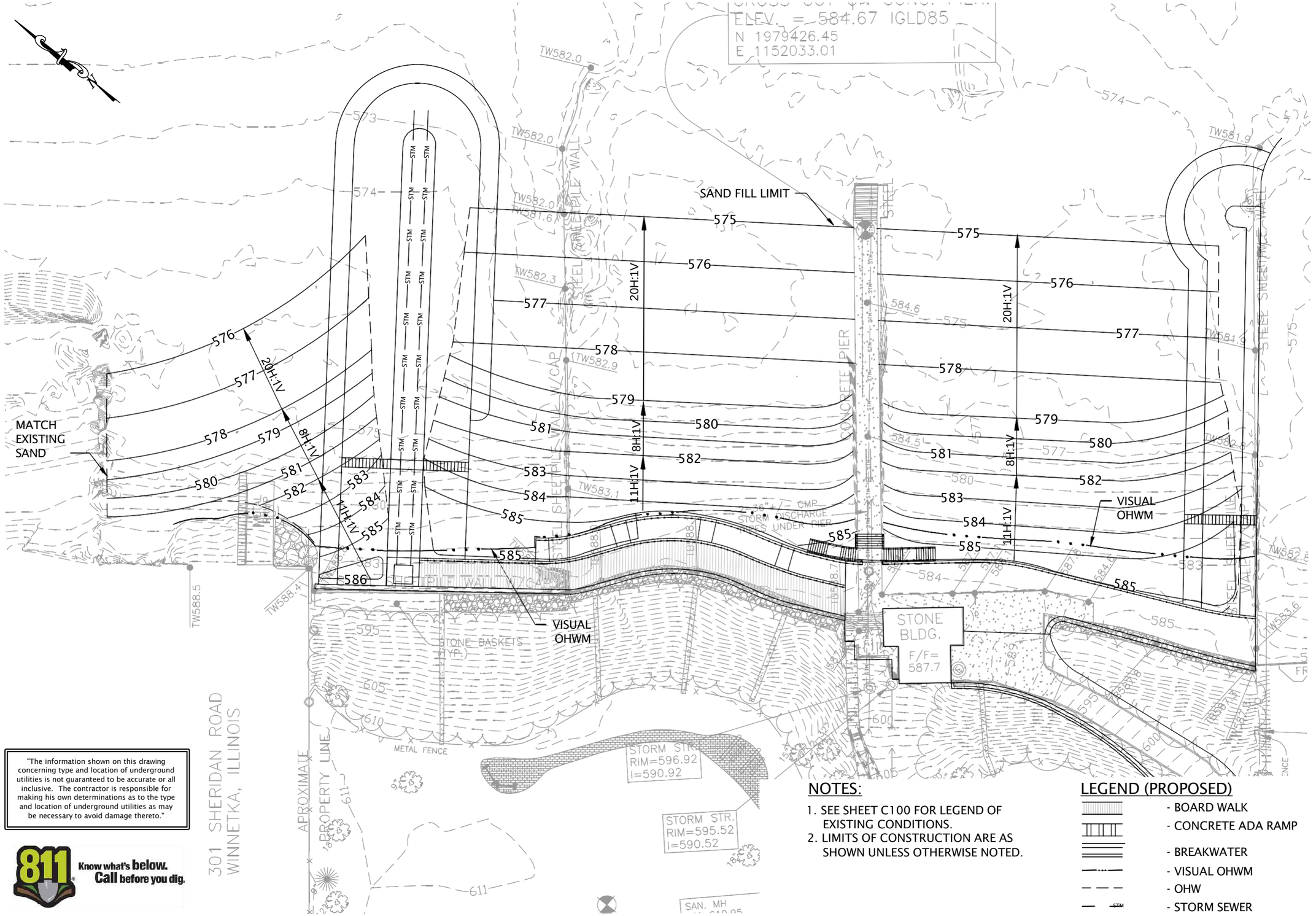
0' 2.5' 5'
(In Feet)

Scale : 1 Inch = 5 Ft.

Drawing Title :

Pier Deck Improvements

Sheet No. C111



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NOTES:

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LEGEND (PROPOSED)

- BOARD WALK
- CONCRETE ADA RAMP
- BREAKWATER
- VISUAL OHWM
- OHW
- STORM SEWER

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Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

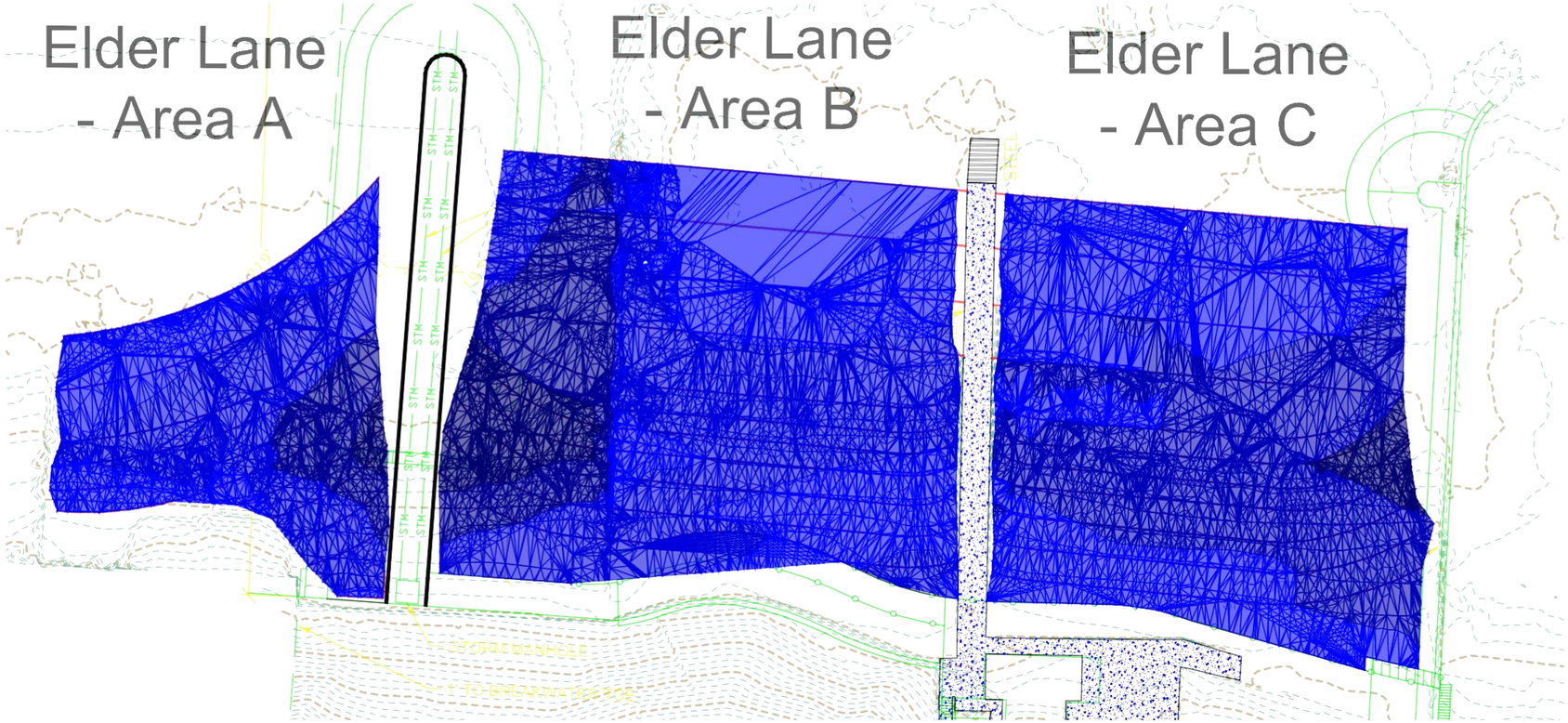
0' 20' 40'
(In Feet)

Scale : 1 Inch = 40 Ft.

Drawing Title :

Sand Fill Layout Plan

Sheet No. C112



Area A

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	0.312	2.000	
2	2.000	4.000	
3	4.000	6.000	
4	6.000	7.169	

Sand Fill = 1,025 C.Y.

Area B

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	0.000	2.000	
2	2.000	4.000	
3	4.000	6.000	
4	6.000	8.848	

Sand Fill = 2,454 C.Y.

Area C

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	0.000	2.000	
2	2.000	4.000	
3	4.000	5.804	

Sand Fill = 1,702 C.Y.

SAND TOTALS:

1,025 C.Y. + 2,454 C.Y. + 1,702 C.Y. = 5,181 C.Y. x 1.25 TON/C.Y. = 6,476 TON

6,476 TON x 20% OVERFILL = 7,771 TON

PLACE 7,800 TON OF CLEAN SAND FROM UPLAND QUARRY

NORTH

RED BARN
Design & Engineering, S.C.

6750 Woodland Drive
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Consultants

Issued for	Rev.	Date
WPD Board Review		11/3/23
Permit Submittal		12/4/23

Project Title:

Elder Lane Beach
Shoreline Improvements
Permit Application
Winnetka, IL

Prepared For:

Winnetka Park District
Winnetka, IL

Graphic Scale :

0 50
(IN FEET)

Scale : 1 Inch = 50 ft.

Drawing Title :

Sand Fill
Quantity
Calculations

Sheet No. C113