Beach Erosion Committee Report
Frequently Heard Questions and Replies
(08/14/07 – This document is continuously updated)

After reading the Beach Erosion Committee report, there sometimes are questions. Here are some that have been heard and the replies.

A. **So, what has caused all this commotion about the beach?**

The current shoreline protection system contains wooden jetties and concrete piers that point into the water. There also are concrete, wood, and steel sea walls that run parallel with the shoreline. All three of these structure types have two purposes: hold the sand on the beach and protect the buildings in times of high water.

The concrete piers are extremely deteriorated and have become dangerous. In fact, a hollow space was discovered under the concrete pier in front of the Inn. Because someone could be sucked under that collapsed pier, most of it was removed this spring (2007).

The wooden jetties are actually called "groins." These groins were installed over 20 years ago. They are falling apart, becoming dangerous, and need to be replaced.

Rather than simply replace what we have, the LCA Board appointed a committee to investigate the situation and recommend a course of action. After two years of intensive study (summarized in the Interim Report and the Final Report), the Beach Erosion Committee made its recommendations and the Board of Directors has approved the recommendations.

The committee was asked to make a recommendation that accomplished three objectives:

1. Protect the buildings
2. Enhance the beach
3. Not harm our neighbors

B. **How often does high water occur?**

Since 1919, there have been five periods where the water was 1½ feet or more above normal: 1929, 1951-55, 1972-76, 1984-87, and 1997. At its highest water level during 1972-76, the lake was 2.37 feet above average. It was 3.41 feet above average during the 1984-87 high water period.

C. **Since this high water happens so infrequently, why not just wait until it comes up again?**

There are four main reasons for not waiting:

1. The groins and piers need to be replaced fairly soon.
2. If we wait for lake levels to be rising, the cost-of-installing projection will go up. (The current period of low water is a very good time to negotiate the best possible price for installation.)
3. If we wait for lake levels to be rising, the State of Michigan Department of Quality Environment (DQE) will be swamped with applications, taking much longer for approval.
4. It is not possible to accurately predict "high water" by watching for "rising water." Sometimes the lake comes up fast and then falls back down. Sometimes it comes up fast but then stops rising without threatening the buildings. Sometimes the lake comes up slowly. Suppose the procedure were established to "start the installation process when the lake is one foot higher than the previous year for several months in a row?" Using this rule over the past 90 years, we would have been:
   - two correct predictions of high water

- five false alarms (the lake came up, but then went down)
- three missed periods of high water

D. **One system has been recommended, but what other systems were examined?**
The committee discovered several dozen methods that claim to deal with one or another of our issues. The committee also discovered that some systems protect the buildings, but destroy the beach. (The huge stone revetment system in front of the original cottage colony, just north of the tennis courts, is an example.)

These several dozen concepts can be collectively grouped into eleven types:

1. Sand Nourishment alone – Placing of additional sand in the lake or on the dune in front of the Camp property.
2. Artificial Seaweed – Placing artificial devises on the lakebed offshore.
3. Revetments – Stone barrier system like that in front of the original cottage colony.
4. Seawalls alone – Substantial vertical structure, parallel with the shore, with no other structures present.
5. Beach Prisms – Concrete blocks in triangular form with an open network front to absorb wave energy and slow sand movement for the purpose of accretion.
6. Submerged Artificial Reefs – Concrete, iron and mesh in triangular cross sections sunken off shore.
7. Submerged Sand Fence – Openwork steel frame construction with baffles on the sides placed up to 400' offshore.
8. Beach Cones and Tire Protector mats – Concrete donuts or tractor tires are laid across the lakeside edge of the beach. Each "donut" weighs 92 lbs. and can be removed or moved.
9. Wave blocks, Wave shields, and Wave Wedges – Variations on the same technology of wave absorption either as a floating or anchored system in modular units.
10. The Sand Grabber – Plastic molded units, roughly shaped like concrete blocks, are sunk in two feet below the water and stick one foot above the water parallel with the shore.
11. Submerged Stabilization System – Groins extent from the seawall, about 100 feet into the lake, that are partially above water and below water.

E. **I've heard that the Sand Grabber system works well and is a lot cheaper than the recommended system?**
Initially, the committee was very interested in the Sand Grabber system. Unfortunately, a number of problems surfaced:

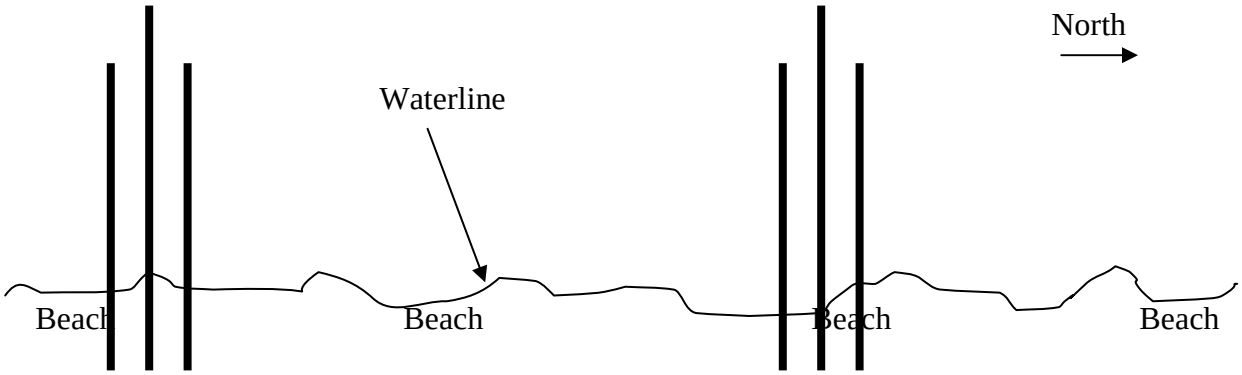
1. This system was designed for ocean installations where daily tides raise and lower the water level by a relatively small amount. But, the average water depth does not change. The system offers no protection more than one foot above the lake level when the system is installed. The entire installation would have to be repeated again during high water.
2. The system runs parallel with the shoreline, blocking the entire beach during installation and while sand settles behind it.
3. There would permanently be a line of the top of the very hard structure, parallel to the shoreline, and right at the surface of the sand.
4. Only one version of the original system was installed in the Great Lakes, and that was thirty years ago. The current version, now over ten years old, has not been installed anywhere.

F. **So, what is this Holmberg system that has been recommended?**
Actually, the system that was recommended is a "submerged stabilization system." Dick Holmberg is the inventor and has been using this approach for forty years. It is the concept that was recommended.

Also, the word “submerged” in the name is misleading. Long tubes, several feet in diameter and filled with concrete, extend from up on the beach out into the water for about 120 feet. At the time of installation, the portion of each tube that is on the beach is above water. The last 80 or so feet on the other end are submerged in the lake. After some storms and high water, the entire system becomes buried in sand. Sand is accumulated four to six feet deeper than the sand was at the time of installation. In addition, the beach becomes wider and more gently sloped.

The crude sketch below describes the system. Two sets of three groins are laid out. The southern set would be located on the beach in front of the Turn Around. The northern set can be off the Assembly. (Interestingly, the northern set can be located as far north of as beyond the tennis courts. The exact location has not been settled.)

On the shoreline end, the groins are about three to four feet high and lay on the sand. They extend into the water and become submerged about twenty feet into the waterline. The experience at all prior installations is that within a year (often sooner) all six groins are covered with sand above on the beach and below the waterline in the water.



Wigwam

G. **Is Holmberg the only supplier of this type of system?**
The committee has located another company that uses this approach. The search continues for additional installers. The committee wants to be sure that the system can be delivered at the best price available.

H. **Have any of these systems been installed on our side of Lake Michigan? How did they work?**
Highly important to the committee is that there have been over five dozen of these systems have previously installed in western Michigan. (More exist throughout the Great Lakes. With so many on our same shoreline, other locations were not examined.) The committee was able to locate an address for 45 of Holmberg’s installations and attempted to contact all of these property owners with a written survey and telephone interview. Surveys or interviews were completed with twenty shorefront property owners. Their comments and the location of their property are provided at www.Camp-Arcadia.com/_____.

All of these people were enthused about their installations. None described any problems with Holmberg or the system. All reported that their neighbors benefited from their installation and

none described any problems for any of their neighbors. (In fact, several explained that skeptical neighbors also installed a Holmberg system after seeing the results.)

A few of the comments are:

1. "Installed 20 years ago. Water has receded. Sand has nearly covered concrete on shore. Groins are no longer exposed. Installed in fall and by the next week sand was building up."

2. "Installed in 1986. Now have 20-30 yards of beach. We were the first of four. The neighbors benefited and then installed there own Holmberg systems."

3. "Installed in about 1985 (during a high water period). We were losing 1½ feet of beach every week. Loss stopped immediately and shortly there after we gained back 10 feet. Neighbors on both sides gained some sand and had no complaints."

4. "Within two years after installation, the beach was sufficiently restored to save our bluff from washing out. The neighbors to the south have continued to lose beach and bluff base. The neighbors to the north also installed systems and are fine."

5. "Added 100 feet of beach into the water for our 820-foot long beach. Vegetation is thriving. Properties on both sides have more beach."

6. "Installed in the mid-1980s. Went from no beach to 300 feet of beach, plus new sandbars off shore. Neighbors on both sides got more sand. When sold in 1994, it was 'premium property.'"

7. "Installed in 1986. Beach at the base of the bluff was gone and the bluff was eroding. Neighbor's cottages had fallen into the lake and ours was hanging over the edge. Now there is 100 feet of beach out into the lake and the bluff is stable. We rebuilt the bluff and it remains stable. Neighbors on both sides now have beach, but the law prevents them from rebuilding."

I. **What will happen to the swimming area in front of the Inn?**

If our experience matches all the other installations that the committee found, the following description is expected.

1. The sand will be a smooth, gentle slope from the Sunset Porch in front of the Inn out into the lake for 50 to 150 feet (the exact distance is hard to predict).
2. Initially, there will be no obstructions (wood groins or concrete piers) from the dune in front to the south end of the Inn all the way to the Assembly.
3. After a limited amount of time (perhaps three to 24 months), the installed groins will become completely buried so that there will be no obstructions from the public beach to the tennis courts.
4. In summary, after three to 24 months and if our experience matches all the other installations located, there will be a smooth gently sloping sand area all the way from the public beach to the tennis courts with no wood groins, concrete jetties, or any other dangerous objects. (You might want to close your eyes and imagine that picture.)

J. **What will happen to the Minnihaha?**

This question is still being investigated. The Michigan Department of Maritime Archeology has informed us that each site is taken on a case-by-case basis. The contact person indicated that he would stop in and look at the Minnihaha.

K. **I've heard that a lot of experts feel that Holmberg is not qualified and should not be listened to. What's up with that?**
Dick Holmberg is a zealot for his invention and has rubbed a lot of people the wrong way. However, there are also a large number of experts (including the independent scientists who helped the committee) who feel that his approach is sound and effective.

L. **I've heard that Holmberg systems have failed.**
The committee received a report from a Holmberg competitor that two Holmberg installations had to be removed. The competitor described removing one himself. However, what he described taking out had characteristics that are not included in Holmberg installations. After considerable effort, the committee was not able to locate anyone familiar with the second "failure" which the competitor had heard about. Neither could be confirmed as definite failures of Holmberg systems. Even if these two rumors proved were actually true, they are the only two that could be found. (A third failure was caused by a governmental agency running heavy equipment over an installation, crushing it, and causing its removal.)

M. **I've heard that the price is over $1 million. That is a lot of money.**
The current proposal is $1.2 million, which certainly is a lot of money. If the system is to be installed, an effort will be undertaken to secure a lower price from one of the companies that install submerged stabilizer systems.

An additional step was taken to analyze the cost. A cost/risk/benefit analysis was completed comparing the four most likely alternatives:

1. Submerged Groin System – Installing the recommended system, a one-time expense
2. Traditional groins – Replacing the current wood groins every 25 or so years.
3. Nourishment alone – Annually dumping in sand lost the prior year. In times of high water, very large quantities of sand would be needed
4. Do nothing – Eventually may need to replace buildings washed away by erosion. (This unacceptable approach is favored by some in the DEQ and must be included in any application.)

Over a period of fifty years, the submerged groin system proved to be significantly less expensive. As the decades continued into the future, the overall cost saving grows dramatically. You can examine this analysis at www.Camp-Arcadia.com/___.

N. **Is the quoted price firm?**
Attempts will be made to negotiate a lower price. Engaging in this negotiation at a time of low water does not adversely effect the installation, but might help to receive a good price.

O. **What does the quoted price include?**
The price in the current proposal includes removal of the existing wood groins and concrete piers. Installation of two sets of three fingers each with its own concrete seawall anchor. The beach will be re-graded and planted with vegetation to restore its natural appearance.

P. **How would we pay for such a high cost?**
A number of alternatives are being examined. These ideas include:
1. Fund raising
2. Using some of the current funds held by the LCA (either as a withdrawal or as loan collateral)

3. Campers pay a “surcharge” for a period of years
4. A combination of all two or three of these methods
5. (“Investing” in the Michigan Lottery was rejected)

The LCA is financially sufficiently strong financially to borrow the entire amount to cover the installation and then pay off the loan with the three approaches being considered.

Q. **I realize that the recommendation said that the Corps of Engineers Section 111 process is not now funded. But, why not wait until it is funded. Then the Corps would pay for the protection, not us?**

There is a major problem. If the Section 111 petition is successful, then the Corps pays for the installation. However, the Corps selects the type of system to be installed and we have no say in the final decision. The committee found three Section 111 installations. In all three, the Corps installed vertical steel sheeting parallel with the waterline. This concept, called armoring’ provides complete protection for the buildings. However, the beach goes away. The camp would be left with a sea wall with sand one side and several feet deep water on the other.

R. **What does the permit process involve?**

A submission of an application to the Michigan Department of Quality Environment (DQE) to receive a permit. The committee has studied the beach question so thoroughly and received reactions from so many experts that the normally difficult permit process is hoped to be a bit smoother. However, it can take as little as a few months to as long as over a year. The timing cannot be predicted.

S. **How about if we informally contact the DEQ to see what they think?**

That was tried. The DEQ has a firm rule to make no comments about a specific proposal until the application is submitted for the permit.

T. **Do we need to involve or inform the Village of Arcadia?**

Because the project is entirely on Camp property, we do not feel that the permission of the Village is needed. But, we will of course make them aware of what is proposed. We have met with the village officials to inform them of this project and will continue to keep them in the communication loop.

U. **The newspapers are talking about how low the lake is and that it will continue to drop. Why are we looking at this when there is no danger from high water?**

The water level in Lake Michigan is expected to drop in 2007 to 24 inches below average. That has happened three times since 1919. In 1926, the lake dropped to 25 inches below average. By 1929, only three years later, the lake was 22 inches <u>above</u> average. Lake Michigan has been even lower. In 1934 the level was 29 inches below average and in 1964 it was 32 inches below normal. The lake has always come back.

Yes, but why not wait with this expensive installation until the lake comes back up?

The lake is currently at low levels and we still do not have sand beach beyond where the wood groin system stops. If our installation of an underwater stabilizer system functions like all the prior installations have, sand will fill in and provide a long gently sloping beach well beyond where the current wooden groins end. (Plus, all of the wooden groins would be removed or reduced.)

Also, remember that the current system has exceeded its life span, has become dangerous, and needs to be refurbished or replaced.

V. **What specifically is meant by "if our system functions like the others?"**
Just south of Muskegon are two neighbors who have underwater stabilizers. When the lake was at the base of their bluff, they installed 125 feet groin systems. In July of 2007, there was about 150 feet of beach from the base of their bluff to the waterline. Properties as far as can be seen to the north and south of their stabilizer system have about 50 feet of beach from their bluff to the edge of the water. In addition, the installation beaches are noticeably deeper (vertical depth). In addition, the face of their bluff is completely covered with vegetation while the north and south neighbors have almost no vegetation. (These two neighbors systems filled in with sand by the year after installation without them adding any sand.)

W. **Well, that is like the Grace Road situation in Elberta, but neither are in the shadow of a pier like we are?**
Two sites have been discovered where the property owners were experiencing sand movement blockage.

North of Leland, the shoreline runs mostly north and south. Then, it takes a sharp turn to the right. The point of land at this sharp turn interferes with the flow of sand along the shoreline. Down drift from this natural formation are three neighbors with underwater stabilizers. In July of 2007, they had about 80 feet of beach from the base of the bluff to the waterline. (The underwater stabilizers installed were 40 feet in length.) When one of these three neighbors saw how well the underwater stabilizer system worked, he tore out his steel jetties and also installed a stabilizer field. The prevailing beach width of the other properties on both sides of the installations, as far as is visible, has about 40 feet of beach from the base of the bluff to the waterline.

Near Duck Lake, the state dropped a large amount of "riprap" (assortment of beach stabilizing junk) to stop erosion of the beach, roads, and a bridge at a state park. Immediately down current was a property owner whose beach started to erode. He was an early installer of a stabilizer system and saved his beach. He has a neighbor who installed four fields of stabilizers and saved 1,000 feet of shoreline (now seven property lots).

In both of these instances, the underwater stabilizers reversed sand erosion caused by a restriction in normal flow of sand. Both filled in quickly without the property owner adding sand (nourishment) and without damage to down current beaches.

X. **I've heard that dredged sand from the RKD channel may become more available to us in the annual channel dredging. Why not just use that?**
Capturing dredged sand will be a good thing for camp. However, the sand must be held by some kind of replacement of our rapidly deteriorating wooded groins (current jetties).

1. The property owner of the Leland system described how a neighbor lost 30 feet of bluff in one storm. His wife told of seeing large stones (like in the cottage colony revetment) "tossed around" by the wave action.
2. The property owner of the Muskegon system volunteered that one of his neighbors lost 50 feet of bluff in one night. In addition, the previous house on his property fell into the lake because the beach eroded and the bluff collapsed. The underwater stabilizer provided the substantial beach that protects the bluff on which the new house sits.
3. The Duck Lake property owner described a severe storm from the west that pushed the lake level on his east Lake Michigan shore (west coast of the State of Michigan) up by 30 feet and eroded 10 feet of bluff.
(Note: While "up by 30 feet" seems a bit suspect, the point to remember is that strong westerly

storms pile up water on our beachfront and can temporarily increase the lake level by a significant amount.)

4. There have been several instances in the camp's history when large amounts of beach were quickly swept away, requiring substantial emergency action to save cottages. During an interview before his death, Carl Muhlenbruch described the effect of a storm in the early 1950s. In response to high lake levels, a steel parallel seawall had been driven into the sand along the cottage colony shoreline. Most of the camp's leadership felt that "this is steel and not going to be moved." Chief invited Carl to view the new wall. After Carl toured the new seawall, he left for home. Upon arriving at home, Carl received a phone call from Chief. During the course of Carl's drive from Arcadia to Chicago, a strong storm had blown in, washed away a large portion of the steel seawall, and eroded beach up to about four feet from the Foust cottage. Two railroad gondola cars of material were needed to replace the soil and sand washed out from in front of the Foust cottage by this one storm, and save the cottage.

Y. **What is our Plan B is we do not get approval from the DQE for the underwater stabilizer system?**

This helpful question points out another reason for pursuing the permitting process at the present time, while the lake levels are low. We do not need a Plan B. There will probably be an ample amount of time to proceed through the lengthy and difficult permitting process.