MPE Engineering Ltd.

Report for:

TOWN OF TABER

TABER ICE ARENA

SMALL ICE CONSULTANT INVESTIGATION

Date: August 31, 2017
Project #: 1415-030-00

Proud of Our Past… Building the Future

www.mpe.ca

Suite 300, 714 - 5 Avenue South
Lethbridge, AB T1J 0V1
Phone: 403-329-3442
1-866-329-3442
Fax: 403-329-9354

MPE Engineering Ltd.

Town of Taber
A 4900 50 Street
Taber, AB
T1G 1T1

August 31, 2017
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Attention: Aline Holmen
Director of Recreation

Dear Aline:

Re: Taber Ice Arena – Small Ice Consultant Investigation

MPE Engineering Ltd. would like to thank the Town of Taber for the opportunity to provide Engineering services and we look forward to working with you to successfully complete this project. If you have any questions, comments or concerns please contact the undersigned at (403) 317-3655.

Yours truly,

MPE ENGINEERING LTD.

Alan Hornberger, P.Eng.
Project Engineer

AH/mw
Enclosure

CORPORATE AUTHORIZATION

This report has been prepared by MPE Engineering Ltd. under authorization of the Town of Taber. The material in this report represents the best judgment of MPE Engineering Ltd. given the available information. Any use that a third party makes of this report, or reliance on or decisions made based upon it is the responsibility of the third party. MPE Engineering Ltd. accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based upon this report.

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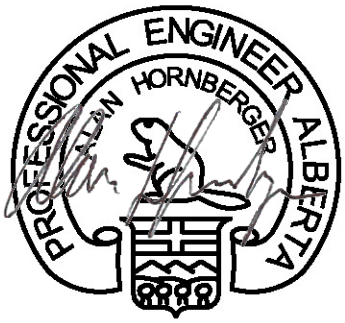
MPE ENGINEERING LTD.



PERMIT TO PRACTICE
MPE ENGINEERING LTD.
PERMIT NUMBER: P 3680
The Association of Professional Engineers and Geoscientists of Alberta

Alan Hornberger, P.Eng.

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1.0 INTRODUCTION

1.1 Overview

The Town of Taber has engaged MPE Engineering Ltd. to perform a consultant investigation of several aspects of the existing Small Ice Arena of the Taber Ice Arena building, and to explore options for bringing the Small Ice Arena up to current codes and regulations.

The Small Ice Arena (referred to as "Auxiliary Arena" in the original floor plans) operates from October to the end of March. The rink is approximately 40 years old. The space was originally used as a curling arena as part of the adjacent existing curling arena. The Small Ice Arena was created by the construction of a wall dividing the original curling arena (see Photo 1). Various aspects of the rink are in visibly poor condition, as well as present multiple operational and safety issues. Specific significant issues are listed below.

Photo 1: Showing location of curling hacks in slab from when space was used as a curling arena.

2.0 ISSUES WITH SMALL ICE ARENA

2.1 Building Code and Safety Issues

a. The access ramp on the east end from the dressing rooms to the ice surface also serves as a fire egress for the spectators. This ramp is too steep to serve as a fire egress according to current building codes (ABC 2014, Section 3.4.6.7) (see Photo 2).

b. When open, the gate at the east end of the ice blocks access to the fire exit from the spectator stands. Because of the door location, there is also a hazard for

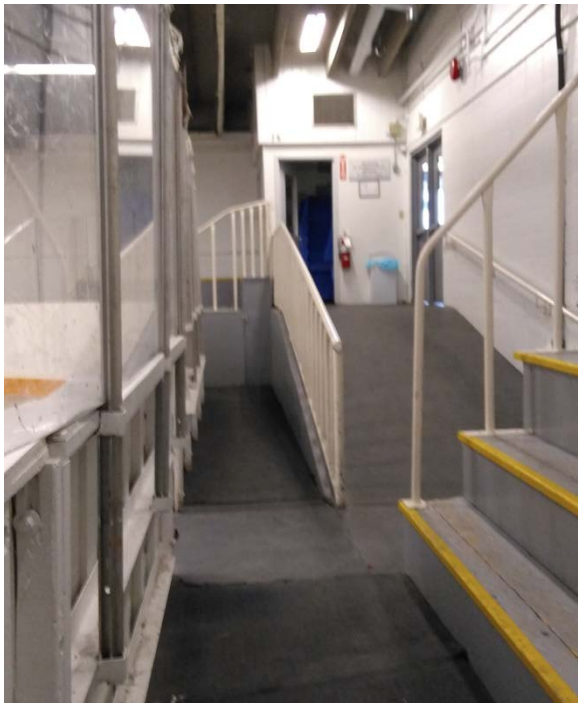


Photo 2: Access Ramp at east end of rink.

stray pucks entering the spectator area during warmups when open.

c. The existing fire alarm system is not sufficient for this space, as there are not manual pull stations at every exit (ABC 2014, section 3.2.4.17). Installation of additional devices is required to meet current building codes.

d. Current dasher boards are not constructed to current guidelines for full-contact hockey (see 2.a. below).

Photo 3: Showing relative board height with person standing as reference.

2.2 Program Space Issues

a. The original intent of the rink was to provide an additional ice surface for hockey practices, non-regulation hockey and recreational skating. However, the usage of this rink has extended to full-contact adult recreational hockey games. The height of the boards is approximately 1.45 m (57 in.) (see Photo 3), which is higher than the regulation height of 1.22 m (48 in.), making it dangerous for usage for full-contact adult games, as well as making the players benches only accessible through the gates.

b. The area of the rink is not regulation size, and therefore not usable for official tournaments or games.

2.3 Equipment Condition and Operational Issues

a. The corners of the boards have too small of a radius for the Zamboni Machine to flood all along the boards, resulting in patches in the corner that must be “flooded” by hand (see Photo 4). This results in uneven and rough ice surfaces

Photo 4: Current process of "flooding" the corners of the ice where the Zamboni cannot reach.

in the corners, making it very unsafe for all skaters, casual or otherwise.

b. The physical condition of the existing dasher boards is poor. There is cracking visible in the boards throughout, and gaps in the boards near the corners and gates, creating further safety hazards for hockey usage. There is also structural damage at the supports in the corners where the Zamboni pushes against the boards where it attempts to get as close to the corners as possible (see Photo 5).

Photo 5: Damaged structural supports for the dasher boards.

c. The concrete slab for the ice surface is cracked in several places and is not level (see Photo 6), requiring the difference to be made up with thicker ice; this reduces the efficiency of the ice slab cooling. There are also many locations where the surface of the slab has been worn down and the rebar and slab cooling piping are exposed (see Photo 7). It should be noted that the rate of deterioration has not been documented over the years, therefore the conditions observed may have occurred recently, or over the course of many years. The slab is approximately 40 years old and is near its expected end-of-life cycle for replacement.

Photo 6: Slab crack near northwest corner.

Photo 7: Exposed rebar in slab.

3.0 OPTIONS FOR SMALL ICE ARENA

The following three options address the above concerns, providing costs for each option, as well as providing design challenges specific to each option, and pros and cons with regards to programming and operations. A fourth option was initially considered, which involved expanding into the existing curling arena, however this option was abandoned due to the cost of displacing the curling arena.

3.1 Option #1: Direct Replacement

This option consists of replacing the existing components of the Small Ice Arena within the existing building envelope (see Figure 1). This option will primarily address the Safety and Building Code shortcomings, as well as improving some operational issues and replacing damaged equipment, but will not allow for any programming improvements, as the arena will remain non-regulation size. Because the rink size will remain smaller, current programming can be maintained to support non-regulation hockey games. The building envelope and roof structure will remain unchanged in this option, which accounts for the significant cost difference from the other options. Major work items consist of the following:

- Replacement of concrete slab for ice surface
- Replacement of the existing dasher boards to adjust to board height for adults, and to adjust the curve of the corners to allow the Zamboni machine to access the entire ice surface
- Replacement of spectator stands
- Addition of another fire egress to meet current building codes
- Adjustment of the access to the existing change room so the grade of the ramp to the main arena building can meet building code
- Upgrades to Fire Alarm System
- Installation of low-E ceiling to improve building envelope
- Replacement of Scoreboard and Sound System
- Upgrade of existing Heating and Ventilation System

Estimated Cost of Option #1: $1,510,000

Cost Estimate Breakdown:

Option 1: Direct Replacement	Demolition of existing boards and slab	$ 140,000	
	Replacement of Dasher boards, customized for smaller ice surface	$ 160,000	
	Replacement of concrete slab for ice surface	$ 300,000	
	New Spectator Stands	$ 90,000	
	New Fire egress	$ 40,000	
	Access ramp adjustment	$ 80,000	
	Fire Alarm upgrades	$ 20,000	
	Low-E ceiling	$ 70,000	
	Scoreboard and Sound System	$ 50,000	
	Heating and Ventilation Upgrades	$ 150,000	
	Electrical Upgrades	$ 100,000	
	Engineering (11%)	$ 130,000	Total:
	Contingency (15%)	$ 180,000	$ 1,510,000

Pros: - Simplest solution, will require the least amount of construction time; it can likely be completed over a summer period.

- Maintains existing envelope and building structure.

- Lowest capital cost of all options.

Cons: - Current rink will remain non-regulation size.

- Current programming could be maintained, but would still not allow for full-sized regulation games, resulting in less revenue.

- Rink ends will result in near half circles, due to the available existing dimensions and the need for larger radius for Zamboni machine.

- Loss of off-season usage of space during construction for summer.

- Allows for least amount of space for spectators and least favorable viewing angles.

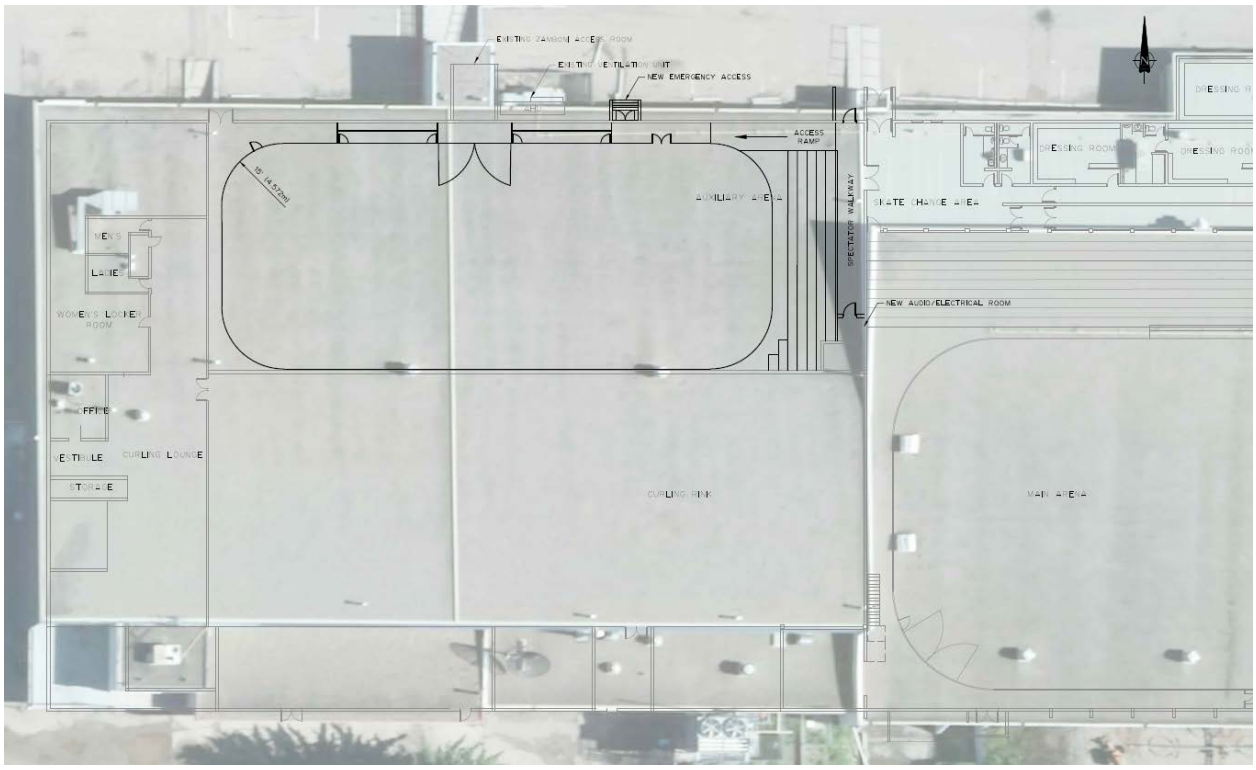


Figure 1 – Option #1 Layout: Direct Replacement of Small Arena within existing building envelope

3.2 Option #2: Expand Current Building North to Allow for Regulation Size

This option extends the envelope of the Small Ice rink north into the existing parking area. This allows for the ability to increase the size of the rink to NHL regulation size (see Figure 2). The roof structure will need to be redesigned for the entire space, as the existing roof structure is currently supported from the north wall, which would need to be removed for expansion. The existing ice plant will be able to maintain a rink of this size; however, it will not have the capacity to start up both this new rink and the main arena rink simultaneously. Major work items consist of the following:

- Redesign and construction of new roof structure to be supported from east and west walls, including providing additional structural support for new roof design.
- Re-grading of the current site to allow for expansion into the parking lot, as elevation of the parking lot is higher than the elevation of the current small ice surface.
- Construction of new building into parking lot area.
- Replacement of concrete slab for ice surface
- Installation of new spectator stands.
- Extension of brine headers for slab cooling and installation of larger brine pump for cooling system.
- Installation of new dasher boards, including spectator protective netting
- Installation of low-E ceiling for improved building envelope
- New Scoreboard and Sound System
- Upgrade existing heating and ventilation systems
- Upgrade existing lighting and electrical systems

Estimated Cost of Option #2: $5,040,000

Cost Estimate Breakdown:

Option 2: Expand Current Building	Demolition of existing building section	$ 190,000	
	New building construction	$ 2,270,000	
	Ice Rink Construction	$ 1,090,000	
	Heating and Ventilation Upgrades	$ 250,000	
	Electrical and Lighting Upgrades	$ 200,000	
	Engineering (11%)	$ 440,000	Total:
	Contingency (15%)	$ 600,000	$ 5,040,000

Pros: - Current programming can be extended to include another full-sized arena.

- Lower cost than constructing new building for full-sized arena (Option #3).

Cons: - Existing roof structure will need to be redesigned and rebuilt for extended space.

- Loss of a large portion of the parking area north of existing Small Ice Arena.
- Loss of usage of small ice during construction for likely one full hockey season.
- Higher estimated capital cost when compared to Option #1

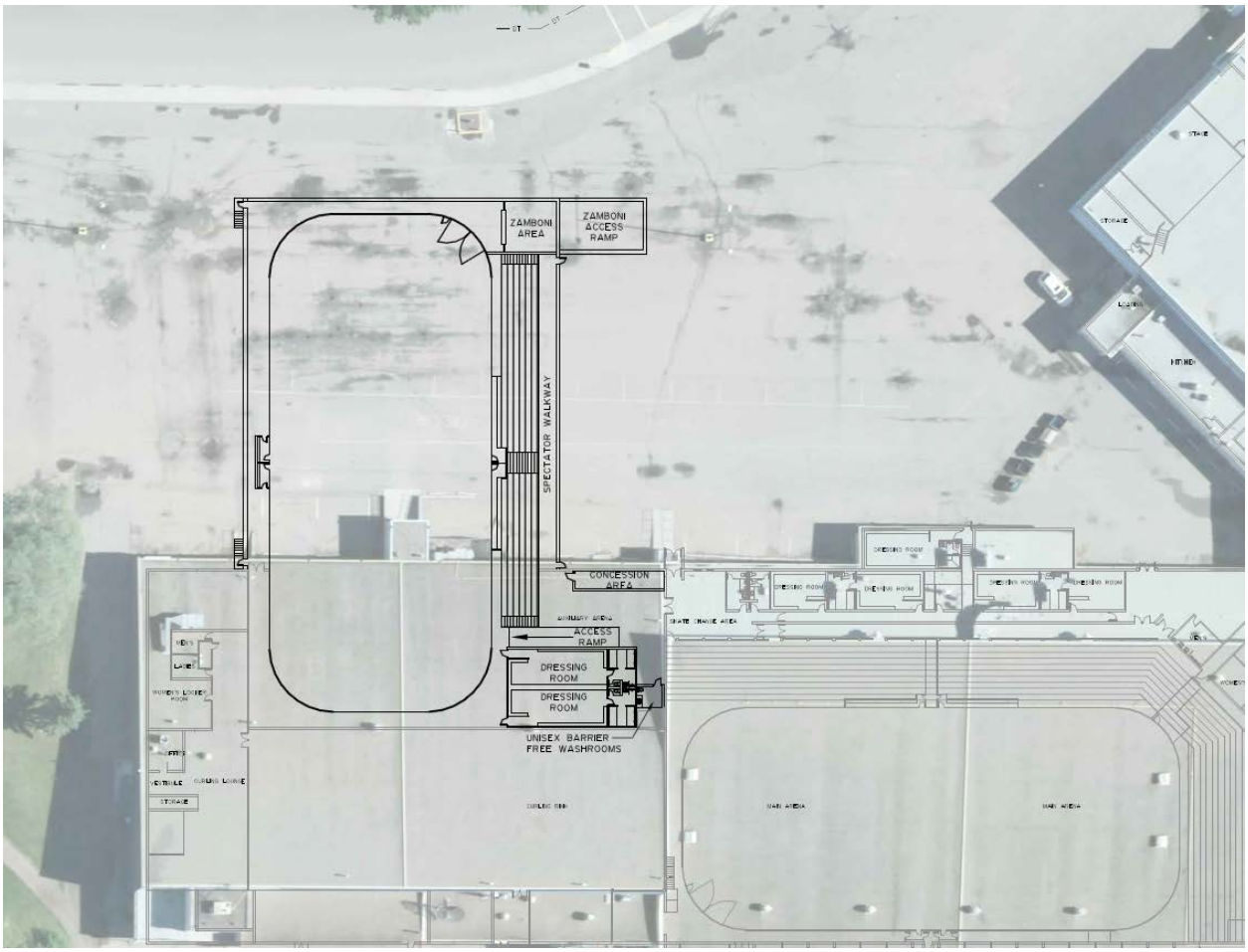


Figure 2 – Option #2 Layout: Extend Small Ice Arena north into parking area.

3.3 Option #3: New Separate Building for Regulation Size Rink

This option is for the installation of a regulation ice sheet in a new structure north of the existing Small Ice Arena. The building will be connected to the existing building to allow for re-use of the existing dressing rooms and washrooms facilities with-in the existing complex. The layout of the proposed new separate building shown in Figure 3 was selected due to its most efficient use of the space north of the existing building. The existing ice plant will be able to maintain another full-size rink, however, it will not have the capacity to start up both rinks simultaneously. This option will require modification to the Ice Plant to include a larger brine cooling pump for the larger ice surface. The Ice Plant will also need to be modified further if the existing Small Ice Arena is also to be maintained as an ice arena (these costs are not included below). The estimated cost below does not include any upgrading of the existing space as per Option #1. Major work items consist of the following:

- Construction of new building for a regulation-sized arena (including all heating, ventilation and electrical)
- Construction of fire separation between new and existing building (for facility to remain non-sprinklered)
- Modifications of existing building to allow connection
- Construction of concrete slab for ice surface
- Installation of new spectator stands
- Extension of brine distribution piping and new brine headers for slab cooling and installation of larger brine pump for cooling system.
- Installation of new dasher boards, including spectator protective netting
- Inclusion of low-E ceiling in building construction

Estimated Cost of Option #3: $6,960,000

Cost Estimate Breakdown:

Option 3: New Separate Rink	New Building Construction	$ 3,830,000	
	Ice Rink Construction	$ 1,240,000	
	Heating and Ventilation Upgrades	$ 250,000	
	Electrical and Lighting Upgrades	$ 200,000	
	Engineering (11%)	$ 610,000	Total:
	Contingency (15%)	$ 830,000	$ 6,960,000

Pros: **-** Current programming can be extended to include another full-sized arena.

- New building can be designed for seating and operation as seen fit by Town.
- Allows for usage of existing Small Ice Arena space as seen fit by Town.
- No downtime for current Small Ice Arena during construction of new arena.

Cons: - Loss of most of the parking area north of the existing building.

- Highest estimated capital cost compared to other options.

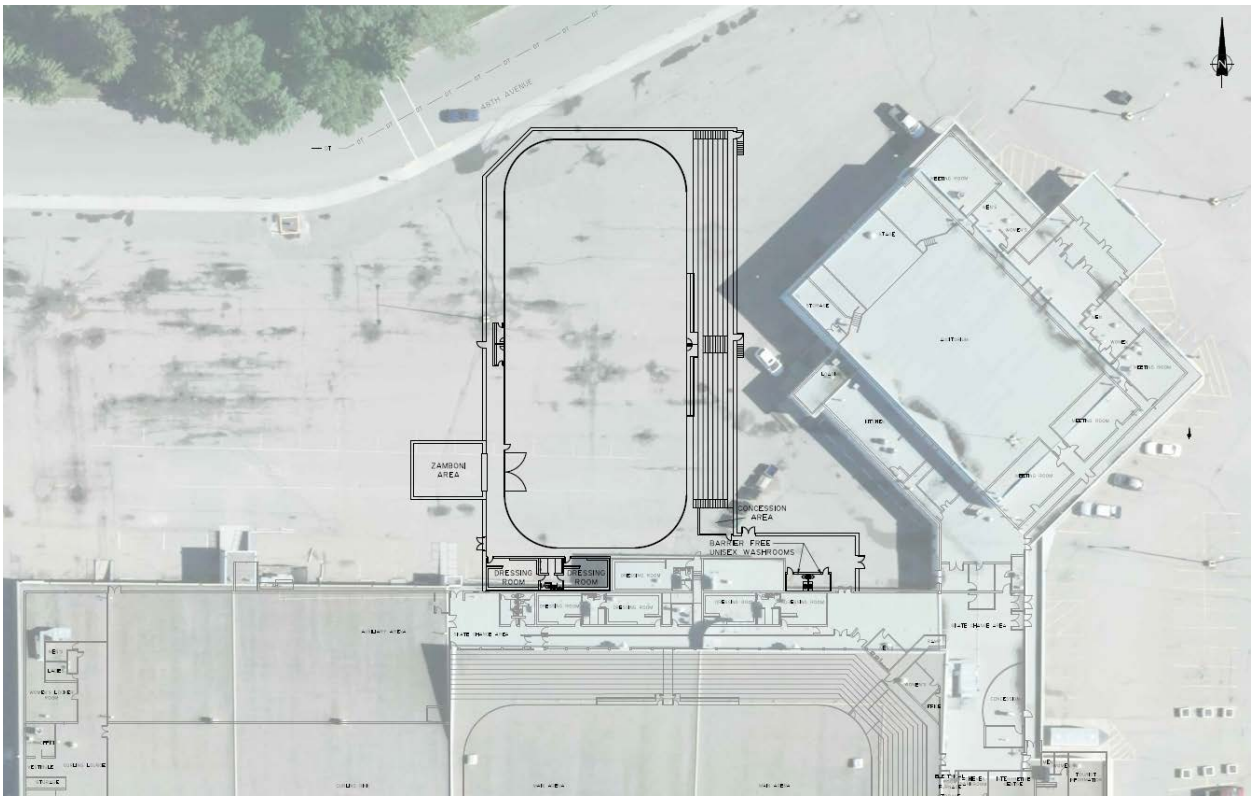


Figure 3 – Option #3 Layout: New Building for Full Ice Arena

4.0 SUMMARY AND DISCUSSION

The following summarizes the overall costs of the options:

Option 1: $1,510,000

Option 2: $5,040,000

Option 3: $6,960,000

Other than Option 1, all options are in the same cost range. The primary negative aspects that go along with the cost savings in Option 1 are:

- No improvement to programming (still have one full-size rink in facility with limited spectator seating)
- No improvement to operations time with respect to Zamboni Operation (will take the Zamboni the same amount of time to flood small ice as full-sized ice, due to size of Zamboni and its turning radius)

Option 2 and Option 3 will allow for design flexibility, as these options will be extending the current building envelope. More input from the Town of Taber could be made during design with respect to programming, operation and maintenance.

Option 3 is the only option that will not interrupt the operation of the existing small ice during construction. Any brine cooling piping modifications can be made in the off-season, while all other construction can occur while the curling and small ice rinks can continue to operate.

All of the options presented are each a 40 year investment into the facility. The population of Taber and surrounding communities is approximately 9,500, and has increased 4% in the last 5 years. At this population growth rate in 40 years Taber will have an estimated population of 13,000. This population number can be compared to that of the City of Brooks, which has 2 full-sized arenas and a population of 14,500; therefore, Taber will merit the need for a second full-sized rink before the end of the 40 year investment. If the arena is maintained as a smaller ice arena, the population of Taber will likely be above 12,000 before a similar study to this will be commissioned and the need for a second full-sized arena will be greater.

It is important to note that the demographics of the town may change over the next 10 years which will result in a change in demand and requirements for public facility usage.

The table below summarizes the considerations discussed.

	Estimated Cost	Full-sized rink?	Maintain Small Ice Operation?	Design Flexibility?
Option 1	$1,510,000	No	No	No
Option 2	$5,040,000	**Yes**	No	**Yes**
Option 3	$6,960,000	**Yes**	**Yes**	**Yes**

5.0 RECOMMENDATIONS

Due to its age and condition, the slab and its components of the Small Ice Arena are expected to fail completely sometime within the next 10 years. This will result in increasing maintenance costs as more significant components of the slab and Small Arena continue to fail over the coming years. Failure of the slab itself and the slab cooling piping will result in significant maintenance and repair costs, as well as significant revenue loss due to downtime of the Small Ice Arena if failure occurs during the operating season.

With the above considered, it is not recommended to proceed until the demand and requirements of a 40 year investment can be confirmed; specifically, whether a second full-sized arena would be merited in the Town of Taber. This decision should be made in no later than 2 years to allow for a full design to be completed so a new facility can be operational in 5 years. It is not recommended to continue to maintain the current Small Ice Arena in its current condition for more than 5 more years.

Based on the considerations of the three options studied in this report, it is recommended that the Town of Taber pursue a detailed design for Option 3: construction of a new building for a full-sized ice arena, connected to the existing facility.

Compared to all other options, the main advantage of Option 3 is that it gives the greatest ability to control the design of the new arena space to match the desired ice surface and required amenities. During the design phase of this option, the Town of Taber will have the ability to adjust the area to fit

the needs of programming and operation. With other options, design is limited to the existing building envelope and footprint, which would limit spectator seating areas, ceiling heights, and arena size in some cases.

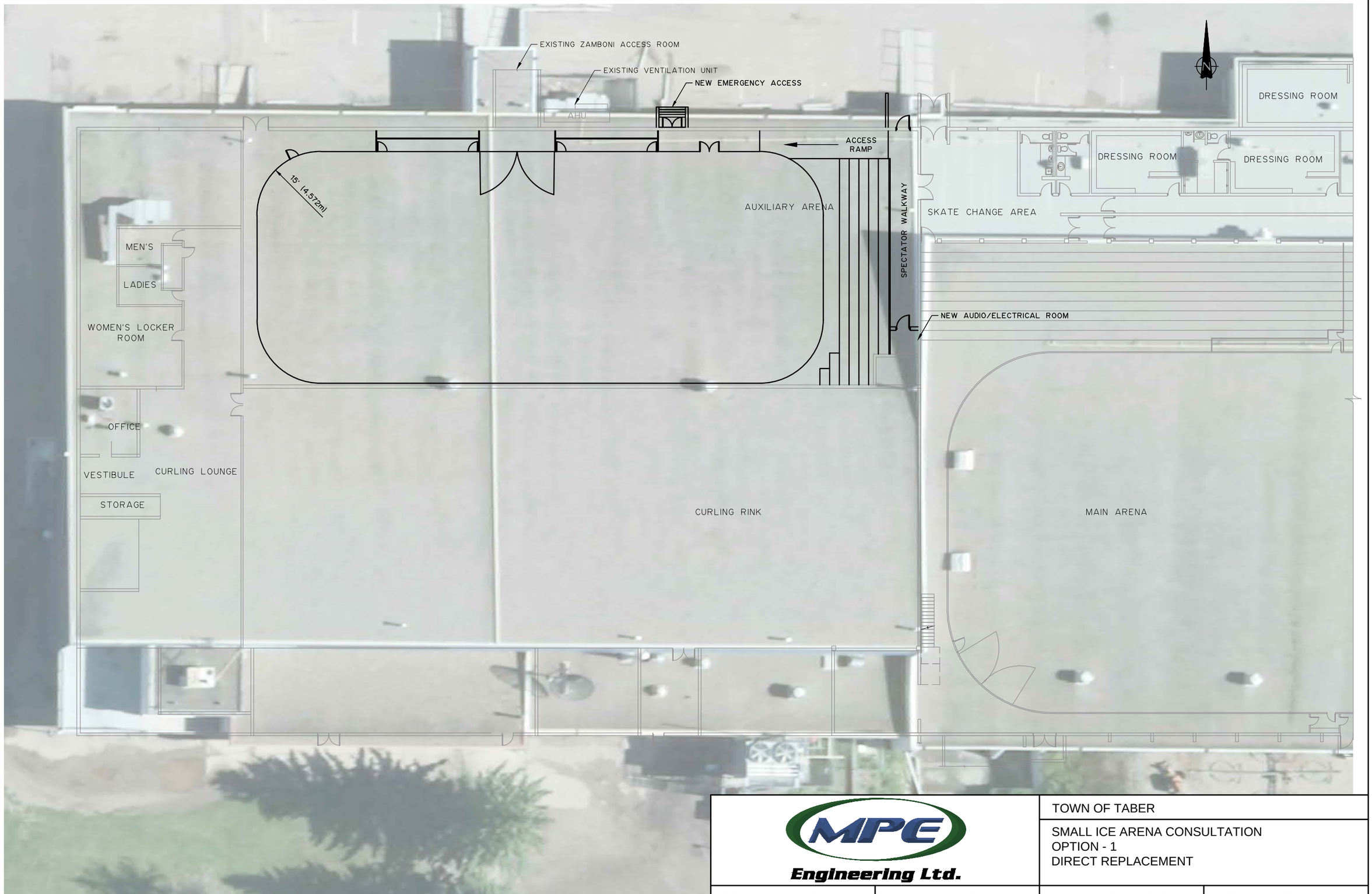
Option 3 also has the advantage of maintaining the existing Small Ice Arena as operable during almost all of construction (with the exception to the required ice plant modifications, which can be performed during the off-season). This will allow the construction to take place over more than one off-season if necessary and still have the ability to schedule the small arena for usage.

The demand and for a second full-sized arena in the Town of Taber and surrounding area should be assessed with the growing population and changing demographics of the area to determine if proceeding with construction of Option #3 is feasible. It should be noted that if population and demographic assessments deem that a second full-sized arena would be largely underutilized, a secondary recommendation would be to proceed with Option #1, to renovate the existing small ice surface. This will give the town an additional 10-20 years to evaluate and decide on building another full-sized arena.

All other work planned to occur in the future at or near this site within the next 5-10 years should be considered with this report as it becomes relevant.

APPENDIX A

LAYOUT DRAWINGS OF OPTIONS

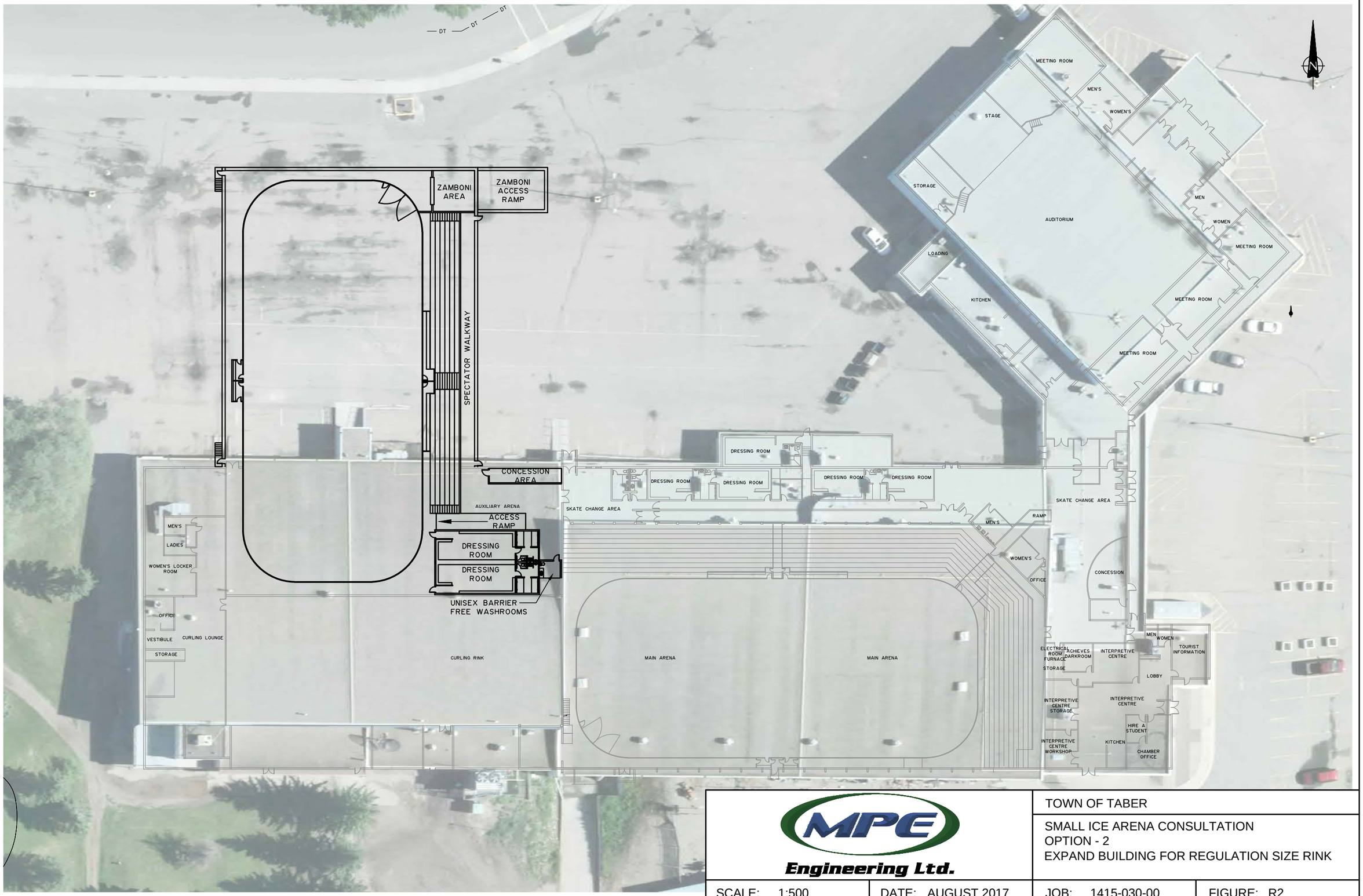


MPE Engineering Ltd.

TOWN OF TABER

SMALL ICE ARENA CONSULTATION
OPTION - 1
DIRECT REPLACEMENT

SCALE: 1:250	DATE: AUGUST 2017	JOB: 1415-030-00	FIGURE: R1



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TOWN OF TABER

SMALL ICE ARENA CONSULTATION
OPTION - 2
EXPAND BUILDING FOR REGULATION SIZE RINK

SCALE: 1:500	DATE: AUGUST 2017	JOB: 1415-030-00	FIGURE: R2

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TOWN OF TABER

SMALL ICE ARENA CONSULTATION
OPTION - 3
NEW SEPARATE BUILDING

SCALE: 1:500	DATE: AUGUST 2017	JOB: 1415-030-00	FIGURE: R3