City of Kenora

Keewatin Boat Lift

Preliminary Feasibility Report

June 7, 2024

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Executive Summary

LBE Group Inc. (LBE) has been retained by the City of Kenora (the City) to develop a pre-feasibility study regarding the implementation of a boat lift connecting the Winnipeg River (the river) and Lake of the Woods (LOTW) at the Keewatin LOTW Boat Launch site north of Portage Bay. Preliminary research was first completed by LBE to determine potential solutions for portaging boats. Each of the options were presented to the City providing benefits and drawbacks of each. A final decision was made on the system to be explored further and parameters of the operation were established. This pre-feasibility study serves to provide a detailed breakdown of the requirements to implement a marine railway/patent slip system capable of transporting boats up to 8.53m (28ft) in length and with a maximum beam (width) of 3m (10 ft), as determined by the City. Key stakeholders to be considered for the project include the citizens of Kenora, including summer residents, surrounding Indigenous communities, as well as the City.

Upon deciding to proceed with the project, it is recommended that the City engage in community and regulatory outreach for determining whether the boat lift will be used and what legal requirements may need to be met in order to proceed. Expected cost for the construction of a marine railway is $840,000.

Site Analysis

The Keewatin LOTW Boat Launch Site has a UTM Easting of 387683.497 and Northing of 5513622.861 in Zone 15 or Latitude/Longitude of N49°45'52.47", W94°33'34.66". Existing site conditions provide a linear distance of 70.6m (231.63ft) required to be covered by the boat lift. On the LOTW side there exists a 10.5 m (34.45ft) wide cove just north of the existing boat launch that provides the shortest distance to the river. This provides a good route for the marine railway to follow. At its widest point the cove opens to 22m (72.18ft) at the end of the boat launch before reducing to 12m (29.37ft) at the inlet to the river/tributary leading to Portage Bay. There are no obvious limitations on the river side of the divide due to landmass.

Water level data was collected from the Lake of the Woods Control Board to determine the elevation needing to be covered by the marine railway. Data from 1916-2023 was analysed to develop the 10th percentile and 90th percentile water levels of both the Winnipeg River and LOTW. This data can be seen in Table 1 below. Assuming the high and low water levels for both bodies of water occur at the same time the change in elevation from the river to LOTW ranges from 6.27m (20.57ft) at times of low water (10th percentile) and 4.2m (13.78ft) at times of high water (90th percentile). This assumption is not 100% accurate but provides a good basis for feasibility/preliminary design.

Table 1 LOTW Control Board Data Analysis

Water Body	10th Percentile (1916-2023) Water Level (m)	90th Percentile (1916-2023) Water Level (m)
LOTW	322.32	323.60
Winnipeg River	316.05	319.40

A topographic survey was completed in the January 2024 to provide a general overview of the land. At the time of the survey, there was little to snow coverage however there was ice coverage of both bodies of water. Peak height of the landmass dividing both bodies of water was at 325m with ice elevations of LOTW and the river at 322.4m and 316.7m, respectively. This justifies the previous assumption made that the water levels of both bodies of water generally fluctuate at equivalent rates. Slope of land from water level to local peak is approximately 44% on the LOTW side and 31% on the Winnipeg River side. There exists a rough land area of 1,555m^2 (16,737.88ft^2) between these two local peaks that is generally flat.

A geotechnical assessment has not been completed at this time, however, from site investigations as well as historical data there is a large amount of fill present that was placed to create the plateau for parking and entrance to the existing boat launch. Historical and current arial photography is provided in Appendix A.

Technical Feasibility

The marine railway/patent slip is a well-established system for carrying marine vessels up/down an inclined plane, having been invented in 1818 and since modified to suite current technology and safety regulations. The Big Chute Marine Railway located in the township of Georgian Bay serving the Trent-Severn Waterway is still being operated today, federally overseen by Parks Canada. As established by the City, the marine railway shall be designed to transport boats not exceeding 28ft long by 10 ft wide. To determine design weight, an investigation into boats commonly seen on Lake of the Woods was conducted that fall under the design dimensions. It was determined that a maximum weight of 10,000 lbs would be a reasonable parameter, not including design safety factors. The results of the investigation can be seen in Table 2 below.

Table 2 Various Boat Specifications

Vessel Type	Mfr.	Model	Length	Width	Dry Weight (lbs)	Weight Capacity (lbs)	Total Weight (lbs)
Wakeboard	Malibu	M242	24'-2"	8'-6"	7,500	2,397	9,897
Bass (Fiber)	Ranger	Z521R	21'-9"	8'-0"	2,300	1,900	4,200
Fishing/Sport	Ranger	VX1988WT	20'-0"	8'-6"	2,200	2,000	4,200
Pontoon	Prince-craft	Vectra 25RL	24'-8"	8'-5"	2,197	3,932	6,129
Cruiser	Cobalt	R6	25'-9"	8'-6"	5,800	2,300	8,100

The marine railway operates by floating vessels into a mesh cradle supported on a submersible cart. An electric motor then pulls the cart up the inclined plane along a track system via cable. The track system consists of two separate rails which alternate relatively to one another to maintain the carriage at a horizontal plane as it traverses the incline and decline from one body of water to the next. As alluded to, this will require two sets of steel railways designed to suite the topography and bathymetry of the design surface, a VFD (variable frequency drive) controlled motor, steel cables, and some low voltage operator controls.

As a result of the existing soil conditions mentioned above, a geotechnical analysis needs to be completed to determine the best method of attachment of the steel railways to land. For determining overall length and location of the railways, a bathymetry survey needs to be completed on both the Winnipeg River and Lake of the Woods in the surrounding water for analysis of subsurface conditions and relation to low water levels. Completion of these tasks should be accomplished as part of the first stages of the detailed design process.

Financial Feasibility

A high-level cost estimate of construction is provided below in Table 3. It should be noted that this estimate does not take into account any costs related to utility upgrades that may be required to accommodate the design, landscaping, or additional facilities that may be required for operation such as washrooms, control booth, docks or walkways/stairs.

Table 3 High-Level Construction Cost Estimate

High-Level Construction Cost Estimate		
Item	**Description**	**Cost**
Investigation	Completion of detailed bathymetry and topographic surveys to be used for completion of detailed design	$10,000
Engineering	Mechanical, Electrical, Structural and Geotechnical engineering design of marine railway, environmental analysis, regulatory consultation, production of construction drawings and documents, construction support, and commissioning.	$70,000
Construction	Site preparation, manufacturing, installation of marine railway design	$750,000
Legal/Regulatory	Permits and environmental compliance	$10,000
Total		$840,000

Consideration from the City can be made for potential investors/donors that may be willing to contribute to the construction cost of the project as part of a naming donation. There should also be consideration made towards a user cost that can be implemented to offset operator wages as well as the relatively low operational and maintenance costs associated with the system.

Legal and Regulatory Analysis

Compliance with Federal and Provincial institution's regulatory requirements should be expected. Discussions with these authorities should begin as part of the early stages in the detailed design process. A list of the organisations that should be contacted can be found below.

- Department of Fisheries and Oceans (DFO)
- Transportation Canada (TC)
- Ministry of the Environment, Conservation, and Parks (MECP)

LBE has completed numerous Environmental Compliance Approvals (ECA) through the MECP as required when an organization plans to carry out activities that have the potential to impact the public or natural environment. This process typically takes a year to complete.

Risk Analysis

This section identifies and evaluates potential risks that could impact the successful completion of the construction project. This analysis is essential for understanding and mitigating uncertainties, ensuring that the project can proceed with minimized disruptions, optimized outcomes and operational success.

Some of the potential risks identified include:

- Regulatory rejection
- Operator and passenger safety
- Transport of foreign species to WR/LOTW
- System breakdown
- Lack of users

Some strategies for mitigating the identified risks include:

- Early coordination with authorities having jurisdiction and compliance with regulatory requirements
- Walkways, stairs, and docks for passenger transport
- Operations and Maintenance schedule/contract

Project Management and Implementation Plan

This section outlines the strategic approach and operational framework for successfully executing the project, detailing suggested project management methodology, key milestones and timelines, resource allocation, and coordination strategies.

Following a conventional project delivery approach, a design-bid-build would provide a good methodology for achieving the intended design at a fixed price, however, may result in a prolonged schedule. A design-build approach would allow for designer, construction contractors, manufacturers, and the City to collaborate throughout design and construction to ensure the output of the project is optimal, however, this approach does not always result in the lowest cost. Either of these approaches would provide a successful framework for design and construction of the marine railway. Estimated timeline for a design-bid-build approach under a stipulated price contract is about 24-30 months for design and construction with simultaneous coordination with AHJs, possibly extending to 36 months for regulatory compliance. Due to the overlapping structure of the design process with the construction process, a design-build approach typically shortens the expected timeline as compared to a design-bid-build however is hard to evaluate the time saved.

Recommendations and Next Steps

This section outlines key recommendations based on the analysis conducted, addressing identified risks, regulatory requirements, financial considerations, and project management strategies. It also details the next steps necessary to initiate the project, ensuring a clear and actionable path forward.

The success of a marine railway system implemented at the Keewatin LOTW Boat Launch site is a perfectly viable project given the identified risks and design considerations are mitigated and/or addressed before proceeding with the design phase. Recommendations for ensuring this occurs are as follows:

- Early investigation into legal and regulatory requirements.
- Definition of design scope of work to meet City expectations outside of marine railway function. i.e. implementation of docks and walkways along marine railway, accessibility, washroom facilities.

Should the City decide the project is something worth proceeding with, LBE suggests that the next step be to reach out to the community to see if the implementation of a boat lift connecting the Winnipeg River and Lake of the Woods is something that will be used. This task should proceed concurrently with outreach to the regulatory bodies for any required compliance approvals or permits that may be required.

Closure

LBE Group Inc. is pleased to provide you with this report. If you wish to discuss any aspect of the report, please do not hesitate to contact us.

Sincerely,

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Appendix A

Photographs

Figure 1 1996 Aerial Photograph of Keewatin Boat Launch/Portage Bay

Figure 2 2023 Aerial Photograph of Keewatin Boat Launch/Portage Bay