Submitted to:

RM of Lac Du Bonnet.

BOAT LAUNCH FEASIBILITY STUDY

LEE RIVER PARK
LEE RIVER, MANITOBA

JANUARY 2022

FILE NO. 21-271-01

ENG-TECH
CONSULTING LIMITED

"Engineering and Testing Solutions That Work for You"

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YEARS OF EXCELLENCE

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Attachments

1.0 INTRODUCTION

ENG-TECH Consulting Limited (ENG-TECH) completed the requested feasibility study for geotechnical investigation for the Lee River Park Boat Launch. This purpose of this study was to conduct an engineered study and pre-design to assess the feasibility of potential options to construct a boat launch at the Lee River Park, including an option for one non-motorized, hand launch only. The assessment includes the identification of potential environmental issues and impacts according to the site, recommendations for parking, site drainage, dock access, capacity of the site based on waterways and parking, and conceptual drawings with a cost estimate for select option(s).

1.1 Scope of Work

ENG-TECH completed the following scope of work:

- Clearance of public utility services.
- A test hole drilling program to determine bedrock depth.
- A topographic and bathymetric survey of the site using GPS and Base Station equipment, including exploratory probing of the river surface to determine bedrock elevation where possible. Three (3) temporary benchmarks were placed at various ends of the site.
- Preparing conceptual drawings in advance of the report to narrow down the design alternatives based on feedback from the Rural Municipality of Lac Du Bonnet.
- Developing a weighted alternative assessment matrix to assess all conceptual alternatives in terms of constructability, environmental and aesthetic impacts, various performance measures such as capacity of boat launch and navigational issues, cost/budget implications, scheduling, and regulatory issues.
- Conceptual drawings and cost estimates for available preferred options.
- An assessment and engineering report outlining the investigation and recommendations as outlined above.

2.0 BACKGROUND

Lee River Park is located on Manitoba Provincial Road 313 at the northeast junction of the Lee River crossing and is a popular visitor attraction to the local area. Lee River Park is accessed from an existing driveway directly off Provincial Road 313 and there is a bay on the west side of the park that connects to Lee River, as well as direct access to Lee River along the northside of the park down an embankment. There are bedrock / boulder outcroppings jutting out from the water where the bay meets the river. During the survey, this was determined to be a shelf of rocks and boulders that spanned from one end of the bay to the other. An old rail bridge crossing used to run north of the bay has long been demolished, however this area is regularly used by visitors for recreational fishing off the bank. Active hydro poles can still be found as remnants from the previous railroad track and run eastward. Three (3) Bell MTS fiber optic lines also run eastward as shown on Drawings 1 and 2. A creek runs westward near the northeast boundary of the park and terminates into Lee River as shown on Drawing 1. Finally, bedrock outcroppings can be found around the river's edge and have been surveyed.

3.0 TEST HOLE DRILLING

ENG-TECH completed the drilling of four (4) test holes (TH1 to TH4) on October 6, 2021. Drilling was completed using a 75 mm diameter hand auger and were backfilled with soil cuttings upon completion of drilling. All four (4) test holes were within or close to the footprint of the proposed boat ramp as shown in Figures 1 and 2 and were advanced to bedrock, except for TH3 which was unable to be drilled past 1.2 m below grade due to excessive sloughing from the existing gravel driveway. Depth to bedrock varied and was surveyed upon completion to determine bedrock elevation at the test hole locations. The elevation of the bedrock for TH1, TH2, and TH4 were 256.21 m, 256,25 m, and 255.90 m, respectively. The bedrock elevation at TH3 was determined to be below 257.60 m, which is satisfactory for the design.

4.0 RECOMMENDATIONS

4.1 Assessment

Based on the site conditions, topography, river bottom elevations and bedrock depth ENG-TECH evaluated various designs suitable to launch both motorized and nonmotorized boats from the site.

The bay south of the railway embankment was found to be too shallow for motorized boat traffic. The bay was probed for bedrock depth and was determined unsuitable for dredging to enable access for motorized boat traffic. Motorized boat launch designs would also not be economical from the bay due to the large amount of rock that would need to be removed from the rock shelf at the entrance to the river, as well as regrading the bank in this area would be costly due to the presence of Bell MTS fiber optic lines. Rock would still be required to be moved to provide access to smaller non-motorized boats (canoes and kayaks) access out of the bay, however a significantly smaller quantity of rocks would be required to be moved. Therefore, for bay access only recommendations for a non-motorized canoe launch will be presented in this report.

The site north of the railway embankment along Lee River is the most suitable location for a motorized boat launch. The bathymetry geometry is more conducive for larger boat traffic, and there are two small islands to the north which protect this area from wind and wave action. ENG-TECH assessed several alignments along the north bank west of the creek location to determine the most suitable location for the boat launch. Any designs further west from the layout specified in this report were determined to be unsuitable due to site geometry and limitations due to bedrock elevations. As such, two (2) layouts were presented to the Rural Municipality of Lac Du Bonnet for a site meeting on November 26, 2021. These layouts included the ramp layout presented in this report set 14 m west of the creek outlet, as well as a similar boat launch 9 m west of the creek orientated more in-line with the creek. The layout further from the creek was the preferred option as it minimized the distance required when backing boats to the river while maintaining maximum distance away from the creek as outlined on Drawings 2. The options were assessed and are outlined in Table 1 Weighted Assessment Matrix for Motorized Boat Launch.

4.2 Boat Launch

ENG-TECH presented four (4) options to the council in December 2021 for the boat ramp under the chosen alignment location. The options including constructing the lower ramp with cable concrete or segmental concrete blocks, while constructing the upper ramp with cable concrete, segmental blocks, or a concrete slab for the upper slab. In response to the feedback received and constructability, ENG-TECH designed the boat launch with a lower ramp consisting of cable concrete CC 70 mats connected to a concrete slab for the upper ramp leading to the driveway. A 40 m long walkway that winds down the bank will be required to access the adjacent dock as the

slopes are too steep to facilitate direct access to the lower bank. This will result in a 7.5% (13:1) grade down the walkway to the lower bank while the side slopes of the walkways will be 4:1 (horizontal:vertical). There is an existing large boulder that the walkway can butt up alongside to meet geometric and aesthetic requirements. The walkway will lead to a wooden gangway and dock supported on piles, while non walking areas off the ramp will be graded at a 4H:1V slope. The dock can be 30.5 m long and could accommodate five (5) motorized boats harboured at one time as outlined on the drawings.

4.3 Canoe Launch

The canoe launch can be located as shown on Drawing 2, consisting of a walkway from the parking lot to the lower bank, a wooden gangway and a 12.2 m long wooden dock supported on piles. The location of dock was chosen based on the most suitable underlying grades for boarding and is designed to board three (3) canoes at one time, while the footprint of the walkway was set to the most direct route at a slope of 7.5% (13:1) while avoiding issues caused by bedrock outcroppings. To utilize the bay for canoe access, two (2) channels will need to be developed for travel out of the bay to the river. This will consist of scouring the rock just beneath the surface of the water to create a minimum 0.6 m deep channel. The scoured rocks can be placed on either side of the channel to make clear travel paths to the river. Signs can also be placed at the entrances to the bay warning motorized boat traffic not to enter the shallow water area.

4.4 Parking Lot and Driveways

A 300 mm thick gravel driveway 9 m wide and parking lot configured as shown on Drawing 2 would be suitable to service the proposed Lee River Park launch development. The driveway would wind around existing trees and service pole south of the ramp, and end before the hydro pole east of the ramp with direction of travel as shown on the drawing. Other layouts were reviewed and could be used, although they were not considered as economical as the option shown and would require the removal of existing trees, pole and potentially rerouting of underground services. Included in the parking lot design are eleven (11) privacy bushes placed between the parking lot and Provincial Road 313. These bushes will reduce headlight glare from the park towards drivers on the highway.

4.4 Environmental Concerns

Environmental impacts from the proposed designs shown are minimal given the changes made to the site are not significant, and the use of the river will essentially remain unchanged to what it is now. The docks along the shoreline are supported on piles and therefore the piles will not occupy a significant area below the water level. Some changes to the riparian area along the shoreline will result, although this area is small and mainly located at the boat ramp below the cable concrete where the grades need adjusting for boat access into the water. Some shrubs and bush along the shoreline will need trimming while most of the riparian area will remain as is. Large volumes of fill material along the shoreline or in the river will not occur.

4.4 Drainage

Proper surface drainage is essential to reduce the potential of frost action, and to reduce excess moisture adjacent the boat ramp and walkways. Grading the site as shown on the drawings will prevent water ponds around the boat ramp while using existing drainage patterns to minimize costs and site alterations. The design has been set to drain water off and around the gravel parking lot westward to the bay and northwest into Lee River.

5.0 COST ESTIMATE

The project is expected to cost approximately $375,000. This cost could be reduced by the values shown in Table 2 should the canoe launch from the bay access be removed from final design and only the motorized boat launch built. Details for additional lighting to the site were not included in this report, however a budget of $20,000 was included in the cost estimate above. Costs associated with lighting may increase significantly depending on chosen designs.

6.0 CLOSURE

This report was based on the scope of work outlined for the purpose of the investigation and was prepared in accordance with acceptable professional engineering principles and practices. If you have any questions, please contact the undersigned.

Sincerely,
ENG-TECH Consulting Limited

Adam Hayes, EIT.
Engineering Department

Clark Hryhoruk, M.Sc., P. Eng.
Principal, Geotechnical Engineer

CDH/alh

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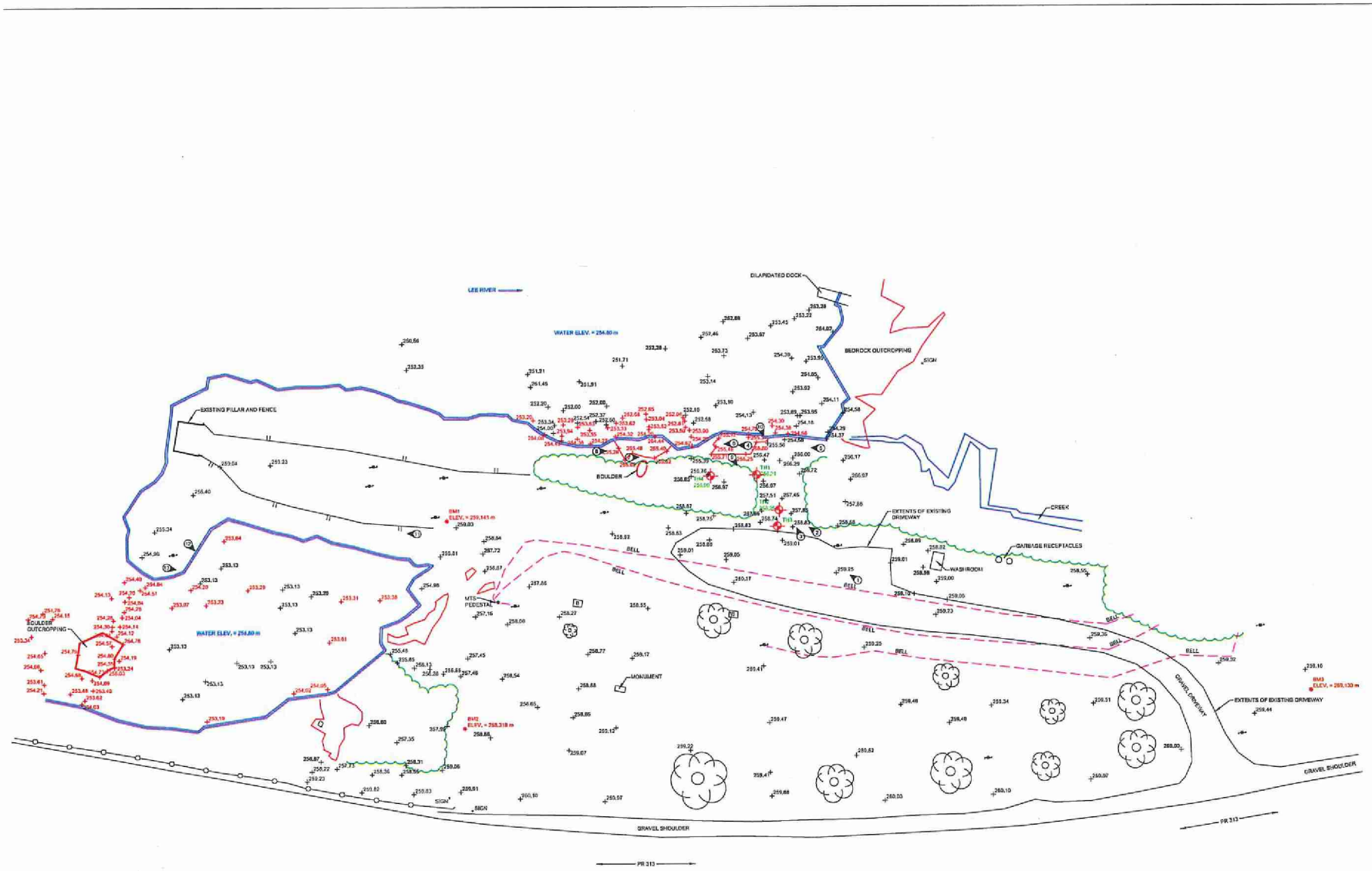

LEGEND

- SPOT ELEVATION
- SPOT ELEVATION ON BEDROCK
- TEMPORARY BENCHMARK (PIN IN GROUND)
- FENCE
- HYDRO POLE
- TEST HOLE WITH BEDROCK ELEVATION DEPTH
- SHORELINE
- TOP OF BANK
- TREE
- EXISTING BENCH
- TREELINE
- BELL MTS LINE (APPROX.)
- BEDROCK OUTCROPPING
- PHOTOGRAPH AND DIRECTION
- SECTION/DETAIL No.
- SECTION / DETAIL PAGE LOCATION
- SECTION / DETAIL PAGE REFERENCE

NOTES

- ENG-TECH SURVEYED PROPERTY ON SEPTEMBER 23, OCTOBER 8, NOVEMBER 18 & 26, 2021.
- ALL DISTANCES AND ELEVATIONS ARE IN METERS.
- SURVEYED WATER LEVEL = 254.80 m

NO.	DATE	ISSUE / REVISION
1	Jan. 2022	accepted / issued

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CLIENT
RM OF LAC DU BONNET

PROJECT
FEASIBILITY STUDY -
LEE RIVER BOAT LAUNCH,
LEE RIVER, MANITOBA

DRAWING/PART
EXISTING SITE PLAN

SCALE
1:400

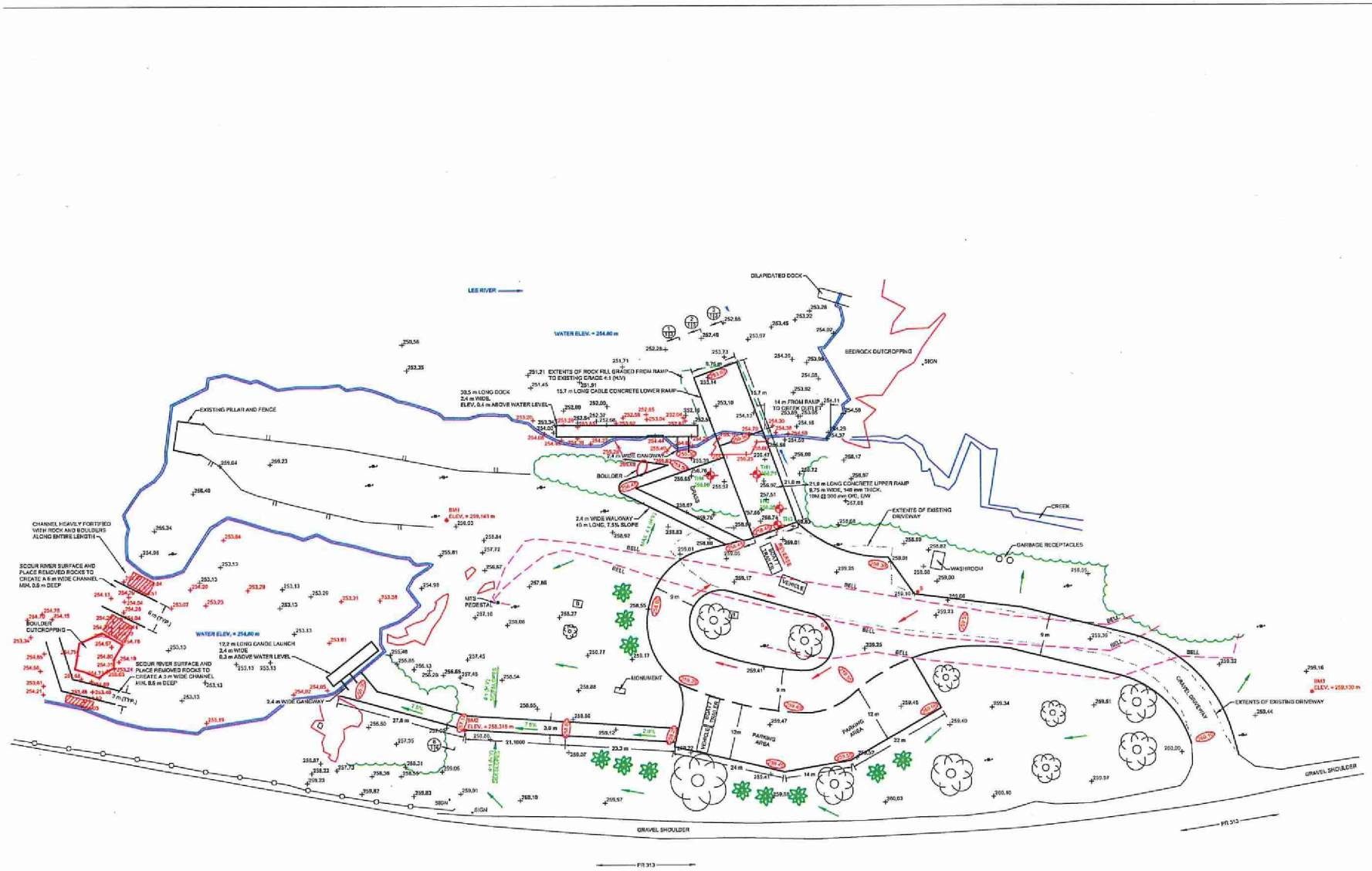
DRAWN BY
AJH

DATE
JANUARY 2022

FILE NO.
20-271-01

DRAWING NO.
1 of 5

REV



LEGEND

- SPOT ELEVATION
- SPOT ELEVATION ON BEDROCK
- TEMPORARY BENCHMARK (PIN IN GROUND)
- FENCE
- HYDRO POLE
- TEST HOLE WITH BEDROCK ELEVATION DEPTH
- SHORELINE
- TOP OF BANK
- TREE
- ADDITIONAL SHRUBBERY 1.2 m TO 1.5 m HIGH FOR VEHICLE LIGHT BLOCKAGE
- EXISTING BENCH
- FINAL GRADE
- DIRECTION OF TRAVEL TO LAUNCH BOAT
- DRAINAGE DIRECTION
- NEW DIRECTIONAL SIGNAGE
- TREELINE
- BELL MTS LINE (APPROX.)
- BEDROCK OUTCROPPING
- AREA TO STACK ROCK REMOVED FROM RIVER TO CREATE A VISIBLE CANOE PATH CHANNEL
- SECTION/DETAIL No.
- SECTION / DETAIL PAGE LOCATION
- SECTION / DETAIL PAGE REFERENCE

NOTES

- ENG-TECH SURVEYED PROPERTY ON SEPTEMBER 23, OCTOBER 6, NOVEMBER 10 & 26, 2021.
- ALL DISTANCES AND ELEVATIONS ARE IN METERS.
- SURVEYED WATER LEVEL = 254.80 m

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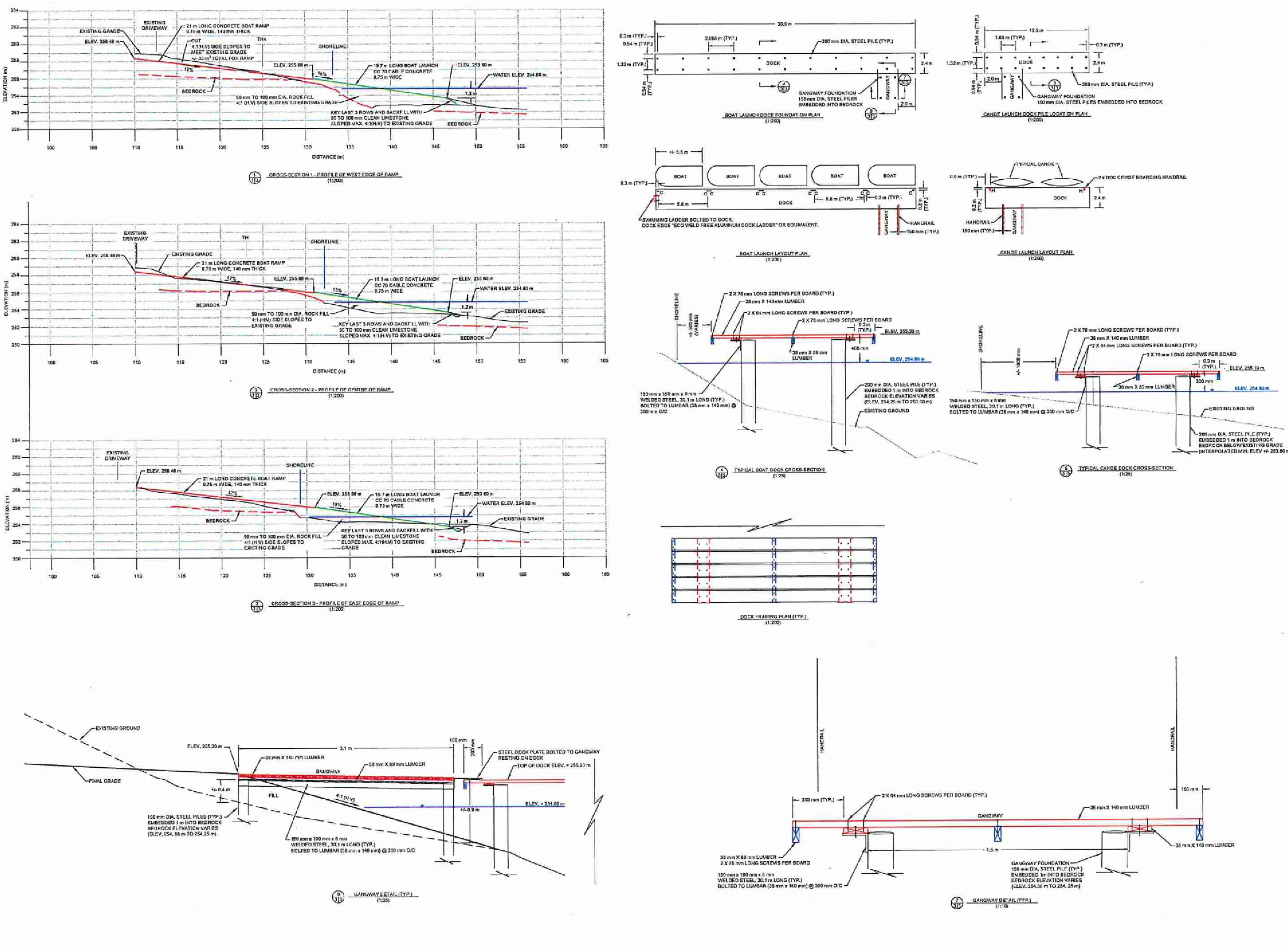
CLIENT: RM OF LAC DU BONNET

PROJECT: FEASIBILITY STUDY - LEE RIVER BOAT LAUNCH, LEE RIVER, MANITOBA

DRAWING TITLE: PROPOSED SITE PLAN

SCALE: 1:400
DESIGNED: ALH
DATE: JANUARY 2022
TECT No: 21-271-01
DRAWING SHEET No: 2 of 5
REV:



LEGEND

- EXISTING GRADE
- BEDROCK
- 15.7 m LONG LOWER RAMP, 8.75 m WIDE, CC 70 CABLE CONCRETE
- 21.0 m LONG UPPER RAMP, 8.75 m WIDE, 140 mm THICK CONCRETE SLAB WITH V-GROOVE
- H DOCK EDGE BOARDING HANDRAIL
- BOAT CLEAT
- 38 x 89 mm LUMBER
- 38 x 140 mm LUMBER

SECTION/DETAIL No.
SECTION / DETAIL PAGE LOCATION
SECTION / DETAIL PAGE REFERENCE

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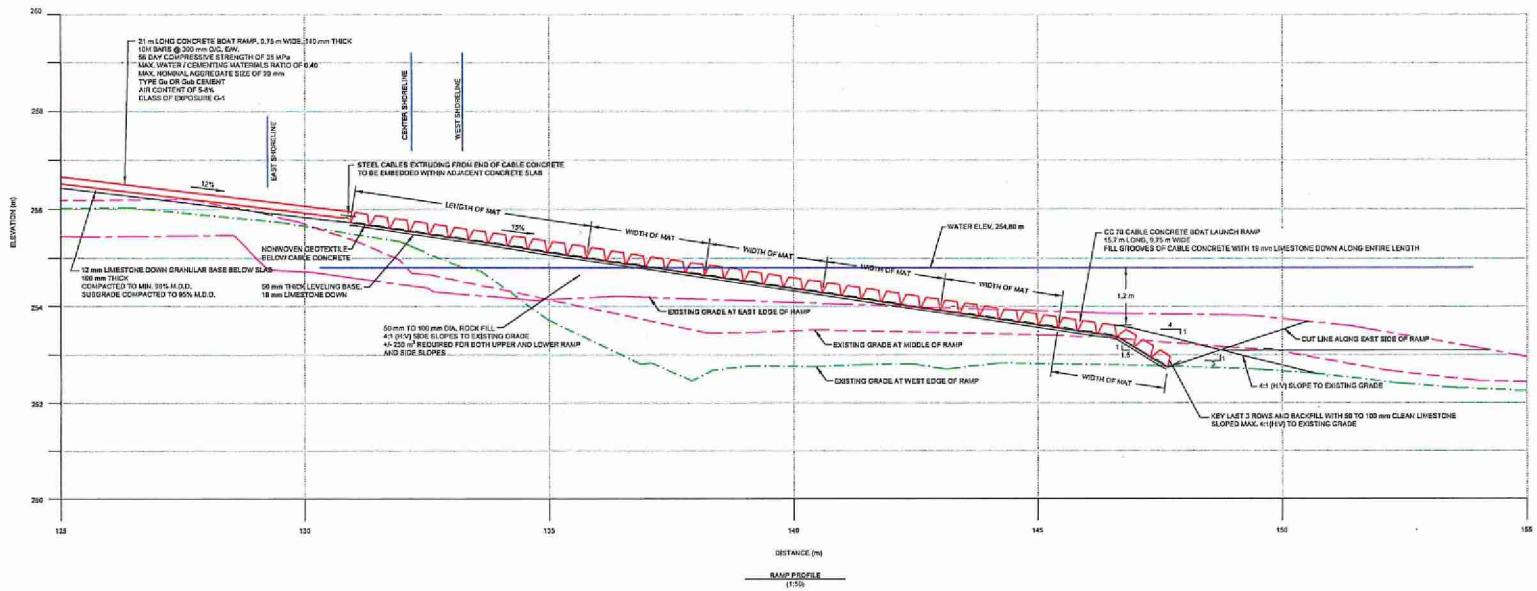
PROJECT
FEASIBILITY STUDY -
LEE RIVER BOAT LAUNCH,
LEE RIVER, MANITOBA

CONSTRUCTION DETAILS - 1

SCALE 1:400
DRAWN BY ALH
DATE JANUARY 2022
FILE NO. 21-271-01
3 of 5

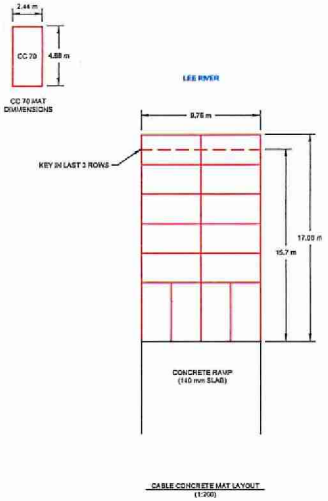


RAMP PROFILE
(1:50)

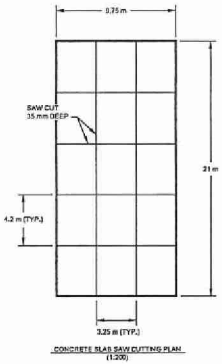
LEGEND

M.D.D. = MAXIMUM DRY DENSITY

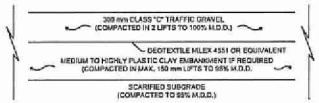
SECTION/DETAIL No.
SECTION / DETAIL PAGE LOCATION
SECTION / DETAIL PAGE REFERENCE



CABLE CONCRETE MAT LAYOUT
(1:200)



CONCRETE SLAB SAW CUTTING PLAN
(1:200)



DRIVEWAY AND PARKING LOT CROSS-SECTION
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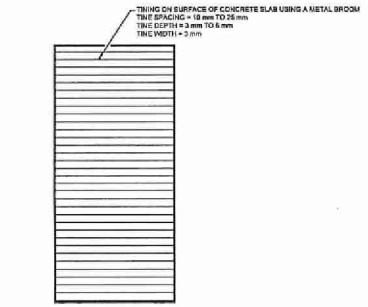

CONCRETE SLAB TRANSVERSE TINING PLAN
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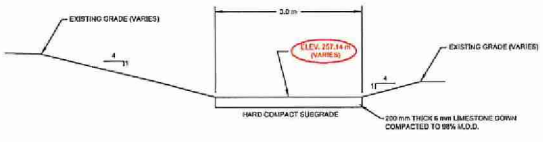

5 / 1.50 WALKWAY DETAILS
(1:50)

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PROJECT
FEASIBILITY STUDY -
LEE RIVER BOAT LAUNCH,
LEE RIVER, MANITOBA

DRG DESCRIPTION
CONSTRUCTION DETAILS - 2

SCALE
1:400

DESIGNED BY	DATE
ALH	JANUARY 2022
PROJECT	DRAWING REFERENCE NO.
21-221-01	
DRAWING NUMBER	REV.
4 of 5	

LEGEND

EXTENTS OF RAMP

EXTENTS OF DOCK


PHOTOGRAPH 1: FACING NORTHWEST, SHOWING BOAT RAMP ENTRANCE LOCATION


PHOTOGRAPH 2: FACING NORTHWEST, LOOKING DOWN RIVERBANK AT APPROXIMATE BOAT RAMP LOCATION


PHOTOGRAPH 3: FACING NORTHWEST, AT TOP OF BANK SHOWING APPROXIMATE EXTENTS OF BOAT RAMP TOWARDS RIVER


PHOTOGRAPH 4: FACING WEST, SHOWING APPROXIMATE BOAT DOCK LOCATION ALONG RIVER


PHOTOGRAPH 5: FACING WEST, SHOWING APPROXIMATE BOAT RAMP LOCATION ALONG RIVERBANK.


PHOTOGRAPH 6: FACING WEST, SHOWING APPROXIMATE BOAT DOCK LOCATION ALONG RIVER


PHOTOGRAPH 7: FACING EAST, SHOWING APPROXIMATE BOAT RAMP LOCATION


PHOTOGRAPH 8: FACING EAST, LOOKING TOWARDS BOAT RAMP LOCATION AND SHOWING EXISTING BOULDER ON RIVERBANK.


PHOTOGRAPH 9: FACING SOUTHEAST, LOOKING UP RIVERBANK SHOWING APPROXIMATE EXTENTS OF BOAT RAMP.


PHOTOGRAPH 10: FACING SOUTH, LOOKING UP RIVERBANK SHOWING APPROXIMATE EXTENTS OF BOAT RAMP.

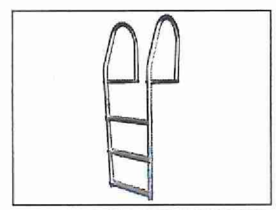

PHOTOGRAPH 11: FACING SOUTH, SHOWING APPROXIMATE WALKWAY AND CANOE DOCK LOCATION.

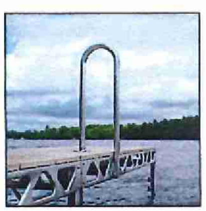

PHOTOGRAPH 12: FACING SOUTHEAST, SHOWING APPROXIMATE WALKWAY AND CANOE DOCK LOCATION.


PHOTOGRAPH 13: SHOWING APPROXIMATE WALKWAY AND CANOE DOCK LOCATION.

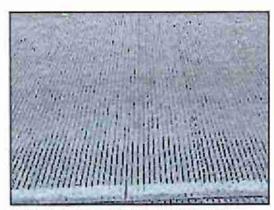

PHOTOGRAPH 14: EXAMPLE BOAT LAUNCH USING CABLE CONCRETE


PHOTOGRAPH 15: EXAMPLE OF BOAT LAUNCH RAMP USING CABLE CONCRETE


PHOTOGRAPH 16: DOCK EDGE "ECO WELD FREE ALUMINUM DOCK LADDER"


PHOTOGRAPH 17: EXAMPLE OF INSTALLED DOCKING HANDRAIL FOR DOCK


PHOTOGRAPH 18: EXAMPLE OF INSTALLED DOCKING HANDRAIL AND CLEAT FOR DOCK


PHOTOGRAPH 19: EXAMPLE OF TINING FINISH ON CONCRETE SLAB

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PROJECT
FEASIBILITY STUDY -
LEE RIVER BOAT LAUNCH,
LEE RIVER, MANITOBA

DWG DESCRIPTION
PHOTOGRAPHS 1 - 18

SCALE
N/A

DRAWN BY
ALH

DATE
JANUARY 2022

FILE NO
21-271-01

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5 of 5

TABLE 1
Weighted Assessment Matrix for Motorized Boat Launch

Criteria	Ranking Factor (1-10)	Ramp Layout 1 Assessment (1-10)	Ramp Layout 2 Assessment (1-10)	Ramp Option 1 Assessment (1-10)	Ramp Option 2 Assessment (1-10)	Ramp Option 3 Assessment (1-10)	Ramp Option 4 Assessment (1-10)
Constructibility	6	7	7	8	6	7	6
Accessibility	6	6	3	6	6	6	6
Environmental Impacts	9	7	4	7	7	7	7
Aesthetics	6	7	8	8	7	7	6
Capacity	4	8	8	8	8	8	8
Navigational Issues	4	6	5	6	6	6	6
Regulatory Issues	7	7	4	7	7	7	7
Cost	7	6	6	6	6	6	6
Total Assessment Value	490	330	266	306	288	294	282

ASSESSMENT OPTION DESCRIPTIONS
Ramp Layout 1 - Ramp constructed greater than 14 m from creek outlet as shown on Drawing 2
Ramp Layout 2 - Ramp constructed 9 m from creek outlet parrallel to creek
Ramp Option 1 - Concrete Slab Upper Boat Ramp + Cable Concrete Lower Boat Ramp
Ramp Option 2 - Concrete Slab Upper Boat Ramp + Segmental Concrete Lower Boat Ramp
Ramp Option 3 - Cable Concrete Upper and Lower Boat Ramp
Ramp Option 4 - Segmental Concrete Block Upper and Lower Boat Ramp

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TABLE 2
Estimated Construction Cost

Item No.	Description	Unit	Approx. Quantity	Unit Price	Total Unit Amount
1	Mob-Demobilization and Site Preparation	Lump Sum	1	$12,000.00	$12,000.00
2	Lighting	Lump Sum	1*	$20,000.00	$20,000.00
3	Construction of new gravel driveway / parking lot. (0.3 m thick)	m^2	2700	$33.00	$89,100.00
4	Installation of Privacy Bushes	Per Bush	11	$500.00	$5,500.00
5	Tree Clearing for Canoe Launch	Lump Sum	1	$1,500.00	$1,500.00
6	Supply and installation of 3 m wide canoe ramp walkway (+/ -20 m^3 cut and 45 m^3 granular)	Lin m	72	$78.00	$5,616.00
7	Supply and Installation of Gangway for canoe launch	Lump Sum	1	$7,500.00	$7,500.00
8	Supply and Installation of canoe launch dock	Lump Sum	1	$22,500.00	$22,500.00
9	Dredging Rocks and Fortifying Channel	Lump Sum	1	$24,000.00	$24,000.00
10	Tree Clearing for Boat Launch	Lump Sum	1	$1,500.00	$1,500.00
11	Supply and installation of 2.4 m wide boat ramp walkway (includes +/- 30 m^3 cut and 24 m^3 Granular)	Lin m	40	$78.00	$3,120.00
12	Supply and placement of fill for regrading boat launch gangway approach	m^3	12	$70.00	$840.00
13	Supply and installation of gangway for boat launch	Lump Sum	1	$7,500.00	$7,500.00
14	Supply and Installation of boat launch dock	Lump Sum	1	$58,500.00	$58,500.00
15	Cut and removal of soil for Boat Launch Ramp and side slopes	m^3	33	$70.00	$2,310.00
16	Supply and placement of rock fill for boat launch ramp and side slopes	Tonnes	500	$100.00	$5,000.00
17	Supply and placement of leveling base for boat launch ramp	m^3	18	$50.00	$900.00
18	Concrete Slab for upper boat launch ramp (205 m^2)	Lump Sum	1	$46,344.00	$46,344.00
19	Supply and Place Cable Concrete Lower Ramp	Lump Sum	1	$21,475.92	$21,475.92
20	Contingency	Lump Sum	1	$20,000.00	$20,000.00
Construction Cost (GST not included)					**$355,205.92**
Total Construction Cost (with GST)					**$372,966.22**

Notes: * A comprehensive lighting plan has not been completed at this time.

ENG-TECH