

Beach Erosion Committee Report – November, 2006 Lutheran Camp Association

A. Overview

This report is a summary of the status of the Beach Erosion Committee's efforts to respond to the charges contained in its mission and purpose. This document is not a complete record of all that has been discussed or researched. Behind each entry is a large amount of detail that can be shared with interested LCA members who would like further elaboration.

B. Committee Charge

The Board of Directors of the Lutheran Camp Association appointed the Beach Erosion Committee to "Research and develop a long-range effective beach erosion solution that...

1. Protects Camp Arcadia's buildings and
2. Provides an accessible, safe shoreline, while
3. Minimizing negative impacts on our neighbors shoreline."

We have found two components of these three charges:

- The first two charges do not necessarily imply compatible solutions. Some solutions that achieve Charge #1 will prevent achievement of Charge #2. Some solutions to Charge #2 have only a marginal impact on Charge #1. In the process of pursuing both Charge #1 and Charge #2 at the same time, a large number of potential solutions were rejected.
- Charge #3 has been an important part of the Committee's deliberations.

C. Givens

- One absolute necessity has surfaced as a result of scientific review and extensive study: Many of the existing jetties and piers are dangerous and must be removed or repaired in the next few years.
- If Removal of these structures is necessary, it must be coordinated with installation of a new protection system that may incorporate one or more of the considered options. The beach cannot be left unprotected.

D. Principal Activities Completed

The committee has spent thousands of hours over the past eighteen months conducting an intensive investigation and review, including:

1. Gathering listings of possible solutions

2. Gathering information on the science of beach erosion and movement of sand
3. Securing an assessment of the characteristics of our current situation
4. Receiving comments from LCA members
5. Convening an Independent Peer Consultation
6. Spoke with countless experts in the field and hired Dr. Robert Dean of Florida as a consultant to aid us with our research.
7. Secured formal input from several additional eminent scientists in the field: Dr. Thomas Straw, Dr. Guy Meadows, Dr. Andy Colburn, Ivan Chou and also Dave Foster and Wayne Schloop with the Army Corps of Engineers.
8. Completing a mailed and telephone survey of all Holmberg system customers available on the western shore in the state of Michigan
9. Receiving a cost estimate from Dick Holmberg for installation of an underwater groin system
10. Receiving cost estimates for replacing the current wooden jetty above water groin system
11. Receiving a cost estimate of relocating our buildings further from the beach

E. Rejected Solutions

The following concepts have been considered and rejected for the reasons summarized:

1. Sand Nourishment alone (placing of additional sand in the lake or on the dune in front of the Camp property). On its own, does not fulfill Charge #1 or #3 as a long-term solution based on summary statements from the panel report.
This solution becomes a permanent annual expense that does not meet any of the charges as a long-term solution. The imported sand can be washed away by two or three big storms at the beginning of the season. This approach is commonly used in many oceanside resort areas using local and state taxes to protect the local economy. It can be completely eliminated by fall and winter storms exposing the buildings to risk in high water. (This option in conjunction with a groin system is still under consideration.)
2. Artificial Seaweed (placing artificial devices on the lakebed offshore)
Seven variations of this concept were not actively reviewed because it is our understanding that state and federal agencies would never permit them in our location.
3. Revetments (a stone barrier system like that in front of the original cottage colony)
This solution provides among the best permanent solutions for Charge #1, but prevents achievement of Charge #2 and Charge #3. This is because revetments do not build beach and are felt to damage neighboring beaches.
4. Seawalls alone (a substantial vertical structure, parallel with the shore, with no other structures present)
While seawalls would address Charge #1, the beach would likely disappear in low, medium, and high water conditions. Seawalls alone have been rejected as they have been proven to cause erosion and scouring of the beach both to property on which they are placed and to neighbors—thus failing to meet Charges #2 and #3.
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) This structure is very similar to the “Sand Grabber” only on a larger modular scale. Units are 6’ and 12’ long and 7’ deep. This system was rejected because no available scientific data exists to demonstrate its

usefulness for any of the three Charges. Moreover, the peer consultation panel was not able to state with any confidence the usefulness of this system.

6. Submerged Artificial Reefs (concrete, iron and mesh in triangular cross sections sunken off shore) These units claim to slow receding wave energy thus causing sand to deposit on the landward side of the unit. This concept was not actively reviewed because it was our understanding that state and federal agencies would never permit it in our location.
7. Submerged Sand Fence (openwork steel frame construction with baffles on the sides placed up to 400' offshore) This system has been used by RKD before and was removed due to failure.
8. Beach Cones and Tire Protector mats (concrete donuts or tractor tires laid across the lakeside edge of the beach. Each "donut" weighs 92 lbs. and can be removed or moved) Some residents on Starkey point attempted this in variation during the mid 80's high water mark. This system is roughly the same as Beach Prisms (#5 above) and rejected for the same reasons.
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) Experimental installations in Michigan in 1985. These concepts were not actively reviewed because it is our understanding that state and federal agencies would never permit them in our location.
10. The Sand Grabber (plastic molded units in a trapezoidal shape which are filled with concrete and contain tapered tubes from front to back of each unit. Units are 5' square at the base and taper to 2' square at the top and are 3' tall. Units are installed in convex and concave positions so that they "stack" together horizontally to form a breakwater wall) Originally made out of concrete blocks this new version has yet to be installed or monitored. This system is roughly the same as Beach Prisms (#5 above) and rejected for the same reasons.

Rejected Options #5 – #10 are all placed in the water in parallel to the beach and are classified as breakwaters. Unfortunately, little scientific data were found on the effectiveness of these technologies, especially in the Lake Michigan system. In our search for solutions and alternative technologies Duke University was contacted via phone and Andy Coburn, Associate Director for the study of alternative beach erosion control and shoreline protection admitted that there is little or no scientific data on these methods.

F. Solutions Still Being Considered

1. Nourishment along with a groin system to hold the sand
This approach involves hauling in large quantities of sand periodically. Nourishment is ideal for all three Charges, but will only be considered with the installation of a groin system to hold the sand, since any one big storm can wash away the sand deposited.

Nourishment may involve securing sand dredged from the Lake Arcadia harbor. This approach involves convincing the Corps to take bottom sand from the Lake Arcadia harbor entrance and depositing it in front of the Public Beach. The assertion is that the sand would then wash onto LCA property. This option is felt to be very low cost. Yet to be studied is whether or not this sand would stay on LCA property or simply keep moving toward

Frankfort. It also does not address the need to replace deteriorating jetties to hold the sand that might drift from the Public Beach to LCA property. (Communication is underway with the Corps regarding this concept.)

2. Retreat from the shore

This process involves moving buildings farther east from the shoreline. The Assembly is the most exposed and easiest to move. Moving the Assembly inland would require other changes to the camp's usage of its footprint space and does not eliminate the need for shoreline protection intervention. While moving the Inn farther inshore is a possibility, a host of other costs and complications are present. This option addresses Charge #1, but does not meet Charges #2 or #3.

3. Above water groins

The basic concept is to replace the current wooden structures with wood, fake wood, or steel structures. The concrete piers would be removed. The cost would be between \$200,000 and \$400,000, depending upon the material used. The installation would have to be repeated every 15 to 30 years, depending upon the material used. State permits would be needed. The Peer Consultation panel indicated that this approach would negatively affect adjacent properties more than a below water groin system, though not likely in amounts that would be larger than what currently exists. This system would meet Charges #1 and perhaps #2, but would likely not meet Charge #3.

4. Below water groins

The basic concept does not mean that the entire groin is inserted below water during a period of low water. The term refers to the factor that portions of the installation extend farther into the lake than do current jetties and would be below water. If a "below water" groin system were installed during the current period of low water, the installation would start well up on the beach (above future water levels) and extend into the water (below the current water level). The above water portion becomes buried and builds dune height and lake-ward progression over time as indicated by previous installations.

(Important note: Some confusion exists on the notion of protection offered by below water groin systems during times of high water. One opinion from the Peer Review is that the protection would be minimal. However, the Holmberg client survey where systems were installed in the 1980s found that the protection continued as water continued to rise in 1985-87 and the 1997 high water period.)

The cost is high. Alternatives to the Holmberg pricing, over \$1 million, will be sought. Because the system becomes completely submerged under new sand, it is expected to be a permanent solution, that some feel might require ongoing nourishing. However, no current Holmberg system owner has ever needed to add sand.

The Peer Consultation panel indicated that below water groin systems cause less damage to neighbors than above water groins. This is because after the groins are covered with sand, the resulting effects upon neighbors is small to nonexistent and could not be separated from more substantial erosive influences that are naturally occurring on our beaches due to the harbor. This system meets Charges #1 and #2, and partially meets charge #3.

5. Initiate Army Corps of Engineers Section 111

This approach involves a procedure in which the Corps of Engineers is forced to conduct a

formal study to establish whether or not their structure at the Lake Arcadia Harbor has harmed the LCA property. We have been told that if the relationship can be proven, then the Corps becomes “obligated” to install a remedy. Most agree that the relationship between the Lake Arcadia piers and our erosion is clear.

Next steps in the process are still being investigated and much is not known. However, five aspects of the process have surfaced so far:

- a. The process will involve 4 – 10 years of deliberation, without assurance that LCA will prevail and the Corps will take action.
 - b. We will need to secure assistance from attorneys experienced in this field.
 - c. Most likely the Village of Arcadia and all the property owners between the pier and us would become involved.
 - d. The only known successful applications of Section 111 have involved larger communities in which many millions of dollars of annual proven economic loss were demonstrated. Frankfort, Ludington and Manistee are all Section 111 harbors. No resort communities are known to have succeeded using this process.
 - e. The Corps makes the final decision about the solution to be imposed. Some feel this is not a risk because the Corps is responsive to “locally developed solutions.” Others do not feel we should expose ourselves to even a five percent chance that the Corps would force a solution that excludes Charge #2. Initial research indicates a 65% - 35% cost split between the Corps and Local interests respectively.
6. Do nothing
- This concept stems from the feeling by some people that “nature should be allowed to take its course.” It would seem clear that removing the dangerous piers and jetties and then “doing nothing” is not acceptable. However, it also seems clear that any permit application will need to include a section explaining that the “do nothing” approach was considered. The idea will be addressed, but is unlikely to be recommended.

(It is yet to be determined if the “do nothing” concept includes repairing the existing jetties and whether the regulatory agencies would require permitting to complete major repairs.)

G. Actions Recommended to the LCA Board

1. Continue assessment options:

Hire an experienced structural engineer to conduct a structural analyses study of our existing shore protection structures. The engineer would provide a report to the LCA board regarding the credibility, weaknesses and the level of protection our structures are likely to provide against a fifty-year storm event and/or rising lake levels.

Consult with an environmental lawyer, who has experience in Section 111 harbor studies, to guide the LCA Board through the potential benefits and pitfalls of pursuing the Army Corps of Engineers to perform a Section 111 study.

2. Sink or remove the concrete pier in front of the Inn:

The Independent Peer Review consultation stated that the concrete pier represented a substantial risk to the loss of life to someone being sucked under the Inn pier and drowned. This written statement identifies a major safety risk and substantially raises the LCA’s financial exposure if that event were to occur. The committee recommended that the wooden

supports around the pier be removed so that the pier would sink into the water. Removal of the entire pier will be necessary in the future.

3. Removal of the most dangerous aspects of the deteriorating wooden jetties:

The committee recommended that rusty nails and bolts, along with sharpened splinters and other hazards be removed or covered in the existing jetties. This action is temporary and will need to be repeated until a permanent solution is enacted. Yet to be discovered is whether or not the State of Michigan will require a permit for this action.

H. Next Steps

The following schedule is being used:

Winter	Committee continues to research the seven Solutions Still Being Considered
3/07	The committee will make a recommendation to the LCA Board
5/07	The LCA Board will decide if the recommendation is ready for submission to the LCA members.
Summer	LCA members can review and ask questions
Fall	LCA membership will make a decision so that the permit process can start
2008	The earliest that replacement could begin.

I. Assistance Needed

The committee is working hard on this very complex issue to help the LCA membership make a good decision. However, some information has been circulated regarding this project that is either inaccurate or factually incorrect. The scientific peer review has helped clarify the majority of these issues but it is important that we all work together if we are to properly evaluate the options under consideration. The committee greatly appreciates the constructive raising of questions to aid in this process. If you have any questions regarding this project please contact a member of the Beach Erosion Committee directly. A strong effort will be made to address all concerns.

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