Hika Park Boat Launch Feasibility Study

Presentation to Village of Cleveland

December 7, 2022



baird.com

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Project Overview

- Investigate and analyze existing coastal processes at Hika Park
 - Topographic & bathymetric surveying
 - Sediment thickness and grain-size measurements
 - Wind/Wave Analysis
 - Longshore Sediment Transport Modeling and Analysis
- Evaluate functionality and feasibility of 2020 Alternatives
 - High-level assessment of alternatives and if necessary, propose modifications
 - Comparison of capital expenditure and long-term (25 year) maintenance cost
 - Assessment of qualitative impacts (e.g., viewshed, regulatory feasibility)

Project Overview

Thank you to...

- Village of Cleveland
- Wisconsin Coastal Management
- Local Fish & Game organization
- Village residents









Topo/Bathymetric & Wind/Wave Summary

- Shallow embayment of Lake Michigan (-10 feet depth contour ~1000 feet from shoreline)
- Very few existing shoreline structures perpendicular to lake which impede sediment transport currently
- Winds predominantly out of north AND south depending on time of year
 - Moreso from south in May-Oct boating season

Sediment Transport

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Sediment Transport

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Sediment Transport Summary

- Bi-modal sediment transportation (north & south)
- Often balanced over the course of a year
- Based on actual observation, area likely sand-starved
 - Changes depending on lake level, availability of sediment up and down shoreline
 - High lake level years -> more bluff erosion -> more sediment in system
- As concerns sedimentation, harbor entrance orientation unlikely to work better north or south









Initial Concepts Evaluation

- Concept 1 (MSA Preferred Alternative) was able to be evaluated as designed
- Concept 2 modified groin moved north and drawn to actual dimensions
- Concept 3 modified groins spaced further apart, extended further lakeward to -6 foot depth contour



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- Model runs a "typical" year's worth of storm events above a 5-ft wave threshold as basis for evaluation
- Simulation includes northerly (blue) & southerly (pink) storms, in winter & boating season



Currents & Waves - Northerly

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Currents & Waves - Southerly



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Alternative 1

- Two groins (275 LF & 533 LF)
- Harbor mouth oriented south
- Basin Depth -4.5 ft (Chart Datum)
 - Long-term mean WL 578.9' IGLD85 or +1.4' CD





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Northerly Storm



Southerly Storm



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Northerly Storm



Southerly Storm





Alternative 2

- One groin (275 LF), midway between creek and boat launch
- Boat launch rehabilitated in place
- No Basin Dredged









Northerly Storm



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Southerly Storm



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Alternative 3

- Two groins (542 LF), either side of creek
- Harbor mouth oriented east

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- Dredge Channel Depth -6.0 ft (Chart Datum)
 - Long-term mean WL 578.9' IGLD85 or +1.4' CD





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Northerly Storm



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Southerly Storm



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Performance Assessment

	Sediment Volume (CY) High End	Sedimentat Volume (CY) Low End	Probable Dredge Cycle
Alternative 1	6000	4200	Annual
Alternative 2	500	200	Bi-Annual
Alternative 3	2000	1000	3 – 5 Year
Alternative 4	N/A	N/A	N/A

Performance Assessment

- Alternative 1 and Alternative 3 feasible and functional as-designed
- Alternative 2 feasible but with limited function as-designed
 - Potential that Alternative 2 could be built as Phase 1 of Alternative 1
- Alternative 1 experiences highest sedimentation, performs best in reducing wave energy entering harbor
- Alternative 3 experiences ~50-70% less sedimentation, slightly choppier seas in harbor while still functional as harbor of refuge

Cost Assessment

	Capital Expense	Operating Expense – 25 Year Lifecycle (High Dredge)	Operating Expense – 25 Year Lifecycle (Low Dredge)	CAPEX + OPEX (High Dredge)	CAPEX + OPEX (Low Dredge)
Alternative 1	\$4.8M	\$3.4M	\$2.6M	\$7.2M	\$6.5M
Alternative 2	\$1.2M	\$0.5M	\$0.1M	\$1.7M	\$1.3M
Alternative 3	\$6.8M	\$2.1M	\$1.6M	\$8.9M	\$8.4M
Alternative 4	\$0.5M	\$20K	\$20K	\$0.6M	\$0.6M

Cost Assessment

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Opinion of 25yr Project Cost (CAPEX + OPEX) High-end Annual Dredge Requirement



Cost Assessment

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Opinion of 25yr Project Cost (CAPEX + OPEX) Low-end Annual Dredge Requirement



Impacts Assessment

- All alternatives will be budgetary net losers as there is no anticipated revenue stream coming online after construction
 - Alternative 1 and Alternative 3 could potentially be designed to incorporate a marina which could offset costs
- All alternatives will impact longshore sediment transport, incurring a need to dredge – either to keep Centerville Creek open, or to keep fillet beach from covering up boat launch
 - Dredge responsibility will vary annually based on water levels and thus may be difficult to budget in advance

Impacts Assessment



 Alternatives 1 and 3 will significantly restrict views of Lake Michigan from the Hika Park shoreline. Lake views would be in the longdistance only.