



MEMO

TO: Jeff Mikula, DPW Director
City of Manistee

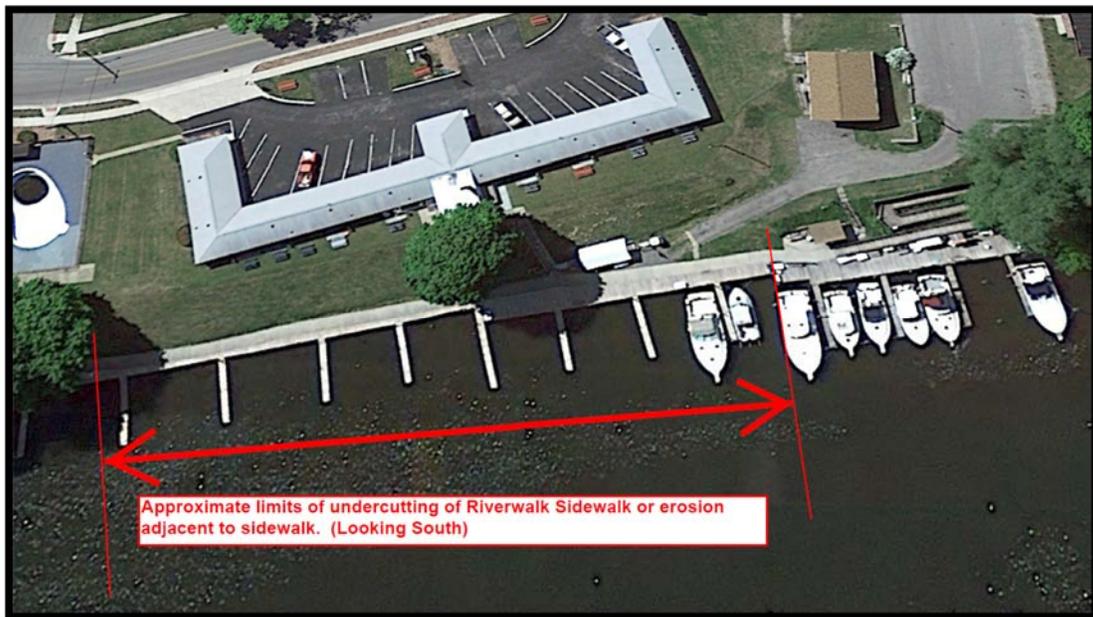
FROM: Shawn Middleton, PE
Spicer Group Inc.

DATE: September 22, 2015

RE: Riverwalk – Undercutting of Sidewalk at Riverside Motel

BACKGROUND/PURPOSE

We were requested to inspect a segment of the City’s Riverwalk path. The specific segment we were requested to inspect was a section of six foot wide concrete sidewalk located directly north of the Riverside Motel. The City was notified that the concrete sidewalk in this section was significantly undercut (soil supporting the sidewalk had partially washed away). This undercutting was occurring on the sidewalk side of the wooden seawall located immediately north of the sidewalk.



The section of concrete sidewalk with the undercutting concern is approximately 300 feet long and six feet wide. A treated lumber deck supported by wood piles, posts, and the wood seawall, has been constructed in between the concrete sidewalk and the wooden seawall. This wood decking generally consists of two separate sections. The westerly section is approximately 130 ft. long and varies in width between 6 and 13 feet. The easterly section is approximately 170 ft. long and varies in width between 2 and 4 feet. Please refer to attached photographs.

The purpose of our inspection was to determine the cause of the undercutting and to identify potential solutions for addressing the undercutting, including preliminary estimates of cost.

SUMMARY OF SITE INSPECTION

A visual field inspection of the site was performed on August 14th, 2015. The City assisted with the removal of some of the wood deck planking located along this section of the Riverwalk to allow direct visual inspection of the soil supporting the concrete sidewalk. Photographs were taken along this reach of the Riverwalk, including photos of the wood seawall, the soils beneath the concrete sidewalk and the surface of the concrete sidewalk and the treated wood decking. Please refer to attached photographs.

In general, the wood seawall located along the northerly edge of the wood deck was in poor condition. The easterly 170 feet of the seawall was in the poorest condition with missing and broken planks, the westerly 130 feet of the seawall was in slightly better condition, but had significant areas where bowing of the wall has occurred and several openings allowing for erosion by wave action. Both sections of the seawall allow water to freely enter behind them causing erosion of the sidewalk's supporting soil.

A visual inspection of the soil underneath and adjacent to the sidewalk was made at two separate locations. The first location was approximately 100 feet west of the easterly end of the concrete sidewalk and the second was at the point where the boardwalk transitions from approximately 2 feet wide to approximately 11 feet wide.

The visual inspection of the supporting soil and underside of the concrete sidewalk revealed the sidewalk was generally undercut from 0 to 3 feet beneath the concrete sidewalk. The soil supporting the sidewalk generally had a vertical face of 2 to 3 feet caused by continuous wave action. This condition existed as far as could be seen to the east or west of our inspection locations.

Supporting piles or beams for the concrete sidewalk were not observed at the point of the inspections. The wood support columns for the wood decking were present and were significantly exposed by erosion, deteriorated, or potentially undersized. Please refer to the attached photographs.

It is our understanding this undercutting condition is fairly consistent along the entire length of the concrete sidewalk section, based on observations by others, including sections we were unable to inspect at the time.

CONCLUSIONS

The undercutting of the soil is primarily being driven by wave action behind the failing wooden seawall. As a wave enters behind the seawall the supporting soils are eroded by the wave action and then as the wave recedes the eroded soil is washed away. Runoff from the adjacent slope onto or below the concrete sidewalk may also be contributing to undercutting of the soil, though no specific areas of concentrated erosion were observed.

Lake Michigan is currently at a water elevation of approximately 579.7 feet (IGLD). This elevation is up approximately 2 feet higher than recent all time low levels, but is only 7 inches higher than long term averages and 7 inches higher than water elevations at this same time last year. The current water elevations are still approximately 3 feet below all-time high water elevations on Lake Michigan. The condition of the seawall and current water elevations are helping to accelerate the erosion caused by wave action.

The lack of supporting soils at the concrete sidewalk edge will ultimately result in the concrete sidewalk failing. The failure will likely be an initial settling of the concrete slab (which has already occurred on a minor level) and then ultimately the sidewalk falling into the void space (2' to 3' deep) that has formed adjacent to and below the north edge of the sidewalk. A more catastrophic type failure resulting from the sidewalk cracking and instantly giving away is also possible, but less likely to occur.

Due to the potential of the sidewalk failing it will be important to monitor this section of sidewalk on a regular basis. It may be warranted to close the north ½ or all of the concrete sidewalk if the sidewalk shows signs of failure.

Responsibility for repair and improvements for this section of the Riverwalk were not reviewed as part of this inspection of the sidewalk integrity. However, if improvements are made it will be important to determine the limits of ownership and maintenance requirements as it relates to the 6 foot wide concrete sidewalk (1,800 sft +/-) and the adjacent wood decking (1,800 sft +/-) and seawall (300 feet +/-). No further research into ownership of these components was completed nor were any discussions with the Riverside Motel conducted as part of our initial field inspections.

Conducting discussions with the Motel to determine the limits of maintenance and improvement responsibilities will be the first step if improvements are proposed for this section of Riverwalk.

RECOMMENDATIONS

To determine potential solutions and to provide rough estimates of cost we met with Paul Swidorski of Swidorski Bros. LLC on site to discuss options. Based upon our site inspection, our review of options, and input from the contractor we have identified the following options for addressing the erosion issue at this location:

Option 1 – Do nothing/ monitor

Monitor the sidewalk on a regular (daily) basis and close the sidewalk when any settlement begins to occur or any failure of the sidewalk is observed.

Estimated permitting, engineering and construction costs: No initial capital costs. Cost of ongoing monitoring and costs to find a solution on a reactive basis when the sidewalk fails.

Option 2 – Remove seawall, remove wood decking and timber supports, backfill existing sidewalk and protect bank with riprap.

This option would include removing all of the timber decking, wood seawall, and the wooden support structure beneath it, compacting sand beneath the existing sidewalk, repairing and replacing sidewalk that fails as a result of the construction, and placing riprap bank protection.

This would result in the Riverwalk at this location being reduced to a 6' wide concrete walk and would require the existing docks be extended to the new sidewalk. The current widened portion of the Riverwalk is used on a frequent basis for charter fishing and use by patrons of the Riverside Motel and will likely result in congestion through this section of the Riverwalk, especially during peak fishing times.

Additionally, the motel has invested in maintaining and improving the boardwalk section of the walk at this location over the past few years.

Estimated permitting, engineering, construction oversight and construction costs: This option is estimated to cost between \$30,000 and \$60,000. These costs are very preliminary and conservative since plans have not been developed and details regarding a design have not been completed. This option and cost estimate assumes replacement of the 1,800 square feet of existing concrete sidewalk.

Option 3 – Temporary fix of seawall, backfill void space and install riprap on bank.

This option would include removal all of all of the timber decking, performing temporary repairs to the seawall and wood deck support system using wooden timbers. The seawall repairs would be done in a wet condition. After repairing the seawall and support system, the steps would include: compact sand beneath the existing sidewalk, repair and replace sidewalk that fails as a result of the construction, place riprap bank protection, and finally replace the wood planks on the wood deck portion of the walk.

Estimated permitting, engineering, construction oversight and construction costs: This temporary option is estimated to cost between \$40,000 and \$80,000. These costs are very preliminary and conservative since plans have not been developed and details regarding a design have not been completed. This option and cost estimate assumes replacement of all 3,600 square feet of existing concrete and wood deck surfaces.

Option 4 – Steel sheet pile seawall, backfill and install concrete and/or wood deck walk.

Replace the failing wood seawall with a steel sheet pile seawall. The estimated lengths of the steel sheet piles would be 12 to 15 feet long. The sheet pile seawall would require a C channel cap, C channel wailer, and tie backs below portions of the existing sidewalk and therefore would require removal of portions, if not all of the existing concrete sidewalk. Some riprap wave protection would be installed along the face of the steel sheet pile to mitigate erosion at the face of the wall.

All of the existing wood decking and portions of the wood support structure would be removed to allow access for the seawall construction and to allow for backfilling behind the seawall. A full concrete surface would require additional backfilling and compacting, while a wood deck surface would require connection to the new seawall, a foundation to be placed along the south edge of the existing concrete sidewalk and timber support system be constructed between them to support the wood deck.

This seawall cross section would be very similar to the currently installed steel sheet pile seawall located directly west of the area of concern.

Estimated permitting, engineering, construction oversight and construction costs: \$120,000 and \$150,000. These costs are very preliminary and conservative since plans have not been developed and details regarding a design have not been completed. This option and cost estimate assumes replacement of all 3,600 square feet of existing concrete and wood deck surfaces.

Option 5 – Remove existing walkway and seawall, place riprap bank protection, and construct wooden walkway on steel piers.

This option would remove the existing concrete sidewalk, wood decking and existing seawall. Riprap bank protection would be placed to prevent further erosion of the bank and a wood deck structure on cylindrical piles would be constructed over the riprap through this section. The existing docks would be tied back into the newly constructed walkway.

This seawall cross section would be very similar to other portions of the Riverwalk with the exception of being constructed on steel piles.

Estimated permitting, engineering and construction costs: \$180,000 and \$240,000. These costs are very preliminary and conservative since plans have not been developed and are not based upon competitive bidding. This option and cost estimate assumes replacement of all 3,600 square feet of existing concrete and wood deck surfaces.

It is our recommendation the City consider Option 4 or 5 as the long term repair/ improvement option for this section of the Riverwalk. Option 1 of doing nothing is not recommended since the sidewalk will eventually fail. Option 2 would only be viable if it is acceptable by the city and stakeholders to reduce the Riverwalk width through this section. Option 3 may be more cost effective in the short term, but will eventually require additional funding to provide a more permanent solution.

FUNDING

We understand the City does not have a budgeted item for this section of the Riverwalk. The City should consider identifying revenue sources to address this section of Riverwalk since it will ultimately fail with continued erosion.

We have researched various MDNR grant options for the City of Manistee to apply for funds to assist with renovating sections of the City Riverwalk. Based on our conversations with the MDNR the Riverwalk renovations would be eligible to apply for the following MDNR grants:

Each of these three grant has application deadlines on April 1, 2016. Grant minimum and maximum amounts and local matches are as follows:

- Recreation Passport Grant
 - 25% Local Match
 - \$7,500 - \$45,000
- Land and Water Conservation Fund (LWCF) Grant
 - 50% Local Match (Requires Nat'l Park Service approval)
 - \$30,000 - \$100,000
- Michigan Natural Resource Trust Fund (MNRTF) Grant
 - 25% Local Match
 - 15,000 - \$300,000

There are no guarantees with grant requests, but with the high volume of use by pedestrians, river access, ADA accessibility, fishing industry, tourism, etc. at this location it is our opinion, one or a combination of these grants would be worth pursuing. Preliminary plans and cost estimates would need to be prepared to pursue any of these funding sources. This may be an opportunity to address other “areas of concern” along the river trail if a grant application was considered.

Attachments

- Photographs



Name: 2015-08-14 10.11.05 (640x360)

Description: Looking SE at wood seawall. 150' west of east end of concrete walk. Wood seawall in poor condition, openings, broken timbers.



Name: 2015-08-14 10.11.09 (640x360)

Description: Looking South at wood seawall. 150' west of east end of concrete walk. Wood seawall in poor condition, openings, broken timbers.



Name: 2015-08-14 10.11.12 (640x360)

Description: Looking SSW at wood seawall, 150' west of east end of concrete walk. Wood seawall in poor condition, openings, broken timbers.



Name: 2015-08-14 10.11.15 (640x360)

Description: Looking SW at wood seawall, 150' west of east end of concrete walk. Wood seawall in poor condition, openings, broken timbers.



Name: 2015-08-14 10.13.26 (640x360)

Description: Looking west below narrow portion of wood decking. Erosion next to walkway on left side, conduit, exposed seawall tieback.



Name: 2015-08-14 10.13.31 (640x360)

Description: Looking SW below narrow portion of wood decking at erosion at sidewalk and conduit



Name: 2015-08-14 10.15.31 (640x360)

Description: Looking East below narrow portion of wood deck. Deteriorated wood seawall on left, undercutting of sidewalk on right



Name: 2015-08-14 10.15.36 (640x360)

Description: Looking south at face of eroded soil immediately below concrete sidewalk



Name: 2015-08-14 10.15.40 (640x360)

Description: Looking SE at eroded soil face below narrow portion of wood decking. Concrete sidewalk south edge is approximately in line with joist in upper portion of photo.



Name: 2015-08-14 10.15.49 (640x360)

Description: Looking west along widened portion of wood deck



Name: 2015-08-14 10.15.53 (640x360)

Description: Looking SW at eroded soil face at approximate south edge of concrete sidewalk.



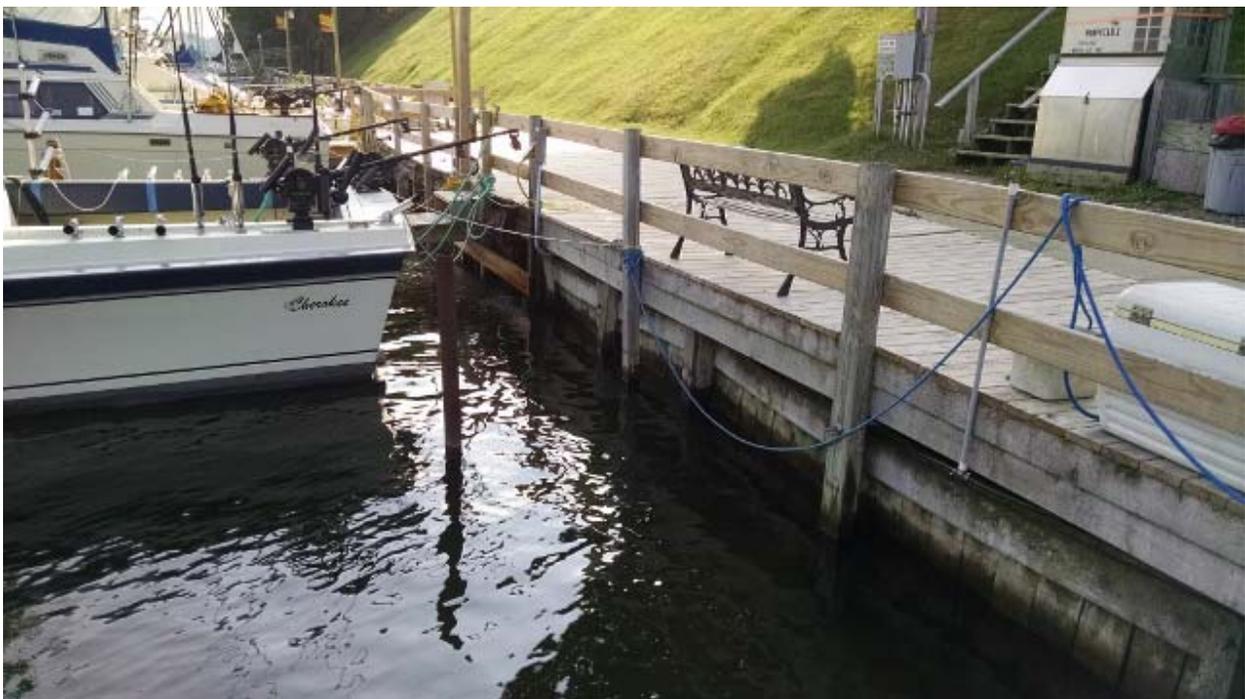
Name: 2015-08-14 10.32.27 (640x360)

Description: Looking West along face of seawall near transition of wood deck width.



Name: 2015-08-14 10.32.41 (640x360)

Description: Looking SW at face of seawall at widened portion of deck. Some bowing of timber members and movement of water behind seawall.



Name: 2015-08-14 10.32.44 (640x360)

Description: Looking SE at face of seawall at west end of widened wood decking. Bowing of wood timbers.