

6750 Woodland Dr. Waunakee, WI 53597

p. 608.849-2042 c. 608.843.1870

redbarnde@tds.net

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 steel sheet pile cell (with concrete cap), pier with quarry stone toe protection, steel sheet pile bulkhead, boardwalk, ADA access ramp and sand nourishment for the Centennial Park shoreline Improvements located at 225 Sheridan Road, Winnetka, Illinois 60093, owned by the Winnetka Park District. The beach at Centennial Park 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 the Centennial 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 owner to the north and south of the project is aware of and supports this project (see attached letter 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.

### COVER LETTER

#### Centennial Beach - December 4, 2023

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 a short steel groin. The proposed system is designed to help improve these issues, provide greater and more stable public access to Lake Michigan waters, offer new recreational activities to beach-goers and dog owners, and provide a sustainable shoreline for the community.

**Project Description** (All the lengths noted below are outside toe to toe, elevations referenced to IGLD 85) This application is for a 240' long pier constructed of a steel sheet pile cell with concrete cap, quarry stone toe protection, shoreline parallel steel sheet pile bulkhead, boardwalk and ADA access ramp, and sand nourishment.

The pier concrete deck will have an elevation 587.5' landward tapering to 585' lakeward. The pier crest will be 15' wide with the lakeward end terminating with a 30' diameter circle area. The surrounding quarry stone toe protection will have a crest elevation of 585' around the circular lakeward end and a crest of 583' for the trunk of the structure. The quarry stone toe protection crest width will be 2 stones wide (6') with side slopes of 1.5H:1V, and toe stone bench width of 8' wide.

Sand fill, approximately 6,400 tons, will be placed in accordance with IDNR regulations which includes a 20% overfill.

The 325' long shore parallel steel sheet pile bulkhead with boardwalk, will be constructed with a crest elevation of 587.5'. An concrete ADA accessible ramp will provide access to the beach with a base elevation of 580'.

At the north end of the existing bulkhead, a 32' wide reach of cantilevered steel sheet pile (crest 595') will be installed to replace the existing deteriorating timber retaining wall.

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 reviewed by the WPD Board.

The first option is 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 the lake is at higher water levels.

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 beaches north and south of the proposed central pier. The Centennial Park Beach proposed improvements consist of one central shore perpendicular steel sheet pile pier that aid in sand retention, and a shore parallel steel sheet pile bulkhead with a boardwalk and other amenities for pedestrian access. The primary shore protection for the entire Centennial Park shoreline is provided by the existing steel sheet pile bulkhead. An existing length of wood/steel bulkhead on the north end of the park adjacent to the 261 property will be removed and replaced with a new steel sheet pile bulkhead. The beach will be divided into two separate program areas with swimming and a dog beach separated by the central pier.



Option 3 - Proposed 2023 Centennial Park 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 the beach at Centennial Park shown by the significant loss of beach recently at above average water levels. Historically, this beach has held a small beach at time 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 Centennial leaving the site without a sandy beach and damage to the shoreline. 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 bluff toe, 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 deeper nearshore conditions. 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* (<u>http://www.isws.illinois.edu/iswsdocs/wsp/climate\_impacts\_012808.pdf</u>) 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.



Halloween 2014 Storm damaged the shoreline at near record low Lake Michigan water levels (looking south from Elder Beach)



2023 photo looking north from the south property line



2023 photo of exposed wood piles from an old crib pier groin

#### **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 and proposed dog park 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 Centennial Park Beach is privately owned residential property that is protected by revetments, steel groins and breakwater protected beaches. The property immediately to the south is currently under construction and a new engineered breakwater protected beach is being constructed. Sand mitigation (as required by the IDNR) will be placed on the subject property with a 20% overfill as required.

The proposed quarry stone breakwater will extend to approximately 240' 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 Centennial 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**

The breakwater and beach will help to provide a more stable shoreline environment for swimmers and dog owners 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 proposed structures at Elder Lane Beach.

#### **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 breakwater and bulkhead will start soon after the permits are issued as the beach is not currently usable for residents. The breakwater 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 10,000 tons of clean granular material will be placed to construct the breakwater/pier system. Approximately 5,101 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 0.38 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 the metastable equilibrium.

#### Mitigation

This project covers 0.38 acres of the lakebed below the Visual OHWM with fill. The fill does improve the quality of the lakebed and water with the quarry stone breakwater creating habitat for fish. As this system will be monitored annually for 5 years north and south of the proposed system, any 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 BARD 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)

Letter of authorization attached: Peter Lee, 261 Sheridan Road – Placement of sand

#### APPENDIX

Centennial Beach – December 4, 2023

#### **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 225 Sheridan Road, Winnetka. The design is based on the drawings included in this submission dated December 4, 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 one steel sheet pile cell (with concrete cap), pier with quarry stone toe protection, 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:		571 ft	
Average Armor Size:		5 tons	
Slope:		1.5H:1V	
Quarry stone Tons/li	near ft:	33 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 to 571.5 ft
•	20-yr lakebed erosion at toe of groin:	3 ft
•	Design wave height:	Hs = 9.35' ft
•	Nearshore Slope:	100H:1V
•	Design Wave Period (T):	9.9 s **
•	Depth at Structure Toe DHW (Ds):	11'
•	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. <u>Sediment transport around structure</u>

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

There will be no negative impact to the 261 Sheridan property being updrift of a new 240' long pier with quarry stone surround. The area north of the breakwater will be nourished with 4,146 tons of sand. The sand cover on the lakebed will help reduce lakebed downcutting (which causes deeper water and larger waves) as well as breaks wave energy farther offshore. The property to the south will have negligible impacts as the steel groin at the Centennial Beach south property line will not be modified on the south side. Additionally, the property at 205 Sheridan Road is under construction of a new shore protection system.

#### 3. Wave Reduction in Rubble-Mound Structures

The Iribarren number ( $\xi$ ), 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<sup>3</sup> 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 11 ft (571) 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 5.1 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 5.3 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 Centennial Park Beach at 225 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 within the north and south property lines. Additionally, all structures should be inspected to assure that they continue to meet design specifications.

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**PHOTO 1** 2023 photo looking north from the south property line



**PHOTO 2** North property line and the wood/steel retaining wall to be replaced (yellow arrow)



**PHOTO 3** 2023 photo of exposed wood piles from an old crib pier groin



**PHOTO 4** 2020 shoreline looking north along the toe of the bluff at Centennial Beach at high water



PHOTO 5 1997 Shabica aerial photograph of Centennial Beach

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

### **FIGURE 1a**

Winnetka -	Elder Lan	e		Date:	06/27/89	Time:				
	En	ter lake s	surface	578.90	elevation	for tim	e of survey			
	En	ter Graph:	1	DATA A	DATA B		DATA C			
	Enter Dist. From Shore	Enter Water Depth	Enter Sand Thick ness	Top of Sand Elev. 1990	Bottom of Sand Elev. 1990	Enter Sand Thick. 1975	Top of of sand 1975	Enter Hard- pan Type	Sand Cu.Yd. 1975	Volume Per ft. 1990
	-10.0	-1.0	2.0	579.9 578.9	577.9 577.1	10.0	587.9		1.9	0.4
	25.0	0.8	1.6	578.1	576.5	10.0	586 5		0.5	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
6	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									
Note all me	easurement	s in feet						TOTAL	364.8 CuYd/ft 1975	140.5 CuYd/ft 1990

#### All Elevations IGLD 1955

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





FIGURE 1c



**FIGURE 2** 



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

# Shore Protection Manual USACE

### Additional Resources: Centennial 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.

### **Centennial Design Development – Renderings**



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### **Centennial Design Development – Renderings**



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## 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 sand on the property at 205 Sheridan Road as part of the Winnetka Park District lakefront project at Centennial Park, 225 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						
1. Application Number	TI LIVIS I ANI	2. Date	Received			
3. and 4. (SEE SPECIAL INSTRUCTIONS) NAME	, MAILING ADDRESS	AND TELEPHO	ONE NUMBERS	S		
3a. Applicant's Name:	3b. Co-Applicant/Pr	roperty Owner N	ame	4. Authorized A	gent (an agent is not rec	juired):
John Peterson, Executive Director	(If needed or it differ	rent from applica	ant):	Shabica &	& Associates,	Inc.
Company Name (if any) : Winnetka Park District Address:	Company Name (if Address:	any):		Company Name Shabica & Asso Address:	(if any): ciates, Inc.	
540 Hibbard Road				550 Fronta	ne Road	
Winnetka, IL 60093				Suite 3735 Northfield,	IL 60093	
Email Address: JPeterson@winpark.org	Email Address:			Email Address: jon@shabica.com	1	
Applicant's Phone Nos. w/area code	Applicant's Phone N	los. w/area code	)	Agent's Phone	Nos. w/area code	
Business: 847-501-2074	Business:			Business: 847	7-446-1436	
Residence:	Residence:			Residence:		
Cell:	Cell:			Cell:		
Fax:	Fax:			Fax:		
	STATEMEN	T OF AUTHORI	ZATION			
I hereby authorize, <u>RED BARN D &amp;</u> request, supplemental information in support of thi <u>Applicant's Signature</u>	└──to act in m s permit application.	ny behalf as my	agent in the pro	ocessing of this ap	oplication and to furnish,	upon
5. ADJOINING PROPERTY OWNERS (Upst	ream and Downstre	am of the wate	er body and w	vithin Visual Rea	ach of Project)	
Name Mailing Ad	adress			P	none No. w/area code	9
a. see attached list						
b.						
с.						
d.						
Centennial Park Shoreline Improv	rements					
7. PROJECT LOCATION: 225 Sheridan Road, Winnetka,Illinois 60093						
		UTMs				
LATITUDE: 42.09821	°N	Northing: 46	60000 65	~		
LONGITUDE: -87.71452	°W	Easting: 16	T440925.	m 73 m		
STREET, ROAD, OR OTHER DESCRIPTIVE LOC	ATION	LEGAL	QUARTER	SECTION	TOWNSHIP NO.	RANGE
Sheridan Road		DESCRIPT	SE	21	42N	13E
IN OR IN NEAR CITY OF TOWN (check a Municipality Name		WATE	RWAY	RIVEF (if app	R MILE licable)	
Winnetka	r	Lake Mic	nıgan			
COUNTY STATE	ZIP CODE					
Cook IL	60093					
Revised 2010 Corps of Engineers IL Dep't of Na	tural Resources	☐ IL E Agency	Invironmenta	I Protection	Applicant's	з Сору

This application is for a 240' long pier constructed of a steel sheet pile steel sheet pile bulkhead, boardwalk and ADA access ramp, and sand landward tapering to 585' lakeward. The pier crest will be 15' wide with surrounding quarry stone toe protection will have a crest elevation of 5 the structure. The quarry stone toe protection crest width will be 2 ston 8' wide. Sand fill, approximately 6,400 tons, will be placed in accordance shore parallel steel sheet pile bulkhead with boardwalk, will be constru- will provide access to the beach with a base elevation of 580'. At the n sheet pile (crest 595') will be installed to replace the existing deteriorat tons annually, is requested for 10 years to help maintain the proposed	cell with concrete cap, quarry stone toe protection, shoreline parallel nourishment. The pier concrete deck will have an elevation 587.5' the lakeward end terminating with a 30' diameter circle area. The 35' around the circular lakeward end and a crest of 583' for the trunk of es wide (6') with side slopes of 1.5H:1V, and toe stone bench width of ce with IDNR regulations which includes a 20% overfill. The 325' long cted with a crest elevation of 587.5'. An concrete ADA accessible ramp orth end of the existing bulkhead, a 32' wide reach of cantilevered steel ng timber retaining wall. As necessary, sand nourishment, up to 1,000 beach contours.
9. PURPOSE AND NEED OF PROJECT:	
Stabilization of a public beach facility, as well as blu	ff toe protection
COMPLETE THE FOLLOWING FOUR BLOCKS IF DRED	GED AND/OR FILL MATERIAL IS TO BE DISCHARGED
10. REASON(S) FOR DISCHARGE:	
Stabilization of a public beach facility, as well as blu	ff 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: 4716 cu. yds; Sand: 5101 cu. yds.	
12. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FIL	ED (See Instructions)
Stone will cover +/- 0.38 acres	
13. DESCRIPTION OF AVOIDANCE, MINIMIZATION AND COMPENSATIO	N (See instructions)
around the end of the breakwaters that do not protru	It. The littoral drift system will continue to move ude further lakeward than the existing structures.
Aquatic and terrestrial species will not suffer from h	abitat loss.
Aquatic and terrestrial species will not suffer from ha	Date activity is expected to be completed April 30, 2025
Aquatic and terrestrial species will not suffer from ha 14. Date activity is proposed to commence May 1, 2024 15. Is any portion of the activity for which authorization is sought now complete? Month and Year the activity was completed	Date activity is expected to be completed         April 30, 2025         No         No         No         No         Indicate the existing work on drawings.
Aquatic and terrestrial species will not suffer from ha 14. Date activity is proposed to commence May 1, 2024 15. Is any portion of the activity for which authorization is Yes sought now complete? Month and Year the activity was completed 16. List all approvals or certification and denials received from other Federal, other activities described in this application.	Date activity is expected to be completed         April 30, 2025         No         No         Image: Section of the existing work on drawings.         Interstate, state, or local agencies for structures, construction, discharges or
Aquatic and terrestrial species will not suffer from harmonic for the activity is proposed to commence May 1, 2024         15. Is any portion of the activity for which authorization is sought now complete?         Month and Year the activity was completed         16. List all approvals or certification and denials received from other Federal, other activities described in this application.         Issuing Agency       Type of Approval         Identification N	Abitat loss.         Date activity is expected to be completed         April 30, 2025         No       NOTE: If answer is "YES" give reasons in the Project         Description and Remarks section.         Indicate the existing work on drawings.         interstate, state, or local agencies for structures, construction, discharges or         Io.       Date of Application         Date of Application       Date of Approval
Aquatic and terrestrial species will not suffer from has         14. Date activity is proposed to commence May 1, 2024         15. Is any portion of the activity for which authorization is sought now complete?         Month and Year the activity was completed         16. List all approvals or certification and denials received from other Federal, other activities described in this application.         Issuing Agency       Type of Approval         Identification N         17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HER	Date activity is expected to be completed         April 30, 2025         No       NOTE: If answer is "YES" give reasons in the Project         Description and Remarks section.         Indicate the existing work on drawings.         interstate, state, or local agencies for structures, construction, discharges or         Io.       Date of Application         Date of Application       Date of Approval         EBY GRANTED.       Yes X
Aquatic and terrestrial species will not suffer from has         14. Date activity is proposed to commence May 1, 2024         15. Is any portion of the activity for which authorization is sought now complete? Month and Year the activity was completed         16. List all approvals or certification and denials received from other Federal, other activities described in this application.         Issuing Agency       Type of Approval         Identification N         17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HER         18. APPLICATION VERIFICATION (SEE SPECIAL INSTRUCTIONS)         Application is hereby made for the activities described herein. I certify that I a best of my knowledge and belief, such information is true, complete, and accuractivities.	Abitat loss.         Date activity is expected to be completed         April 30, 2025         No       Image: NoTE: If answer is "YES" give reasons in the Project Description and Remarks section. Indicate the existing work on drawings.         Indicate the existing work on drawings.         interstate, state, or local agencies for structures, construction, discharges or         Io.       Date of Application         Date of Application       Date of Approval         EBY GRANTED.       Yes X         Image: Non-training the information contained in the application, and that to the irrate. I further certify that I possess the authority to undertake the proposed
Aquatic and terrestrial species will not suffer from has         14. Date activity is proposed to commence May 1, 2024         15. Is any portion of the activity for which authorization is sought now complete?         Month and Year the activity was completed         16. List all approvals or certification and denials received from other Federal, other activities described in this application.         Issuing Agency       Type of Approval         Identification N         17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HER         18. APPLICATION VERIFICATION (SEE SPECIAL INSTRUCTIONS)         Application is hereby made for the activities described herein. I certify that I a best of my knowledge and belief, such information is true, complete, and accuractivities.         Signature of Applicant or Authorized Agent	abitat loss.     Date activity is expected to be completed   April 30, 2025     No   M   Date of Application   Date of Approval   Date of Denial                  BY GRANTED.   M   Yes   No                     BY GRANTED.   M   M   M <t< td=""></t<>
Aquatic and terrestrial species will not suffer from has         14. Date activity is proposed to commence May 1, 2024         15. Is any portion of the activity for which authorization is sought now complete? Month and Year the activity was completed         16. List all approvals or certification and denials received from other Federal, other activities described in this application.         Issuing Agency       Type of Approval         Identification N         17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HER         18. APPLICATION VERIFICATION (SEE SPECIAL INSTRUCTIONS)         Application is hereby made for the activities described herein. I certify that I a best of my knowledge and belief, such information is true, complete, and accuractivities.         Signature of Applicant or Authorized Agent         Signature of Applicant or Authorized Agent	abitat loss.         Date activity is expected to be completed         April 30, 2025         No       Image: Section and Remarks section.         Indicate the existing work on drawings.         Interstate, state, or local agencies for structures, construction, discharges or         Io       Date of Application         Date of Application       Date of Approval         EBY GRANTED.       Yes X         Image: No       Image: No         Image: No       Iman
Aquatic and terrestrial species will not suffer from has         14. Date activity is proposed to commence May 1, 2024         15. Is any portion of the activity for which authorization is sought now complete?         Month and Year the activity was completed         16. List all approvals or certification and denials received from other Federal, other activities described in this application.         Issuing Agency       Type of Approval         Identification N         17. CONSENT TO ENTER PROPERTY LISTED IN PART 7 ABOVE IS HER         18. APPLICATION VERIFICATION (SEE SPECIAL INSTRUCTIONS)         Application is hereby made for the activities described herein. I certify that I a best of my knowledge and belief, such information is true, complete, and accuractivities.         Signature of Applicant or Authorized Agent         Signature of Applicant or Authorized Agent	abitat loss.         Date activity is expected to be completed April 30, 2025         No       Image: Section and Remarks section. Indicate the existing work on drawings.         Interstate, state, or local agencies for structures, construction, discharges or         Io       Date of Application         Date of Application       Date of Approval         EBY GRANTED.       Yes X         Infamiliar with the information contained in the application, and that to the irrate. I further certify that I possess the authority to undertake the proposed         Date       Date         Date       Date

SEE INSTRUCTIONS FOR ADDRESS

#### **Vicinity Map**



#### Shoreline Improvements

Centennial Park 225 Sheridan Road Winnetka, IL 60093



Shabica & Associates, Inc.

Location of Project: 225 Sheridan Road, Winnetka, IL 60093

List of property owners (from North to South):

- 1. John A. Edwardson, 301 Sheridan Road, Winnetka, IL 60093 (mailing: 585 Bank Lane, Lake Forest IL 60045)
- 2. Elder Lane Beach, 299 Sheridan Road, Winnetka, IL 60093 (mailing: Winnetka Park District, 540 Hibbard Road, Winnetka, IL 60093)
- 3. Orchard 2020 Revocable Trust, 261 Sheridan Road, Winnetka, IL 60093 (mailing: 353 N. Clark Street, Floor 27, Chicago, IL 60654)
- 4. Subject Property: Centennial Park, 225 Sheridan Road, Winnetka, IL 60093 (mailing: Winnetka Park District, 540 Hibbard Road, Winnetka, IL 60093)
- Orchard 2020 Revocable Trust, 209 Sheridan Road (to be known as 205 Sheridan Road), Winnetka, IL 60093
   (mailing) 252 N. Clark Street, Electr 27, Chicago, IL 60654)
- (mailing: 353 N. Clark Street, Floor 27, Chicago, IL 60654)6. 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)
- 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)
- 8. Nancy Santi, 191 Sheridan Road, Winnetka, IL 60093
- Joint Management LLC, 181 Sheridan Road, Winnetka, IL 60093 (mailing: 309 W. Chicago Avenue, #1R, Chicago, IL 60654)
- 10. Robert & Carol Rasmus, 175 Sheridan Road, Winnetka, IL 60093
- 11. Richard Tinberg, 159 Sheridan Road, Winnetka, IL 60093
- 12. Jason Hanold, 151 Sheridan Road, Winnetka, IL 60093 (mailing: 207 Cumberland Avenue, Kenilworth, IL 60043)
- 13. John McDonagh, 141 Sheridan Road, Winnetka, IL 60093
- 14. Mike Bonds, 139 Sheridan Road, Winnetka, IL 60093



Location of Project: 225 Sheridan, Winnetka, IL 60093





550 Frontage Road 🗆 Suite 3735 🗋 Northfield, Illinois 60093 🗆 Tel 847.446.1436 🗆 info@shabica.com www.shabica.com

# Centennial Park Shoreline Improvements Permit Application Winnetka, IL





SOURCE : GOOGLE EARTH

PROJECT SITE NTS

LOCATION MAP NTS

# DRAWING LIST:

- T101 Title Sheet
- C100 Existing Conditions Plan
- C101 Site Preparation Plan
- C102 Temporary Construction Haul Road Layout Plan
- C103 Site Improvements Layout Plan
- C104 Breakwater Layout Plan
- C105 Sheet Pile Bulkhead/Shoreline Layout Plan
- C106 Sheet Pile Bulkhead Section A-A'
- C107 Sheet Pile Bulkhead Section B-B'
- C108 Breakwater Section C-C'
- C109 Breakwater Section D-D'
- C110 Sheet Pile Bulkhead Section E-E'
- C111 Sand Fill Layout Plan
- C112 Sand Fill Quantity Calculation

# 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



	Design & Eng	ineering, S.	с.
		***	
-	6750 Woo	odland Driv	/e
	Waunakee W	/isconsin 5 849 2042	3597
	c. 608	843.1870	
	redbarnd	e@tds.net	
Con	sultants		
Issue	d for	Rev	. Date
WPD	Board Review	==	11/03/23
Permit	Submittal		12/04/23
Proj	ject Title	:	
Cent Shor Pern Win	tennial Par eline Impr nit Applica netka, IL	rk ovemen ition	ts
Pro	pared Fo	r	
		D	
Wini	netka Park netka, IL	District	
Gra	phic Scal	e:	
N		- •	
INOR	ie		
Scal	e : None		
Dra	wing Tit	le :	
Titl	e Sheet	t	
Shee	et No.		

RED BARN





1. BASEMAP. TOPOGRAPHIC AND BATHYMETRIC INFORMATION PREPARED FROM SURVEYS PERFORMED IN JUNE 2023. 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

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

CONTROL POINTS/BENCHMARKS

ELEV. = 610.95 IGLD 85



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/ RETAINING WALL TO BE REMOVED





	6750 Woodland Drive Waunakee Wisconsin 53597 p. 608.849.2042 c. 608.843.1870 redbarnde@tds.net
	Consultants
	Issued for Review         Rev. Date           WPD Board Review         10/27/23           Permit Submittal         12/04/23
	Project Title: Centennial Park Shoreline Improvements Permit Application Winnetka, IL
	Prepared For: Winnetka Park District Winnetka, IL
	Graphic Scale : 0' 40' 80' (In Feet ) Scale :   Inch = 80 Ft. Drawing Title :
R LEGEND OF INS. ICTION ARE AS HERWISE NOTED.	Temporary Construction Haul Road Layout Plan
<u>ED)</u> HAUL ROAD	
	Sheet No. C102

1. SEE SHEET C100 FOR EXISTING CONDITION 2. LIMITS OF CONSTRU SHOWN UNLESS OTH

# LEGEND (PROPOSI



TEMPORARY H









"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."

















"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."









# Area A

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	9.439				

Sand Fill = 2,764 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	6.627				

Sand Fill = 1,487 C.Y.







SAND TOTALS: 2,764 C.Y. + 1,487 C.Y. = 4,251 C.Y. 4,251 C.Y. x 1.25 TON/C.Y. = 5,313 TON

5,313 TON x 20% OVERFILL = 6,376 TON PLACE 6,400 TON OF CLEAN SAND FROM UPLAND QUARRY