

Site Observation Summary

Date: August 20, 2020
To: Village of Michiana – Attn: Michael Mintz
From: Edgewater Resources, LLC
Subject: Summary of Observations from 8/5/2020 Site Visit

Distribution: Village of Michiana Council

This memorandum summarizes the observations made during the site visit by Edgewater Resources (ER) on 8/5/2020 along with basic shoreline repair recommendations. ER met with Village Representatives and visited Stops 43, 39, and 38 to view the existing conditions and engaged in a discussion of each location.



Figure 1: Photo of Stop 38, 8/5/20

According to USACE water level data, Lake Michigan average static water levels were 582.18' on the day of the site visit. This is approximately 56" above the Lake Michigan Low Water Datum (LWD) of 577.5, and 35" above the long-term average for the month of August. The current water elevation is 2" above the record monthly



water level for August. Based on NOAA and USACE predictions, high water levels will be sustained over the next few years.

Stop 43 – Existing Conditions

The shoreline at Stop 43 is approximately 40 LF consisting of a 20' - 25' section of steel sheet pile seawall, a pavilion structure with a partial set of timber stairs, and dispersed concrete riprap. The 40' wide road end of East Ct. has a small parking area near Ponchartrain Dr. with a sand/vegetated walking path to the timber pavilion structure.

Although survey information was not available for ER review, the Village mentioned that the existing stake on the south side was the corner of the Ginther property, which is the adjacent vacant lot. The remaining lakeward portion of the Stop 43 consists of the Lakeshore Drive 50' Right-of-Way (ROW), which is also owned by the Village. It is our understanding that the Gintners are in the final stages of permitting a stone revetment structure and are looking to install large sandbags as a temporary measure. The Village has been in discussions with the Gintners regarding coordinating on a possible strategy that includes a continuous shore protection system.



Figure 2: Drone Photo Stop 43, 8/5/20

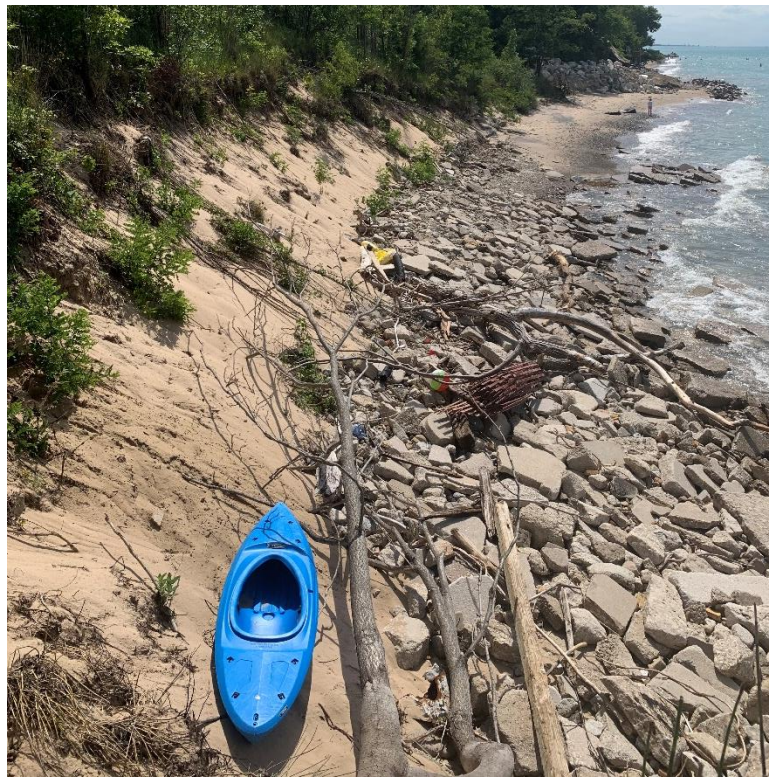


Figure 3: Photo of Concrete Riprap Facing Southwest, 8/5/20

The existing steel seawall runs approximately 15' - 20' along Lake Michigan and has a 10' section that cuts back on a 45-degree angle towards the dune. The seawall is currently being flanked on the south side due to wave diffraction around the structure and the lack of shore protection on the Ginther Property on the south side. The adjacent north property has a steel seawall and an open riprap/vegetation shore area that is 25' until the Stop 43 seawall begins. The shoreline along this break area is experiencing sloughing due to waves overtopping the broken concrete riprap. A substantial amount of concrete riprap exists throughout this entire shoreline area and apparently was installed in the 1950 - 60's in an attempt to save Old Lakeshore Drive, which eventually failed. The footings holding the timber pavilion structure were exposed on the south side and the timber stairs are not in working order. The beach stop is closed due to the lack of safe access to the beach from the erosion.

ER has been involved in the Gerber Project (4 properties south of Stop 43) since June 2019 and a review of the photos of Stop 43 was reviewed as part of the current scope to illustrate the dramatic change. As shown in Figure 4 below, the front seawall was barely exposed, and the return wall was starting to appear. A substantial amount of sand was present at this time. It is apparent due the increased lake levels, the Fall/Winter/Spring storms and lack of ice protection during the Winter resulted in a substantial amount of erosion.



Figure 4: Photo of Stop 43 Seawall Facing North, 10/29/19

Stop 43 - Shoreline Protection Recommendations

1. Shoreline Protection System - Emergency Measures (Short-term)

To address the failure erosion/flanking along the seawall following steps are recommended:

- A. Regrade repair/install stone toe protection at the base of the front seawall to prevent scour
- B. Install a sandbag system along the 45 degree and connect the system to the Ginther sandbag project. The sandbag system should be installed to achieve a crest elevation of 590' minimum (Low Water Datum +12.5')
- C. Move timber pavilion landward to prevent additional deterioration or possible loss of the structure

2. Shoreline Protection System – Long-term Recommendations

- A. The entire shoreline would benefit from the installation of an armor stone revetment. The existing concrete riprap would be utilized as the base for the revetment. The armor stones should be installed in such a manner to ensure positive interlock of the armor stones. The newly placed armor stone would be on top of geotextile fabric and mattress stone (8"-12" diameter). To prevent funneling of wave energy between Stop 43 and the Gintners, the revetment should either continue across the Gintners or terminate back into the dune to prevent future flanking.
 - B. The north side of the property will require a larger armor stone revetment along the water's edge where the seawall is not present.
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- C. The most robust solution includes the extension of the front seawall to connect to the north property and the extension of the 45-degree segment on the south side back into the dune. The installation of the seawall will still require an armor stone revetment to prevent scour, however, the size of the revetment would be smaller than described in recommendations A and B.

Stop 39 – Existing Conditions

Stop 39 is located where Pokagon Trail meets Lakeshore Drive. The Village of Michiana owns five parcels within this Stop. The shoreline along Stop 39 is approximately 240 LF consisting of a sparsely vegetated bluff that is approximately 15' – 20' high with a timber pavilion structure and three timber retaining walls surrounding the pavilion. A 30' - 40' wide sandy beach area exists in front of the bluff and a very small amount of concrete riprap is present near the pavilion structure. The beach stop is closed due to the lack of safe access to the beach from the ongoing erosion issues. The north and south shorelines surrounding the Village's parcels consists of large armor stone structures that are 30' - 40' lakeward of the dune cut along Stop 39.

The bluff is experiencing erosion at the toe of the slope due to the lack of shoreline protection. The existing gentle beach slope allows the wave energy to run up the beach and erode the toe. Additionally, it is suspected that stormwater runoff from the adjacent roadways could be contributing to the erosion on the face of the bluff, especially near the pavilion.



Figure 5: Drone Photo Stop 39, 8/5/20



Figure 6: Photo of Stop 39 Beach Facing Southwest, 8/5/20

Stop 39 - Shoreline Protection Recommendations

1. Shoreline Protection System - Emergency Measures (Short-term)

To address the failure erosion/flanking along bluff, the following steps are recommended:

- A. Install a sandbag system along toe of slope. The sandbags would need to be placed to ensure they are at an appropriate elevation and have scour protection in the front. The sandbag system should be installed to achieve a crest elevation of 590' minimum (Low Water Datum +12.5'). The proposed system would need to connect to the adjacent revetment projects to prevent any funneling of wave energy.
- B. Install roadside stormwater mitigation that could include a drainage system to reduce the sheet flow coming down the road and off the pavilion hardscape

2. Shoreline Protection System – Long-term Recommendations

- A. The entire shoreline would benefit from the installation of an armor stone revetment. The armor stones should be installed in a manner which would ensure positive interlock within the stones. The newly placed armor stone would be on top of geotextile fabric and mattress stone (8"-12" diameter)
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- B. An access stair system could be constructed with steel piles across the revetment to assist with public beach access
- C. The pavilion structure area could be better protected by a steel sheet pile wall with a revetment in front.

Stop 38 – Existing Conditions

Stop 38 is located where Powhattan Trail meets Lakeshore Drive. Stop 38 is located within a 600 LF stretch of open/undeveloped shoreline and the north/south adjacent properties have shoreline protection consisting of steel seawall and stone revetment. The shoreline at Stop 38 is approximately 80 LF consisting of a sparsely vegetated bluff that is approximately 10' – 15' high with a timber pavilion and partial stairs at the top of the bluff. Broken concrete riprap was present along the Stop and connects to the north adjacent seawall/revetment system. A 30' wide sandy beach area exists in front of the bluff. According to the Village, the large concrete structures within the water were installed by the U.S. Army Corps of Engineers in the 1970s. The structures were meant to break the waves before they reach the shore. The structures have been buried for a long time and are now uncovered, which pose as a safety hazard to the public. The beach stop is closed due to the lack of safe access to the beach and the offshore wave break structures.

The bluff is experiencing erosion at the toe of the slope due to the lack of shoreline protection. The existing gentle beach slope allows the wave energy to run up the beach and erode the toe. The concrete riprap is providing some protection as shown in Figure 7, however, the waves are overtopping the riprap and removing material from the upland bluff. This results in the sloughing of the bluff and bring the active erosion closer to Lakeshore Drive. The south side of the 600 LF beach area is experiencing significant erosion and Lakeshore Drive is only 10' from the top of the bluff, which puts the existing utility infrastructure along the road in jeopardy.

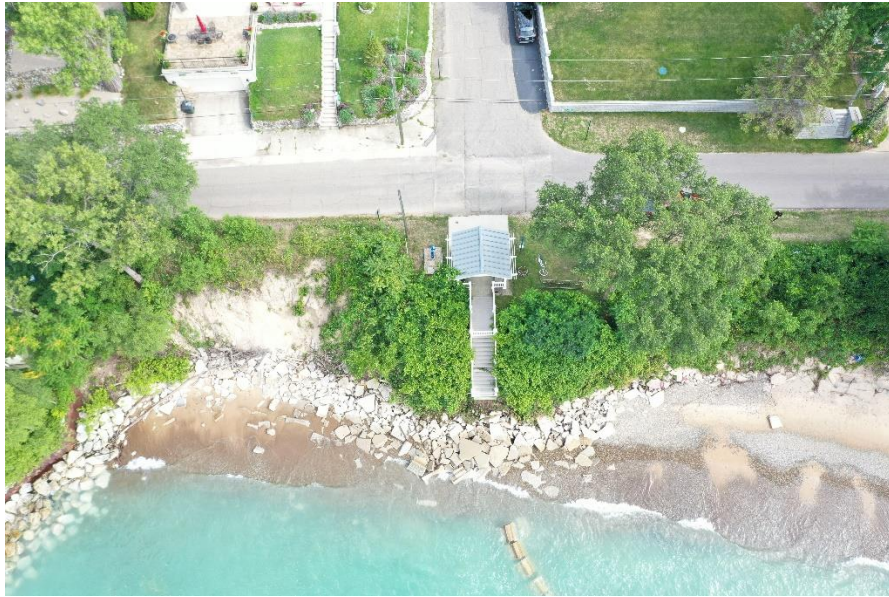


Figure 7: Drone Photo Stop 38, 8/5/20

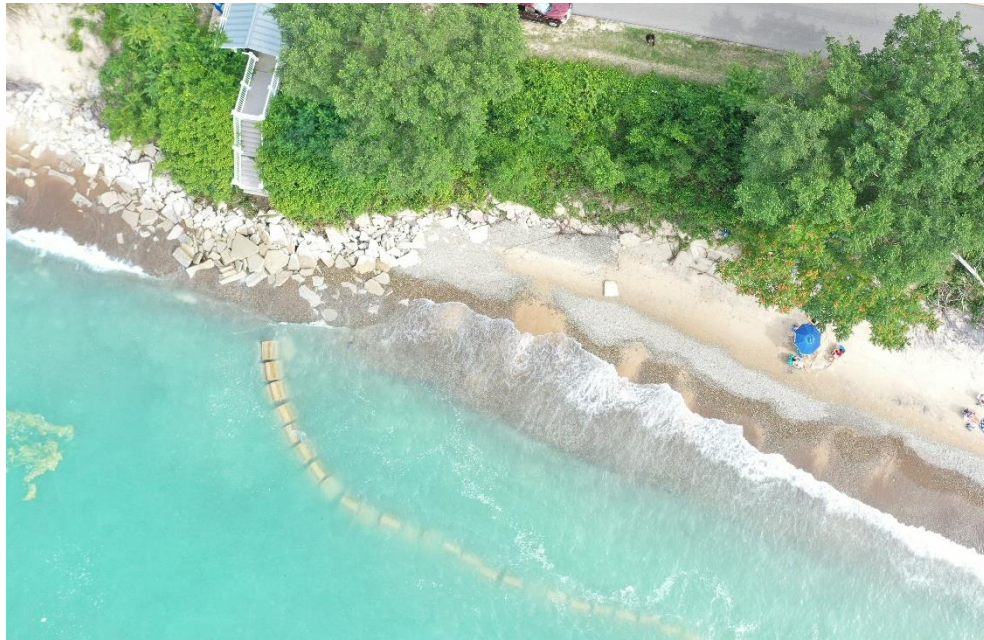


Figure 8: Photo of Wave Breaks at Stop 38, 8/5/20

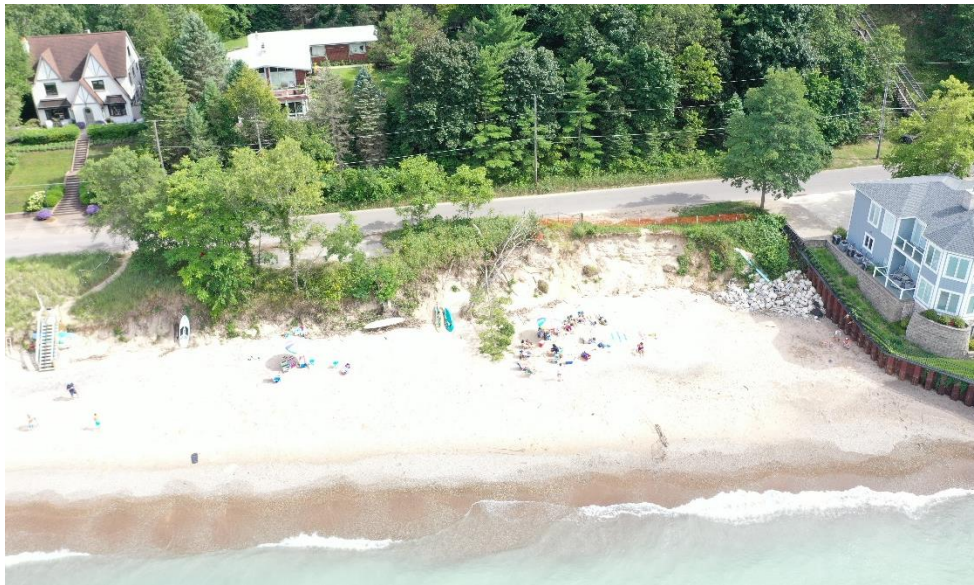


Figure 9: Photo of Erosion on Southern Beach Area, 8/5/20

Stop 38 - Shoreline Protection Recommendations

1. Shoreline Protection System - Emergency Measures (Short-term)

To address the failure erosion/flanking along bluff following steps are recommended:

- A. Regrade the concrete riprap to provide an appropriate bed for the shore protection system
- B. Install a sandbag system along toe of slope. The sandbags would need to be placed to ensure they are at an appropriate elevation and have scour protection in the front. The sandbag system should be installed to achieve a crest elevation of 590' minimum (Low Water Datum +12.5'). The system would need to connect the system to the adjacent revetment projects to prevent any funneling of wave energy
- C. Construct an access stairway across the revetment with steel pile system

2. Shoreline Protection System – Long-term Recommendations

- A. Install an armor stone revetment system across the toe of the slope to prevent erosion. The armor stones should be installed to ensure positive interlock within the stones. The newly placed armor stone would be on top of geotextile fabric and mattress stone (8"-12" diameter).
 - B. An access stair system could be constructed with steel piles across the revetment to assist with public beach access
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Site Access

The most cost-effective way to install shoreline protection for all the Stops is likely be from land. It appears site access from land can be achieved using the access roads within the limits of each Stop.

Cost Considerations

Through recent discussions with local contractors, pricing for a typical sandbag system ranges from \$350-500/LF. The pricing would be dependent upon the size of the project, contractor availability and equipment access.

Based on several projects up and down the Lake Michigan coast, we would anticipate costs for permanent recommendations described above as follows:

1. Armor stone revetment: 2,000-2,500/LF
2. Steel sheet pile system with a smaller revetment: \$3,000-3,500/LF

Permitting Considerations

We recommend that any proposed shoreline work be coordinated with the regulatory agencies, U.S. Army Corps of Engineers (USACE) and Michigan Department of Energy, Great Lakes, & Environment (EGLE, formerly MDEQ). Any fill placed below the Ordinary High-Water Mark (OHWM), elevation 581.5' (USACE) and 580.5' (EGLE) IGLD '85 will be subject to regulatory review. It is likely that all of the Stops are located within a designated Critical Dune and would require additional authorizations through EGLE.

All of the proposed work, including site access, would be subject to review and approval by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the United States Army Corps of Engineers (USACE) through ELGE/USACE Joint Permit Application (JPA) process. Proposed materials and quantities would need to be summarized in the application, including any temporary fill required to construct a temporary access road. We encourage you to discuss any proposed work with the agencies prior to implementation to ensure compliance.

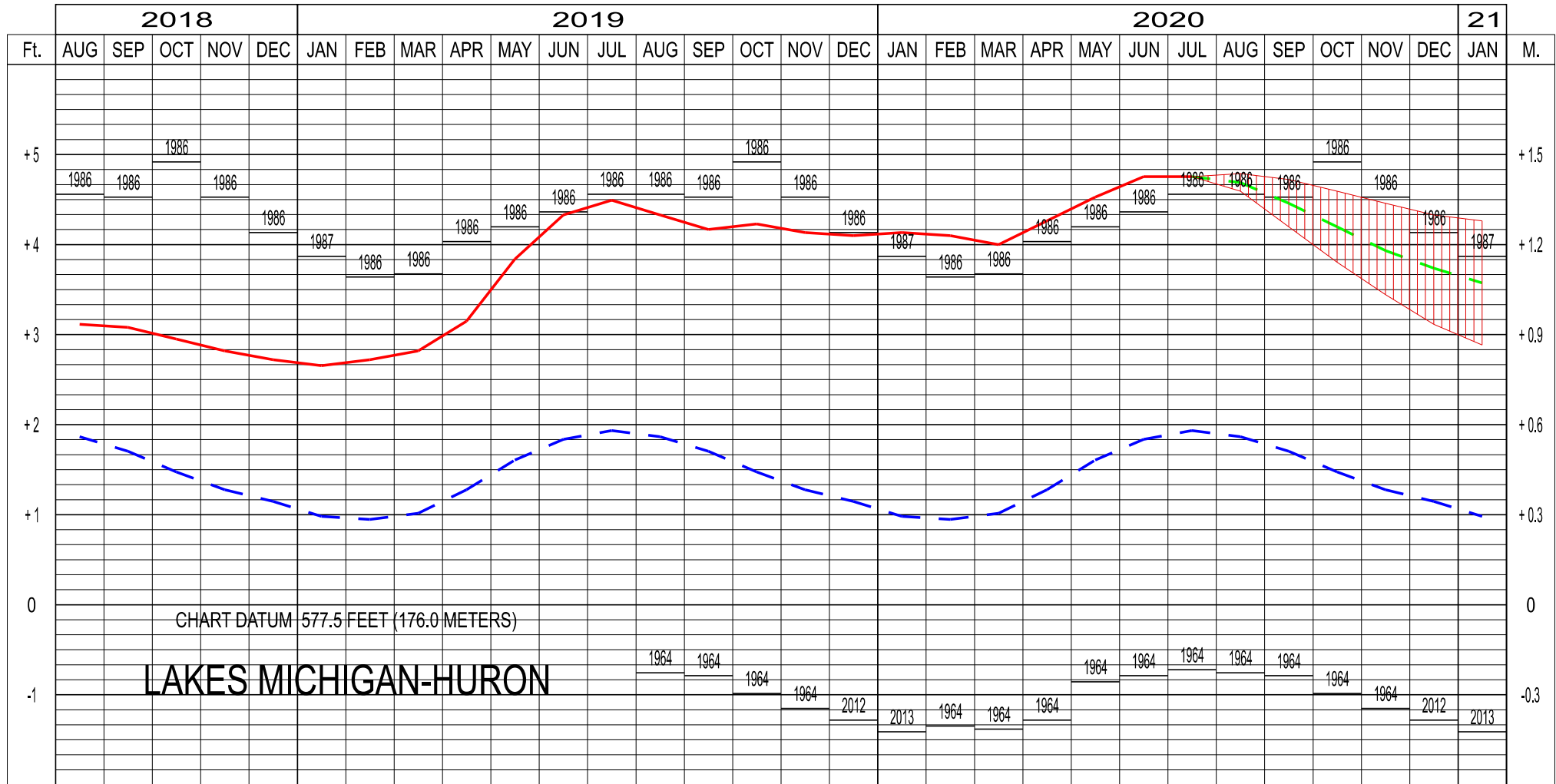
Next Steps

In order to facilitate the construction of either/both a short-term and/or long-term solution, we would recommend moving to a preliminary engineering phase. The first step in the preliminary engineering phase would include collecting topographic survey information, identifying the property limits, and reviewing coastal conditions at each Stop location. We would then put together 30% level engineering drawings for discussion with the Village and ultimately submit for permits to the USACE and EGLE. We can then provide contractor procurement, final design, and contractor observation services.

**Limitations of Memorandum**

All information included within this memorandum is based upon visual observations made during the site visit. No confirmation of record retaining wall as-built information, exploratory excavation, or survey of any form was performed, provided, or reviewed. All possible shoreline repairs indicated above are solely based upon the visual observations made, survey and engineering efforts would be required in order to design, locate, and quantify all of the proposed improvements.

LAKES MICHIGAN-HURON WATER LEVELS - AUGUST 2020

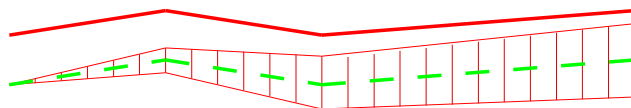


LEGEND

LAKE LEVELS

RECORDED

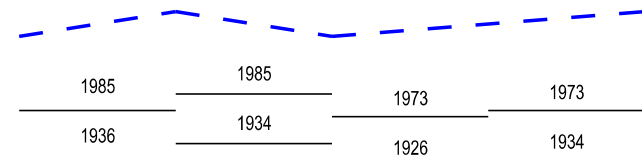
PROJECTED



AVERAGE **

MAXIMUM **

MINIMUM **



** Average, Maximum and Minimum for period 1918-2019