June 18, 2014

The Corporation of the City of Vernon

Vernon Civic Arena Replacement Feasibility Study

Vernon, BC

MQN ARCHITECTS

#100 - 3313 32 Avenue, Vernon, BC V1T 2E1
250.542.1199 www.mqnarchitects.com

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1.0 PROJECT OVERVIEW

1.1 EXECUTIVE SUMMARY

The City of Vernon, on behalf of the Greater Vernon Advisory Committee, contracted MQN Architects to provide a report identifying potential locations for and feasibility of replacing the Vernon Civic Arena. MQN Architects has considered the potential locations and evaluated the solutions on feasibility of construction, adherence to the program requirements, site constraints, and overall project cost.

Upon analysis of the identified design criteria, MQN Architects has recommended a preferred option for a proposed Civic Arena replacement.

Following the analyses, the preferred option has been evaluated against the report submitted by Bruce Carscadden Architect Inc. (BCA) with respect to the option of renovating the existing Civic Arena.

Figure 1. Vernon Civic Arena.

Figure 2. Kal Tire Place.

Figure 3. Priest Valley Arena.

1.2 INTRODUCTION – Team

The City of Vernon – Civic Arena Replacement Feasibility Study represents a comprehensive effort by a carefully selected team of individuals to evaluate the feasibility of the three (3) site options as directed by the City of Vernon.

This document summarizes the findings of MQN Architects and their team of consultants in reference to the proposed site options. Through diligent collaboration and investigation, the following professionals performed a thorough analysis of each option in their respective disciplines, in order to deliver a professional recommendation regarding the preferred location for a replacement sheet of ice.

Team of Consultants

Architecture & Planning	**MQN Architects**
	Brian Quiring
	Jay Gillman
	Jennifer Fossum
	Alyssa Quiring
Civil Engineering	**Monaghan Engineering & Consulting**
	Brian Monaghan
Electrical Engineering	**Smith & Andersen Falcon Engineering**
	Kent Galloway
Mechanical Engineering	**Smith & Andersen Falcon Engineering** (Formerly Poole & Associates)
	Don Poole
Refrigeration Engineering	**Bradley Refrigeration Consultants**
	Eric Bradley
Structural Engineering	**R&A Engineering**
	Greg Wylie
Quantity Surveyor	**LTA Consultants Inc**
	Lyndon Thomas

The consulting team was complimented by the insightful contributions by stakeholder and owner representatives.

Key participants included:

City of Vernon	**Doug Ross, Director** Recreation Services
City of Vernon	**Stan Mitchell,** Arenas Manager
City of Vernon	**Jim Coughlin**, Recreation Facilities Coordinator

1.3 METHODOLOGY

Based on the objectives outlined by the Greater Vernon Advisory Committee (GVAC), the following five (5) site options were reviewed and compared with respect to their location viability for the replacement sheet of ice: Kal Tire Place (North side), Kal Tire Place (West side), Priest Valley Arena (West side), Priest Valley Arena (East side), and a new stand alone arena (within city limits or regional park land). The viability of each site was evaluated on a variety of factors, including land acquisition, capacity for future expansion, parking retention, and cost. Through public consultation and meetings with notable stakeholders, the program was refined and weighted in the evaluation of each site. Stakeholders include, but are not limited to, The Greater Vernon Advisory Committee (GVAC), the City of Vernon, Vernon Vipers, Greater Vernon Minor Hockey (GVMH), On the Edge Hockey Academy, Pursuit of Excellence Hockey Academy, Greater Vernon Ringette, Vernon Speed Skating Club, Vernon Figure Skating Club, and the City of Vernon arena operations staff.

Through these forums, the base facility program was identified.

The new facility should include a 400 seating capacity bench type spectator area and a standard size NHL ice surface (200' x 85'), complete with dasher board system (with glass), spectator netting along the perimeter, players and penalty benches, and signal and timing devices. Along with the necessary support spaces the following are also included in the design: washroom facilities (as required by BCBC), mechanical and electrical rooms, refrigeration room, ice resurfacing room (with ice dump pit), janitors room, storage room (with mop sink and shelving), and maintenance staff room / equipment room.

Consultation with the stakeholders, including the Vernon Vipers, Greater Vernon Minor Hockey (GVMH), and On the Edge Hockey Academy, identified and acknowledged the following program items that were incorporated and reflected in the base program. In reference to their requests, four (4) team dressing rooms complete with two (2) shower facilities, two (2) water closet facilities, and single washbasin, were included. Two (2) referee / gender neutral dressing rooms, each with shower facilities, water closet and a washbasin were also included to accommodate coed participation at the suggestion of GVMH. In addition, a front lobby area with ticket sales office, office space, and a dry goods concession have also been identified and incorporated into the base program.

The following enhancements were further recognized during the program development and are described as "value added" options. These options include a multipurpose room, fitness training facilities, an elevated walking track, and additional office space. These options are seen as program items that could be incorporated within the project if alternate sources of funding were made available.

Taking into consideration the interests of the stakeholders and relevant historical data, the potential of each site was reviewed on respective advantages, disadvantages, and design options. A matrix was used to evaluate the proposed sites and aforementioned design options, in order obtain an effective and equitable comparison. The comparative analysis of the respective options took into consideration the following criteria: benefits and challenges, preliminary cost estimates, and operating efficiencies. A final recommendation was made based on these findings. Lastly, the preferred option was evaluated against the previous Civic Arena Assessment report.

Figure 4. Open house with stakeholder groups.

2.0 DESIGN OPTIONS

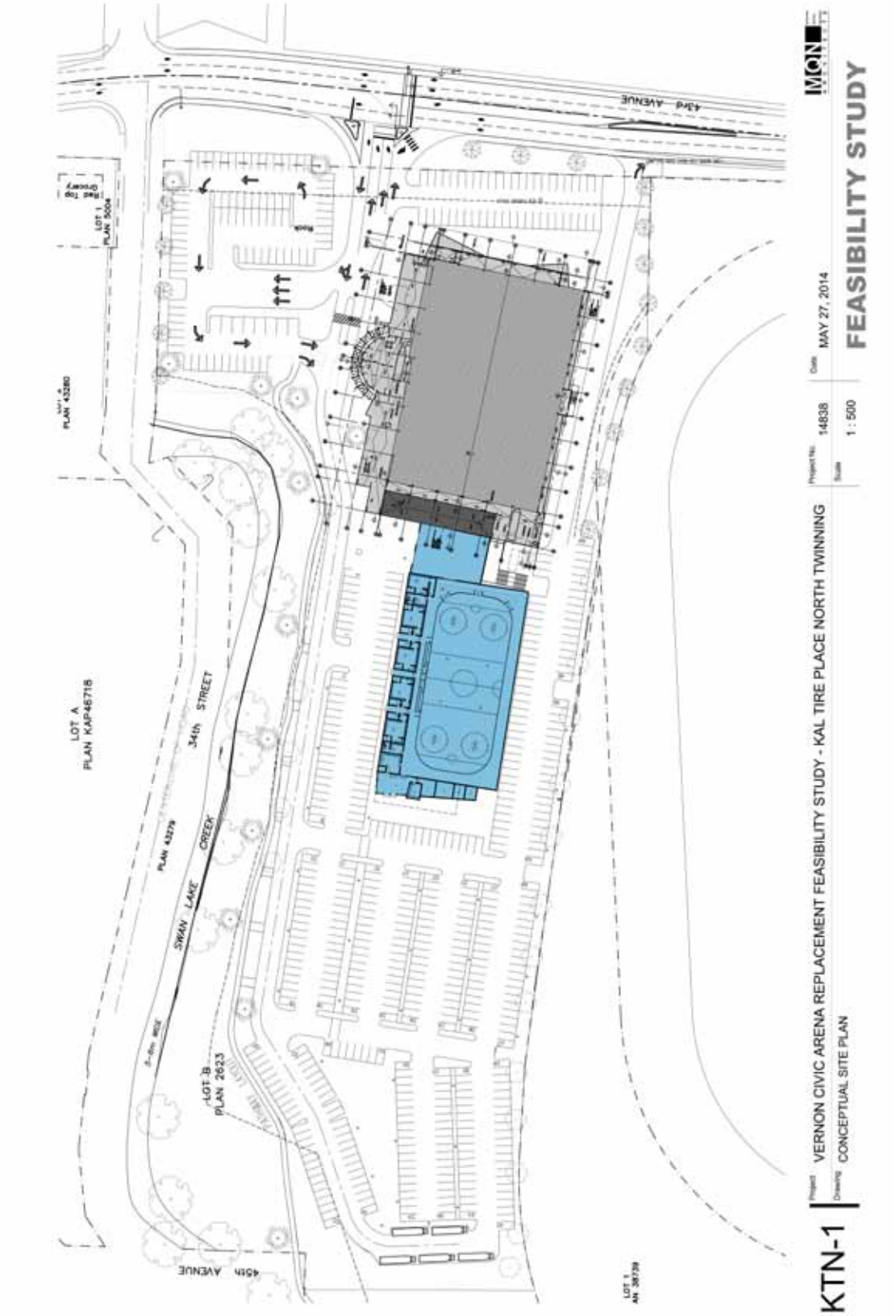
2.1 A – KAL TIRE PLACE NORTH

Figure 5. Existing Kal Tire Place.

Kal Tire Place North, option 1a, investigates the potential to add a second sheet of ice to the north end of the existing Kal Tire Place facility, covering a portion of the existing parking area. This option does not require additional land acquisition, has the ability to be constructed within the allotted time frame, and is appropriately zoned. We consider this option to be among the more viable choices. Furthermore, because the land use is consistent with the OCP, the project utilizes advantages and efficiencies gained through existing infrastructure, and has minimal foreseeable code implications, we suggest further consideration of the site, Kal Tire Place – North.

Figure 6.

Proposed facility.


43rd AVENUE
LOT 1
PLAN 3004
LOT 1
PLAN 43280
LOT A
PLAN KAP46718
34th STREET
PLAN 43279
SWAN LAKE CREEK
LOT B
PLAN 2623
45th AVENUE
LOT 1
PLAN 38739
MQN ARCHITECTS
Date MAY 27, 2014
Project No. 14838
Scale 1 : 500
FEASIBILITY STUDY
Project VERNON CIVIC ARENA REPLACEMENT FEASIBILITY STUDY - KAL TIRE PLACE NORTH TWINNING
Drawing CONCEPTUAL SITE PLAN
KTN-1

ADVANTAGES & CHALLENGES

Advantages

- Consistent with current OCP
- Supported by existing zoning
- Land acquisition not required
- Existing staff on site with minimal staff level additions
- Existing facility is sprinklered
- Existing facility is non-combustible construction
- Minimal code implications
- Future expansion already included in the design of the existing facility's ice plant
- Potential to use existing facility's infrastructure – Zamboni, ice pit etc.
- Sufficient space to accommodate an elevated walking track
- Sufficient space to accommodate the "value added program elements"
- Proposed new parking area (along 43rd Avenue) increases parking availability in close proximity to the existing facility's main entrance
- Allows for future bowl expansion of existing facility (current program areas relocated to 2nd level of connection)
- Ability to meet the allotted time constraints, as outlined by the City of Vernon
- Sufficient space for future expansion of additional ice sheets (towards the west to create a quad facility, if challenges with track can be resolved)
- Minimal Site Servicing work required
- Sufficient Electrical Servicing
- Ability to extend existing Electrical Distribution, Fire Alarm, Communication and securities systems.
- Existing site lighting removed for to suite building location can be reused in additional parking area
- Increased opportunities for large dry floor events
- Increased opportunities for large event (tournament) hosting at single venue

Challenges

- Second ice sheet will increase the parking demand by 100 stalls
- loss of one parking stall
- Existing parking deficiency
- Parking variance may be required
- Increased distance between existing parking at the north end of site and the existing facility's main entrance
- Diminished vehicular access to existing ice sheet surface (especially large trucks and busses)
- Loss of existing bus parking
- No future expansion (if challenges with track remain unresolved)
- Existing ROW at north end of existing building (between proposed addition and existing building)
- 5 existing ventilation systems located along north side (may need to be reconfigured)
- Sewer lift station may be required
- Shore power stations removed and/or relocated

CITY OF VERNON, ICE SHEET EXPANSION PROJECT | **OPTION 1A KAL TIRE NORTH** | **CONCEPTUAL ESTIMATE**

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - OPTION 1A (KTN)

Description		Gross Floor Area / Estimated Value	m^2 / $/m^2$	ft^2 / $/ft^2$
		Gross Floor Area	4,016.00	43,228
Net Building Cost		$8,578,780	$2,136.15	$198
Site Development		$590,061	$146.93	$14
Ancillary Work (Interfacing Costs)		$245,438	$61.11	$6
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,459,213	$363.35	$34
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$10,873,492**	**$2,707.54**	**$252**
GST	5.00%	$543,675	$135.38	$13
ESTIMATED CONSTRUCTION COST (Including GST)		**$11,417,166**	**$2,842.92**	**$264**
SOFT COST				
Design Fees - Allowance	10.00%	$1,087,349	$270.75	$25
Building Permit Fees	1.20%	$130,482	$32.49	$3
Development Cost Charges		$35,662	$8.88	$1
Miscellaneous	1.50%	$163,102	$40.61	$4
ESTIMATED SOFT COSTS (Excluding GST)		**$1,416,596**	**$352.74**	**$33**
GST	5.00%	$70,830	$17.64	$2
ESTIMATED SOFT COSTS (Including GST)		**$1,487,425**	**$370.37**	**$34**
ESTIMATED PROJECT COSTS (Including GST)		**$12,904,592**	**$3,213.29**	**$299**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE

1) Running Track	$533,447
2) Dryland Training Facility	$552,005
3) Multi-Purpose Room	$59,671
4) Additional Office Space	$142,174
5) New Parking Area Adjacent to 43rd Avenue	$238,334

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST.

2.1 B – KAL TIRE PLACE WEST

Figure 7. Existing Kal Tire Place adjacent to proposed location for new facility.

Kal Tire Place – West, option 1b, investigates the potential to add a second sheet of ice, covering the existing laneway and extending into the neighbouring race track property, along the west edge of the existing Kal Tire facility.

As this option does not require additional land acquisition, the land use is consistent with the OCP, the property is zoned appropriately, the project utilizes advantages and efficiencies gained through existing infrastructure, has minimal foreseeable code implications, and has less impact on parking, it could be considered to be one of the more viable options. However, given the allotted schedule, together in view of the considerable unresolved challenges presented by the existing race track, at this time option 1b, Kal Tire Place – West, is not recommended and should not be pursued further.

Figure 8. Proposed Kal Tire Place West facility.


FEASIBILITY STUDY
MAY 27, 2014
14838
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KTW-1
VERNON CIVIC ARENA REPLACEMENT FEASIBILITY STUDY - KAL TIRE WEST TWINNING
CONCEPTUAL SITE PLAN
34th STREET
SWAN LAKE CREEK
LOT A
PLAN KAP46715
LOT B
PLAN 2623
43rd AVENUE

ADVANTAGES & CHALLENGES

Advantages

- Consistent with current OCP
- Supported by existing zoning
- Land acquisition not required
- Existing staff on site with minimal staff level additions
- Gain of 20 additional parking stalls
- Existing facility is sprinklered
- Existing facility is non-combustible construction
- Minimal code implications
- Existing facility's ice plant designed for future expansion
- Potential to use existing facility's infrastructure - Zamboni, ice pit etc.
- Sufficient space to accommodate an elevated walking track
- Sufficient space to accommodate the "value added program elements"
- Proposed new parking area (along 43rd Avenue) increases parking availability in close proximity to the existing facility's main entrance.
- Allows for future bowl expansion of existing facility
- Vehicular access to existing ice sheet surface undisturbed (large trucks and busses)
- Existing bus parking unaffected
- Sufficient space for future expansion of additional ice sheets in both north and west directions. (Assumes race track challenges resolved)
- Minimal Site Servicing work required
- Sufficient Electrical Servicing
- Ability to extend existing Electrical Distribution, Fire Alarm, Communication and securities systems. Staffing on site with minimum additions to staff levels
- Increased opportunities for large dry floor events
- Increased opportunities for large event (tournament) hosting at single venue

Challenges

- Second ice sheet will increased the parking demand by 100 stalls
- Existing parking deficiency
- Parking variance may be required
- Race Track
- May not be able to be completed within the allotted time constraints
- Diminished vehicular access (if western lane is not relocated)
- Existing stormwater ROW along western edge of existing building (to be relocated)
- Increased geotechnical risk
- Significant site work costs
- Increased site development costs
- 12 existing ventilation systems along west side (may need to be reconfigured)
- Existing Gas service on west side of building (may need to be relocated)

CITY OF VERNON, ICE SHEET EXPANSION PROJECT | **OPTION 1B KAL TIRE WEST** | **CONCEPTUAL ESTIMATE**

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - OPTION 1B (KTW)

Description			m^2	ft^2
		Gross Floor Area	3,835.00	41,280
		Estimated Value	$/m^2	$/ft^2
Net Building Cost		$8,407,476	$2,192.30	$204
Site Development		$909,072	$237.05	$22
Ancillary Work (Interfacing Costs)		$350,831	$91.48	$8
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,498,444	$390.73	$36
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$11,165,822**	**$2,911.56**	**$270**
GST	5.00%	$558,291	$145.58	$14
ESTIMATED CONSTRUCTION COST (Including GST)		**$11,724,114**	**$3,057.14**	**$284**
SOFT COST				
Design Fees - Allowance	10.00%	$1,116,582	$291.16	$27
Building Permit Fees	1.20%	$133,990	$34.94	$3
Development Cost Charges		$34,055	$8.88	$1
Miscellaneous	1.50%	$167,487	$43.67	$4
ESTIMATED SOFT COSTS (Excluding GST)		**$1,452,114**	**$378.65**	**$35**
GST	5.00%	$72,606	$18.93	$2
ESTIMATED SOFT COSTS (Including GST)		**$1,524,720**	**$397.58**	**$37**
ESTIMATED PROJECT COSTS (Including GST)		**$13,248,833**	**$3,454.72**	**$321**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE

1) Running Track	$533,447
2) Dryland Training Facility	$552,005
3) Multi-Purpose Room	$59,671
4) Additional Office Space	$142,174
5) New Parking Area Adjacent to 43rd Avenue	$238,334

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST.

2.2 A – PRIEST VALLEY ARENA EAST

Figure 9. Existing Priest Valley Arena facility.

Option 2b, the Priest Valley East option investigates the potential to add a second sheet of ice to the east edge of the existing Priest Valley Arena facility, in the courtyard created by the arena, pool, Halina Centre, and curing rink, which would cover the existing Centennial Outdoor Rink.

This option meets many of the criteria to be considered ideal. There is considerable value in providing a facility of this type within an overall recreation complex, especially in such a centralized location in the City. Adding value, the existing ice plant has the design capacity for an additional ice sheet and there are significant operating cost savings in running a multi-sheet facility. The project could be constructed within the allotted time frame as the site is owned by the City of Vernon, is congruent with the OCP, and is zoned appropriately. However, there are also a number of challenges. The proximity to the existing fire lane and main recreation complex may be more challenging than anticipated. The base program is unable to be met with the constrained site.* The constrained site further complicates construction and the loss of the outdoor rink would be notable. This option is among the more viable options investigated however, for the above reasoning it is not considered preferred.

Figure 10. Proposed location for the Priest Valley East facility.


FEASIBILITY STUDY
MAY 27, 2014
14838
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PVE-1
VERNON CIVIC ARENA REPLACEMENT FEASIBILITY STUDY - PV ARENA EAST TWINNING
CONCEPTUAL SITE PLAN
AUDITORIUM
RECREATION CENTRE
POOL
CURLING RINK
EXISTING FIRE LANE
37TH AVENUE
39TH AVENUE
VERNON ARTS THEATRE
VERNON ARTS THEATRE PARKING
DAYCARE & YOUTH CENTER
REC CENTER PARKING LOT
RECREATION CENTER PARKING
CURLING RINK PARKING LOT
47 NEW STALLS

ADVANTAGES & CHALLENGES

Advantages

- Consistent with current OCP
- Supported by existing zoning
- Land acquisition not required
- Centralized location
- Complement to the existing recreation centre amenities
- Existing staff on site with minimal staff level additions
- Existing facility is non-combustible construction
- Existing facility's ice plant designed for additional ice sheet
- Potential to use existing facility's infrastructure - Zamboni, ice pit etc.
- Ability to meet the allotted time constraints, as outlined by the City of Vernon
- Potential to split spectator viewing area between existing and new ice sheet
- Ability to extend existing Electrical Distribution, Fire Alarm, Communication and securities systems.
- Gain of 6 additional parking stalls
- Increased opportunities for large dry floor events
- Increased opportunities for large event (tournament) hosting at single venue

Challenges

- Loss of Outdoor Centennial skating rink
- Insufficient space to provide for all base program elements.*
- Second ice sheet will increased the parking demand by 100 stalls
- Existing parking deficiency
- Parking variance may be required
- Spectator viewing position not ideal
- Existing Fire Lane Access
- Costs to sprinkler existing building
- Limited future expansion - (PV West Option)
- Inadequate existing site servicing
- Inadequate electrical servicing
- Insufficient space to accommodate an elevated walking track
- Insufficient space to accommodate the "value added program elements"*
- Constrained construction site
- 1 existing ventilation systems along west side (may need to be reconfigured)

* With additional study more of the program elements may potentially be incorporated

** Information regarding the current existing firefighter access was unable to be confirmed within the time frame allotted the report

CITY OF VERNON, ICE SHEET EXPANSION PROJECT | **OPTION 2A PRIEST VALLEY EAST** | **CONCEPTUAL ESTIMATE**

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - OPTION 2A (PVE)

Description			m^2	ft^2
		Gross Floor Area	3,318.00	35,715
		Estimated Value	$/m^2	$/ft^2
Net Building Cost		$7,886,294	$2,376.82	$221
Site Development		$599,328	$180.63	$17
Ancillary Work (Interfacing Costs)		$659,466	$198.75	$18
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,417,489	$427.21	$40
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$10,562,577**	**$3,183.42**	**$296**
GST	5.00%	$528,129	$159.17	$15
ESTIMATED CONSTRUCTION COST (Including GST)		**$11,090,706**	**$3,342.59**	**$311**
SOFT COST				
Design Fees - Allowance	10.00%	$1,056,258	$318.34	$30
Building Permit Fees	1.20%	$126,751	$38.20	$4
Development Cost Charges		$29,464	$8.88	$1
Miscellaneous	1.50%	$158,439	$47.75	$4
ESTIMATED SOFT COSTS (Excluding GST)		**$1,370,911**	**$413.17**	**$38**
GST	5.00%	$68,546	$20.66	$2
ESTIMATED SOFT COSTS (Including GST)		**$1,439,457**	**$433.83**	**$40**
ESTIMATED PROJECT COSTS (Including GST)		**$12,530,163**	**$3,776.42**	**$351**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE

1) Running Track	N/A
2) Dryland Training Facility	$588,487
3) Multi-Purpose Room	$61,334
2) Additional Office Space	$146,137

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST.

2.2 B – PRIEST VALLEY ARENA WEST

Figure 11. Priest Valley Arena.

Option 2a, the Priest Valley West option investigates the potential to add a second sheet of ice to the west edge of the existing Priest Valley Arena facility, expanding the facility and property west into the Becker Park lands.

There is considerable value in providing a facility of this type within an overall recreation complex, especially in such a centralized location in the City. Adding value, the existing ice plant has the design capacity for an additional ice sheet and there are significant operating cost savings in running a multi-sheet facility. However, this option requires multiple land acquisitions, all of which subsequently require OCP amendments and re-zoning, with negative impact on the project schedule. Provided the indicated schedule, this option may not be able to be completed within the City's time constraints, together with substantial site works, and the increased geotechnical risk it is not recommended to pursue further.

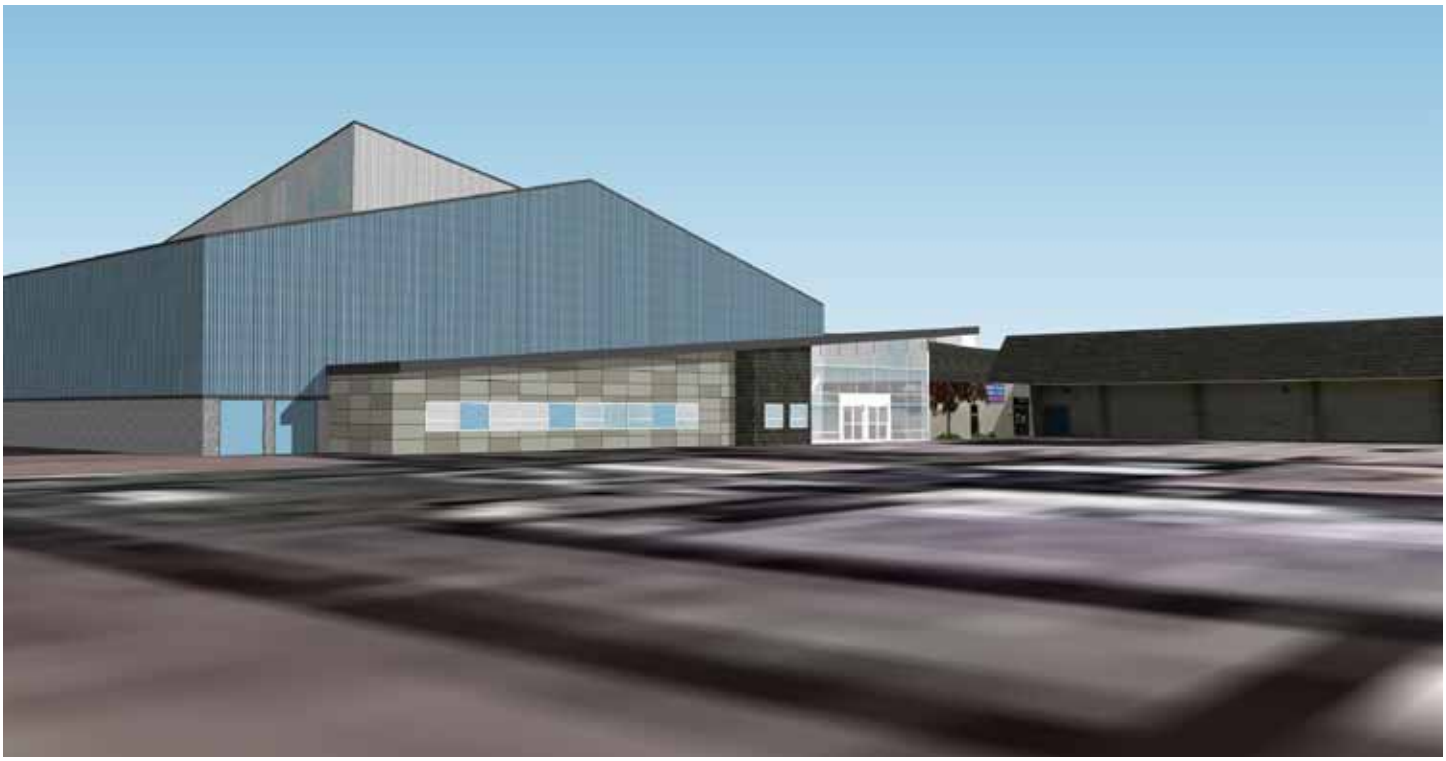

Figure 12. Proprosed facility for Priest Valley West.


FEASIBILITY STUDY
MAY 15, 2014
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PVW-1
VERNON CIVIC ARENA REPLACEMENT FEASIBILITY STUDY - PV ARENA: WEST TWINNING
CONCEPTUAL SITE PLAN
35TH AVENUE
37TH AVENUE
32ND STREET
VERNON ARTS THEATRE PARKING
DAYCARE & YOUTH CENTER
REC CENTER PARKING LOT
RECREATION CENTER PARKING
VERNON ARTS THEATRE
CURLING RINK PARKING LOT
AUDITORIUM
RECREATION CENTER
POOL
HALINA CENTRE
CURLING RINK
CENTENNIAL OUTDOOR RINK
PV ARENA
GYMNASIUM

ADVANTAGES & CHALLENGES

Advantages

- Centralized location
- Complement to the existing recreation centre amenities
- Net gain of 105 parking stalls
- Existing facility is non-combustible construction
- Existing staff on site with minimal staff level additions
- Existing facility's ice plant designed for additional ice sheet
- Potential to use existing facility's infrastructure - Zamboni, ice pit etc.
- Sufficient space to accommodate an elevated walking track
- Sufficient space to accommodate the "value added program elements"
- Ability to extend existing Electrical Distribution, Fire Alarm, Communication and securities systems.
- Increased opportunities for large dry floor events
- Increased opportunities for large event (tournament) hosting at single venue

Challenges

- OCP amendment
- Re-zoning
- Multiple land acquisitions required
- Second ice sheet will increased the parking demand by 100 stalls
- Existing parking deficiency
- Parking variance may be required
- Cost to sprinkler existing building
- Limited future expansion - (PV East Option)
- May not be able to be completed within the City's allotted time constraints
- Existing Fire Lane access
- Increased geotechnical risk
- Inadequate existing site servicing
- Inadequate electrical servicing
- Significant site work costs
- Increased site development costs
- Existing Gas service on west side of building (may need to be relocated)
- Significant site retaining required (up to 15m retaining walls)
- May not have sufficient space to construct retaining walls

CITY OF VERNON, ICE SHEET EXPANSION PROJECT | **OPTION 2B PRIEST VALLEY WEST** | **CONCEPTUAL ESTIMATE**

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - OPTION 2B (PVW)

Description		Estimated Value	$/m²	$/ft²
		Gross Floor Area	3,732.00	40,171
Net Building Cost		$8,503,613	$2,278.57	$212
Site Development		$2,888,828	$774.07	$72
Ancillary Work (Interfacing Costs)		$603,580	$161.73	$15
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,859,383	$498.23	$46
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$13,855,404**	**$3,712.59**	**$345**
GST	5.00%	$692,770	$185.63	$17
ESTIMATED CONSTRUCTION COST (Including GST)		**$14,548,174**	**$3,898.22**	**$362**
SOFT COST				
Design Fees - Allowance	10.00%	$1,385,540	$371.26	$34
Building Permit Fees	1.20%	$166,265	$44.55	$4
Development Cost Charges		$33,140	$8.88	$1
Miscellaneous	1.50%	$207,831	$55.69	$5
ESTIMATED SOFT COSTS (Excluding GST)		**$1,792,776**	**$480.38**	**$45**
GST	5.00%	$89,639	$24.02	$2
ESTIMATED SOFT COSTS (Including GST)		**$1,882,415**	**$504.40**	**$47**
ESTIMATED PROJECT COSTS (Including GST)		**$16,430,590**	**$4,402.62**	**$409**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE

1) Running Track	$561,097
2) Dryland Training Facility	$552,005
3) Multi-Purpose Room	$59,671
2) Additional Office Space	$142,174

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST.

2.3 – STAND ALONE

Option 3, the stand alone facility, investigates a proposed hypothetical arena for a undetermined site.

As a hypothetical project, the stand alone option is the able to meet all of the program requirements and can be adjusted to suit any number of value added options. The considerable parcel size required for such a facility, (approx 5 acres) especially if planned to allow for a future ice sheet, together with the constraint to be within the City or on Regional Park lands will be challenging to find. If land needs to be acquired, a parcel of this size will be expensive and it is unlikely that this process could be completed within the allotted time frame, especially if the land requires an OCP amendment or needs to be rezoned, and costs may be further driven upwards if the parcel is unserviced. In addition, there are no cost saving efficiencies with this option, as new ice making equipment, resurfacing machines and staff will all be required. For this reasoning we consider this option to be one of the least viable options.

ADVANTAGES & CHALLENGES

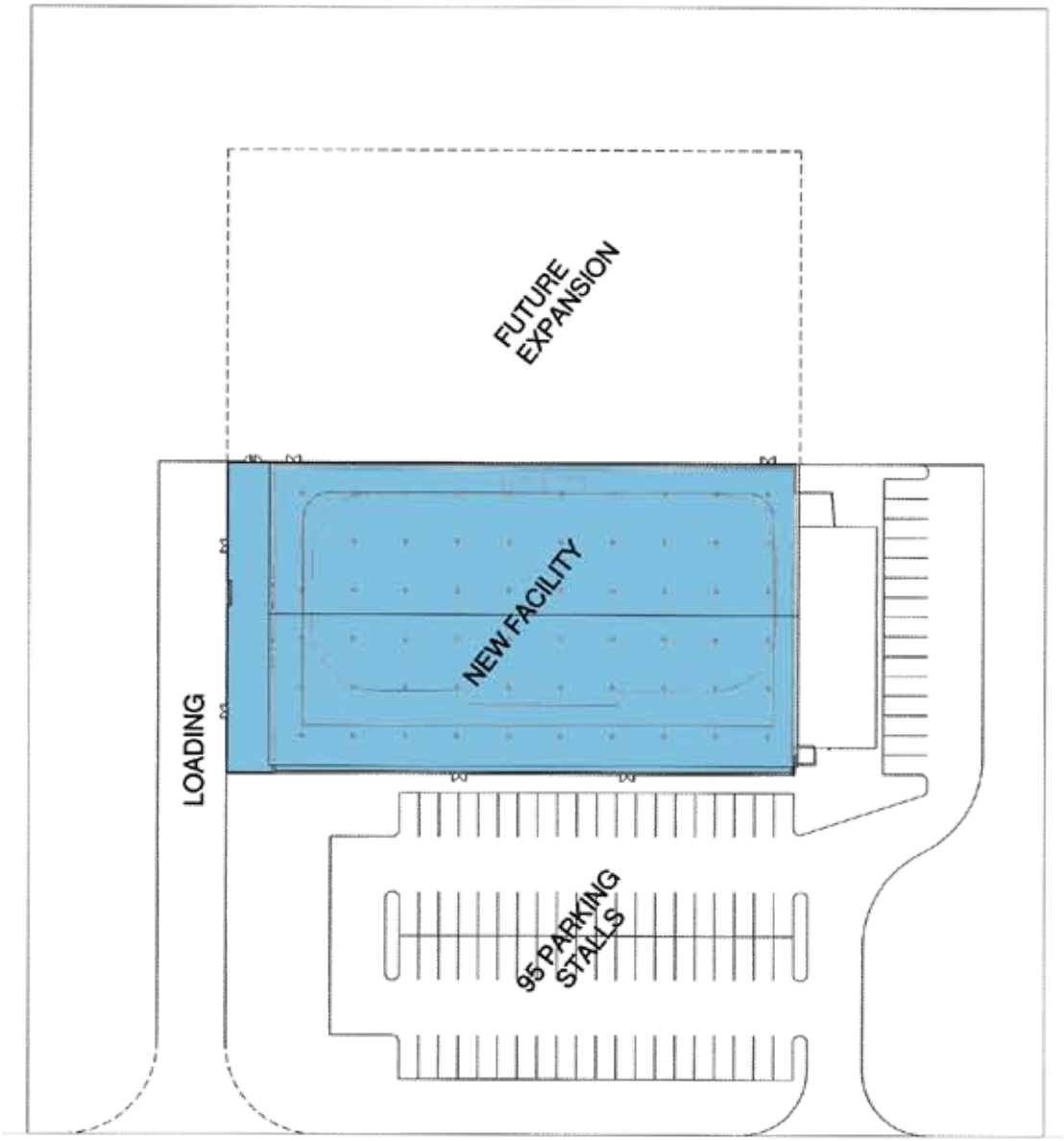
Advantages (with appropriate site)

- Minimal code implications
- Sufficient space to accommodate an elevated walking track and value-added program elements
- Allows for future expansion

Challenges (site dependant)

- Land acquisition required
- May require OCP amendment
- May require re-zoning
- No staffing efficiencies
- No shared operational cost advantages
- No potential to use existing facility's infrastructure - Zamboni, ice pit...
- Without site in place - may not be able to meet City's time constraints
- May require site servicing
- No improved opportunities for large dry floor events
- No improved opportunities for tournament hosting

Figure 13. Proposed stand alone facility.


FUTURE EXPANSION
NEW FACILITY
LOADING
95 PARKING STALLS

CITY OF VERNON, ICE SHEET EXPANSION PROJECT | **OPTION 3 STAND ALONE FACILITY** | **CONCEPTUAL ESTIMATE**

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - OPTION 3 (SAF)

Description			m^2	ft^2
		Gross Floor Area	3,767.00	40,548
		Estimated Value	$/m^2	$/ft^2
Net Building Cost		$9,060,642	$2,405.27	$223
Site Development		$1,075,016	$285.38	$27
Ancillary Work (Interfacing Costs)		$0	$0.00	$0
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,571,027	$417.05	$39
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$11,706,686**	**$3,107.69**	**$289**
GST	5.00%	$585,334	$155.38	$14
ESTIMATED CONSTRUCTION COST (Including GST)		**$12,292,020**	**$3,263.08**	**$303**
SOFT COST				
Design Fees - Allowance	10.00%	$1,170,669	$310.77	$29
Building Permit Fees	1.20%	$140,480	$37.29	$3
Development Cost Charges		$33,451	$8.88	$1
Miscellaneous	1.50%	$175,600	$46.62	$4
ESTIMATED SOFT COSTS (Excluding GST)		**$1,520,200**	**$403.56**	**$37**
GST	5.00%	$76,010	$20.18	$2
ESTIMATED SOFT COSTS (Including GST)		**$1,596,210**	**$423.74**	**$39**
ESTIMATED PROJECT COSTS (Including GST)		**$13,888,230**	**$3,686.81**	**$343**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE

1) Running Track	$417,052
2) Dryland Training Facility	$552,005
3) Multi-Purpose Room	$59,671
2) Additional Office Space	$142,174

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST.

3.0 BUSINESS CASE

3.1 BUSINESS PLAN MODELS

Recreation Facility Business Plans adhere to the principle of cost minimization throughout the facility development program and attempt to strike the appropriate balance between community need and the role of the municipality as a principle provider of the respective recreation service.

Local consultations with user groups assist in the development of an understanding of local facility (ice skating) use as well as need, both existing and future. Facility needs are then assessed using market-driven and population-based (per capita) targets in conjunction with other important factors including, service level criteria, activity trends both Provincial and National, usage patterns and capacity available at existing venues, degree of latent demand, population growth in respective age groups, and most importantly, the capacity of the City and/or Greater Vernon area to fund, operate and maintain the facility.

3.2 ECONOMICS FACTORS INFLUENCING THE ADDITION OF ARENAS

Across Canada, single sheet ice facilities are being de-commissioned and replaced at other locations by twinning, or even adding four, six or more sheets. The reason for doing so is almost entirely to do with operating costs including high maintenance and repair costs, higher energy consumption, and perhaps most significantly, staffing levels. Simply, a single sheet facility requires about four full time staff and a twin facility requires only five FTE's a reduction or efficiency gained of almost 40%. Additional ice sheets also add minimal staff with diminishing returns. Kal Tire Place is the exception as a spectator venue seating 3000 and home to the Vernon Vipers of the BCHL. It could remain a stand alone single sheet facility though the site appears to be large enough to accommodate twinning.

New arenas cost between $11 and $13 million with limited (±200) spectator capacity. The range depends upon quality of construction with pre-engineered steel structures at the low end and more durable institutional-quality structures at the high end. Arenas with 600, 1,200 or more seats are considerably larger buildings and more costly to build and operate.

Another factor in determining the need for ice arenas is user demand. Across Canada the decline in participation in youth male hockey (5 – 19yrs) has been significant over the past several years. Changes and development in girls and women's sport has however created a greater need for sport-specific facilities traditionally reserved for male usage i.e. hockey arenas. Opportunities exist for substantial development in ice sports for girls and women thereby enhancing the fitness level of this specific segment of the community. This opportunity, however, is not without its challenges.

When combined in an actual local population decrease in the same age group of over 10% in the past six years factored with a changing ethnic profile suggests soft growth projections for youth ice activities in the future. On the flip side, our aging population also plays a role in determining the needs of our ice facilities with adult hockey seeing a slight increase in the past years, with the trend for adults clearly from organized (structured) to unorganized (informal) and accessible to the daytime hours during the weekday.

Figure 14. Curling at the Multiplex.

3.3 CONCLUSION

The main impetus for building new arenas aside from responding to increased demand, is almost entirely based on the efficiency of operating cost recovery, including staffing (about 50% of the total), energy use (about 25%) and maintenance, repair and overhead costs (25%). Multi-sheet facilities are more economical to operate than older single-pad arenas that are gradually being phased out. An arena facility will cost in the range of $9-11 per square foot per year to operate, for a twin ice facility this would amount to about $450,000 to $550,000 annually. Revenues need to correspond to this for sustainable break-even operation.

While there are scheduling and access to ice time challenges, there presently isn't sufficient pent up or unmet demand in the region to trigger the construction of very costly additional ice sheets beyond what is proposed in this report.

Whenever possible, new facilities should be developed in conjunction with existing facilities in order to maximize both the convenience and enjoyment of citizens and economies of scale in terms of operations. The municipality should respond to trends in facility development by focusing its projects on the development and enhancement of existing and new multi-function facilities. Where possible and prudent, indoor recreation facility components (arenas) should be provided in or near multiuse centres and in combination with other services such as libraries, municipal offices and service centres to reduce operating costs and increase visibility and revenue generation potential.

Facilities should be scheduled to accommodate the needs of users while at the same time, maximizing cost recovery. The best opportunity for highest revenue generation is prime time however the majority of this time period utilized by the youth organizations and subsidized by the municipality. However our aging and active population is a group that should be approached for facility use in periods of low demand, facilities can and should be used for any acceptable community program. However, priorities for scheduling should be clearly indicated so that users recognize they may be displaced if new higher-level demands materialize.

Figure 15. Prospera Centre Chilliwack.

Greater Vernon Minor Hockey Association
P.O. Box 1894 Vernon, BC V1T 2X9
Phone: 250.542.0754 • Fax: 250.542.0784
Email: gvmha@shaw.ca • Website: www.vernonminorhockey.com

June 17, 2014

RE: Proposed New Arena

Dear Doug,

Our executive has attended the open house meetings with great interest in regards to the proposed new arena. We have also tried to keep our membership informed through emails and posts on our GVMHA Facebook page.

From the outset, Greater Vernon Minor Hockey Association (GVMHA) has not been in favour of a renovated Civic arena. Spending upwards of $6 million to fix up a 77 year old building (which has a small ice surface - 179x79) and no ability to expand to a twin facility; makes little sense to our executive and membership. A decision to renovate the Civic would also cause us to lose that sheet of ice for an indefinite period of time, which would cripple our ability to deliver the programs and tournaments we currently offer. As you well know, the Civic arena was built in 1938, when the population of Vernon was a mere 5,000 people. The population has grown over 8 fold since the Civic arena was constructed, but Vernon's recreation facilities have not grown to keep pace.

Ideally, GVMHA would like to see a twinned facility with two NHL sized ice surfaces. This would provide the best opportunity to grow membership numbers by drawing new families to our community. In fact, the largest growth in Vernon's history occurred in the 10 years following the construction of the Civic (+50%). We would also develop additional skill camps, and have the ability to host additional tournaments. Instead of our usual 8 team tournaments, we could easily attract 12 to 16 team tournaments throughout each weekend in the fall and winter. Private Spring and summer teams would have the same benefits. The economic benefit from sport tourism can be seen every weekend when GVMHA hosts a tournament. Hotel parking lots are full, Boston Pizza and other restaurants are enjoying increased visitation, and families are spending throughout the community.

I understand the decision to build a new, stand-alone facility will require consensus from the tax payers of Greater Vernon, but first our elected leaders must have the vision and fortitude to lead us into the future, and demonstrate a commitment to the youth of today, and tomorrow, by allowing it's citizens the opportunity to show their support through a referendum to build a new twin facility.

On the following page is an article from the Vernon High School Annual written in 1938. It outlines the positive impact the construction of their new Civic Arena had on the community and all the positive opportunities it created in its time. We can and **should**, experience this for ourselves. The benefits will be realized for generations to come.

We would be pleased to meet with the GVAC board members any time should they wish to meet with our executive and gain perspective of the needs of our association. We believe our programs help create the healthy, community oriented citizens of our future. It's time we invest in that future.

Sincerely,
Richard Frater
President GVMHA

The Vernon Civic Arena

The construction of the Vernon Civic Arena has had, and will have great effect on the Sport life of the Vernon High School. Because of tl added facilities offered by the Arena, the members of the V. H. S. Hocke Team practically lived on ice last winter. The results of this fact a plainly shown when it is realized that out of ten games played, the Verno team lost but one and then topped off this record by capturing the Hocke Cup. Now that the summer sport of Lacrosse has taken the place of hocke in the Arena, many of the local boys, and especially those in High Schoc are showing a great interest in the game. Because of this interest, mad possible mainly because of the added advantages which the Arena offer the not too distant future will probably see lacrosse become a recognize sport in the school. If this prediction should come to be fulfilled, it will b entirely through the influence of the Arena and those who control the ir terests connected with it. Therefore we wish to set before you here a few c the facts concerning the Arena and its management in order that those wh read this annual now and in the future will remember the Arena and it first year of existence.

Early in 1937 work began on what was to be one of Vernon's mos ambitious projects. After many months of tireless effort there stood a building which was the pride of Vernon. That building—the Arena—mea sures two hundred and thirty feet long by one hundred and thirty feet wide At the peak of its roof it stands fifty-six feet high. Inside, the playing or ice surface is one hundred and eighty feet by eighty feet. The bed of this surface contains approximately seven miles of pipes which lie on a nine inch depth of coke screening. In summer this surface is covered by a sec- tional wooden floor in order that the Arena may be used for the playing of Box-lacrosse. The roof is of such construction that no posts or pillars are necessary for its support. The lowest beam is twenty feet above the play- ing surface and thus allows an unobstructed view from any seat in the building. The eight tiers of seats which encircle the Arena can accommod- ate thirty-two hundred persons. Entrances in the four corners of the build- ing can handle large crowds without congestion or crowding and in the case of emergency, should the lights fail, four spot lights connected to batteries are centred on each entrance so that sufficient light to enable it to be cleared is provided.

The building is not lacking in electrical fixtures. Over the playing surface there are forty-five 1000 watt lamps, while over the seats there are twenty eight 200 watt lamps. The many rooms in the building are heated by 1000 watt heaters. Over the entrances outside are placed five 1000 watt floodlights.

Running almost the entire length of the east side of the building are the dressing rooms for the use of skaters while at the south end are the Teams' dressing rooms. The building's west side is taken up entirely by a rifle range. The various rooms in the building house are the Executive Room which is over the south west entrance, the Concession Room over the south east entrance, and the broadcasting booth high on the east wall.

The sports which hold the Arena "sport-light" are, in the winter, hockey, and in the summer, lacrosse.—Stuart Fleming.

VERNON VIPERS HOCKEY CLUB
3445 – 43rd Avenue, Vernon, BC V1T 8P5

Tel: 250-542-6022
Fax: 250-545-7360
Web: www.vipers.bc.ca
Email:jason@vipers.bc.ca

6/17/2014

To whom it may concern:

The Vernon Vipers Hockey Club strongly supports the twinning of Kal Tire Place. We feel that this expansion will create great benefit to the city of Vernon and its surrounding areas for many years to come.

The RBC Cup Championship Tournament that was recently held in the North Okanagan was a great success. Hockey Canada was very impressed with the community support for hockey and suggested the potential for future events to be hosted in our city. One main drawback to hosting future events is accessibility to ice and practice facilities locally. The expansion of KTP creates opportunity for teams to practice on site with convenience.

Our league partners are set to host the annual BCHL Showcase in Chilliwack, BC this fall. It will be the 3rd consecutive year that the event will take place at Prospera Centre. The only other venue in the league capable of hosting the event is the SOEC in Penticton, who opt not to as they host the NHL Young Stars Tournament. The Showcase brings an estimated 3 Million dollars to the economy of Chilliwack throughout the duration of the event. Twinning KTP would enable Vernon to host events of this calibre.

We feel it is important to standardize all ice sheets to NHL dimensions. This brings consistency to practices and games for all users. Currently, when the Vipers are moved to the Civic Arena for practice, it is necessary that we restructure practice due to the size restraints. Having a second regulation sized ice sheet to practice on would allow us to relocate practice more frequently – freeing up the primary sheet for other events or bookings.

The North Okanagan would benefit greatly by the twinning of Kal Tire Place. It creates opportunity for the region to host national calibre events, numerous tournaments and local activities. For the Vernon Vipers it provides a secondary surface to practice on and build camaraderie amongst the team and its supporters. We feel that this proposal will have a long term positive effect on the city of Vernon and its surrounding communities.

Regards

Jason Williamson
Head Coach/GM
Vernon Vipers

6 TIME NATIONAL CHAMPIONS
1990, 1991, 1996, 1999, 2009, 2010

ON THE EDGE
PREMIER HOCKEY ACADEMY

Proposed Arena Referendum

Letter of Support - June 17, 2014

Dear Doug Ross,

This letter is being sent in support of the Proposed Arena Referendum. As a key user of the ice facilities in the Vernon area I am keenly interested in seeing a positive decision made that benefits all stakeholders. A strict cost-only decision model can lead to sub-optimized long term outcomes.

Having a proper NHL sized replacement arena, in a twin format, provides our group specifically with the opportunity to grow our business in several directions. Same site location allows for much easier management of the students who are enrolled in our programs. The larger ice surface clearly means we are able to accommodate more skaters per session. That said, the benefits of our growth can have excellent spin off benefits for the Vernon community.

Firstly, our group is now accepting international students which means an excellent infusion of additional revenue into the SD-22 coffers, as well as local billet families and merchants. Generally speaking these students come from affluent families and contribute real cash to the community.

Secondly Vernon minor hockey has faced an increasing challenge over the last decade with Academies (POE) luring players away from our minor hockey system. Our Academy looks to reverse that trend via skill development services right here. As more players remain local, for more of their hockey career, that means more revenue that can go toward paying back a new twinned NHL facility.

Thirdly there needs to be a re-energized focus on re-building Vernon's attractiveness as a destination for hockey, ringette, figure skating and speed skating competitions and tournaments. These generate excellent cash gains for the entire community as well as revenue for the ice facilities themselves.

Best regards,
Sam Mowat

Managing Partner
ON THE EDGE - Premier Hockey Academy
589 Mt. Moberly Place
Coldstream, B.C. V1B3Y1
O (250)549-7308
C (250)550-4046
smowat2@shaw.ca

ON THE EDGE PREMIER HOCKEY ACADEMY • WWW.OTEHOCKEYACADEMY.COM • 250 549 7308

June 17, 2014

City of Vernon
Doug Ross
Director, Recreation Services
Recreation Centre, 3310-37th Avenue
Vernon, BC V1T 2Y5

RE: 2014 RBC Cup & Kal Tire Place

As Hockey Canada's Event Manager for the 2014 RBC Cup hosted in Vernon, BC I had an opportunity and the pleasure to work closely with representatives of the Vernon Viper Hockey Club, Host Organizing Committee, and representatives of the City of Vernon and Kal Tire Place.

The 2014 RBC Cup bid was awarded to the City of Vernon as a result of a solid business plan, the amenities of the area for the player and fan experience, the quality of venue, the event legacy for local community groups, support of local event stakeholders, and the strong support and tradition of the Vernon Vipers. The community was very well equipped given its proximity to a major airport, the availability and quality of hotels, local partnerships, and the quality of competition venue delivered by Kal Tire Place.

Once a community hosts a Hockey Canada event there is the hope that the experience is such that they would like to host another as part of their long term event hosting strategy and the resulting economic impact for the community which accompanies. Currently the RBC Cup is the Hockey Canada event that has the least amount of demands in terms of minimum requirements as it pertains to teams and facility infrastructure requirements.

Hockey Canada national and international events that the City of Vernon may consider hosting in the future have a minimum of 6 competing teams that would make it very difficult to host at Kal Tire Place as it is currently configured. Consideration of the addition of second adjoining NHL sized ice pad would assist greatly in terms of the number of teams that could be accommodated for larger events, ability to use as practice ice, or potentially as an option for ancillary events. Having a venue with these capabilities under one roof rather than multiple venues would be a significant benefit when competing against other communities across Canada for the potential to host a sporting event.

Should there be a desire to discuss further please don't hesitate to get in touch at your convenience by contacting me at (403) 777-4591.

Yours truly,

Ryan Robins
Senior Manager, Events & Properties
HOCKEY CANADA

Calgary – Phone / Tél. : (403) 777-3636
201-151 Canada Olympic Road SW, Calgary, AB T3B 6B7
201-151 Canada Olympic Road SO, Calgary, AB T3B 6B7

Ottawa – Phone / Tél. : (613) 562-5677
N204-801 King Edward Avenue, Ottawa ON K1N 6N5
N204-801 avenue King Edward, Ottawa ON K1N 6N5

HockeyCanada.ca

4.0 LIFE CYCLE COST ANALYSIS

CITY OF VERNON, ICE SHEET EXPANSION PROJECT

LIFE CYCLE COST ANALYSIS

NPV AT THE FOLLOWING OPERATING YEARS

	Option 1A	Option 1B	Option 2A	Option 2B	Option 3	Renovated Civic Arena
Gross Floor Area (m^2)	4,016	3,835	3,318	3,732	3,767	3,307
Year						
0	$12,904,592	$13,248,833	$12,530,163	$16,430,590	$13,888,230	$14,000,000
5	$15,077,348	$15,432,866	$14,608,724	$18,555,964	$16,195,744	$16,278,734
10	$17,250,104	$17,616,898	$16,687,285	$20,681,338	$18,503,257	$18,557,467
20	$21,595,617	$21,984,963	$20,844,407	$24,932,086	$23,118,284	$23,114,935
30	$25,941,130	$26,353,028	$25,001,529	$29,182,834	$27,733,311	$27,672,402
40	$30,286,643	$30,721,093	$29,158,651	$33,433,582	$32,348,338	$32,229,869

Notes:

1) The Net Present Value (NPV) at year 40 represents the total current cash value of all estimated expenses for the facility, including the initial capital cost, as well as the on-going maintenance/operational costs, over the 'life cycle' of the building (40 years);

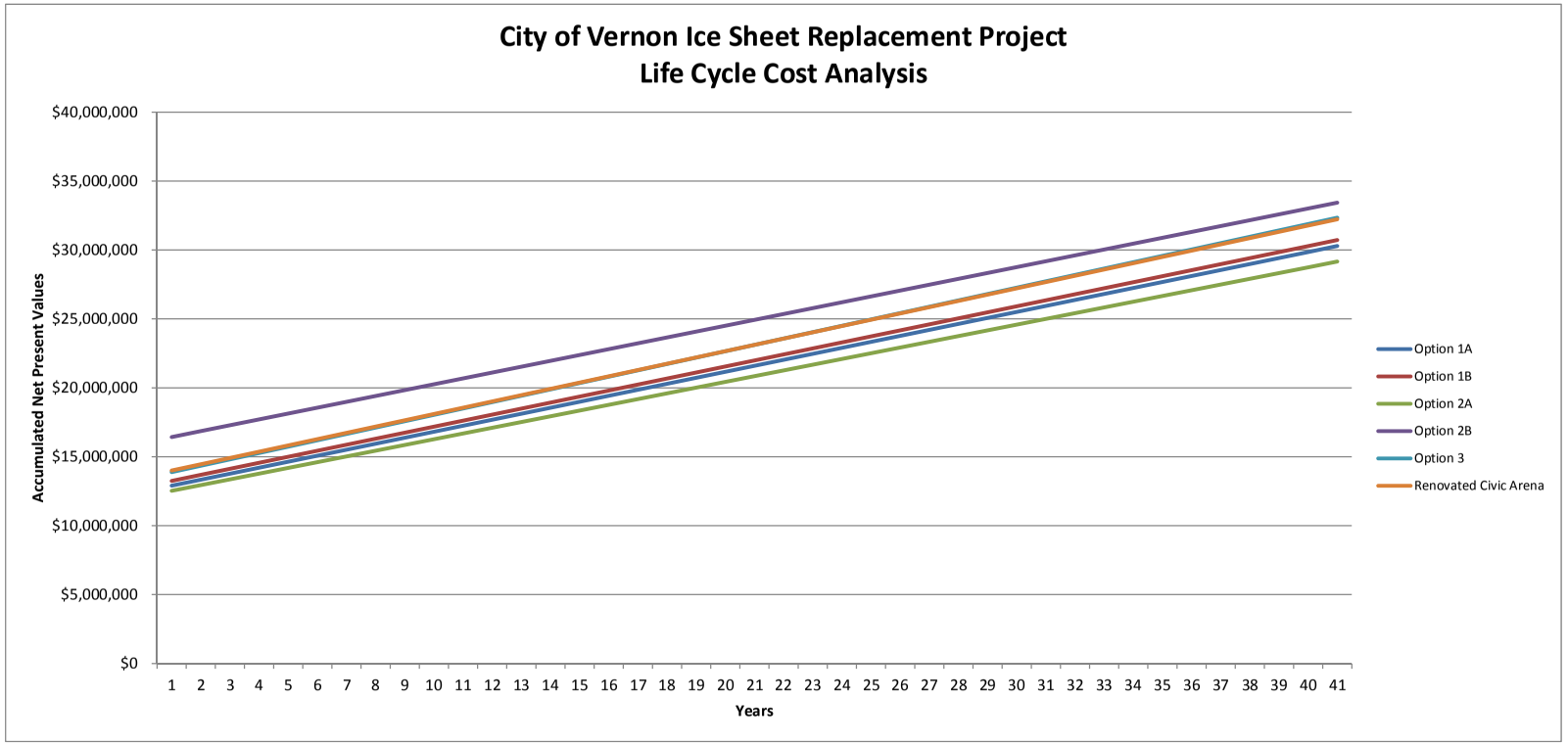
2) A discount rate of 5%, and price escalation rate of 5%, has been used for all options;

3) Adjustments have been made to the various options to take into account the operational efficiencies.

4) Option 2B and the Existing Civic Arena have the highest initial first cost. When tracked across the anticipated life of the building, Option 2B, Option 3 and the Existing Civic Arena are the most costly options.

CITY OF VERNON, ICE SHEET EXPANSION PROJECT

LIFE CYCLE COST ANALYSIS



5.0 RECOMMENDED OPTION

MQN Architects has considered the potential locations and evaluated the solutions on feasibility of construction, adherence to the program requirements, site constraints, and overall project cost.

Upon analysis of the identified design criteria, MQN Architects has recommended a preferred option for a proposed Civic Arena replacement.

The study has investigated three project sites, and five placement options to determine a feasible location for the replacement facility. The sites considered include the North and West sides of Kal Tire Place, West and East sides of Priest Valley Arena and a hypothetical undetermined parcel for a new site. This study included the consulting services of Structural, Mechanical, Electrical, and Civil Engineers, a Refrigeration Consultants and Quantity Surveyor. Several factors were considered in the criteria for a successful site option. Factors include, but were not limited to site availability, ability to achieve program requirements, ability to accommodate the value added options, retention or gain of on-site parking, future expansion, and other criteria.

Through the options presented during the investigation process we received input from the general public, user groups, facility owner-operator and consultants.

The stand alone option was apparent that it was a less feasible option. As a stand alone facility it would have higher operating costs than the other options, which take advantage of staffing and operational efficiencies. Without a predetermined site, it would be extremely unlikely that a suitable lot could be found within the constraints of the project schedule and land acquisition would increase the project costs well beyond the other options.

Similarly Option 2b, Priest Valley West, also required the purchase of land, together with the highest site work costs this option was dismissed

Given the allotted schedule, together in view of the considerable unresolved challenges presented by the existing race track, and considering the increased site work costs for Option 1b, Kal Tire West, it too was dismissed.

This left two options remaining, both viable: Option 2a, the Priest Valley East & Option 1a, Kal Tire Place North.

Both options have existing ice plants with the design capacity for an additional ice sheet and as multi-sheet facilities, would provide significant operating cost savings. Either option could be constructed within the allotted time frame as both sites are owned by the City, are congruent with the OCP, and are zoned appropriately.

As previously discussed, there is considerable value in providing a facility of this type within an overall recreation complex, especially within a centralized location which would favour Option 2a. However, the proximity to the existing fire lane and main recreation complex may be more challenging than anticipated, the loss of the outdoor rink would be notable, and the constrained site further complicates construction.

Without these challenges the Kal Tire North option, Option 1a, emerges as the preferred option. For this reasoning, at the time of this report, in consideration of the above-mentioned factors our recommendation to the GVAC is to pursue a public referendum for the Kal Tire Place – North Expansion, Option 1A.

Figure 16. Recommended Option - Kal Tire North.

OPTION COMPAIRISON MATRIX

OPTION	SITE						VALUE ADDED[4]					EXPANSION		RESOURCES		TIME	COST SUMMARY[11]				RANKING
	Land Acquisition	OCP Amendment	Rezoning	Variances[2]	Additional Challenges	Parking Retention[3]	Elevated Walking Track	Dry Land Fitness	Multipurpose Rm	Additional office Space	Twin Facility[7]	Future Ice Sheet[5]	Future Program[6]	Increased Staff Efficency[8]	Existing Infrastructure[9]	Project Schedule[10]	Base Building Cost $$$	Servicing/ Site Work Cost $$$	land acquisition cost $$$	TOTAL COST $$$	
Kal Tire - North	N	N	N	Y	N	N (-1)	Y	Y	Y	Y	N	Y(W[1])	Y	Y	Y	Y	8.6M	835K	N/A	12.9M	1
Kal Tire - West[1]	N	N	N	Y	Y*	Y (+20)	Y	Y	Y	Y	Y	Y(W,N)	Y	Y	Y	N	8.4M	1.3M	N/A	13.2M	4
PV Arena - East	N	N	N	Y	Y**	Y (+6)	N	Y	Y	Y	N	Y(W)	Y	Y	Y	Y	7.9M	1.3M	N/A	12.5M	2
PV Arena - West	Y	Y	Y	N	N	Y (+105)	Y	Y	Y	Y	N	Y(E)	Y	Y	Y	N	8.5M	3.5M	1.0M est.	17.4M	3
Stand Alone	Y	UKN	UKN	UKN	UKN	N/A	Y	Y	Y	Y	Y	Y	Y	N	N	N	9.1M	1.1M	2.5M est.	16.4M	5

* Existing Race Track

** Existing Centennial Outdoor Rink

[1] Assumes Race Track Challenges are Resolved

[2] Parking variance may be required

[3] The number of parking spaces remaining after the addition vs number of existing parking spaces

[4] Sufficient space available on site to provide value added options

[5] Sufficient space available for future expansion of an additional ice sheet

[6] Is sufficient space available for future expansion for additional program requirements

[7] Is sufficient space available to provide a twin ice sheet facility at this time

[8] Share existing staff

[9] Share existing infrastructure such as Refrigeration Eq., Snow Melt Pit, Ice Resurfacing Eq....

[10] Can the project be delivered within the allotted time frame

[11] Summarized from LTA's report

UKN - Unknown

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - ALL OPTIONS

Description		Option 1A - KTN	Option 1B - KTW	Option 2A - PVE	Option 2B - PVW	Option 3
Net Building Cost		$8,578,780	$8,407,476	$7,886,294	$8,503,613	$9,060,642
Site Development		$590,061	$909,072	$599,328	$2,888,828	$1,075,016
Ancillary Work (Interfacing Costs)		$245,438	$350,831	$659,466	$603,580	$0
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,459,213	$1,498,444	$1,417,489	$1,859,383	$1,571,027
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$10,873,492**	**$11,165,822**	**$10,562,577**	**$13,855,404**	**$11,706,686**
GST	5.00%	$543,675	$558,291	$528,129	$692,770	$585,334
ESTIMATED CONSTRUCTION COST (Including GST)		**$11,417,166**	**$11,724,114**	**$11,090,706**	**$14,548,174**	**$12,292,020**
SOFT COST						
Design Fees - Allowance	10.00%	$1,087,349	$1,116,582	$1,056,258	$1,385,540	$1,170,669
Building Permit Fees	1.20%	$130,482	$133,990	$126,751	$166,265	$140,480
Development Cost Charges		$35,662	$34,055	$29,464	$33,140	$33,451
Miscellaneous	1.50%	$163,102	$167,487	$158,439	$207,831	$175,600
ESTIMATED SOFT COSTS (Excluding GST)		**$1,416,596**	**$1,452,114**	**$1,370,911**	**$1,792,776**	**$1,520,200**
GST	5.00%	$70,830	$72,606	$68,546	$89,639	$76,010
ESTIMATED SOFT COSTS (Including GST)		**$1,487,425**	**$1,524,720**	**$1,439,457**	**$1,882,415**	**$1,596,210**
ESTIMATED PROJECT COSTS (Including GST)		**$12,904,592**	**$13,248,833**	**$12,530,163**	**$16,430,590**	**$13,888,230**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE	Option 1A - KTN	Option 1B - KTW	Option 2A - PVE	Option 2B - PVW	Option 3
1) Running Track	$533,447	$533,447	N/A	$561,097	$417,052
2) Dryland Training Facility	$552,005	$552,005	$588,487	$552,005	$552,005
3) Multi-Purpose Room	$59,671	$59,671	$61,334	$59,671	$59,671
4) Additional Office Space	$142,174	$142,174	$146,137	$142,174	$142,174
5) New Parking Area Adjacent to 43rd Avenue	$238,334	$238,334	N/A	N/A	N/A
TOTAL ESTIMATED CONSTRUCTION COST (Including GST)	**$1,525,630**	**$1,525,630**	**$795,959**	**$1,314,947**	**$1,170,902**

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST, but exclude all Soft Costs

6.0 CIVIC COMPARISON

Throughout the report every attempt was made to ensure that each option was based on a consistent architectural program. In this way challenges and advantages unique to each site would become the bases for our recommendation.

With this in mind the existing Civic Arena does not provide the outlined program requirements, the ice sheet (80'x180') is smaller than an NHL size sheet (85'x200'), and the building and its amenities are not of the same standard as new. To renovate the Civic to a level in keeping with a new facility, one with an NHL ice sheet, additional costs beyond the Carscadden Report's $5.6M, 5 year plan need to be provided. For the above reasoning, we have added the associated costs to complete the items identified in the Carscadden Report's 10 year plan along with the cost to upgrade the existing ice sheet to the NHL standard size.

The costs have been estimated to be an additional $5.2M for the items identified within the 10 year plan, and an additional $3.1M to upgrade to the NHL sheet of ice. This brings the total estimated costs to renovate the existing Civic to be $13.9M, approximately $1.5M in excess of the recommended option.

As a stand alone facility, a renovated Civic Arena does not realize operational cost saving advantages associated with twin facilities and does not create increased opportunities for larger dry floor events or tournament hosting.

For the above reasoning, we consider a renovation of the existing Civic Arena to be less desirable than the recommended option, Kal Tire Place - North.

CITY OF VERNON, ICE SHEET EXPANSION PROJECT | **EXISTING CIVIC ARENA** | **OPINION OF PROBABLE COSTS**

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - EXISTING CIVIC ARENA

		m^2	ft^2
	Gross Floor Area	3,307.45	35,601
Description	**Estimated Value**	**$/m²**	**$/ft²**
Civic Arena Engineering Assessment Report - Carscadden Report	$5,600,000	$1,693.15	$157
Total - Engineering Assessment Report	**$5,600,000**	**$1,693.15**	**$157**
Additional Items (Within 10 Years)			
Seismic Upgrade	$1,416,593	$428.30	$40
Washroom Facility Addition	$1,263,496	$382.02	$35
Renovation/Conversion of Existing Change Rooms	$428,304	$129.50	$12
Exterior Envelope Upgrade	$1,130,722	$341.87	$32
HVAC Upgrade	$651,633	$197.02	$18
Electrical Upgrade	$283,319	$85.66	$8
Total - Additional Items (Within 10 Years)	**$5,174,066**	**$1,564.37**	**$145**
NHL Ice Sheet Expansion			
Extra Over Cost NHL Ice Sheet Expansion	$685,286	$207.19	$19
Elevator	$261,265	$78.99	$7
Bleacher Renovations	$2,135,094	$645.54	$60
Total - NHL Ice Sheet Expansion	**$3,081,645**	**$931.73**	**$87**
Total - All Renovations/Upgrades	**$13,855,711**	**$4,189.24**	**$389**

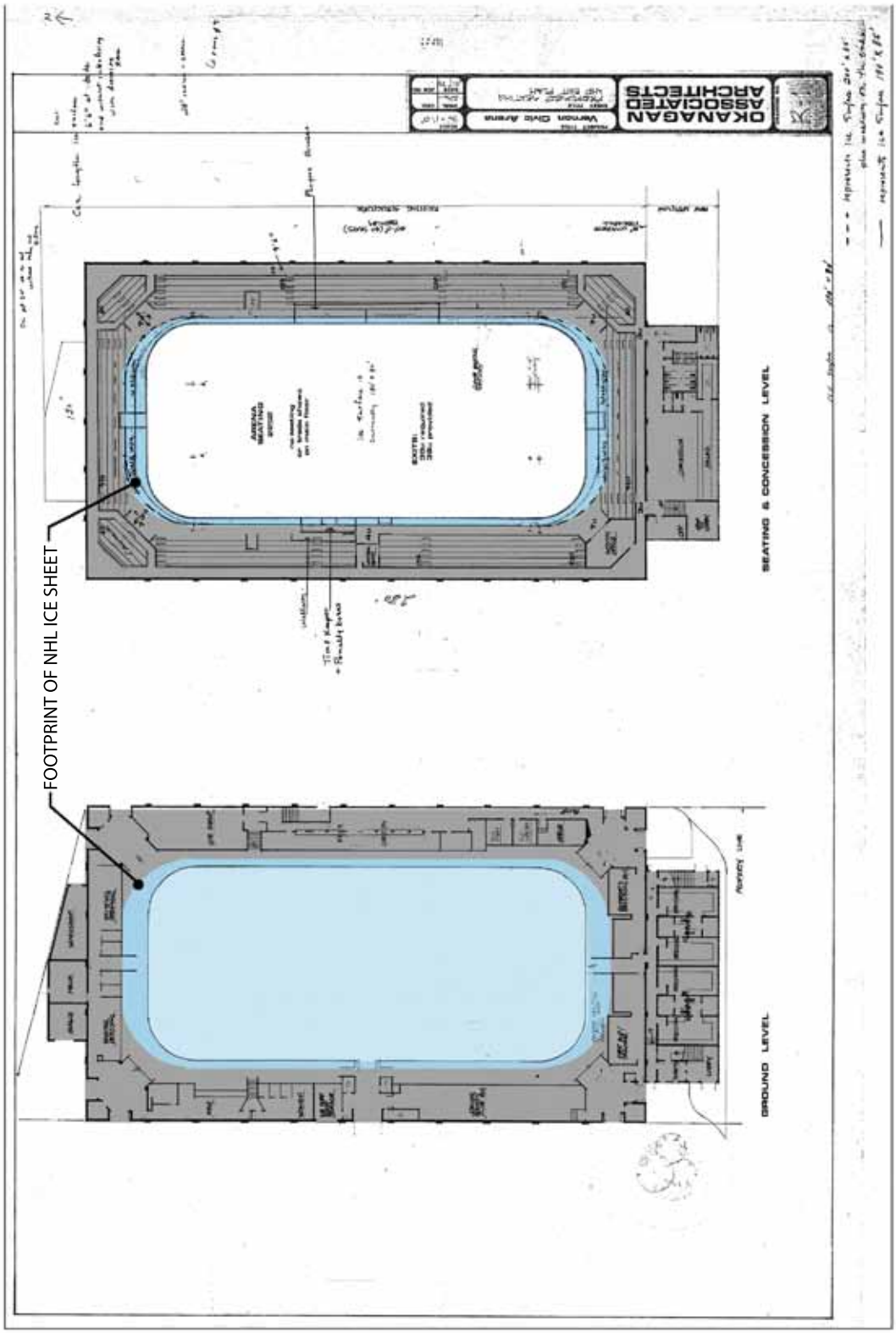


Figure 17. Existing Civic Arena

OPTION 1A - KAL TIRE PLACE NORTH

1.1 INTRODUCTION

Kal Tire Place North, option 1a, investigates the potential to add a second sheet of ice to the north of the existing Kal Tire Place facility, located in the existing bus parking area. The existing Kal Tire Place is a 5985m^2 sprinklered non-combustible building with a steel structure and combination of metal panel and concrete masonry unit cladding.

The property is owned by the City of Vernon and is designated OCP-PARK in Vernon's Official Community Plan (OCP). The property is currently zoned P2 - Public Institutional. The proposed land use is consistent with the OCP and the zoning supports the proposed project. For this reasoning, with the exception of a parking variance described below, it is understood no additional variances would be required.

The current zoning bylaw requires 1 stall per seat for spectator sports establishments. The existing facility has 3003 seats. If the current parking bylaw were applied to the existing facility, 752 parking spaces would be required. The current site provides for 668 parking stalls, resulting in a deficiency of 84 stalls. The proposed 400 seat facility would require an additional 100 spaces, increasing the total parking requirement for the facility to 852 spaces. A total of 86 existing spaces are lost under the new facility. However, an additional 38 new stall can be created around the perimeter of the new facility. By developing the landscaped area to the south of the facility, along 43rd Ave, an additional 48 stalls can be provided. The net result is a loss of one space, which decreases the total provided parking to 667 spaces. This results in a deficiency of 185 spaces. As previously stated, a variance may be required to address the parking deficiency.

Referencing the City of Vernon's zoning bylaws, the parking calculation has been based on the requirement for 1 parking space per 4 seats for Spectator Sports Establishments. However, for the vast majority of the facility's use, which includes community programming such as youth ringette, minor lacrosse, public skating, and adult hockey leagues, there will typically be less spectators than participants on the ice, and significantly less spectators than the facility is designed for.

During these times, the zoning bylaw's lower parking requirement of 1 space per employee on duty, plus 1 space per 3 users, for Participant Recreation Services, Indoor, may be more appropriate. Using the assumption of 1 employee on duty with 50 players and coaches on the ice, and another 50 in the change rooms, the existing facility would require 35 spaces and the new facility would require another 34. Even increasing this to 1 per user, the total parking requirement for the new facility would only be 200 spaces, which is well below the amount provided The likelihood that both spectator areas would be at peak capacity and all 675 spaces would be required would most likely only occur during conventions, concerts, or Vipers hockey games. This could be mitigated through facilities programming to assure that peak parking demands for both facilities do not occur at the same time.

1.1.1 Proposed Location

1.2 DESIGN DESCRIPTION

This option calls for the addition of a second NHL sized ice sheet (200' x 85') to the north end of the existing Kal Tire Place facility. Initially, an ice sheet orientated in an East – West configuration was investigated. However, it was quickly discovered that this option would not be feasible, as the site is insufficiently wide to accommodate such an orientation. With this orientation dismissed, a North – South orientation was determined with the new facility connecting to the existing facility through the south end of the addition.

With the 3486m^2 addition of a new ice sheet, the facility's overall footprint would increase to 9470m^2. With both the addition and the existing building being of single storey, sprinklered, and non-combustible construction, the project is well within the maximum footprint permitted by the building code.

For comparison purposes, we have proposed a 3490m^2 sprinklered building, consisting of a steel structure and an insulated metal panel system envelope. The lower 7 feet of the building envelope is clad with concrete masonry units to help mitigate the potential for damage and vandalism. A 400 seat capacity viewing area with bench type seating has been provided, located above the change room facilities.

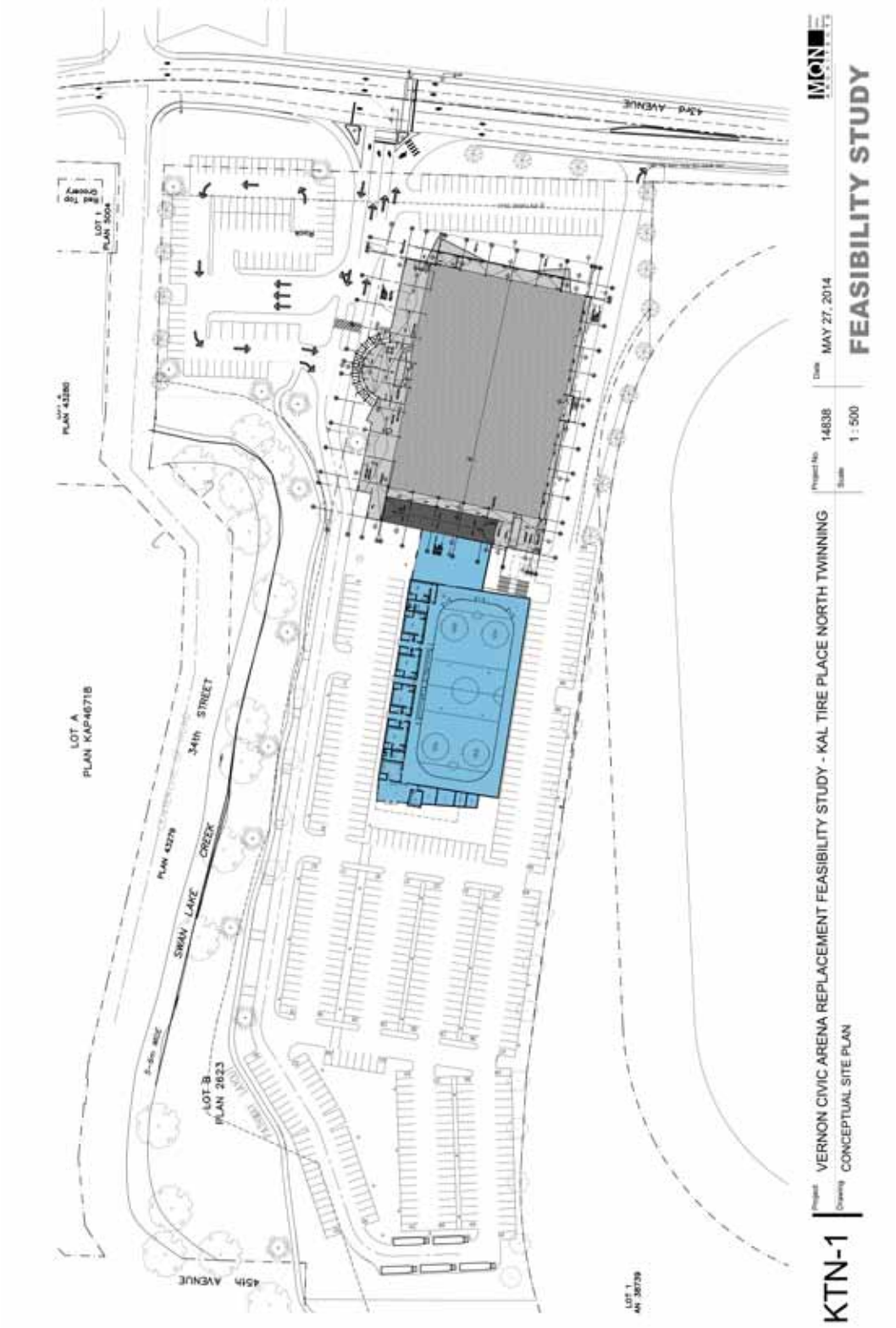
The new facility includes a standard size NHL ice surface (200' x 85'), complete with dasher board system (with glass), spectator netting along the perimeter, players and penalty benches, and signal and timing devices. Four (4) team dressing rooms, each with two (2) shower facilities, two (2) water closet facilities, and single washbasin are provided, along with two (2) referee / gender neutral dressing rooms, each with shower facilities, one (1) water closet, and one (1) washbasin.

Along with the necessary support spaces, the following program rooms have also been included in the design: a front lobby area with ticket sales office, office space, dry goods concession, washroom facilities (to BCBC requirements), mechanical and electrical rooms, refrigeration room, ice resurfacing room (with ice dump pit), custodial room, storage room (with mop sink and shelving), and maintenance staff room / equipment room.

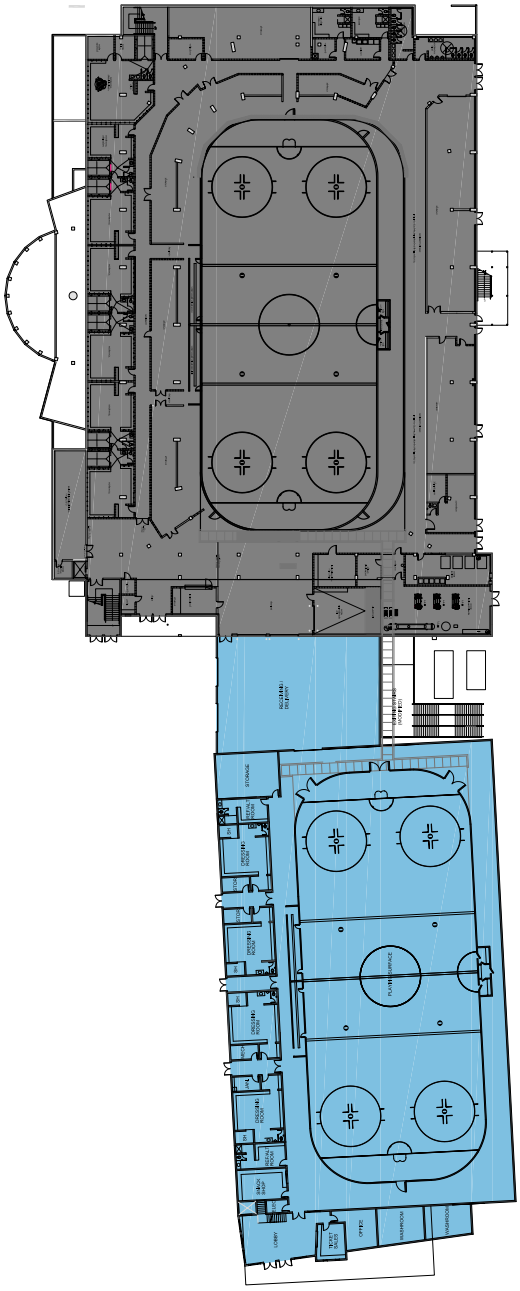
The proposed option meets all of the program requirements and can provide any number of the "value added" options, including a multipurpose room, fitness training facilities, an elevated walking track, and additional office space, without significant impact to the parking.

1.3 TECHNICAL INFORMATION

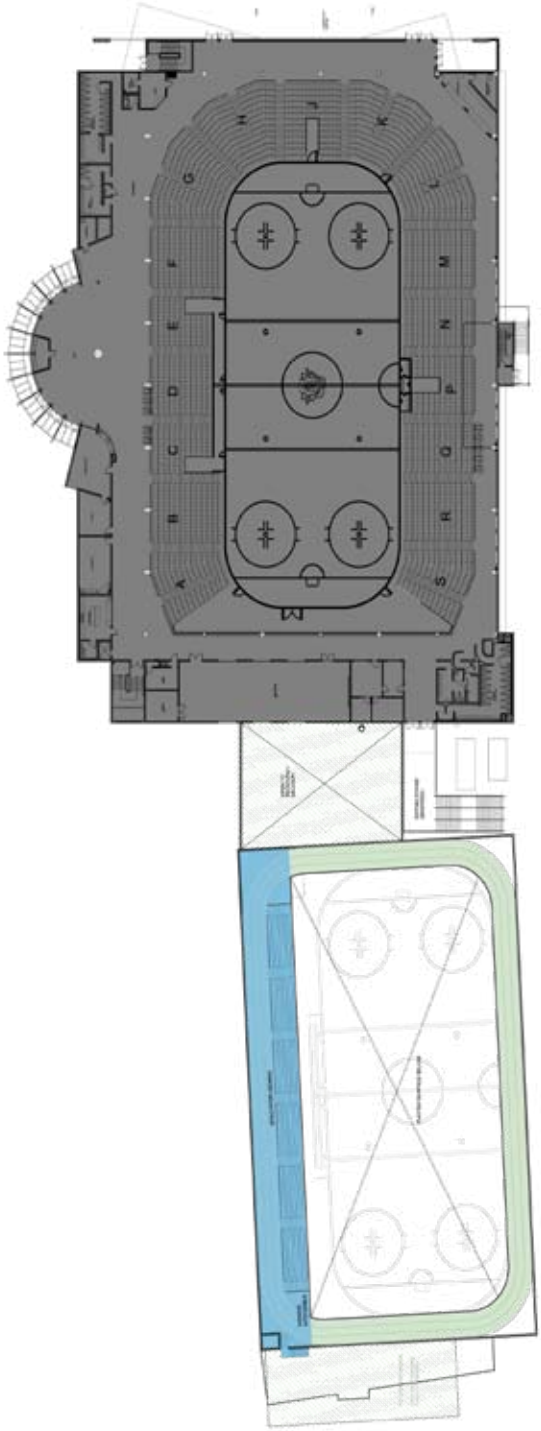
1.3.1 Architectural Site Plan



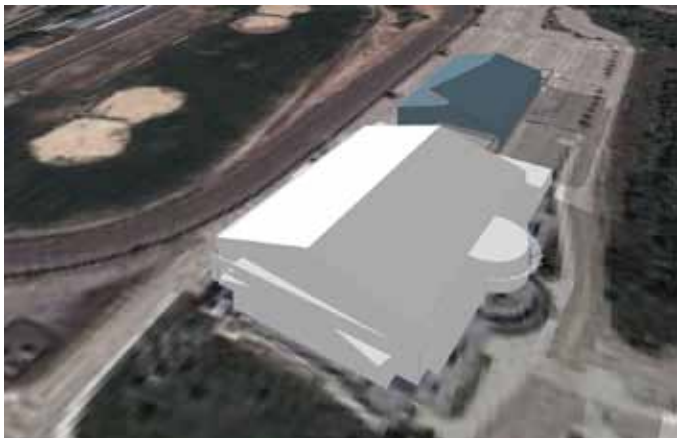
1.3.2 Main Floor Plan

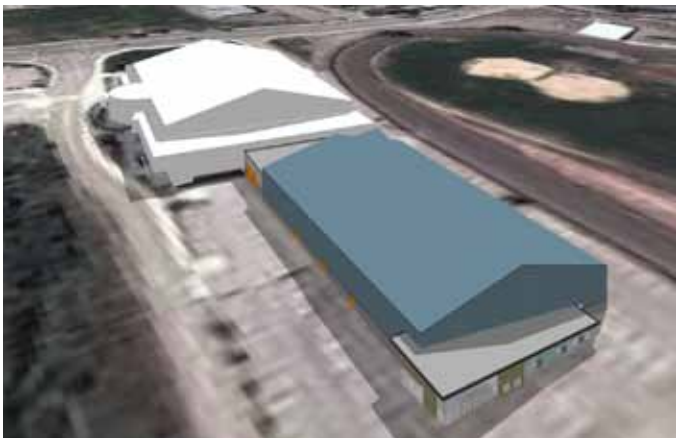


1.3.3 Second Floor Plan



1.3.4 Perspectives





1.3.5 Civil

The Kal Tire North proposal will fit well with the existing grading of the site, adjacent to the proposed building. It is expected that approximately 5 to10m of parking area beyond the building footprint will have to be regraded to accommodate the new building, at the same slab elevation as the existing facility. However, given the nature of the soils at this location and the surrounding area, there is the potential for settlement to occur under the permanent loading of the floor slab. No detailed geotechnical information is available for this area of the site and therefore we cannot comment on the adequacy of the existing soils conditions; however, an allowance should be made for addressing this condition with a preload, if necessary.

The main site circulation, along with access and egress to the site, will not be impacted by this layout. However, the current plan shows the building over an existing storm sewer ROW through the site. To address this concern, the building should be shifted to the north to avoid any structures within the ROW, which based on the site plan, should not be an issue.

Due to safety concerns, there cannot be any left turn in to the additional parking area shown at the front of the building, from the existing east access to the site. Connection to this drive aisle from driveway will be by way of a right in right out only.

The grading of the additional parking shown at the front of the building will be governed by the elevations off of the drive aisle of the west access to the site. This will provide some challenges regarding grading to accommodate the exiting of the doors adjacent to this parking area, from the existing building. This grading may also require the existing water

service to be replaced at a new grade to accommodate the finished asphalt elevations.

A portion of the existing storm system servicing the parking area at the back of the site will have to be replaced to accommodate the proposed building, resulting in a new collection system on the east side of the new building, however this can be easily accommodated. Since the building is replacing an asphalt surface and since there is already detention and water quality controls, there will be no need to provide these services.

The existing water service to the site will be adequate to provide servicing to the new building. No upgrading will be required. Sanitary sewer servicing to the new building can be extended by gravity to the south edge of the building but it will only be 1.1m deep and there will likely be a conflict with the existing storm sewer. Therefore, it will be necessary to provide a pump to service the sanitary sewer system of the new building. For purposes of the preliminary design we have assumed that this pump will be installed outside the building, with a forcemain connection to the existing sewer service.

Off-site requirements associated with this proposal will be limited to upgrades of 34th street adjacent to the site near the south end, with new curb and gutter and approximately 3.0m road widening. Although the proposed building straddles 2 properties that have frontage on Old Kamloops Road, this frontage is identified as a DCC project consisting of road widening and a bike path. Because these road works are a DCC project, legislation states they do not have to be completed unless the applicant volunteers to complete the works.

1.3.5.1 Cost Estimates

Site servicing cost estimates were developed for each of the options. These estimates include on-site and off-site costs. Without the benefit of a geotechnical investigation or detailed topographic survey, we have had to make assumptions regarding the earthworks associated with each site. The following table summarizes the assumptions for Kal Tire Place – North, as it relates to the earthworks:

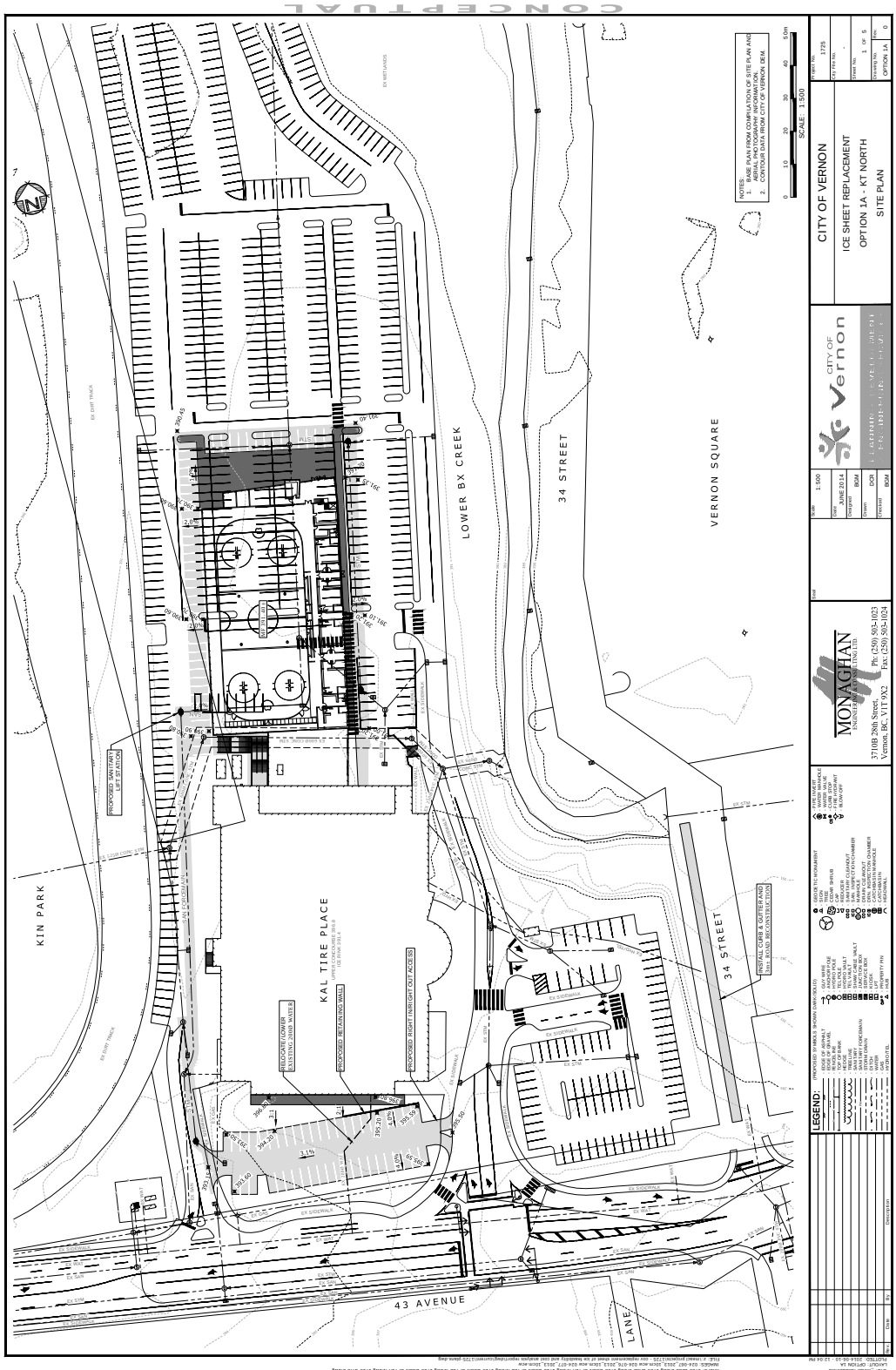
Option	Earthworks Assumptions
Kal Tire North	Existing material within 1.5m of the underside of the slab is removed and backfilled with structural material to 0.5m below floor slab elevation.

Kal Tire North should be considered the second most sensitive site as it relates to the geotechnical considerations. If considered, a detailed investigation should be completed.

Based on the above assumption, a detailed estimate has been developed. Detailed estimates for all options are included at the end of this report. Option 1A, Kal Tire North, is summarized in the following table:

Option	On-Site Servicing	Off-Site Servicing	Total Servicing
Kal Tire North	$786,520	$48,055	$834,575

Based on the costs noted above, Kal Tire Place – North is the site with the second lowest servicing costs, next to Priest Valley Arena – East.


CONCEPTUAL
KIN PARK
KAL TIRE PLACE
LOWER BX CREEK
34 STREET
VERNON SQUARE
43 AVENUE
LANE
PROPOSED SANITARY LIFT STATION
RELOCATE/LOWER EXISTING 200Ø WATER
PROPOSED RETAINING WALL
PROPOSED RIGHT-IN/RIGHT-OUT ACCESS
INSTALL CURB & GUTTER AND 6m ROAD RECONSTRUCTION
NOTES
1. BASE PLAN FROM COMPILATION OF SITE PLAN AND AERIAL PHOTOGRAPH INFORMATION.
2. CONTOUR DATA FROM CITY OF VERNON, IDIM.
SCALE 1:500
LEGEND:
CITY OF VERNON
ICE SHEET REPLACEMENT
OPTION 1A - KT NORTH
SITE PLAN
MONAGHAN
3710B 28th Street
Vernon, BC, V1T 9X2
Ph: (250) 503-1023
Fax: (250) 503-1024
CITY OF Vernon
Scale 1:500
Date JUNE 20 14
Designed BGM
Drawn DCR
Checked BGM
Project No. 1726
Drawing No. OPTION 1A
Rev. 0

1.3.6 Structural

The following summarizes the general type of structure to be used for each arena option. This information is to be used for general budgeting purposes. Soil conditions at the various sites are unknown. This report assumes that each site has reasonable soil conditions, and each option has similar soil conditions to each other. The new structure would be designed to the snow, wind and seismic standards of the 2012 British Columbia Building Code.

The anticipated structure is as follows:

Starting at the foundation:

Two (2) of the sides of the building have full height walls to the roof, while the other two sides have a second floor and then walls to the roof. The lobby end of the building will have full height walls to the roof with a lower roof over the front lobby.

For the typical full height walls, there would be a reinforced concrete strip footing bearing 900mm below grade for frost protection. On top of this footing there would be a 200mm thick reinforced concrete perimeter frost wall with pilasters at the column locations. Bearing on the concrete pilasters would be steel columns. The steel columns would go full height to the roof and support steel wind girts and steel roof beams. Within the beam/columns would be a few bays of HSS cross-bracing for overall lateral support.

Along the two exterior walls that support the second floor there would be a 200mm thick reinforced concrete wall bearing on reinforced concrete strip footings bearing 900mm below grade. This concrete wall would extend up to the underside of the second floor and support a suspended slab. At this level, perimeter structural steel columns, girts and bracing would start and be similar to around the rest of the building, and extend up to support the roof.

The structural steel frame system around the perimeter of the building would support large structural steel fabricated roof trusses spanning across the short direction of the ice surface. These steel trusses would comprise of W-beam top and bottom chords, with HSS diagonals. They would support open web steel joists, spanning the distance between the large trusses. The Open Web steel joists would be spaced at about 1700mm centres and support 38mm steel decking.

There are many rooms around the ice surface. These rooms would be constructed of 200mm reinforced masonry block supported on strip footings, that would bear approximately 450mm below the top of slab-on-grade. There would be a suspended slab system on top of the walls, providing a surface to support the bleachers, as well as a surface for a corridor or future walking path.

The large roof trusses and the exterior wall structure would be designed to support a future suspended walk-way.

The low roof over the lobby end of the building would be constructed of a similar structural steel column/brace frame supporting open web steel joists supporting 38mm steel decking.

The bleacher seats could either be precast concrete or a proprieatory steel/aluminum product.

There would be some additional structure required between the new arena and the existing arena. This structure is anticipated to be the typical structural steel beams, columns, open web steel joists and steel decking. The walk-way link would be suspended slab supported by concrete columns. There also would be some connections of new to existing. New construction against existing construction is usually more expensive than “stand alone” type of construction, due to the unknowns inherent with existing construction.

There would be a structural separation between the new and old, which means that the new structure would be independent from the existing, so there would be a redundancy of structure along the existing building.

The stair structure for fire exiting would also have to be extended and re-built.

Conclusion

From a structural perspective all the options are very similar, with some of the options being more difficult to build because of their locations or close vicinity to other buildings.

1.3.7 Mechanical

Executive Summary

- The new arena HVAC systems will be configured to be utilized for summer ice and also for assembly use when the ice is not in use.
- Natural gas usage for the new arena will be minimized by utilizing reliable sealed combustion, condensing water heating systems for domestic water, ice resurfacing water and hydronic heating systems.
- Outside air consumption for the new arena will be minimized by utilizing conventional demand control and motion control devices on the ventilation system.
- Grades for the sanitary service will be shallow if the elevations are to be the same between the new and existing ice surface. Consideration should be made for a sewage lift station so that the piping system can be installed at appropriate depths.
- Existing ice resurfacing room ventilation and water heating systems can be utilized for both new and existing arenas.
- The addition of the new arena on the north side will require some ventilation systems to be reconfigured.

1.1 General

S+A Falcon Engineering Ltd. have been retained by MQN Architects Inc. to provide comments on mechanical systems in relation to a new 400 seat Community Arena in Vernon, British Columbia. There are 5 configurations for the facility under consideration.

The purpose of this report is for:

- Developing requirements for the mechanical systems so that five arena options can be assessed.
- Means of assisting the pricing process.

The scope of this commission includes:

- Plumbing Systems.
- Heating, Ventilating and Air Conditioning Systems.
- Exhaust Systems.
- Fire Protection Systems.

The scope does not include:

- Ice Making Refrigeration Systems.
- Civil Works.

1.2 Documentation and Research Resources

The comments in this report are based on:

- Drawings prepared by MQN Architects Inc. for the five options.
- Mechanical tender drawings for the Kal Tire Place dated October 2000.
- Mechanical tender drawings for the Priest Valley Arena and Gym dated September 1978.
- Discussions with the Owner and Consulting Team.
- On-site inspection.

1.3 Building and Systems Descriptions

The project is based on 400 seat spectator community NHL sized arena. The base facility program includes; lobby areas, dressing rooms, referee rooms, washrooms, office and ticket sales spaces, concession, janitor rooms, storage rooms, mechanical rooms, electrical rooms and equipment rooms, refrigeration room and ice resurfacing room.

This report contains comments on the mechanical systems for these spaces.

Other program enhancements could include a combination of; extra office spaces, fitness areas, dedicated team rooms, extra viewing capacity, display areas, walking track, multipurpose, meeting and conference rooms and also a variety of training facilities.

2.0 PLUMBING SYSTEMS

1.1 Water Service

The existing water service is 200mm and is located on the south side of the building.

This water service is adequate for domestic water supply and fire protection for the arena addition but in order to be utilized, new pipe supplies will need to extend from the service to the new arena.

1.2 Storm Water Service

The existing storm drainage systems are configured to exit the existing building as follows:

- Existing Arena - North West Corner 250 mm
- Existing Arena - North East Corner 250 mm

The configuration of these systems does not appear to require upgrade due to the addition.

New dedicated storm water system for the new arena will be needed.

1.3 Sanitary Drainage Service

The existing 150mm sanitary system exits the facility at the south west corner of the building. The existing sanitary system is not capable of supporting new loads from either a sizing or elevation point of view. A new 150mm service will need to extend from the new arena to the manhole on the south west corner of the existing building.

It is likely that a sewage lift station will be needed at the floor elevations proposed. We recommend the lift station be positioned outside so that piping systems can be installed at appropriate depths.

1.4 Gas Service

The existing gas service location is on the west wall closer to the south end of the existing arena. The position of the gas service and capacity of the gas mains will service the new addition as well. An allowance for a new meter set to match the new loads of the building should be provided for.

1.5 General Plumbing Systems

All drainage systems above ground will be cast iron with mechanical couplings. All drainage systems below grade will be plastic. Drainage systems will be provided with a clean out as the service exits the building.

All hot and cold water piping should be insulated copper. Domestic water supply piping will be configured so that no piping will be constructed or concealed within a masonry wall. Piping systems within masonry walls are subject to premature failure and are extremely difficult to repair.

Hose bibbs will be provided around the facility for cleaning and initial ice making purposes. Hose bibbs will be frost free and vandal resistant. Hose bibbs will be recessed and fit with removable operating handles or keys.

1.6 Domestic Water Heating Systems

A new domestic water heating system will be provided with individual high efficient, gas-fired, heaters and re-circulating systems for the new arena. The hot water heaters will be sealed combustion with venting systems directed to wall discharge. The hot water systems will be capable of temperatures up to 60 deg C (140 deg F). Expansion tanks will be provided for this system.

1.7 Tempered Water Supply Systems

Large central tempered water recirculation systems are very difficult for building operators to maintain constant temperatures over a wide range of scenarios. We therefore recommend point of use tempered mixing valves for each washroom group and shower groups.

The tempered mixing valve for the change rooms will be mounted at high level in lockable stainless steel service boxes near the shower area.

1.8 Ice Making Water Heating Systems

The existing gas fired instantaneous hot water heater will be utilized to provide hot water supply for the ice cleaning equipment systems. The system will be capable of boosting temperatures from the domestic water service to 60 Deg C (140 Deg F). The existing 38 mm hot water connection for the ice resurfacing equipment shall be utilized to allow quick fill turnaround. The combustion air and vent will need to be reconfigured to accommodate the addition to the north.

1.9 Plumbing Fixtures

Plumbing and drainage for fixtures shown on the architectural drawings will be provided, including devices and fixtures required for barrier free access.

All fixtures on exterior walls will require furring and insulation.

We recommend plumbing fixtures if not already installed as follows:

- Water closets: low consumption, floor mounted with battery infrared control type flush valve.
- Urinals: low consumption, wall mounted with battery infrared type flush valve.
- Change Rooms Showers: low consumption, vandal resistant head, with 24 volt electronic timed push button 60 second control. Shower systems will be provided with stainless steel enclosures mounted on block walls, for concealing valves and supply piping.
- Hand Lavatories: counter mounted stainless steel with battery infrared control faucet.
- Combination drinking fountain bottle fillers: refrigerated wall mount.
- Custodian Rooms: Moulded stone, floor mount service sink, wall mounted, manual valve, hot and cold trim with hose connection.
- Plant Refrigeration and both Ice Resurfacing Rooms: Moulded stone, leg mount, double or single compartment service sinks, wall mounted, manual valve, hot and cold trim with hose connection.

- The existing emergency eye wash and safety shower in the vestibule to the Plant Refrigeration Room should remain in service.

1.10 Kitchen and Concession Plumbing Systems

Kitchen or Concession Areas are not intended to be commercial quality. Under this configuration, these systems will not require grease interceptors. However, plumbing fixtures that comply with Health Regulations will be required. Usually, three compartment sinks and a hand lavatory is required unless a commercial quality dishwasher is provided.

3.0 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

1.1 Existing systems that require reconfiguration due to addition of new facility.

Typical Louvers

Five ventilation systems will need to be reconfigured to accommodate the addition to the north.

1.2 Primary Heating

Primary heating for the new arena shall be provided through gas fired sealed combustion boilers that supply energy to the hydronic heating systems.

Two circulation pumps and piping systems will be utilized to deliver energy to terminal heat transfer units.

1.3 Arena Area

The arena will be served by one or two packaged rooftop gas fired heating and electric cooling units. These units will be able to deliver cooling effect to the arena area when the ice making systems are off. Outside air quantities and dedicated exhaust will be varied by modulating dampers controlled by economizer programs and/or CO, CO_2 and NO_2 sensors. Systems will be activated through the Building Automation System.

Air supply distribution will be through overhead, exposed ductwork and double vane type diffusers. The ductwork will be located generally over the dasher boards and the diffusers will be directed toward the seating area. Air flow at the ice surface is to be kept as calm as possible. Return air will be through ductwork located at low level.

Desiccant dehumidifying equipment will be provided to ensure adequate dehumidification to keep the ice level at 50% relative humidity at 10 deg C (50 deg F) at 1,200 mm above ice level.

The seating area will be heated with gas fired, infrared tubular heaters in eight sections. These heaters will be operated on a demand override for a pre-determined time through the Building Automation System. These units will be separate combustion air systems that draw air directly from outside.

1.4 Lobby Area

The lobby will be served by one packaged rooftop gas fired heating and electric cooling units.

1.5 Team and Referee Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.6 Office, Ticket Sales and Other Small Regularly Occupied Spaces

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Cooling will be provided with ductless split systems.

Outside air will be delivered through the ductless split systems and a constant flow outside air connection.

1.7 Kitchen and Concession

The menu for foods supplied in this area is limited to items that can be cooked without emitting grease laden vapors. Therefore residential style range hoods can be utilized.

1.8 Washrooms and Janitor Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.9 Storage, Equipment, Mechanical and Electrical Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights or temperature control.

1.10 Ice Resurfacing Rooms

Existing hydronic unit heaters will be utilized for Ice Resurfacing Rooms.

Existing exhaust and control system will be utilized.

1.11 Ice Making Refrigeration Rooms

The existing Plant Refrigeration Room has been provided with an emergency exhaust system. This system can be upgraded to provide the required ventilation rates for the new refrigeration system capacity.

Make up air will be drawn through the existing louver and damper located on the north wall.

Heating for this area is provided through existing hydronic unit heaters.

1.12 Controls

The control system specifications will be based on a direct digital control Building Automation System, with monitoring and controlling capability for all areas of the complex.

The system will incorporate direct digital control with a networking type system. All wiring, computer terminal, printer and devices required will be supplied for a complete and fully operational system.

4.0 FIRE PROTECTION SYSTEMS

1.1 General

The existing arena has been provided with a fire protection system. The new arena will be provided with a fire protection system.

The automatic sprinkler system will be designed and specified to comply with the requirements of NFPA 13 and the British Columbia Building Code. All of the equipment and sprinkler heads incorporated into the system will be ULC and FM listed.

Fire extinguishers will be provided to comply with the requirements of NFPA 10 and the British Columbia Building Code.

A wet type automatic sprinkler system will be utilized for the bulk of the building. Consideration should be made for a dry system in the arena and other nominally cold areas. The sprinkler piping systems for the bulk of this building should be Schedule 40 as this piping system as a longer life expectancy that some of the thin wall systems.

1.2 Hazard Classification

All areas that could possibly be used for exhibition, trade show in the Arena or lobby will be treated as Ordinary Hazard Group 2.

Storage Rooms, Mechanical Rooms, Custodian Rooms, Concessions and Kitchen Areas will be classified as Ordinary Hazard Group 1.

All other areas will be treated as light hazard.

1.3 Main Sprinkler Station

The existing sprinkler station is at the south end of the building. The existing sprinkler system can be reconfigured to accommodate the systems required for the new arena. Piping system will be needed from the service to the new building.

1.4 Fire Hose and Standpipe

It is not anticipated that a standpipe and hose system will be required for the building.

5.0 CONCLUSIONS

5.1 Conclusion

The recommendations presented in this Design Brief should be reviewed by the Owner and Design Team. Any recommendation can be incorporated for the pricing process or further development of the design program.

1.3.8 Electrical

GENERAL

1. S+A Falcon has been retained by MQN Architects to provide comments on electrical systems in relation to a new 400 seat community arena in Vernon, British Columbia.
2. The purpose of this report is to develop requirements for electrical systems so that 5 arena options can be reviewed.
3. A primary focus of the electrical design should be safety for both the public and for facility operational staff.
4. In consideration of the expected life of this facility, electrical equipment should be selected for energy efficiency, durability and ease of maintenance.

Infrastructure should also be included to support temporary events such as trade shows and concerts.

2. SERVICE AND DISTRIBUTION

1. The incoming services for the existing arena is fed underground from the east property line, to a BC Hydro pad mounted transformer located outdoor near the existing electrical room.
2. The existing main service is rated at 1600A@347/600V 3 phase. The service and distribution has been designed to allow for the expansion at the existing facility into a twin rink.
3. The existing distribution will be modified to extend a sub-distribution service to the new north arena.
4. 120/208V panel boards will be located throughout the building as required for receptacle and other power loads. 120/208V Panels will generally be located close to loads for user convenience, easy reconfiguration, and lower line losses.
5. Motor control centres will be specified and installed in conjunction with the mechanical equipment layout and design. Motor control centres will be installed as close to the utilization equipment as is practicable.
6. Branch circuit wiring and feeders will be minimum #12 AWG 90°C rated copper wire in EMT or PVC/DB2 below grade. AC90 cable will be permitted for drops to devices on suspended ceilings and for wiring in frame walls. All wiring will be copper.
7. All new distribution equipment will be charged with minimum 25% spare load carrying capacity. All distribution equipment will have a minimum 25% spare device capacity.

3. LIGHTING

1. Lighting levels will be in accordance with the requirements of the Illuminating Engineering Society (IES) recommendations.
2. Main arena lighting will consist of LED “high bays’ switched selectively to provide alternate illumination levels. Care will be taken during detailed design to ensure that glare effects of the arena lights are reduced.
3. Concourse lighting and arena bowl lighting will be provide via architectural style fluorescent luminaires providing instant on capability for emergency lighting. Enclosed vandal proof luminaires will be utilized where required.

4. Interior lighting in other areas will be primarily fluorescent with electronic instant start ballasts and T8 lamps with a colour temperature of 3500K. Luminaire types will typically be as follows:
    - Main lobby/concourse – LED down lights and decorative LED/compact fluorescent suspended luminaires.
    - Dressing rooms –vandal proof fluorescent luminaires with polycarbonate lenses.
    - Shower stalls – vapour/vandal proof surface mount fluorescent.
    - Office/meeting areas – recessed fluorescent.
    - Storage/service rooms – fluorescent strip lights with wire guards.
    - Concessions/lounges/ticket offices/public washrooms–2 x 4' fluorescent with framed K12 lens. LED pot lights will be utilized for accent lighting.
5. Existing site lighting will need to be removed to suit the expansion of the north arena. The poles and luminaires would be reinstalled in the new parking area as required and reconnected to the exiting exterior lighting system.
6. The building facade and perimeter will be illuminated with recessed or surface mounted "dark sky friendly" down lights to suit the architectural design.
7. Dedicated and controlled outlets will be provided for decorative festival and seasonal lighting.
8. Exit lights will be energy efficient LED type, 2 watts AC. Vandal resistant signs will be specified where necessary.

4. LIGHTING CONTROLS

1. The existing lighting control system will be extended as required to suit the loads of the new north arena.
2. Multi-level switching will be provided for the event floor and concourse lighting.
3. Occupancy sensor switch will be utilized throughout for all offices, change and storage rooms.
4. Exterior lighting will be photocell controlled. Lighting not required to be on all night will be photocell on/Building Automation System off through the lighting control system.
5. Daylight sensors will be installed to switch or dim luminaires in areas where daylighting is available.
6. The lighting control system will interface with the emergency power system, (if generator is installed) to provide for automatic on of all emergency lights during a power failure.
7. Interior and exterior illuminated advertising and building signage will be controlled by the lighting control system.

5. POWER

1. Normal power will be provided to receptacles throughout the facility from local panel boards.
2. Connections will be provided to advertising and information and building signage.
3. Panel boards will be provided near each concession and electrical connections will be provided for all concession equipment included in the design build contract.
4. Connections/power will be provided for score clocks, shot clocks, goal lights and timekeepers bench.
5. All line voltage wiring and controls will be provided for mechanical equipment.
6. 600V feeders/connections will be provided to the refrigeration motor control centre.
7. Show power outlets will be provided for media mobile units.
8. Show/stage power will be provided to fused switch/splitter arrangements for connection of event based equipment and for portable distribution to trade show type booths. Panels will be provided with Camlock style connectors for connection to the power distribution system by travelling event companies.

6. FIRE ALARM

1. The existing fire alarm system will be extended into the new arena expansion. The annunciator will be modified to identify the new and existing zones. Multiple addressable initiation loops will extend out into the building and connect all of the remote devices. Wiring will be in Class A configuration and protected by loop isolation modules to prevent a single wiring fault from disabling other initiation devices.
2. Pull stations will be provided at each exit. Smoke detectors will be installed in stairwells and fire alarm loudspeakers will be located as required for audibility. All loudspeakers will be combination strobe light style for visual indication.
3. Sprinkler system flow, tamper and low pressure switches will annunciate separately.

4. Fire alarm system connection and control of smoke control HVAC equipment will be provided as required by the Building Code and the Code Consultant during detailed design.

7. INTRUDER ALARM SYSTEM

1. The existing security system will be extended into the new arena expansion with building perimeter intruder alarm.
2. The intruder alarm system will consist of monitored door contact switches, glass break detection, and motion detection within critical areas. The system will be armed/disarmed by localized zoned keypads, or by auto arming through system programming.

8. VOICE/DATA COMMUNICATIONS

1. The existing communication system will be extended into the arena expansion.
2. Communications rooms will be located around the facility to minimize wiring runs lengths and to allow for future communications cabling expansion in the facility.
3. Cable tray will be run throughout the building connecting the communications rooms for installation of voice and data network cables as well as for use by media during special events.
4. A 4' x 4" box complete with single gang plaster ring and minimum 1" conduit run back to the cable tray (or stubbed into the accessible ceiling space) will be provided at each telephone/data and co-ax outlet location.
5. Four twisted pair 24 gauge category 6 cable, insulated, unshielded and FT4 rated will be run from the local patch panel to each voice and data outlet. Cables will be terminated in RJ45 modular jacks at the outlet and at rack mounted patch panels.
6. Interconnection between the communications rooms will consist of 6 strand fiber optic Multimode cables, terminated at each end and tested.
7. A complete coaxial cable network consisting of RG6U coaxial cable, outlets and distribution cabinets will be provided for provision of Cable Television. Outlets will be provided in all lounges, dressing rooms, and meeting rooms.

9. ADVANTGES/DISADVANTGES

The advantages of this proposed site compared to 'base' stand alone are the electrical distribution, fire alarm, communication and securities systems are existing. Only the extension of existing systems will be required to accommodate the additional arena.
The disadvantage of this proposed site is that some site lighting to the north of the existing arena will be required to be removed to suit the location of the new arena. This is a minimal disadvantage as these lights could be used for the required new parking area.

1.3.9 Refrigeration

The existing facility consists of a single ice sheet served by an ammonia refrigeration plant. The existing plant would be modified to include a new chiller, pump, receiver and rink floor piping for the addition of a second sheet of ice. The refrigeration design would also include for the addition of a future third ice sheet to the existing plant. No equipment would be provided for the future third ice sheet.

- Add one new chiller, pump, receiver and compressor.
- Rink mains to new floor
- Rink headers and piping for the new floor.
- The existing refrigeration equipment room would be used for the new equipment.

Estimated cost of the new refrigeration equipment and rink floor piping: $415,000.

Advantages

- Reduced staffing cost for the refrigeration plant – no additional operator required.
- Reduced construction costs – no additional plant room cost, the existing plant is reused.
- Reduced energy costs – the use of a common refrigeration plant offers a cost of saving of approximately 20 percent in energy cost over stand alone facility.

General Comments

Construction of this refrigeration plant addition would not disrupt the existing refrigeration plant operation. The addition of the new equipment would be coordinated to allow for continued operation of the plant with the existing ice surface.

The use of a common plant allows for redundant refrigeration equipment as back up for the operation. The risk of down time when using a common refrigeration system is minimal.

1.4 FINANCIAL INFORMATION

INTRODUCTION

The City of Vernon has employed MQN Architects to look at various options to provide a new community arena with an NHL sized ice sheet as well as seating for approximately 400 visitors.

LTA Consultants Inc. has been retained by MQN Architects as part of the consultant team for the project to provide cost consulting and cost planning services for the project.

We have been provided with copies of the architects and engineers conceptual reports for the project. Five potential site options have been identified for the new arena. This report covers option 1A, which comprises an ice sheet expansion to the north elevation of the existing Kal Tire Place, Vernon, BC. Please refer to the architectural and engineering sub-consultant reports for further information regarding this option.

From the documentation and information provided, we have prepared an opinion of probable costs/conceptual estimate for option 1A (KTN). Please refer to schedule 'B' (Pages A1 – A58).

The base line arena specification for this option includes:

- Seating for approximately 400 visitors along one face of the ice sheet;
- NHL playing size ice sheet (200' x 85'), complete with dasher boards, players boxes, penalty boxes, safety netting, and scoring equipment;
- Four team dressing rooms and two referee/gender neutral dressing rooms;
- Common areas including a front lobby with ticket sales area, concession, washroom facilities and storage areas;
- Ancillary spaces.

The estimate report includes a main cost summary (refer to page A1). The 'estimated costs' for this option are contained in the summary under the following categories:

- Net Building Cost – Estimated construction cost for the new building addition work, including the sub-structure foundation costs, superstructure costs, building envelope costs and interior improvements and finishing costs, including mechanical and electrical;
- Site Development – Estimated construction costs for site improvements, site development, on-site servicing and off-site servicing. This would include any site specific costs relating to an option located on a sloping site, requiring bulk earthwork and retaining walls. All costs for re-constructing exterior parking and paving displaced by the new addition are included under this category;
- Ancillary Work (Interfacing Costs) – Estimated construction costs for renovation work to the existing facility to

interface the new building (where applicable). This would include any base building code upgrades required in the existing facility, as a result of the new addition;

- Project Contingencies;
- Estimated soft costs, including design fees, permits and development cost charges.

For option 1A (KTN), five separate price items have been developed for the following 'value added' options:

1. Dryland Training Facility;
2. Multi-Purpose Office Space;
3. Additional Office Space;
4. New Parking Area Adjacent to 43rd Avenue;
5. Elevated Running Track.

Please note, the separate price items are specifically excluded from the baseline estimate.

DOCUMENTATION & INFORMATION

We have been provided with the following documentation and information for the preparation of this opinion of probable costs/conceptual estimate:

- Architect's report and sketch plans, prepared by MQN Architects;
- Structural Engineers Report dated June 10th, 2014, prepared by R&A Engineering (1997) Ltd;
- Mechanical Design Brief dated June 10th, 2014, prepared by S + A Falcon Engineering Ltd;
- Electrical Feasibility Study Report dated June 18th, 2014, prepared by S + A Falcon Engineering Ltd;
- Refrigeration Summary Report dated June 12th, 2014, prepared by Bradley Refrigeration Consultants Ltd;
- Civil Engineers Report, prepared by Monahan Engineering Consultants Ltd;

BASIS OF THE ESTIMATE

Budget Estimate

We have met with the consultant team and reviewed the drawing documentation and information provided to establish the scope and extent of the work.

From the documentation and information provided, we have prepared the enclosed conceptual estimate.

Project Procurement and Pricing

Pricing for this project is based upon our opinion of current June 2014 standard construction industry market costs for this size and type of residential care project in Vernon, BC. It has been assumed that the project will be procured on a fixed stipulated 'lump sum' contract basis, from a competitive bidding field of at least six competent General Contractors. It has also been assumed that a competitive bidding field of at least five competent sub-contractors for each trade will tender for the work and that there will be no 'sole source' bids.

This conceptual estimate attempts to establish a fair and reasonable price for the proposed work and is not intended to be a prediction of 'low bid'.

Contingency Reserves

A Design Contingency Allowance of 10% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the design phase that do not change the project scope. This allowance is ultimately absorbed into the designed and quantified work as more detailed information becomes available and is, therefore, normally reduced to zero at the tender stage.

An Escalation Contingency Allowance of 0% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover price increases in construction costs due to changes in market conditions between the date the estimate is prepared and the date the tender is called.

A Construction Contingency of 5% is included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the construction period which will result in change orders. This contingency is not intended to cover changes in the scope of the work.

Level of Accuracy

This is a preliminary class 'D' opinion of probable cost/conceptual estimate with a level of accuracy of +/-20% 18 times out of 20.

We note that this conceptual estimate report has been prepared from preliminary documentation for cost comparison purposes only, and should not be used for establishing the capital planning purposes for the preferred option.

GST

GST has been included at the full rate payable of 5%.

Excluded Items

The following items are **specifically excluded** from this conceptual estimate:

- Financing Costs;
- Course of Construction Insurance;
- Portering, relocation and temporary accommodation;
- Removal and/or remediation of hazardous materials;
- Special Foundations and Ground Improvement Work;
- Workstations and systems furniture;
- Loose furniture, furnishings and equipment;
- LEED™ certification and registration costs.

RECOMMENDATIONS

A combined summary of all options is included in schedule 'A' of the report (refer to page S1).

From an initial capital cost perspective we recommend that Option 1A (KTN), be further investigated and pursued as the best potential solution. Although Option 2A (PVE), is slightly cheaper, it does not meet the base program requirements. Additionally, the Option 2A (PVE) estimate does not include any cost allowance to replace the displaced exterior ice sheet.

LIFE CYCLE COST ANALYSIS

A Life Cycle Cost Analysis has been prepared for the five options based on a time frame of 40 years. Please refer to Pages LCC 1-3 in schedule 'C' of this report for further information regarding the assumptions and rates used for the calculations.

We note that adjustments have been made to the rates for various options to take into account the operational efficiencies.

OPTION 1B - KAL TIRE PLACE WEST

1.1 INTRODUCTION

Kal Tire Place – West, option 1b, investigates the potential to add a second sheet of ice, covering the existing laneway and extending into the neighbouring race track property, along the west edge of the existing Kal Tire facility.

This option spans across three existing properties. All three are either owned by or shall be titled to the City of Vernon in accordance with the Greater Vernon Recreation Facilities and Programming Agreement. All three properties are currently zoned P2 - Public Institutional. The proposed land use is consistent with the OCP and the zoning supports the proposed project. For these reasons, with the exception of a parking variance described below, it is understood no additional variances would be required.

The current zoning bylaw requires 1 stall per seat for spectator sports establishments. The existing facility has 3006 seats. If the current parking bylaw were applied to the existing facility, 752 parking spaces would be required. The current site provides for 668 parking stalls, a deficiency of 84 stalls. The proposed 400 seat facility would require an additional 100 spaces increasing the total parking requirement for the facility to 852 spaces. A total of 28 existing spaces are lost under the new facility. However, by developing the landscaped area to the south of the facility, along 43rd Ave, an additional 48 stalls can be provided. The net result is a gain of 20 spaces, increasing the total provided parking to 688 spaces, which leaves a deficiency of 164 spaces. As previously stated, a variance may be required to address the parking deficiency.

Based on the City of Vernon's zoning bylaw, the parking calculation has been based on the requirement for 1 parking space per 4 seats for Spectator Sports Establishments. However for the vast majority of the facilities use, which includes community programing such as youth ringette, minor lacrosse, public skating, and adult hockey leagues, there are typically fewer spectators than participants on the ice, and significantly fewer spectators than the facility is designed for.

During these times, the zoning bylaw's lower parking requirement of 1 space per employee on duty, plus 1 space per 3 users, for Participant Recreation Services, Indoor, may be more appropriate. Using the assumption of 1 employee on duty with 50 players and coaches on the ice, and another 50 in the change rooms, the existing facility would require 35 spaces and the new facility require another 34. Even increasing this to 1 per user the total parking requirement for the new facility would only be 200 spaces, well below the amount provided. The likelihood that both spectator areas would be at peak capacity and all 688 spaces would be required would most likely only occur during conventions, concerts, or Vipers hockey games. This could be mitigated through facilities programming to assure peak parking demands for both facility's do not occur at the same time.

The proposed facility is located overtop the south east edge of the existing race track. In order to facilitate expansion to the west, the existing race track would need to be relocated further North. This may be a considerable challenge given the history and unresolved issues with the race track property.

The existing Kal Tire Place is a 5985m^2 sprinklered non-combustible building with a steel structure and combination of metal panel and concrete masonry unit cladding.

1.1.1 Proposed Location

1.2 DESIGN DESCRIPTION

This option calls for the addition of a second NHL sized ice sheet (200' x 85') to the west of the existing Kal Tire Place facility. The new facility connects to the existing facility through access at the north ends of both buildings. The ice sheet is orientated in a North – South direction.

With the 3210m^2 addition of a new ice sheet, the facility's overall footprint would increase to 9194m^2. With both the addition and the existing building being of single storey, sprinklered, and non-combustible construction the project is well within the maximum footprint permitted by the Building Code.

For comparison purposes, we have proposed a 3210m^2 sprinklered building consisting of a steel structure and an insulated metal panel system envelope. The lower 7' of the building envelope is clad with concrete masonry units to help mitigate the potential for damage and vandalism. A 400 seat capacity viewing area with bench type seating has been provided, located above the change room facilities.

The new facility includes a standard size NHL ice surface (200' x 85'), complete with dasher board system (with glass), spectator netting along the perimeter, players and penalty benches, and signal and timing devices. Four (4) team dressing rooms each with two (2) shower facilities, two (2) water closet facilities, and single washbasin are provided, along with two (2) referee / gender neutral dressing rooms each with shower facilities, one (1) water closet and, one (1) washbasin.

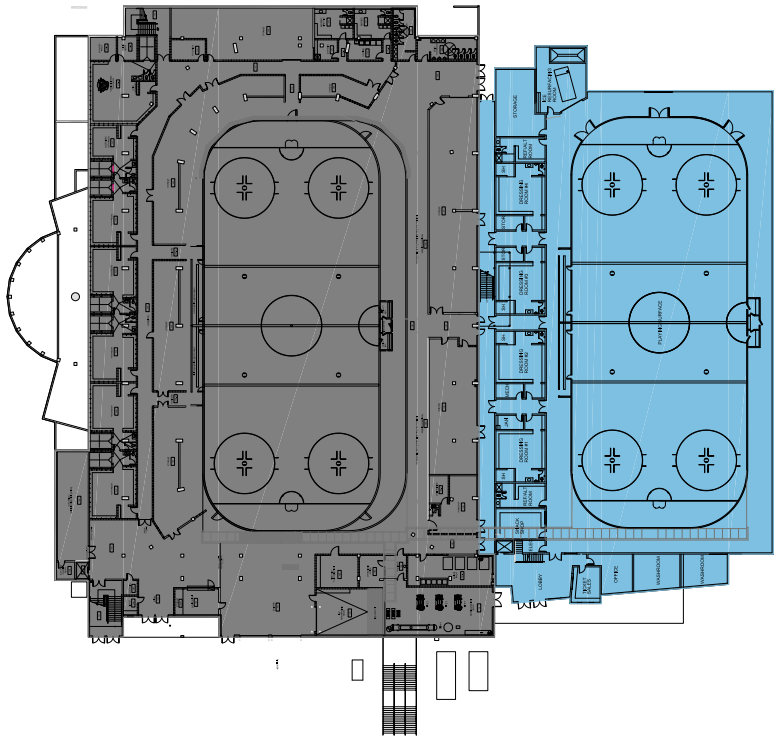
Along with the necessary support spaces, the following program rooms have also been included in the design: a front lobby area with ticket sales office, office space, dry goods concession, washroom facilities (to BCBC requirements), mechanical and electrical rooms, refrigeration room, ice resurfacing room (with ice dump pit), custodial room, storage room (with mop sink and shelving), and maintenance staff room / equipment room.

The proposed option meets all of the program requirements and can provide any number of the "value added" options, including a multipurpose room, fitness training facilities, an elevated walking track, and additional office space, without further significant impact to the parking.

1.3 TECHNICAL INFORMATION

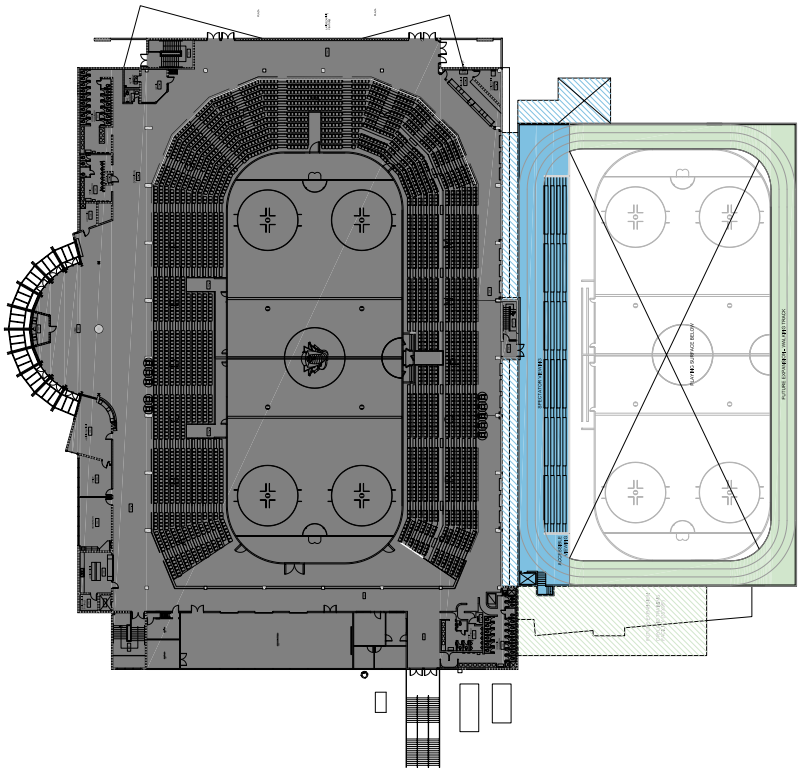
1.3.1 Architectural Site Plan

1.3.2 Main Floor Plan



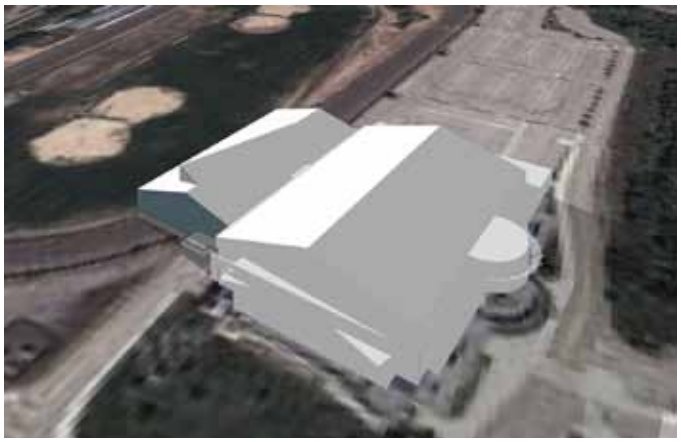
KTW-2
Project VERNON CIVIC ARENA REPLACEMENT FEASIBILITY STUDY - KAL TIRE PLACE: WEST TWINNING
Drawing CONCEPTUAL MAIN FLOOR PLAN
Project No. 14838
Scale 1 : 250
Date MAY 27, 2014
FEASIBILITY STUDY

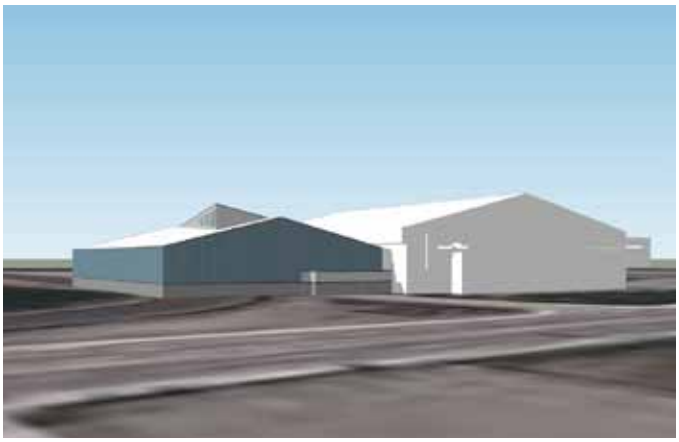
1.3.3 Second Floor Plan

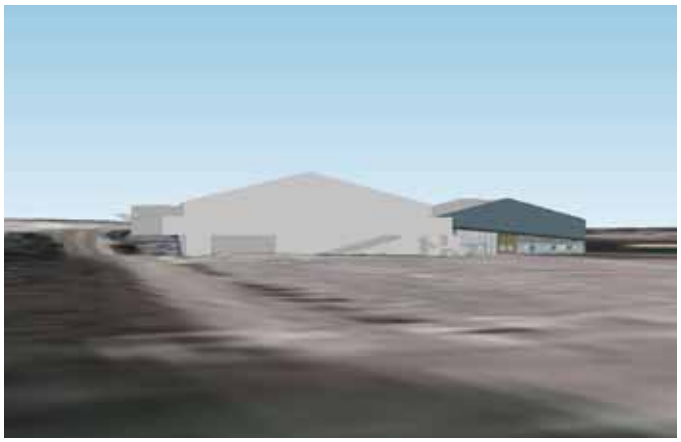


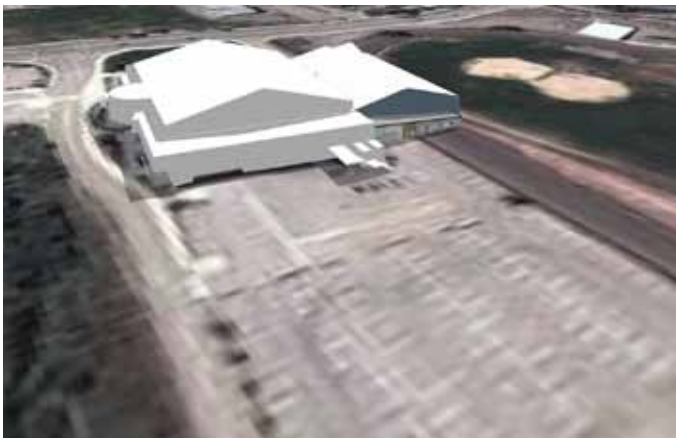
KTW-3
Project VERNON CIVIC ARENA REPLACEMENT FEASIBILITY STUDY - KAL TIRE PLACE WEST TWINNING
Drawing CONCEPTUAL SECOND FLOOR PLAN
Project No. 14838
Scale 1 : 250
Date MAY 27, 2014
FEASIBILITY STUDY

1.3.4 Perspectives









1.3.5 Civil

The Kal Tire West proposal will sit slightly below the existing grades of the adjacent lands and would be constructed on ground that has never been exposed to any significant loading. As such, there is potential for significant geotechnical and structural issues associated with the construction at this location, which need to be reviewed by a geotechnical engineer. In addition, the proposed location is also over top of the existing ROW for storm drainage from 43rd ave and the race track area. A portion of this line, and the line that provides drainage for the western drive aisle, will have to be relocated to accommodate the building in the location shown.

In addition to the relocation of the storm sewer, there is also a requirement for additional detention storage and water quality control however we have assumed that this can be dealt with in the existing storm pond at the rear of the site.

Under this option a significant concern would be the elimination of secondary access to the site. This option cuts off the access to 43rd ave on the west side of the site. Given the nature of the site and the volume of traffic during event times, this access would either have to be re-established around the perimeter of the new site or alternatively a new access would have to be constructed out to Old Kamloops Road. Conditions of an access to old Kamloops road will likely include the introduction of the left turn lane at the proposed location of the access.

Since the layout of the parking in front of the building is the same as in Option 1A, the concerns and issues noted in the Option 1A above are consistent with this option.

The existing water service to the site will be adequate to provide servicing to the new building and no upgrading will be required. Sanitary sewer servicing is available at the southeast corner of the new building. A short section of the existing

line will have to be removed and a new service to the building will be installed.

With the exception of conditions associated with a new access to Old Kamloops Road, the off-site requirements are identical to those of option 1A.

1.3.5.1 Cost Estimates

Site servicing cost estimates were developed for each of the options. These estimates include on-site and off-site costs. Without the benefit of a geotechnical investigation or detailed topographic survey, we have had to make assumptions regarding the earthworks associated with each site. The following table summarizes the assumptions for Kal Tire Place – West, as it relates to the earthworks:

Option	Earthworks Assumptions
Kal Tire West	Existing material within 1.5m of the underside of the slab is removed and backfilled with structural material to 0.5m below floor slab elevation.

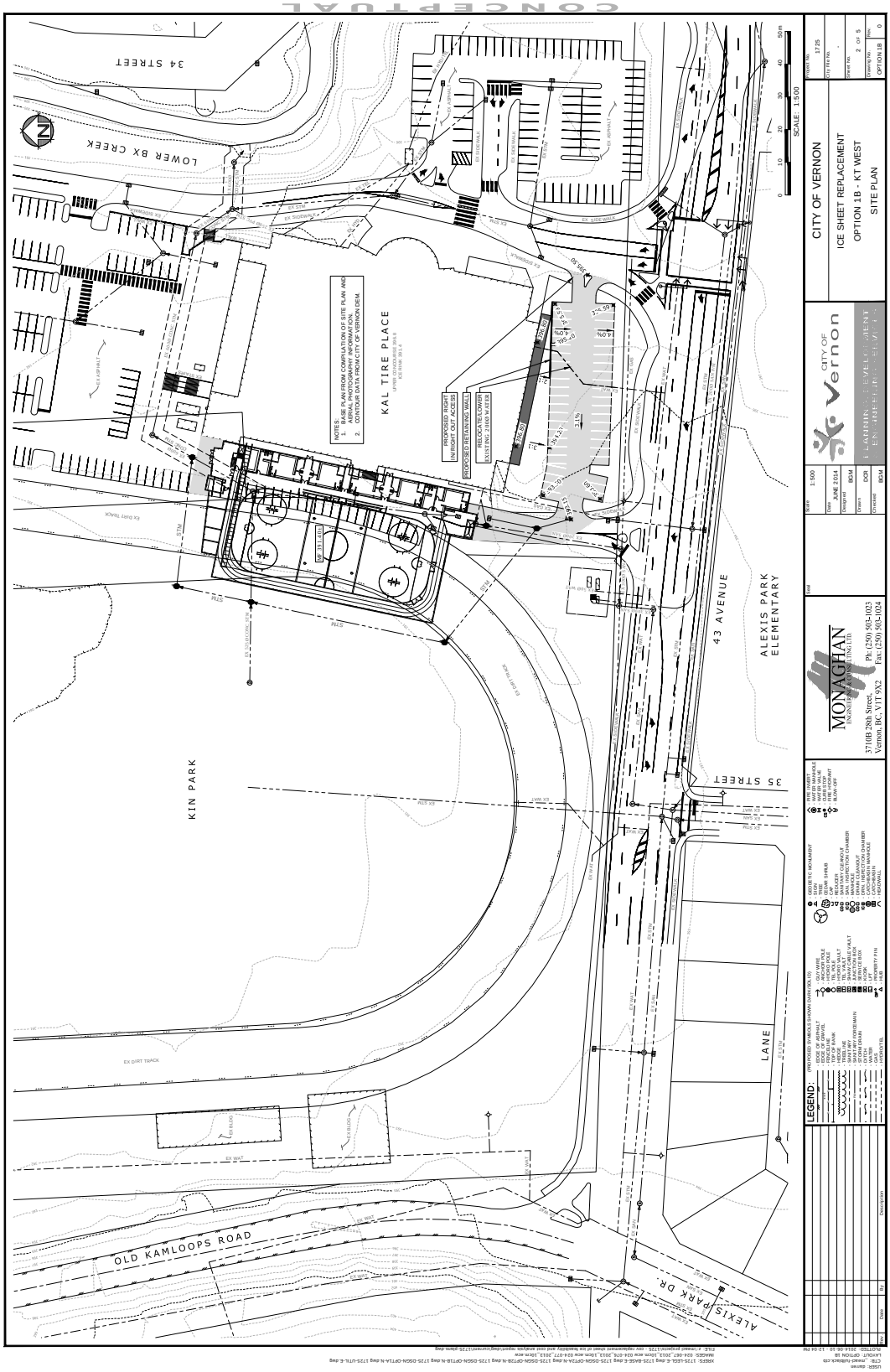
While any site will require detailed geotechnical investigation prior to moving forward, the assumptions for the Kal Tire West, along with PV West, sites have the most potential to be out of line with actual conditions and if these sites are to be considered, should be thoroughly investigated.

For purposes of a secondary access for the Kal Tire West project, we have included an allowance of $250,000 for the construction of this access out to Old Kamloops Road. This cost is based on a review of a 2002 report for Mr. Al McNiven of Greater Vernon Parks, and updated for today's costs.

Based on the above assumption, a detailed estimate has been developed. Detailed estimates of all the options are included at the end of this report. The findings for Kal Tire West are summarized in the following table:

Option	On-Site Servicing	Off-Site Servicing	Total Servicing
Kal Tire West	$952,000	$48,055	$1,000,055

Based on the cost noted above, the Kal Tire West option (1B) is associated with the second highest servicing costs.


CONCEPTUAL
34 STREET
LOWER BX CREEK
KAL TIRE PLACE
43 AVENUE
ALEXIS PARK ELEMENTARY
KIN PARK
35 STREET
OLD KAMLOOPS ROAD
ALEXIS PARK DR.
LANE
NOTES:
1. BASE PLAN FROM COMPILATION OF SITE PLAN AND AERIAL PHOTOGRAPH PROVIDED BY CITY.
2. CONTOUR DATA FROM CITY OF VERNON DEM.
PROPOSED RIGHT-IN/RIGHT-OUT
PROPOSED RETAINING WALL
EXISTING CONTOURS
EXISTING WATER TRUCK JUNCTION
CITY OF VERNON
ICE SHEET REPLACEMENT
OPTION 1B - KT WEST
SITE PLAN
SCALE 1:500
MONAGHAN
3710B 28th Street
Vernon, BC, V1T 9X2
Ph: (250) 503-1023
Fax: (250) 503-1024
LEGEND:

1.3.6 Structural

The following summarizes the general type of structure to be used for each arena option. This information is to be used for general budgeting purposes. Soil conditions at the various sites are unknown. This report assumes that each site has reasonable soil conditions, and each option has similar soil conditions to each other. The new structure would be designed to the snow, wind and seismic standards of the 2012 British Columbia Building Code.

The anticipated structure is as follows:

Starting at the foundation:

2 of the sides of the building have full height walls to the roof, while the other two sides have a second floor and then walls to the roof. The lobby end of the building will have full height walls to the roof with a lower roof over the front lobby.

For the typical full height walls, there would be a reinforced concrete strip footing bearing 900mm below grade for frost protection. On top of this footing there would be a 200mm thick reinforced concrete perimeter frost wall with pilasters at the column locations. Bearing on the concrete pilasters would be steel columns. The steel columns would go full height to the roof and support steel wind girts and steel roof beams. Within the beam/columns would be a few bays of HSS cross-bracing for overall lateral support.

Along the two exterior walls that support the second floor there would be a 200mm thick reinforced concrete wall bearing on reinforced concrete strip footings bearing 900mm below grade. This concrete wall would extend up to the underside of the second floor and support a suspended slab. At this level, perimeter structural steel columns, girts and bracing would start and be similar to around the rest of the building, and extend up to support the roof.

The structural steel frame system around the perimeter of the building would support large structural steel fabricated roof trusses spanning across the short direction of the ice surface. These steel trusses would comprise of W-beam top and bottom chords, with HSS diagonals. They would support open web steel joists, spanning the distance between the large trusses. The Open Web steel joists would be spaced at about 1700mm centres and support 38mm steel decking.

There are many rooms around the ice surface. These rooms would be constructed of 200mm reinforced masonry block supported on strip footings, that would bear approximately 450mm below the top of slab-on-grade. There would be a suspended slab system on top of the walls, providing a surface to support the bleachers, as well as a surface for a corridor or future walking path.

The large roof trusses and the exterior wall structure would be designed to support a future suspended walk-way.

The low roof over the lobby end of the building would be constructed of a similar structural steel column/brace frame supporting open web steel joists supporting 38mm steel decking.

The bleacher seats could either be precast concrete or a proprieatory steel/aluminum product.

Similar to Kal Tire North, there would be some additional structure required between the new arena and the existing arena, but for this option there would be significantly more. As there would be a longer section of building attached to the existing, we would anticipate that the cost per square metre would increase due to the inherent challenges of building new against existing, keeping in mind that the new structure would be independent from the existing. The new roof would also have to be designed for potential sliding snow from the existing arena's roof. Thus this area of roof would then most likely be more expensive to build than for the stand alone building, as it would be designed for a higher snow load.

Conclusion

From a structural perspective all the options are very similar, with some of the options being more difficult to build because of their locations or close vicinity to other buildings.

1.3.7 Mechanical

Executive Summary

- The new arena HVAC systems will be configured to be utilized for summer ice and also for assembly use when the ice is not in use.
- Natural gas usage for the new arena will be minimized by utilizing reliable sealed combustion, condensing water heating systems for domestic water, ice resurfacing water and hydronic heating systems.
- Outside air consumption for the new arena will be minimized by utilizing conventional demand control and motion control devices on the ventilation system.
- The addition of the new arena on the west side will require the gas service to be reconfigured to a new location.
- The addition of the new arena on the west side will require a significant number of ventilation systems to be reconfigured.

1.1 General

S+A Falcon Engineering Ltd. have been retained by MQN Architects Inc. to provide comments on mechanical systems in relation to a new 400 seat Community Arena in Vernon, British Columbia. There are 5 configurations for the facility under consideration.

The purpose of this report is for:

- Developing requirements for the mechanical systems so that five arena options can be assessed.
- Means of assisting the pricing process.

The scope of this commission includes:

- Plumbing Systems.
- Heating, Ventilating and Air Conditioning Systems.
- Exhaust Systems.
- Fire Protection Systems.

The scope does not include:

- Ice Making Refrigeration Systems.
- Civil Works.

1.2 Documentation and Research Resources

The comments in this report are based on:

- Drawings prepared by MQN Architects Inc. for the five options.
- Mechanical tender drawings for the Kal Tire Place dated October 2000.
- Mechanical tender drawings for the Priest Valley Arena and Gym dated September 1978.
- Discussions with the Owner and Consulting Team.

1.3 Building and Systems Descriptions

The project is based 400 seat spectator community NHL sized arena. The base facility program includes; lobby areas, dressing rooms, referee rooms, washrooms, office and ticket sales spaces, concession, janitor rooms, storage rooms, mechanical rooms, electrical rooms and equipment rooms, refrigeration room and ice resurfacing room.

This report contains comment on the mechanical systems for these spaces.

Other program enhancements could include a combination of; extra office spaces, fitness areas, dedicated team rooms, extra viewing capacity, display areas, walking track, multipurpose, meeting and conference rooms and also a variety of training facilities.

2.0 PLUMBING SYSTEMS

Water Service

The existing water service in 200mm and is located on the south side of the building.

This water service is adequate for domestic water supply and fire protection for the arena addition but in order to be utilized, new pipe supplies will need to extend from the service to the new arena.

1.1 Storm Water Service

The existing storm drainage systems are configured to exit the existing building as follows:

- Existing Arena - North West Corner 250 mm
- Existing Arena - North East Corner 250 mm

The configuration of these systems does not appear to require upgrade due to the addition.

New dedicated storm water system for the new arena will be needed.

1.2 Sanitary Drainage Service

The existing 150mm sanitary system exits the facility at the south west corner of the building. A new 150mm service will need to extend from the new arena to the manhole on the south west corner of the existing building.

1.3 Gas Service

The existing gas service location is on the west wall closer to the south end of the existing arena. The addition of the new arena on the west side will require the gas service to be reconfigured to a new location. The gas service will be upgraded to match the new loads.

1.4 General Plumbing Systems

All drainage systems above ground will be cast iron with mechanical couplings. All drainage systems below grade will be plastic. Drainage systems will be provided with a clean out as the service exits the building.

All hot and cold water piping should be insulated copper. Domestic water supply piping will be configured so that no piping will be constructed or concealed within a masonry wall. Piping systems within masonry walls are subject to premature failure and are extremely difficult to repair.

Hose bibbs will be provided around the facility for cleaning and initial ice making purposes. Hose bibbs will be frost free and vandal resistant. Hose bibbs will be recessed and fit with removable operating handles or keys.

1.5 Domestic Water Heating Systems

A new domestic water heating system will be provided with individual high efficient, gas-fired, heaters and re-circulating systems for the new arena. The hot water heaters will be sealed combustion with venting systems directed to wall discharge. The hot water systems will be capable of temperatures up to 60 deg C (140 deg F). Expansion tanks will be

provided for this system.

1.6 Tempered Water Supply Systems

Large central tempered water recirculation systems are very difficult for building operators to maintain constant temperatures over a wide range of scenarios. We therefore recommend point of use tempered mixing valves for each washroom group and shower groups.

The tempered mixing valve for the change rooms will be mounted at high level in lockable stainless steel service boxes near the shower area.

1.7 Ice Making Water Heating Systems

A new gas fired instantaneous hot water heater will be utilized to provide hot water supply for the ice cleaning equipment systems as a second ice resurfacing room is required. The system will be capable of boosting temperatures from the domestic water service to 60 Deg C (140 Deg F). New 38 mm hot water connection for the ice resurfacing equipment shall be utilized to allow quick fill turnaround.

1.8 Plumbing Fixtures

Plumbing and drainage for fixtures shown on the architectural drawings will be provided, including devices and fixtures required for barrier free access.

All fixtures on exterior walls will require furring and insulation.

We recommend plumbing fixtures if not already installed as follows:

- Water closets: low consumption, floor mounted with battery infrared control type flush valve.
- Urinals: low consumption, wall mounted with battery infrared type flush valve.
- Change Rooms Showers: low consumption, vandal resistant head, with 24 volt electronic timed push button 60 second control. Shower systems will be provided with stainless steel enclosures mounted on block walls, for concealing valves and supply piping.
- Hand Lavatories: counter mounted stainless steel with battery infrared control faucet.
- Combination drinking fountain bottle fillers: refrigerated wall mount.
- Custodian Rooms: Moulded stone, floor mount service sink, wall mounted, manual valve, hot and cold trim with hose connection.
- Plant Refrigeration and both Ice Resurfacing Rooms: Moulded stone, leg mount, double or single compartment service sinks, wall mounted, manual valve, hot and cold trim with hose connection.
- The existing emergency eye wash and safety shower in the vestibule to the Plant Refrigeration Room should remain in service.

1.9 Kitchen and Concession Plumbing Systems

Kitchen or Concession Areas are not intended to be commercial quality. Under this configuration, these systems will not require grease interceptors. However, plumbing fixtures that comply with Health Regulations will be required. Usually, three compartment sinks and a hand lavatory is required unless a commercial quality dishwasher is provided.

3.0 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

1.1 Existing systems that require reconfiguration due to addition of new facility.

Typical Louvers

Twelve ventilation systems will need to be reconfigured to accommodate the addition to the west.

1.2 Primary Heating

Primary heating for the new arena shall be provided through gas fired sealed combustion boilers that supply energy to the hydronic heating systems.

Two circulation pumps and piping systems will be utilized to deliver energy to terminal heat transfer units.

1.3 Arena Area

The arena will be served by one or two packaged rooftop gas fired heating and electric cooling units. These units will be able to deliver cooling effect to the arena area when the ice making systems are off. Outside air quantities and dedicated exhaust will be varied by modulating dampers controlled by economizer programs and/or CO, CO_2 and NO_2 sensors. Systems will be activated through the Building Automation System.

Air supply distribution will be through overhead, exposed ductwork and double vane type diffusers. The ductwork will be located generally over the dasher boards and the diffusers will be directed toward the seating area. Air flow at the ice surface is to be kept as calm as possible. Return air will be through ductwork located at low level.

Desiccant dehumidifying equipment will be provided to ensure adequate dehumidification to keep the ice level at 50% relative humidity at 10 deg C (50 deg F) at 1,200 mm above ice level.

The seating area will be heated with gas fired, infrared tubular heaters in eight sections. These heaters will be operated on a demand override for a pre-determined time through the Building Automation System. These units will be separate combustion air systems that draw air directly from outside.

1.4 Lobby Area

The lobby will be served by one packaged rooftop gas fired heating and electric cooling units.

1.5 Team and Referee Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.6 Office, Ticket Sales and Other Small Regularly Occupied Spaces

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Cooling will be provided with ductless split systems.

Outside air will be delivered through the ductless split systems and a constant flow outside air connection

1.7 Kitchen and Concession

The menu for foods supplied in this area is limited to items that can be cooked without emitting grease laden vapors. Therefore residential style range hoods can be utilized.

1.8 Washrooms and Janitor Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.9 Storage, Equipment, Mechanical and Electrical Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights or temperature control.

1.10 Ice Resurfacing Rooms

New hydronic unit heaters will be utilized for Ice Resurfacing Rooms.

Ice Resurfacing Room will be provided with new dedicated exhaust service. The systems will be controlled by CO, CO_2 and NO_2 and propane sensors to maintain safe levels when ice cleaning equipment is in operation.

1.11 Ice Making Refrigeration Rooms

The existing Plant Refrigeration Room has been provided with an emergency exhaust system. This system can be upgraded to provide the required ventilation rates for the new refrigeration system capacity.

Make up air will be drawn through the existing louver and damper located on the north wall.

Heating for this area is provided through existing hydronic unit heaters.

1.12 Controls

The control system specifications will be based on a direct digital control Building Automation System, with monitoring and controlling capability for all areas of the complex.

The system will incorporate direct digital control with a networking type system. All wiring, computer terminal, printer and devices required will be supplied for a complete and fully operational system.

4.0 FIRE PROTECTION SYSTEMS

1.1 General

The existing arena has been provided with a fire protection system. The new arena will be provided with a fire protection system.

The automatic sprinkler system will be designed and specified to comply with the requirements of NFPA 13 and the British Columbia Building Code. All of the equipment and sprinkler heads incorporated into the system will be ULC and FM listed.

Fire extinguishers will be provided to comply with the requirements of NFPA 10 and the British Columbia Building Code.

A wet type automatic sprinkler system will be utilized for the bulk of the building. Consideration should be made for a dry system in the arena and other nominally cold areas. The sprinkler piping systems for the bulk of this building should be Schedule 40 as this piping system as a longer life expectancy that some of the thin wall systems.

1.2 Hazard Classification

All areas that could possibly be used for exhibition, trade show in the Arena or lobby will be treated as Ordinary Hazard Group 2.

Storage Rooms, Mechanical Rooms, Custodian Rooms, Concessions and Kitchen Areas will be classified as Ordinary Hazard Group 1.

All other areas will be treated as light hazard.

1.3 Main Sprinkler Station

The existing sprinkler station is at the south end of the building. The existing sprinkler system can be reconfigured to accommodate the systems required for the new arena. Piping system will be needed from the service to the new building.

1.4 Fire Hose and Standpipe

It is not anticipated that a standpipe and hose system will be required for the building.

5.0 CONCLUSIONS

Conclusion

The recommendations presented in this Design Brief should be reviewed by the Owner and Design Team. Any recommendation can be incorporated for the pricing process or further development of the design program.

1.3.8 Electrical

1.1 GENERAL

1. S+A Falcon has been retained by MQN Architects to provide comments on electrical systems in relation to a new 400 seat community arena in Vernon, British Columbia.
2. The purpose of this report is to develop requirements for electrical systems so that 5 arena options can be reviewed.
3. A primary focus of the electrical design should be safety for both the public and for facility operational staff.
4. In consideration of the expected life of this facility, electrical equipment should be selected for energy efficiency, durability and ease of maintenance.
   Infrastructure should also be included to support temporary events such as trade shows and concerts.

1.2 SERVICE AND DISTRIBUTION

1. The incoming services for the existing arena is fed underground from the east property line, to a BC Hydro pad mounted transformer located outdoor near the existing electrical room.
2. The existing main service is rated at 1600A@347/600V 3 phase. The service and distribution has been designed to allow for the expansion at the existing facility into a twin rink.
3. The existing distribution will be modified to extend a sub-distribution service to the new north arena.
4. 120/208V panel boards will be located throughout the building as required for receptacle and other power loads. 120/208V Panels will generally be located close to loads for user convenience, easy reconfiguration, and lower line losses.
5. Motor control centres will be specified and installed in conjunction with the mechanical equipment layout and design. Motor control centres will be installed as close to the utilization equipment as is practicable.
6. Branch circuit wiring and feeders will be minimum #12 AWG 90°C rated copper wire in EMT or PVC/DB2 below grade. AC90 cable will be permitted for drops to devices on suspended ceilings and for wiring in frame walls. All wiring will be copper.
7. All new distribution equipment will be charged with minimum 25% spare load carrying capacity. All distribution equipment will have a minimum 25% spare device capacity.

1.3 LIGHTING

1. Lighting levels will be in accordance with the requirements of the Illuminating Engineering Society (IES) recommendations.
2. Main arena lighting will consist of LED “high bays’ switched selectively to provide alternate illumination levels. Care will be taken during detailed design to ensure that glare effects of the arena lights are reduced.
3. Concourse lighting and arena bowl lighting will be provide via architectural style fluorescent luminaires providing instant on capability for emergency lighting. Enclosed vandal proof luminaires will be utilized where required.
4. Interior lighting in other areas will be primarily fluorescent with electronic instant start ballasts and T8 lamps with a colour temperature of 3500K. Luminaire types will typically be as follows:
   - Main lobby/concourse – LED down lights and decorative LED/compact fluorescent suspended luminaires.
   - Dressing rooms –vandal proof fluorescent luminaires with polycarbonate lenses.
   - Shower stalls – vapour/vandal proof surface mount fluorescent.
   - Office/meeting areas – recessed fluorescent.
   - Storage/service rooms – fluorescent strip lights with wire guards.
   - Concessions/lounges/ticket offices/public washrooms–2 x 4’ fluorescent with framed K12 lens. LED pot lights will be utilized for accent lighting.
5. The building facade and perimeter will be illuminated with recessed or surface mounted “dark sky friendly” down lights to suit the architectural design.
6. Dedicated and controlled outlets will be provided for decorative festival and seasonal lighting.
7. Exit lights will be energy efficient LED type, 2 watts AC. Vandal resistant signs will be specified where necessary.

1.4 LIGHTING CONTROLS

1. The existing lighting control system will be extended as required to suit the loads of the new west arena.
2. Multi-level switching will be provided for the event floor and concourse lighting.
3. Occupancy sensor switch will be utilized throughout for all offices, change and storage rooms.
4. Exterior lighting will be photocell controlled. Lighting not required to be on all night will be photocell on/Building Automation System off through the lighting control system.
5. Daylight sensors will be installed to switch or dim luminaires in areas where daylighting is available.
6. The lighting control system will interface with the emergency power system, (if generator is installed) to provide for automatic on of all emergency lights during a power failure.
7. Interior and exterior illuminated advertising and building signage will be controlled by the lighting control system.

1.5 POWER

1. Normal power will be provided to receptacles throughout the facility from local panel boards.
2. Connections will be provided to advertising and information and building signage.
3. Panel boards will be provided near each concession and electrical connections will be provided for all concession equipment included in the design build contract.
4. Connections/power will be provided for score clocks, shot clocks, goal lights and timekeepers bench.
5. All line voltage wiring and controls will be provided for mechanical equipment.
6. 600V feeders/connections will be provided to the refrigeration motor control centre.
7. Show power outlets will be provided for media mobile units.
8. Show/stage power will be provided to fused switch/splitter arrangements for connection of event based equipment and for portable distribution to trade show type booths. Panels will be provided with Camlock style connectors for connection to the power distribution system by travelling event companies.

1.6 FIRE ALARM

1. The existing fire alarm system will be extended into the new arena expansion. The annunciator will be modified to identify the new and existing zones. Multiple addressable initiation loops will extend out into the building and connect all of the remote devices. Wiring will be in Class A configuration and protected by loop isolation modules to prevent a single wiring fault from disabling other initiation devices.
2. Pull stations will be provided at each exit. Smoke detectors will be installed in stairwells and fire alarm loudspeakers will be located as required for audibility. All loudspeakers will be combination strobe light style for visual indication.
3. Sprinkler system flow, tamper and low pressure switches will annunciate separately.
4. Fire alarm system connection and control of smoke control HVAC equipment will be provided as required by the Building Code and the Code Consultant during detailed design.

1.7 INTRUDER ALARM SYSTEM

1. The existing security system will be extended into the new arena expansion with building perimeter intruder alarm.
2. The intruder alarm system will consist of monitored door contact switches, glass break detection, and motion detection within critical areas. The system will be armed/disarmed by localized zoned keypads, or by auto arming through system programming.

1.8 VOICE DATA COMMUNICATIONS

1. The existing communication system will be extended into the arena expansion.
2. Communications rooms will be located around the facility to minimize wiring runs lengths and to allow for future communications cabling expansion in the facility.
3. Cable tray will be run throughout the building connecting the communications rooms for installation of voice and

data network cables as well as for use by media during special events.

4. A 4' x 4" box complete with single gang plaster ring and minimum 1" conduit run back to the cable tray (or stubbed into the accessible ceiling space) will be provided at each telephone/data and co-ax outlet location.
5. Four twisted pair 24 gauge category 6 cable, insulated, unshielded and FT4 rated will be run from the local patch panel to each voice and data outlet. Cables will be terminated in RJ45 modular jacks at the outlet and at rack mounted patch panels.
6. Interconnection between the communications rooms will consist of 6 strand fiber optic Multimode cables, terminated at each end and tested.
7. A complete coaxial cable network consisting of RG6U coaxial cable, outlets and distribution cabinets will be provided for provision of Cable Television. Outlets will be provided in all lounges, dressing rooms, and meeting rooms.

ADVANTGES

The advantages of this proposed site compared to 'base' stand alone are the electrical distribution, fire alarm, communication and securities systems are existing. Only the extension of existing systems will be required in order to accommodate the additional arena.

1.3.9 Refrigeration

The existing facility consists of a single ice sheet served by an ammonia refrigeration plant. The existing plant would be modified to include a new chiller, pump, receiver and rink floor piping for the addition of a second sheet of ice. The refrigeration design would also include for the addition of a future third ice sheet to the existing plant. No equipment would be provided for the future third ice sheet.

- Add one new chiller, pump, receiver and compressor.
- Rink mains to new floor
- Rink headers and piping for the new floor.
- The existing refrigeration equipment room would be used for the new equipment.

Estimated cost of the new refrigeration equipment and rink floor piping: $415,000.

Advantages

- Reduced staffing cost for the refrigeration plant – no additional operator required.
- Reduced construction costs – no additional plant room cost, the existing plant is reused.
- Reduced energy costs – the use of a common refrigeration plant offers a cost of saving of approximately 20 percent in energy cost over stand alone facility.
- Reduced maintenance cost by using common equipment for both ice surfaces.

General Comments

Construction of this refrigeration plant addition would not disrupt the existing refrigeration plant operation. The addition of the new equipment would be coordinated to allow for continued operation of the plant with the existing ice surface.

The use of a common plant allows for redundant refrigeration equipment as back up for the operation. The risk of down time when using a common refrigeration system is minimal.

1.4 FINANCIAL INFORMATION

INTRODUCTION

The City of Vernon has employed MQN Architects to look at various options to provide a new community arena with an NHL sized ice sheet as well as searing for approximately 400 visitors.

LTA Consultants Inc. has been retained by MQN Architects as part of the consultant team for the project to provide cost consulting and cost planning services for the project.

We have been provided with copies of the architects and engineers conceptual reports for the project. Five potential site options have been identified for the new arena. This report covers option 1B, which comprises an ice sheet expansion to the west elevation of the existing Kal Tire Place, Vernon, BC. Please refer to the architectural and engineering sub-consultant reports for further information regarding this option.

From the documentation and information provided, we have prepared an opinion of probable costs/conceptual estimate for option 1B (KTW). Please refer to schedule 'A' (Pages B1 – B3).

The base line arena specification for this option includes:

- Seating for approximately 400 visitors along one face of the ice sheet;
- NHL playing size ice sheet (200' x 85'), complete with dasher boards, players boxes, penalty boxes, safety netting, and scoring equipment;
- Four team dressing rooms and two referee/gender neutral dressing rooms;
- Common areas including a front lobby with ticket sales area, concession, washroom facilities and storage areas;
- Ancillary spaces.

The estimate report includes a main cost summary (refer to page A1). The 'estimated costs' for this option are contained in the summary under the following categories:

- Net Building Cost – Estimated construction cost for the new building addition work, including the sub-structure foundation costs, superstructure costs, building envelope costs and interior improvements and finishing costs, including mechanical and electrical;
- Site Development – Estimated construction costs for site improvements, site development, on-site servicing and off-site servicing. This would include any site specific costs relating to an option located on a sloping site, requiring bulk earthwork and retaining walls. All costs for re-constructing exterior parking and paving displaced by the new addition are included under this category;
- Ancillary Work (Interfacing Costs) – Estimated construction costs for renovation work to the existing facility to interface the new building (where applicable). This would include any base building code upgrades required in the existing facility, as a result of the new addition;
- Project Contingencies;
- Estimated soft costs, including design fees, permits and development cost charges.

For option 1B (KTW), five separate price items have been developed for the following 'value added' options:

1. Dryland Training Facility;
2. Multi-Purpose Office Space;
3. Additional Office Space;
4. New Parking Area Adjacent to 43rd Avenue;
5. Elevated Running Track.

Please note, the separate price items are specifically excluded from the baseline estimate.

DOCUMENTATION & INFORMATION

We have been provided with the following documentation and information for the preparation of this opinion of probable costs/conceptual estimate:

- Architect's report and sketch plans, prepared by MQN Architects;
- Structural Engineers Report dated June 10th, 2014, prepared by R&A Engineering (1997) Ltd;
- Mechanical Design Brief dated June 10th, 2014, prepared by S + A Falcon Engineering Ltd;
- Electrical Feasibility Study Report dated June 18th, 2014, prepared by S + A Falcon Engineering Ltd;
- Refrigeration Summary Report dated June 12th, 2014, prepared by Bradley Refrigeration Consultants Ltd;
- Civil Engineers Report, prepared by Monahan Engineering Consultants Ltd;

BASIS OF THE ESTIMATE

Budget Estimate

We have met with the consultant team and reviewed the drawing documentation and information provided to establish the scope and extent of the work.

From the documentation and information provided, we have prepared the enclosed conceptual estimate.

Project Procurement and Pricing

Pricing for this project is based upon our opinion of current June 2014 standard construction industry market costs for this size and type of residential care project in Vernon, BC. It has been assumed that the project will be procured on a fixed stipulated 'lump sum' contract basis, from a competitive bidding field of at least six competent General Contractors. It has also been assumed that a competitive bidding field of at least five competent sub-contractors for each trade will tender for the work and that there will be no 'sole source' bids.

This conceptual estimate attempts to establish a fair and reasonable price for the proposed work and is not intended to be a prediction of 'low bid'.

Contingency Reserves

A Design Contingency Allowance of 10% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the design phase that do not change the project scope. This allowance is ultimately absorbed into the designed and quantified work as more detailed information becomes available and is, therefore, normally reduced to zero at the tender stage.

An Escalation Contingency Allowance of 0% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover price increases in construction costs due to changes in market conditions between the date the estimate is prepared and the date the tender is called.

A Construction Contingency of 5% is included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the construction period which will result in change orders. This contingency is not intended to cover changes in the scope of the work.

Level of Accuracy

This is a preliminary class 'D' opinion of probable cost/conceptual estimate with a level of accuracy of +/-20% 18 times

out of 20.

GST

GST has been included at the full rate payable of 5%.

Excluded Items

The following items are **specifically excluded** from this conceptual estimate:

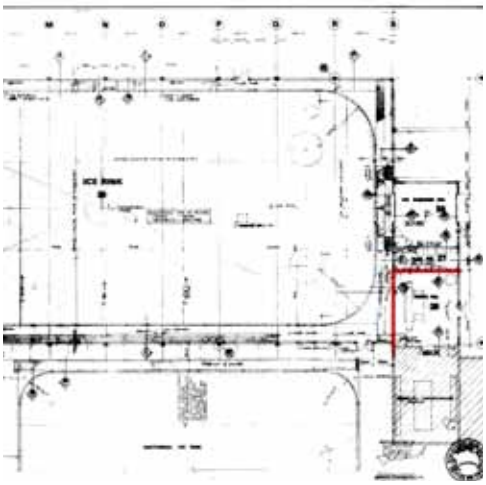
- Land Acquisition and Associated Costs;
- Financing Costs;
- Course of Construction Insurance;
- Portering, relocation and temporary accommodation;
- Removal and/or remediation of hazardous materials;
- Special Foundations and Ground Improvement Work;
- Workstations and systems furniture;
- Loose furniture, furnishings and equipment;
- LEED™ certification and registration costs.

OPTION 2A - PRIEST VALLEY EAST

1.1 INTRODUCTION

Option 2b, the Priest Valley East option investigates the potential to add a second sheet of ice to the east edge of the existing Priest Valley Arena facility, in the courtyard created by the arena, pool, Halina Centre, and curing rink, which would cover the existing Centennial Outdoor Rink.

The property is owned by the City of Vernon and is designated as Public Institutional, OCP-PUBINS in Vernon's Official Community Plan (OCP). The recreation property is currently zoned P2 - Public Institutional. The proposed land use is consistent with the OCP and the zoning supports the proposed project. For this reasoning, with the exception of a parking variance, described below, it is understood no additional variances would be required.



The current zoning bylaw requires 1 stall per seat for spectator sports establishments for the proposed addition. The existing PV arena has limited seating available. Based on this reasoning, the bylaw's parking requirement of 1 space per employee on duty, plus 1 space per 3 users, for Participant Recreation Services, Indoor, seemed more appropriate. Using this calculation, accounting for 1 employee on duty and 50 players and coaches on the ice, with and another 50 in the change rooms, the existing arena would require 35 spaces.

The recreation complex consists of 6 buildings: the pool and auditorium, the curling rink, PV Arena, Performing Arts Theatre, The Boys & Girls Club, and the Winter Carnival office. The existing buildings cover a total area of 14,900m^2.

Although attached to the curling rink facility, the PV arena and gymnasium building are separated by a 2hr fire wall, indicated in red on the adjacent image. As a result, the existing Priest Valley Arena is a 3450m^2, unsprinklered, non-combustible, concrete masonry unit cladded building with heavy timber glue laminated beams supporting the roof (note the Halina centre is sprinklered).

The the main building of the recreation complex, which contains the pool and Halina Centre, and neighbour the proposed site location, is an unsprinklered building. The creek flowing directly in front of the main building severely restricts access. Being, for the most part, (some upgrades have been completed) unsprinklered and with limited access for firefighting this location any construction that further limits or hinders the limited access may not be acceptable.

Applying the current parking bylaw to the existing facility the approximate requirements are as follows:

- Pool -1000m^2 @ 8/100m^2 surface area = 80 spaces
- Auditorium & Halina Centre 2240m^2 @ 20/100m^2 fl area = 448 spaces
- The Curling Rink, 6 sheets @ 4/sheet = 24
- PV Arena, 100 users @ 1/on duty employee + 1/3 users = 35 spaces
- PV Gymnasium 60 users @ 1/on duty employee + 1/3 users = 20 spaces
- Dogwood Gymnasium 60 users @ 1/on duty employee + 1/3 users = 20 spaces
- Performing Arts Theatre 850 seats @ 1/4 seats = 213 spaces
- The Boys & Girls Club, 1765m^2 @ 2.2/100m^2 GFA = 39 spaces
- Winter Carnival Office. 190m^2 @ 2.2/100m^2 GFA = 4
- TOTAL EXISTING FACILITY PARKING REQUIREMENT = 883 spaces.

Under the current parking bylaw, the existing facility requires 883 parking spaces. The current site provides 556 parking stalls; a deficiency of 327 stalls. The proposed 400 seat facility would require an additional 100 spaces, increasing the total parking requirement for the facility to 983 spaces. A total of 41 existing spaces are lost under the new facility. To expand the site's available parking, the city has recently acquired four lots located along 35th Ave, between Vernon creek and the south east parking entrance. An additional 47 new stall can be created on these four properties. The net result is a gain of 6 spaces increasing the recreation complex's total provided parking to 562 spaces, a deficiency of 421 spaces. A variance may be required to address the parking deficiency.

1.1.1 Proposed Location

1.2 DESIGN DESCRIPTION

This option calls for the addition of a second NHL sized ice sheet (200' x 85') to the eastern side of the existing Priest Valley Arena, in the courtyard created by the arena, pool, Halina Centre, and curling rink, and covers the existing Centennial Outdoor Rink. The new facility connects to the existing facility through access at the north ends of both buildings. The ice sheet is orientated in a north south direction.

With the 2974m^2 addition of a new ice sheet, the building's overall footprint would increase to 6417m^2 and would be considered too large for an unsprinklered building by the building code. Since the existing arena is unsprinklered, there are two main options for attaching the addition. A fire wall could be constructed between the addition and the existing facility. This would essentially make the addition a separate building. However, constructing a fire wall next to an existing building can be costly and challenging. Alternatively, the existing Priest Valley Arena / gymnasium building could be splinklered. Further understanding that there is some pressure to sprinkler the entire complex, we consider this to be the preferred option. With both the addition and the existing building sprinklered and being of single storey, non-combustible construction the project is well within the maximum footprint permitted by the building code. The basic code classification that would apply to this building requires the structure to be of non-combustible construction, but permits the roof to be of heavy timber construction allowing the continued use of the large glue laminated beams that support the existing arena.

There is an existing fire lane between the Halina Centre and the outdoor rink. In order to fit the ice sheet in this area, we have to built out 1.5m out past the edge of the existing lane, which would reduce the lane width from 5.7m to 4.2m. With the creek flowing directly in front of the main building, which severely restricts access for firefighting, reducing this lane most likely will not be acceptable unless a solution can be found that would improve access. The existing lane is less than 6m in width, and as a result, the lane width may need to be upgraded to current code requirements which would result in even less buildable space for the rink.

The proposed proximity of this building with the Halina Centre, together with it being unsprinklered and having limited access, the spatial separation between the proposed building and the existing may also be of concern.

For comparison purposes we have proposed a 2974m^2 sprinklered building consisting of a steel structure and an insulated metal panel system envelope. The lower 7 feet of the building envelope is clad with concrete masonry units to help mitigate the potential for damage and vandalism. A 400 seat capacity viewing area with bench type seating has

been provided located above the change room facilities.

The new facility includes a standard size NHL ice surface (200' x 85'), complete with dasher board system (with glass), spectator netting along the perimeter, players and penalty benches, and signal and timing devices. Three (3) team dressing rooms each with two (2) shower facilities, two (2) water closet facilities, and single washbasin are provided, along with two (2) referee / gender neutral dressing rooms each with shower facilities, one (1) water closet and, one (1) washbasin.

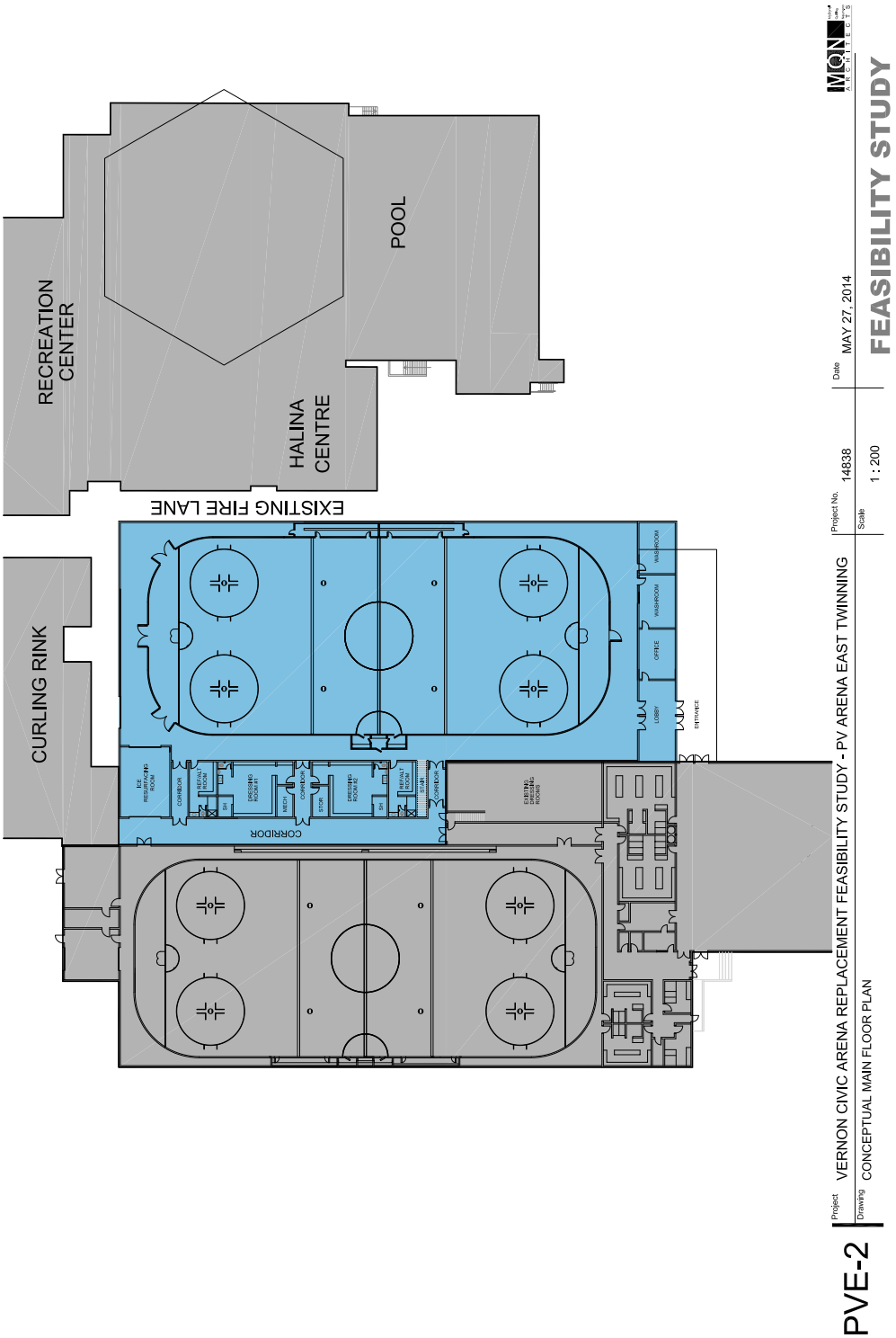
Along with the necessary support spaces, the following program rooms have also been included in the design: a front lobby area with ticket sales office, office space, dry goods concession, washroom facilities (to BCBC requirements), mechanical and electrical rooms, refrigeration room, ice resurfacing room (with ice dump pit), custodial room, storage room (with mop sink and shelving), and maintenance staff room / equipment room.

The proposed option does not meet all of the program requirements and cannot provide many of the "value added" options. There is insufficient space for an elevated walking track, and the addition of a multipurpose room, fitness training facilities, or additional office space, would have further impact to the parking. However, with further investigation, (beyond scope) there may be opportunities to accommodate a greater number of the program items.

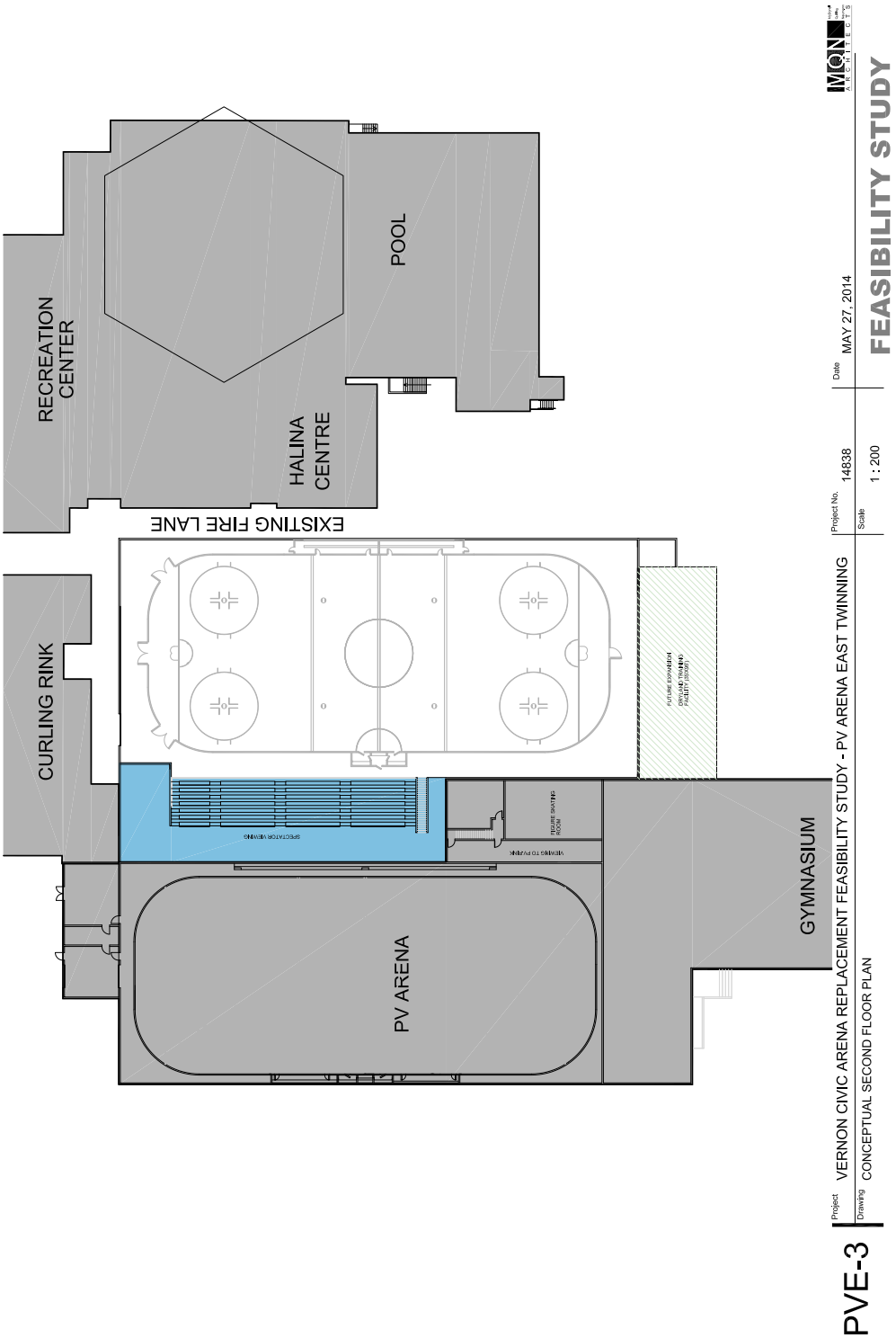
1.3 TECHNICAL INFORMATION

1.3.1 Architectural Site Plan

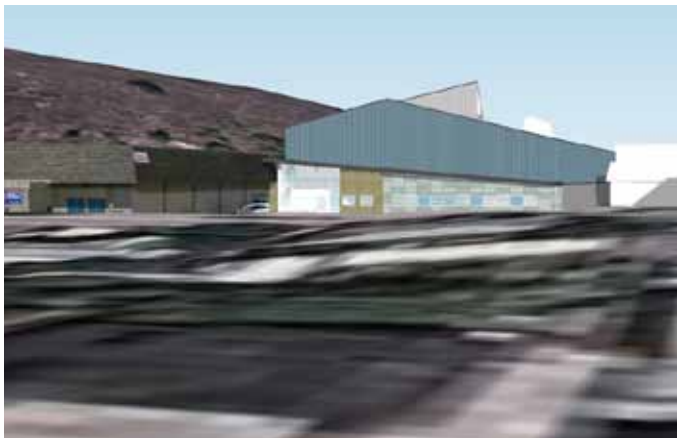
1.3.2 Main Floor Plan



1.3.3 Second Floor Plan



1.3.4 Perspectives



1.3.5 Civil

The Priest Valley East option fits well with the existing recreation complex layout, grading and infrastructure, except for the displacement of the existing parking. Extending the new ice sheet to the east at the same grade as the existing ice sheet will result in an exposed foundation wall on the east and the south faces of the new building, of between 0.2 to 1.2m. With the construction of the foundation walls as noted above, the grading and drainage of the site remains consistent with what is occurring now and no significant changes are necessary.

It is understood that an additional 100 parking space are to be developed in support of this option however the location of these spaces is yet to be determined and therefore have not been commented on.

On-site traffic circulation through the site is not affected by the proposed plan as there are no circulation lanes in this area of the property, but rather, only parking.

The eastern edge of the new building will impact existing sewer and sanitary lines which drain between the outdoor rink and the recreation center building. There is also water servicing that runs from the recreation complex through to the existing ice rink and the south side of the curling club. These lines will have to be abandoned and new servicing established through the new building. To address these issues we have proposed new service connections from 35th ave to the building, with the storm system including a detention facility and storm water treatment.

As this building is on the same property as the rest of the recreation complex, the off-site requirements include works in 39th ave, 33rd street and 35th ave. However since these streets are built out, the only deficiency is street lighting on 33rd street.

1.3.5.1 Cost Estimates

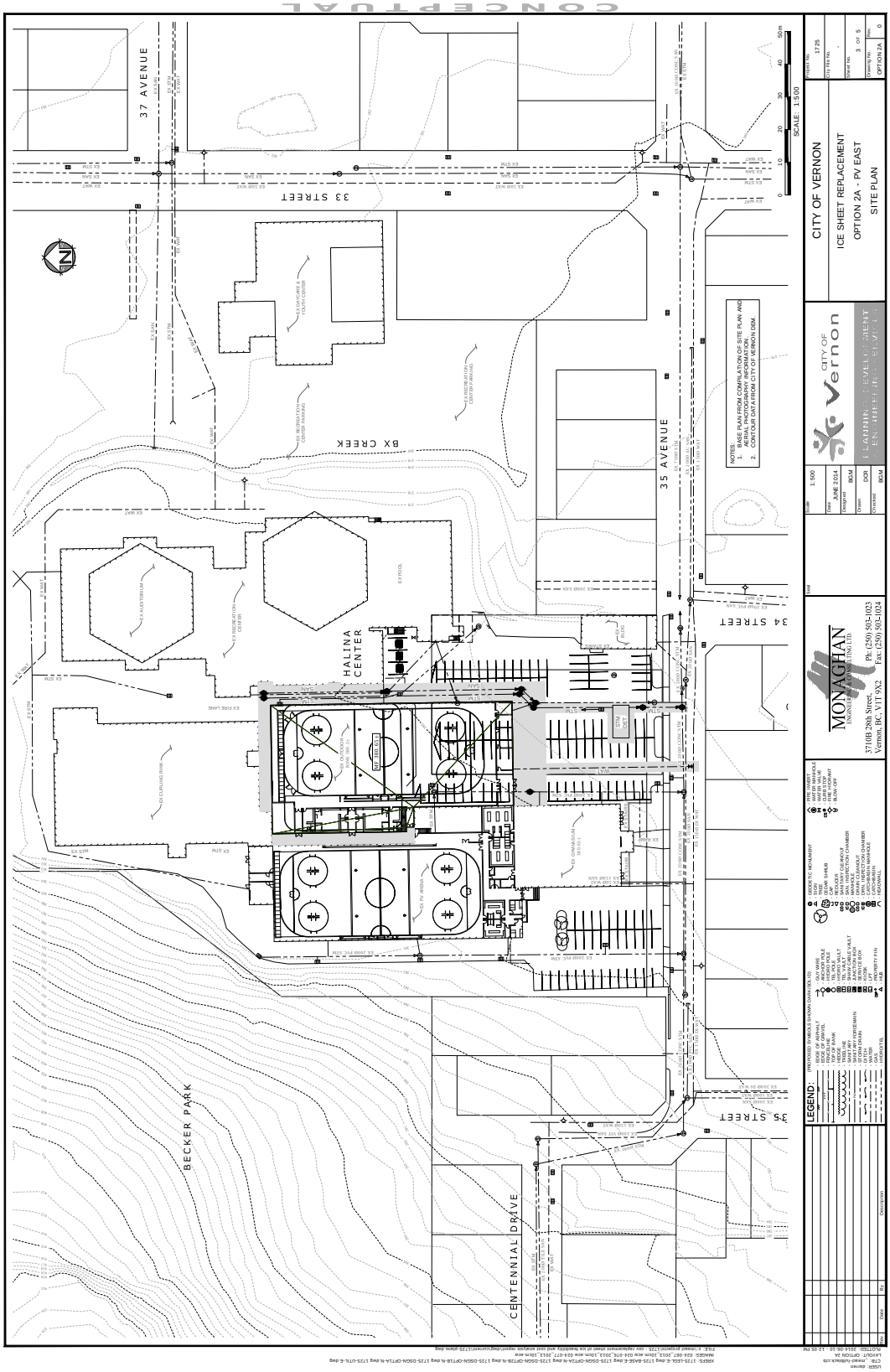
Site servicing cost estimates were developed for each of the options. These estimates include on-site and off-site costs. Without the benefit of a geotechnical investigation or detailed topographic survey, we have had to make assumptions regarding the earthworks associated with each site. The following table summarizes the assumptions for Priest Valley East, as it relates to the earthworks:

Option	Earthworks Assumptions
PV East	Existing ground surface is excavated to 0.5m below the surface and then backfilled with structural material to 0.5m below floor slab elevation.

Based on the above assumption, a detailed estimate has been developed. Detailed estimates are included at the end of this report, with Priest Valley East summarized in the following table:

Option	On-Site Servicing	Off-Site Servicing	Total Servicing
PV East	$450,660	$109,830	$560,490

Based on the costs noted above, the least expensive servicing costs would be associated with the PV East plan.


CONCEPTUAL
37 AVENUE
33 STREET
BX CREEK
35 AVENUE
34 STREET
35 STREET
HALINA CENTER
BECKER PARK
CENTENNIAL DRIVE
CITY OF VERNON
ICE SHEET REPLACEMENT
OPTION 2A - PV EAST
SITE PLAN
MONAGHAN
3710B 28th Street
Vernon, BC, V1T 9X2
Ph: (250) 503-1023
Fax: (250) 503-1024
LEGEND:
NOTES:
1. BASE PLAN FROM COMPILATION OF SITE PLAN AND AERIAL PHOTOGRAPHY FROM CITY OF VERNON GIM.
2. CONTOUR DATA FROM CITY OF VERNON GIM.

1.3.6 Structural

The following summarizes the general type of structure to be used for each arena option. This information is to be used for general budgeting purposes. Soil conditions at the various sites are unknown. This report assumes that each site has reasonable soil conditions, and each option has similar soil conditions to each other. The new structure would be designed to the snow, wind and seismic standards of the 2012 British Columbia Building Code.

The anticipated structure is as follows:

Starting at the foundation:

2 of the sides of the building have full height walls to the roof, while the other two sides have a second floor and then walls to the roof. The lobby end of the building will have full height walls to the roof with a lower roof over the front lobby.

For the typical full height walls, there would be a reinforced concrete strip footing bearing 900mm below grade for frost protection. On top of this footing there would be a 200mm thick reinforced concrete perimeter frost wall with pilasters at the column locations. Bearing on the concrete pilasters would be steel columns. The steel columns would go full height to the roof and support steel wind girts and steel roof beams. Within the beam/columns would be a few bays of HSS cross-bracing for overall lateral support.

Along the two exterior walls that support the second floor there would be a 200mm thick reinforced concrete wall bearing on reinforced concrete strip footings bearing 900mm below grade. This concrete wall would extend up to the underside of the second floor and support a suspended slab. At this level, perimeter structural steel columns, girts and bracing would start and be similar to around the rest of the building, and extend up to support the roof.

The structural steel frame system around the perimeter of the building would support large structural steel fabricated roof trusses spanning across the short direction of the ice surface. These steel trusses would comprise of W-beam top and bottom chords, with HSS diagonals. They would support open web steel joists, spanning the distance between the large trusses. The Open Web steel joists would be spaced at about 1700mm centres and support 38mm steel decking.

There are many rooms around the ice surface. These rooms would be constructed of 200mm reinforced masonry block supported on strip footings, that would bear approximately 450mm below the top of slab-on-grade. There would be a suspended slab system on top of the walls, providing a surface to support the bleachers, as well as a surface for a corridor or future walking path.

The large roof trusses and the exterior wall structure would be designed to support a future suspended walk-way.

The low roof over the lobby end of the building would be constructed of a similar structural steel column/brace frame supporting open web steel joists supporting 38mm steel decking.

The bleacher seats could either be precast concrete or a proprieatory steel/aluminum product.

Priest Valley East

The base building would be similar to as described for the Stand Alone arena, but would pose many more challenges. Not only would the cost of construction increase as with the other buildings built against existing but there would also be a complexity factor. On the other 3 options, a crane would have access to at least 3 sides. For this option a crane would only have access to one end.

To help avoid differential settlement issues and to permit the new building to behave independently from the existing building during an earthquake, the new building would have to be structurally separated from the existing buildings by about 150mm, which would waste some floor area space. None of the existing structure could be used to support the new structure, so there would be significant redundancy of structure where the two are close together. The new arena would have to have a roof design such that no snow could slide on to the existing adjacent area roofs. Alternatively, any lower existing roofs would have to be upgraded to support snow sliding off the new roof onto the existing roof. This is usually avoided with new roofs that flatten out near adjacent existing roofs. Though these are solvable challenges, they would cost to the overall construction.

Conclusion

From a structural perspective all the options are very similar, with some of the options being more difficult to build because of their locations or close vicinity to other buildings.

1.3.7 Mechanical

Executive Summary

- The new arena HVAC systems will be configured to be utilized for summer ice and also for assembly use when the ice is not in use.
- Natural gas usage for the new arena will be minimized by utilizing reliable sealed combustion, condensing water heating systems for domestic water, ice resurfacing water and hydronic heating systems.
- Outside air consumption for the new arena will be minimized by utilizing conventional demand control and motion control devices on the ventilation system.
- A new water service will be required for fire protection systems to the existing and new arena facility.
- Storm water system on the east side of the building will require significant upgrade to accommodate the addition.
- The sanitary service will need to be upgraded to accommodate the addition.

1.1 General

S+A Falcon Engineering Ltd. have been retained by MQN Architects Inc. to provide comments on mechanical systems in relation to a new 400 seat Community Arena in Vernon, British Columbia. There are 5 configurations for the facility under consideration.

The purpose of this report is for:

- Developing requirements for the mechanical systems so that five arena options can be assessed.
- Means of assisting the pricing process.

The scope of this commission includes:

- Plumbing Systems.
- Heating, Ventilating and Air Conditioning Systems.
- Exhaust Systems.
- Fire Protection Systems.

The scope does not include:

- Ice Making Refrigeration Systems.
- Civil Works.

1.2 Documentation and Research Resources

The comments in this report are based on:

- Drawings prepared by MQN Architects Inc. for the five options.
- Mechanical tender drawings for the Kal Tire Place dated October 2000.
- Mechanical tender drawings for the Priest Valley Arena and Gym dated September 1978.
- Discussions with the Owner and Consulting Team.

1.3 Building and Systems Descriptions

The project is based 400 seat spectator community NHL sized arena. The base facility program includes; lobby areas, dressing rooms, referee rooms, washrooms, office and ticket sales spaces, concession, janitor rooms, storage rooms, mechanical rooms, electrical rooms and equipment rooms, refrigeration room and ice resurfacing room.

This report contains comment on the mechanical systems for these spaces.

Other program enhancements could include a combination of; extra office spaces, fitness areas, dedicated team rooms, extra viewing capacity, display areas, walking track, multipurpose, meeting and conference rooms and also a variety of training facilities.

2.0 PLUMBING SYSTEMS

1.1 Water Service

The existing water service is 50mm and is located on the south side of the building near the Gym. This service will need to be eventually abandoned.

This water service is inadequate for domestic water supply and fire protection for the arena addition. A new 150mm water service will be required to a new mechanical room preferably positioned on the south side of the building. This new service will be provided with the necessary cross connection, metering and pressure control systems. Piping will be fed from the new service to the existing arena piping systems.

1.2 Storm Water Service

A series of storm water connections are located on the east and west side of the facility.

The storm water systems on the east side will need to be completely reconfigured to accommodate the addition to the building.

1.3 Sanitary Drainage Service

The existing 100mm sanitary system exits the facility at the south side of the gym. The existing sanitary system is not capable of supporting new loads so a new 150 mm service will need to be brought onto the site.

1.4 Gas Service

The existing gas service location is on the west wall at the south end of the existing arena. The position of the gas service and capacity of the gas mains will service the new addition as well. An allowance for a new meter set to match the new loads of the building should be provided for.

1.5 General Plumbing Systems

All drainage systems above ground will be cast iron with mechanical couplings. All drainage systems below grade will be plastic. Drainage systems will be provided with a clean out as the service exits the building.

All hot and cold water piping should be insulated copper. Domestic water supply piping will be configured so that no piping will be constructed or concealed within a masonry wall. Piping systems within masonry walls are subject to premature failure and are extremely difficult to repair.

Hose bibbs will be provided around the facility for cleaning and initial ice making purposes. Hose bibbs will be frost free and vandal resistant. Hose bibbs will be recessed and fit with removable operating handles or keys.

1.6 Domestic Water Heating Systems

A new domestic water heating system will be provided with individual high efficient, gas-fired, heaters and re-circulating systems for the new arena. The hot water heaters will be sealed combustion with venting systems directed to wall discharge. The hot water systems will be capable of temperatures up to 60 deg C (140 deg F). Expansion tanks will be

provided for this system.

1.7 Tempered Water Supply Systems

Large central tempered water recirculation systems are very difficult for building operators to maintain constant temperatures over a wide range of scenarios. We therefore recommend point of use tempered mixing valves for each washroom group and shower groups.

The tempered mixing valve for the change rooms will be mounted at high level in lockable stainless steel service boxes near the shower area.

1.8 Ice Making Water Heating Systems

A new gas fired instantaneous hot water heater will be utilized to provide hot water supply for the ice cleaning equipment systems as a second ice resurfacing room is required. The system will be capable of boosting temperatures from the domestic water service to 60 Deg C (140 Deg F). New 38 mm hot water connection for the ice resurfacing equipment shall be utilized to allow quick fill turnaround.

1.9 Plumbing Fixtures

Plumbing and drainage for fixtures shown on the architectural drawings will be provided, including devices and fixtures required for barrier free access.

All fixtures on exterior walls will require furring and insulation.

We recommend plumbing fixtures if not already installed as follows:

- Water closets: low consumption, floor mounted with battery infrared control type flush valve.
- Urinals: low consumption, wall mounted with battery infrared type flush valve.
- Change Rooms Showers: low consumption, vandal resistant head, with 24 volt electronic timed push button 60 second control. Shower systems will be provided with stainless steel enclosures mounted on block walls, for concealing valves and supply piping.
- Hand Lavatories: counter mounted stainless steel with battery infrared control faucet.
- Combination drinking fountain bottle fillers: refrigerated wall mount.
- Custodian Rooms: Moulded stone, floor mount service sink, wall mounted, manual valve, hot and cold trim with hose connection.
- Plant Refrigeration and both Ice Resurfacing Rooms: Moulded stone, leg mount, double or single compartment service sinks, wall mounted, manual valve, hot and cold trim with hose connection.
- The existing emergency eye wash and safety shower in the vestibule to the Plant Refrigeration Room should remain in service.

1.10 Kitchen and Concession Plumbing Systems

Kitchen or Concession Areas are not intended to be commercial quality. Under this configuration, these systems will not require grease interceptors. However, plumbing fixtures that comply with Health Regulations will be required. Usually, three compartment sinks and a hand lavatory is required unless a commercial quality dishwasher is provided.

3.0 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

1.1 Existing systems that require reconfiguration due to addition of new facility.

Typical Louvers

One ventilation system will need to be reconfigured to accommodate the addition to the east.

1.2 Primary Heating

Primary heating for the new arena shall be provided through gas fired sealed combustion boilers that supply energy to the hydronic heating systems.

Two circulation pumps and piping systems will be utilized to deliver energy to terminal heat transfer units.

1.3 Arena Area

The arena will be served by one or two packaged rooftop gas fired heating and electric cooling units. These units will be able to deliver cooling effect to the arena area when the ice making systems are off. Outside air quantities and dedicated exhaust will be varied by modulating dampers controlled by economizer programs and/or CO, CO_2 and NO_2 sensors. Systems will be activated through the Building Automation System.

Air supply distribution will be through overhead, exposed ductwork and double vane type diffusers. The ductwork will be located generally over the dasher boards and the diffusers will be directed toward the seating area. Air flow at the ice surface is to be kept as calm as possible. Return air will be through ductwork located at low level.

Desiccant dehumidifying equipment will be provided to ensure adequate dehumidification to keep the ice level at 50% relative humidity at 10 deg C (50 deg F) at 1,200 mm above ice level.

The seating area will be heated with gas fired, infrared tubular heaters in eight sections. These heaters will be operated on a demand override for a pre-determined time through the Building Automation System. These units will be separate combustion air systems that draw air directly from outside.

1.4 Lobby Area

The lobby will be served by one packaged rooftop gas fired heating and electric cooling units.

1.5 Team and Referee Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.6 Office, Ticket Sales and Other Small Regularly Occupied Spaces

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Cooling will be provided with ductless split systems.

Outside air will be delivered through the ductless split systems and a constant flow outside air connection

1.7 Kitchen and Concession

The menu for foods supplied in this area is limited to items that can be cooked without emitting grease laden vapors. Therefore residential style range hoods can be utilized.

1.8 Washrooms and Janitor Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.9 Storage, Equipment, Mechanical and Electrical Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights or temperature control.

1.10 Ice Resurfacing Rooms

New hydronic unit heaters will be utilized for Ice Resurfacing Rooms.

Ice Resurfacing Room will be provided with new dedicated exhaust service. The systems will be controlled by CO, CO_2 and NO_2 and propane sensors to maintain safe levels when ice cleaning equipment is in operation.

1.11 Ice Making Refrigeration Rooms

The existing Plant Refrigeration Room has been provided with two exhaust systems. This system can be upgraded to provide the required ventilation rates for the new refrigeration system capacity.

Make up air will be drawn through the existing louver and damper located on the north wall.

Heating for this area is provided through existing electric unit heaters.

1.12 Controls

The control system specifications will be based on a direct digital control Building Automation System, with monitoring and controlling capability for all areas of the complex.

The system will incorporate direct digital control with a networking type system. All wiring, computer terminal, printer and devices required will be supplied for a complete and fully operational system.

4.0 FIRE PROTECTION SYSTEMS

1.1 General

The existing arena has not been provided with a fire protection system. The new and existing arenas will be provided with a fire protection system.

The automatic sprinkler system will be designed and specified to comply with the requirements of NFPA 13 and the British Columbia Building Code. All of the equipment and sprinkler heads incorporated into the system will be ULC and FM listed.

Fire extinguishers will be provided to comply with the requirements of NFPA 10 and the British Columbia Building Code.

A wet type automatic sprinkler system will be utilized for the bulk of the building. Consideration should be made for a dry system in the arena and other nominally cold areas. The sprinkler piping systems for the bulk of this building should be Schedule 40 as this piping system as a longer life expectancy that some of the thin wall systems.

1.2 Hazard Classification

All areas that could possibly be used for exhibition, trade show in the Arena or lobby will be treated as Ordinary Hazard Group 2.

Storage Rooms, Mechanical Rooms, Custodian Rooms, Concessions and Kitchen Areas will be classified as Ordinary Hazard Group 1.

All other areas will be treated as light hazard.

1.3 Main Sprinkler Station

A new sprinkler station will be required at the same location as the water service on the south end of the building. The sprinkler station will house the required backflow prevention systems. A new fire department Siamese connection will be needed and it should be located with 45 metres of a fire hydrant.

1.4 Fire Hose and Standpipe

It is not anticipated that a standpipe and hose system will be required for the building.

5.0 CONCLUSIONS

Conclusion

The recommendations presented in this Design Brief should be reviewed by the Owner and Design Team. Any recommendation can be incorporated for the pricing process or further development of the design program.

1.3.8 Electrical

1. GENERAL

1. S+A Falcon has been retained by MQN Architects to provide comments on electrical systems in relation to a new 400 seat community arena in Vernon, British Columbia.
2. The purpose of this report is to develop requirements for electrical systems so that 5 arena options can be reviewed.
3. A primary focus of the electrical design should be safety for both the public and for facility operational staff.
4. In consideration of the expected life of this facility, electrical equipment should be selected for energy efficiency, durability and ease of maintenance.
5. Infrastructure should also be included to support temporary events such as trade shows and concerts.

2. SERVICE AND DISTRIBUTION

1. The incoming services for the existing arena is fed underground from a BC Hydro platform mounted transformer bank located outdoor near the northwest corner of the site.
2. The existing main service is rated at 1200A@347/600V 3 phase. The existing service feeds the existing arena as well as the curling rink and community centre.
3. For an additional arena, a new incoming service of at least 1600A@347/600V 3 phase will be required. The service will have a sub feed and reconnect the existing service to new.
4. The existing overhead BC Hydro service and metering system will be removed to suit the new incoming service via BC Hydro pad mounted transformer.
5. A thorough review of the existing U/G sub-services for the curling rink and community centre would be required to confirm the proposed new arena does not interfere with the location of the feeders serving the other buildings.
6. 120/208V panel boards will be located throughout the building as required for receptacle and other power loads. 120/208V Panels will generally be located close to loads for user convenience, easy reconfiguration, and lower line losses.
7. Motor control centres will be specified and installed in conjunction with the mechanical equipment layout and design. Motor control centres will be installed as close to the utilization equipment as is practicable.
8. Branch circuit wiring and feeders will be minimum #12 AWG 90°C rated copper wire in EMT or PVC/DB2 below grade. AC90 cable will be permitted for drops to devices on suspended ceilings and for wiring in frame walls. All wiring will be copper.
9. All new distribution equipment will be charged with minimum 25% spare load carrying capacity. All distribution equipment will have a minimum 25% spare device capacity.

3. LIGHTING

1. Lighting levels will be in accordance with the requirements of the Illuminating Engineering Society (IES) recommendations.
2. Main arena lighting will consist of LED “high bays’ switched selectively to provide alternate illumination levels. Care will be taken during detailed design to ensure that glare effects of the arena lights are reduced.
3. Concourse lighting and arena bowl lighting will be provide via architectural style fluorescent luminaires providing instant on capability for emergency lighting. Enclosed vandal proof luminaires will be utilized where required.
4. Interior lighting in other areas will be primarily fluorescent with electronic instant start ballasts and T8 lamps with a colour temperature of 3500K. Luminaire types will typically be as follows:
    - Main lobby/concourse – LED down lights and decorative LED/compact fluorescent suspended luminaires.
    - Dressing rooms –vandal proof fluorescent luminaires with polycarbonate lenses.
    - Shower stalls – vapour/vandal proof surface mount fluorescent.
    - Office/meeting areas – recessed fluorescent.
    - Storage/service rooms – fluorescent strip lights with wire guards.

- Concessions/lounges/ticket offices/public washrooms–2 x 4' fluorescent with framed K12 lens. LED pot lights will be utilized for accent lighting.

5. The building facade and perimeter will be illuminated with recessed or surface mounted "dark sky friendly" down lights to suit the architectural design.
6. Dedicated and controlled outlets will be provided for decorative festival and seasonal lighting.
7. Exit lights will be energy efficient LED type, 2 watts AC. Vandal resistant signs will be specified where necessary.

4. LIGHTING CONTROLS

1. The existing lighting control system will be extended as required to suit the loads of the new east arena.
2. Multi-level switching will be provided for the event floor and concourse lighting.
3. Occupancy sensor switch will be utilized throughout for all offices, change and storage rooms.
4. Exterior lighting will be photocell controlled. Lighting not required to be on all night will be photocell on/Building Automation System off through the lighting control system.
5. Daylight sensors will be installed to switch or dim luminaires in areas where daylighting is available.
6. The lighting control system will interface with the emergency power system, (if generator is installed) to provide for automatic on of all emergency lights during a power failure.
7. Interior and exterior illuminated advertising and building signage will be controlled by the lighting control system.

5. POWER

1. Normal power will be provided to receptacles throughout the facility from local panel boards.
2. Connections will be provided to advertising and information and building signage.
3. Panel boards will be provided near each concession and electrical connections will be provided for all concession equipment included in the design build contract.
4. Connections/power will be provided for score clocks, shot clocks, goal lights and timekeepers bench.
5. All line voltage wiring and controls will be provided for mechanical equipment.
6. 600V feeders/connections will be provided to the refrigeration motor control centre.
7. Show power outlets will be provided for media mobile units.
8. Show/stage power will be provided to fused switch/splitter arrangements for connection of event based equipment and for portable distribution to trade show type booths. Panels will be provided with Camlock style connectors for connection to the power distribution system by travelling event companies.

6. FIRE ALARM

1. The existing fire alarm system will be replaced and extended into the new and existing arena expansion. A new annunciator will be modified to identify the new and existing zones. Multiple addressable initiation loops will extend out into the building and connect all of the remote devices. Wiring will be in Class A configuration and protected by loop isolation modules to prevent a single wiring fault from disabling other initiation devices.
2. Pull stations will be provided at each exit. Smoke detectors will be installed in stairwells and fire alarm loudspeakers will be located as required for audibility. All loudspeakers will be combination strobe light style for visual indication.
3. Sprinkler system flow, tamper and low pressure switches will annunciate separately.
4. Fire alarm system connection and control of smoke control HVAC equipment will be provided as required by the Building Code and the Code Consultant during detailed design.

7. INTRUDER ALARM SYSTEM

1. The existing security system will be extended into the new arena expansion with building perimeter intruder alarm.
2. The intruder alarm system will consist of monitored door contact switches, glass break detection, and motion detection within critical areas. The system will be armed/disarmed by localized zoned keypads, or by auto arming through system programming.

8. VOICE/DATA COMMUNICATIONS

1. The existing communication system will be extended into the arena expansion.
2. Communications rooms will be located around the facility to minimize wiring runs lengths and to allow for future communications cabling expansion in the facility.
3. Cable tray will be run throughout the building connecting the communications rooms for installation of voice and data network cables as well as for use by media during special events.
4. A 4' x 4" box complete with single gang plaster ring and minimum 1" conduit run back to the cable tray (or stubbed into the accessible ceiling space) will be provided at each telephone/data and co-ax outlet location.
5. Four twisted pair 24 gauge category 6 cable, insulated, unshielded and FT4 rated will be run from the local patch panel to each voice and data outlet. Cables will be terminated in RJ45 modular jacks at the outlet and at rack mounted patch panels.
6. Interconnection between the communications rooms will consist of 6 strand fiber optic Multimode cables, terminated at each end and tested.
7. A complete coaxial cable network consisting of RG6U coaxial cable, outlets and distribution cabinets will be provided for provision of Cable Television. Outlets will be provided in all lounges, dressing rooms, and meeting rooms.
8. A thorough review of the existing U/G sub-services for the curling rink and community centre would be required to confirm the proposed new arena does not interfere with the location of the services to the other buildings.

9. ADVANTGES/DISADVANTGES

The advantages of this proposed site compared to 'base' stand alone are the electrical distribution, fire alarm, communication and securities systems are existing. The extension of the existing systems will be required to accommodate the additional arena.

The disadvantages of this proposed site is that a new incoming service would be required. A sub-feed from this main service would then require to be reconnected to the existing main distribution. The BC Hydro incoming service and associated metering would be removed.

1.3.9 Refrigeration

The existing facility consists of three sheets of ice served by a common ammonia refrigeration plant.

- Remove the existing outdoor rink chiller and replace it with a larger chiller and new pump.
- Rink headers and piping for the new floor.
- The existing refrigeration equipment room would be reused.

Estimated cost of the new refrigeration equipment and rink floor piping: $295,000.

Advantages

- Reduced staffing cost for the refrigeration plant – no additional operator required.
- Reduced construction costs – no additional plant room cost, the existing plant is reused.
- Reduced energy costs – the use of a common refrigeration plant offers a cost of saving of approximately 20 percent in energy cost over stand alone facility.
- Reduced maintenance cost by using common equipment for both ice surfaces.

General Comments

The use of a common plant allows for redundant refrigeration equipment as back up for the operation. The risk of down time when using a common refrigeration system is minimal.

This construction would cause no disruption to the operation of the existing refrigeration system.

This construction process would eliminate the need to upgrade the existing outdoor rink ice surface.

1.4 FINANCIAL INFORMATION

INTRODUCTION

The City of Vernon has employed MQN Architects to look at various options to provide a new community arena with an NHL sized ice sheet as well as seating for approximately 400 visitors.

LTA Consultants Inc. has been retained by MQN Architects as part of the consultant team for the project to provide cost consulting and cost planning services for the project.

We have been provided with copies of the architects and engineers conceptual reports for the project. Five potential site options have been identified for the new arena. This report covers option 2B, which comprises an ice sheet expansion to the east elevation of the existing Priest Valley Arena, Vernon, BC. Please refer to the architectural and engineering sub-consultant reports for further information regarding this option.

From the documentation and information provided, we have prepared an opinion of probable costs/conceptual estimate for option 2B (PVE). Please refer to schedule 'A' (Pages C1 – C3).

The base line arena specification for this option includes:

- Seating for approximately 400 visitors along one face of the ice sheet;
- NHL playing size ice sheet (200' x 85'), complete with dasher boards, players boxes, penalty boxes, safety netting, and scoring equipment;
- Two team dressing rooms and two referee/gender neutral dressing rooms. ***We note that this option does not meet the baseline requirement for four dressing rooms;***;
- Common areas including a front lobby with ticket sales area, concession, washroom facilities and storage areas;
- Ancillary spaces.

The estimate report includes a main cost summary (refer to page A1). The 'estimated costs' for this option are contained in the summary under the following categories:

- Net Building Cost – Estimated construction cost for the new building addition work, including the sub-structure foundation costs, superstructure costs, building envelope costs and interior improvements and finishing costs, including mechanical and electrical;
- Site Development – Estimated construction costs for site improvements, site development, on-site servicing and off-site servicing. This would include any site specific costs relating to an option located on a sloping site, requiring bulk earthwork and retaining walls. All costs for re-constructing exterior parking and paving displaced by the new addition are included under this category;
- Ancillary Work (Interfacing Costs) – Estimated construction costs for renovation work to the existing facility to interface the new building (where applicable). This would include any base building code upgrades required in the existing facility, as a result of the new addition;
- Project Contingencies;
- Estimated soft costs, including design fees, permits and development cost charges.

For option 2B (PVE), four separate price items have been developed for the following 'value added' options:

1. Dryland Training Facility;
2. Multi-Purpose Office Space;
3. Additional Office Space;
4. Elevated Running Track.

Please note, the separate price items are specifically excluded from the baseline estimate.

DOCUMENTATION & INFORMATION

We have been provided with the following documentation and information for the preparation of this opinion of probable costs/conceptual estimate:

- Architect's report and sketch plans, prepared by MQN Architects;
- Structural Engineers Report dated June 10th, 2014, prepared by R&A Engineering (1997) Ltd;
- Mechanical Design Brief dated June 10th, 2014, prepared by S + A Falcon Engineering Ltd;
- Electrical Feasibility Study Report dated June 18th, 2014, prepared by S + A Falcon Engineering Ltd;
- Refrigeration Summary Report dated June 12th, 2014, prepared by Bradley Refrigeration Consultants Ltd;
- Civil Engineers Report, prepared by Monahan Engineering Consultants Ltd;

BASIS OF THE ESTIMATE

Budget Estimate

We have met with the consultant team and reviewed the drawing documentation and information provided to establish the scope and extent of the work.

From the documentation and information provided, we have prepared the enclosed conceptual estimate.

Project Procurement and Pricing

Pricing for this project is based upon our opinion of current June 2014 standard construction industry market costs for this size and type of residential care project in Vernon, BC. It has been assumed that the project will be procured on a fixed stipulated 'lump sum' contract basis, from a competitive bidding field of at least six competent General Contractors. It has also been assumed that a competitive bidding field of at least five competent sub-contractors for each trade will tender for the work and that there will be no 'sole source' bids.

This conceptual estimate attempts to establish a fair and reasonable price for the proposed work and is not intended to be a prediction of 'low bid'.

Contingency Reserves

A Design Contingency Allowance of 10% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the design phase that do not change the project scope. This allowance is ultimately absorbed into the designed and quantified work as more detailed information becomes available and is, therefore, normally reduced to zero at the tender stage.

An Escalation Contingency Allowance of 0% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover price increases in construction costs due to changes in market conditions between the date the estimate is prepared and the date the tender is called.

A Construction Contingency of 5% is included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the construction period which will result in change orders. This contingency is

not intended to cover changes in the scope of the work.

Level of Accuracy

This is a preliminary class 'D' opinion of probable cost/conceptual estimate with a level of accuracy of +/-20% 18 times out of 20.

We note that this conceptual estimate report has been prepared from preliminary documentation for cost comparison purposes only, and should not be used for establishing the capital planning purposes for the preferred option.

GST

GST has been included at the full rate payable of 5%.

Excluded Items

The following items are **specifically excluded** from this conceptual estimate:

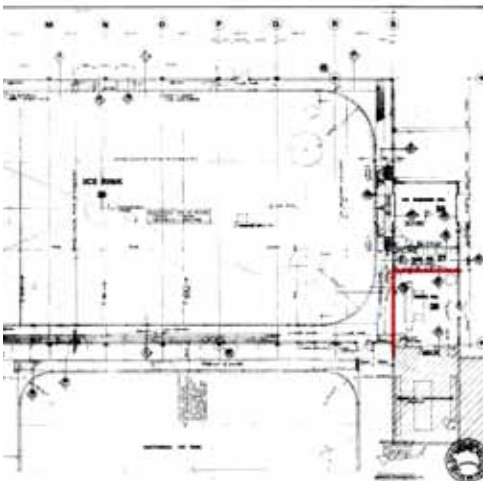
- Financing Costs;
- Course of Construction Insurance;
- Portering, relocation and temporary accommodation;
- Removal and/or remediation of hazardous materials;
- Special Foundations and Ground Improvement Work;
- Workstations and systems furniture;
- Loose furniture, furnishings and equipment;
- Additional Parking;
- Replacement of Outdoor Skating Rink;
- LEED™ certification and registration costs.

OPTION 2B - PRIEST VALLEY WEST

1.1 INTRODUCTION

Option 2a, the Priest Valley West option investigates the potential to add a second sheet of ice to the west edge of the existing Priest Valley Arena facility, expanding the facility and property west into the Becker Park lands.

This option requires additional land to be acquired. The three properties neighbouring the site would need to be purchased, as well as a portion of Becker Park. The existing recreation complex property and the adjacent Becker Park property are owned by the City of Vernon. The recreation complex property and the eastern side of the park are designated in Vernon's Official Community Plan (OCP) as Public Institutional, OCP-PUBINS and would support the proposed land use. However, the three properties to be purchased are designated as Residential High Density, OCP-RHD, which does not support the proposed zoning that would be required. As a result, an OCP amendment would be required.



The recreation property is currently zoned P2 - Public Institutional, while the Becker Park property is zoned MZ - Multi Zone / P1 - Parks Open Space. These zoning designations permit the proposed arena land use. Conversely, the neighbouring properties to be acquired are zoned R2 - Large Lot Residential, which does not permit the arena land usage. As a result, a re-zoning would be necessary.

In addition to the OCP amendment and re-zoning, it is understood that a parking variance would also be needed.

The current zoning bylaw requires 1 stall per seat for spectator sports establishments for the proposed addition. The existing PV arena has limited seating available, so by this reasoning, the bylaw's parking requirement of 1 space per employee on duty, plus 1 space per 3 users, for Participant Recreation Services, Indoor, seemed more appropriate. Using this calculation with 1 employee on duty and 50 players and coaches on the ice, and another 50 in the change rooms, the existing arena would require 35 spaces.

The recreation complex consists of 6 buildings: the pool and auditorium, the curling rink, PV Arena, Performing Arts Theatre, The Boys & Girls Club, and the Winter Carnival office. The existing buildings cover a total area of 14,900m^2.

Although attached to the curling rink facility, the PV arena and gymnasium building are separated by a 2hr fire wall, indicated in red on the above figure. As a result, the existing Priest Valley Arena is a 3450m^2, unsprinklered, non-combustible, concrete masonry unit cladded building with heavy timber glue laminated beams supporting the roof.

Applying the current parking bylaw to the existing facility, the approximate requirements are as follows:

- Pool -1000m^2 @ 8/100m^2 surface area = 80 spaces
- Auditorium & Halina Centre 2240m^2 @ 20/100m^2 fl area = 448 spaces
- The Curling Rink, 6 sheets @ 4/sheet = 24
- PV Arena, 100 users @ 1/on duty employee + 1/3 users = 35 spaces
- PV Gymnasium 60 users @ 1/on duty employee + 1/3 users = 20 spaces
- Dogwood Gymnasium 60 users @ 1/on duty employee + 1/3 users = 20 spaces
- Performing Arts Theatre 850 seats @ 1/4 seats = 213 spaces
- The Boys & Girls Club, 1765m^2 @ 2.2/100m^2 GFA = 39 spaces
- Winter Carnival Office. 190m^2 @ 2.2/100m^2 GFA = 4
- TOTAL EXISTING FACILITY PARKING REQUIREMENT = 883 spaces.

Under the current parking bylaw the existing facility requires 883 parking spaces. The current site provides 556 parking stalls, a deficiency of 327 stalls. The proposed 400 seat facility would require an additional 100 spaces, increasing the total parking requirement for the facility to 983 spaces. In this option, 58 new spaces are created in front of the new facility and no existing spaces are lost. To expand the site's available parking the City has recently acquired four lots located along 35th Ave, between the Creek and the south east parking entrance. An additional 47 new stalls can be created on these four properties. The net result is a gain of 105 spaces increasing the recreation complex's total provided parking to 661 spaces, a deficiency of 322 spaces. A variance may be required to address the parking deficiency, however the amount of new spaces created is in excess of the amount required for that addition, improving the amount of parking available to the complex.

1.1.1 Proposed Location

1.2 DESIGN DESCRIPTION

This option calls for the addition of a second NHL sized ice sheet (200' x 85') to the western side of the existing Priest Valley Arena. The new facility connects to the existing facility through access at the north ends of both buildings. The ice sheet is orientated in a north south direction.

With the 3212m^2 addition of a new ice sheet, the building's overall footprint would increase to 6655m^2 and would be considered too large for an unsprinklered building by the building code. Since the existing arena is unsprinklered, there are two main options for attaching the addition. A fire wall could be constructed between the addition and the existing facility. This would essentially make the addition a separate building. However, constructing a fire wall next to an existing building can be costly and challenging. Alternatively, the existing Priest Valley Arena / gymnasium building could be splinklered. Further understanding that there is some pressure to sprinkler the entire complex, we consider this to be the preferred option. With both the addition and the existing building sprinklered and being of single storey, non-combustible construction the project is well within the maximum footprint permitted by the building code. The basic code classification that would apply to this building requires the structure to be of non-combustible construction but permits the roof to be of heavy timber construction, allowing the continued use of the large glue laminated beams that support the existing arena.

For comparison purposes we have proposed a 3212m^2 sprinklered building consisting of a steel structure and an insulated metal panel system envelope. The lower 7 feet of the building envelope is clad with concrete masonry units to help mitigate the potential for damage and vandalism. A 400 seat capacity viewing area with bench type seating has been provided located above the change room facilities.

The new facility includes a standard size NHL ice surface (200' x 85'), complete with dasher board system (with glass), spectator netting along the perimeter, players and penalty benches, and signal and timing devices. Four (4) team dressing rooms each with two (2) shower facilities, two (2) water closet facilities, and single washbasin are provided, along with two (2) referee / gender neutral dressing rooms each with shower facilities, one (1) water closet and, one (1) washbasin.

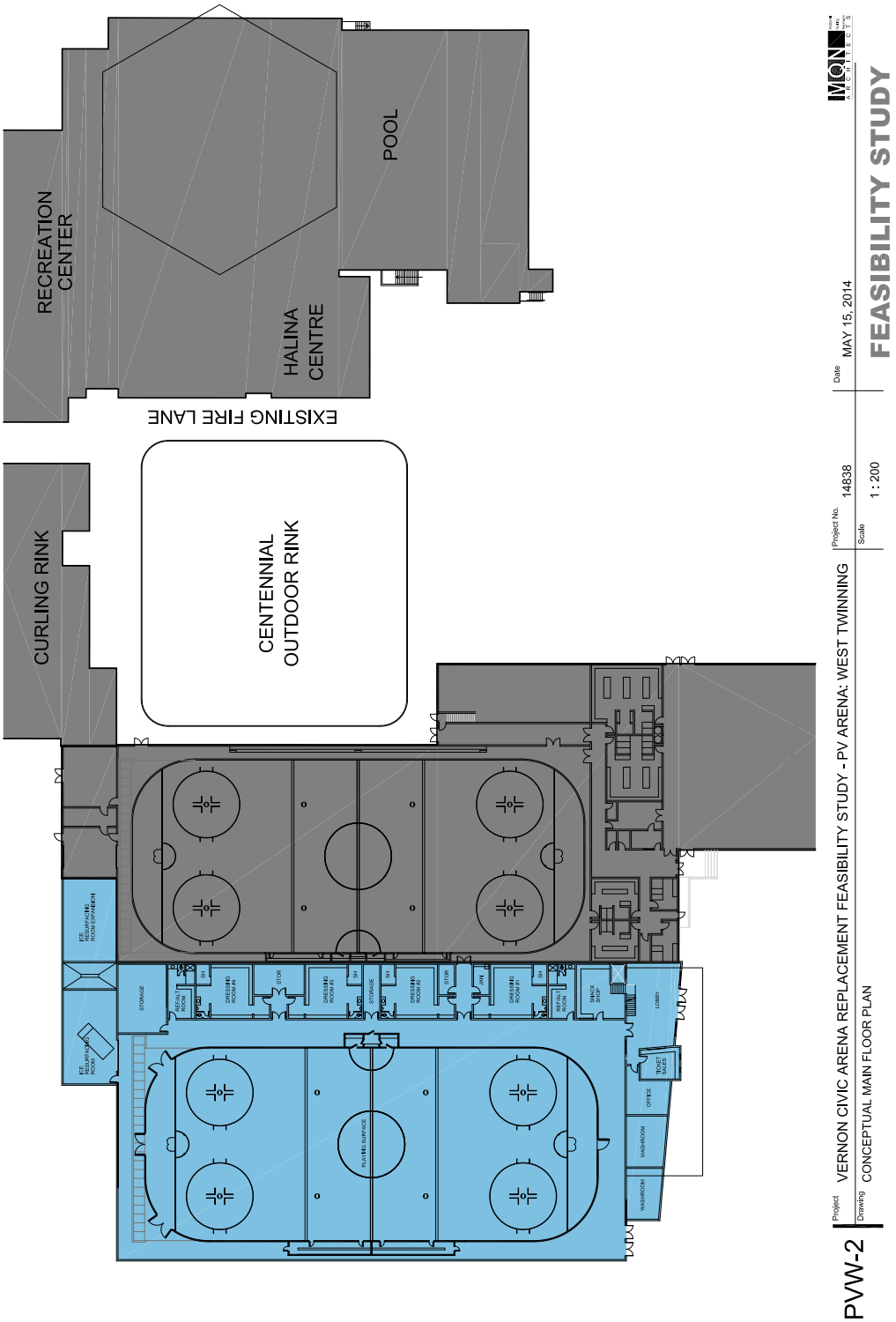
Along with the necessary support spaces, the following program rooms have also been included in the design: a front lobby area with ticket sales office, office space, dry goods concession, washroom facilities (to BCBC requirements), mechanical and electrical rooms, refrigeration room, ice resurfacing room (with ice dump pit), custodial room, storage room (with mop sink and shelving), and maintenance staff room / equipment room.

The proposed option meets all of the program requirements and can provide any number of the "value added" options, including a multipurpose room, fitness training facilities, an elevated walking track, and additional office space, without further significant impact to the parking.

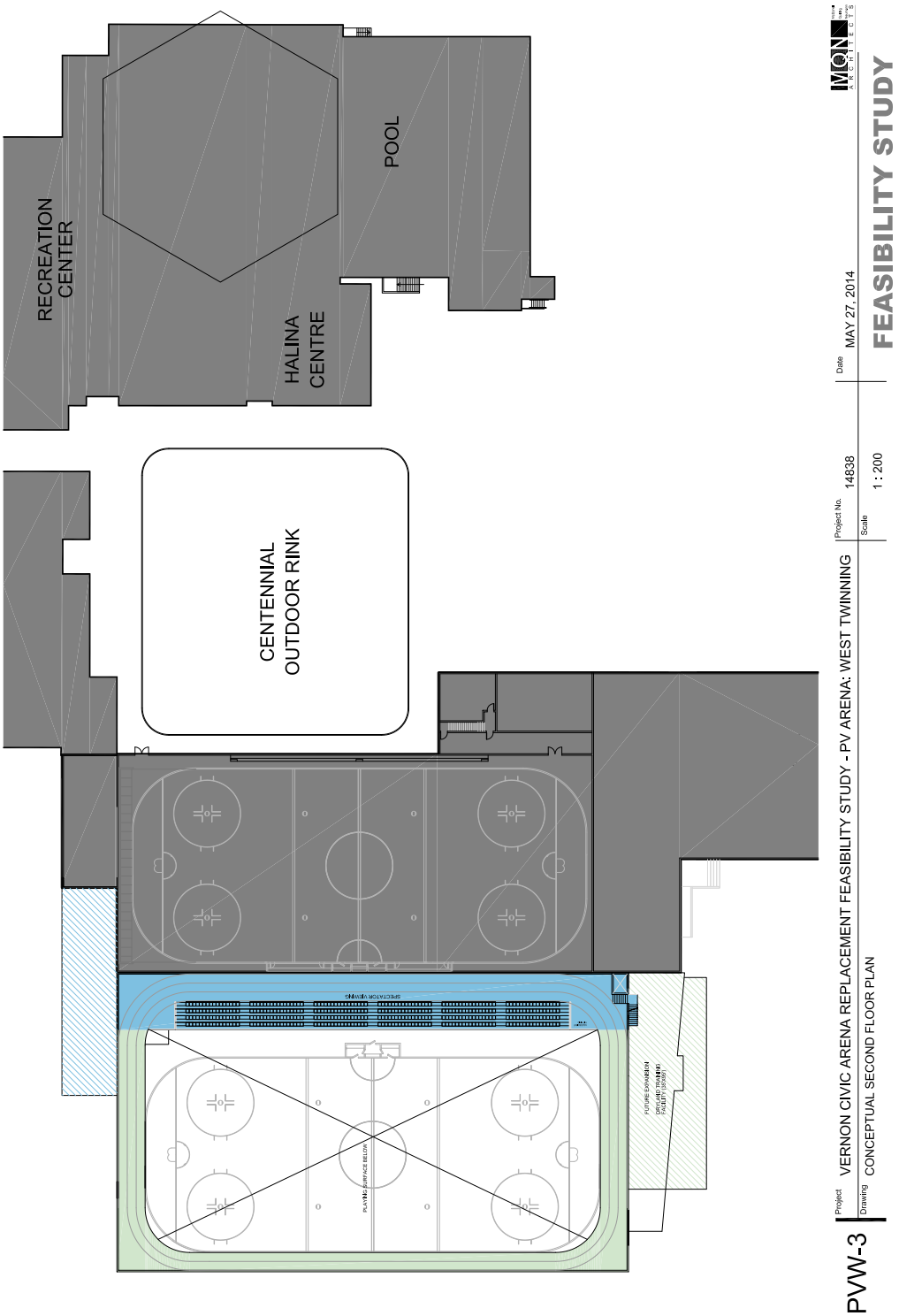
1.3 TECHNICAL INFORMATION

1.3.1 Architectural Site Plan

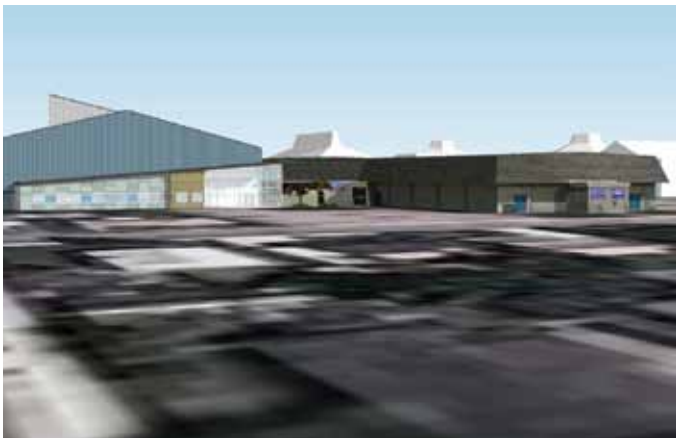
1.3.2 Main Floor Plan

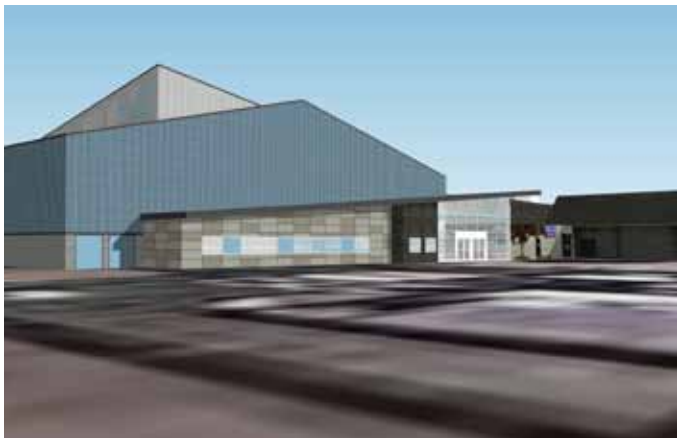


1.3.3 Second Floor Plan



1.3.4 Perspectives





1.3.5 Civil

The Priest Valley West option will involve massive earthworks and result in significant retaining wall structures varying in height from 15m high in the northwest corner to 7m high in the southwest corner of the building and between 1.2m to 6.0m in the parking area. To construct these walls or construct the building, there will be extensive disturbance to Becker Park adjacent to the building. This disturbance will be reduced if there is rock in the area of the walls however, it will still be significant. For the walls in the area of the parking lot, it is likely grid necessary to support the walls would encroach into the 35th street ROW which will likely not be supported by the City. Beyond the retaining wall issues, grading of the site can be achieved relatively easy.

Access and circulation of the existing site is not really affected by the proposed works. This site plan relies on the existing access and parking on the west side of the gymnasium and extends further to the west.

Since this site plan contemplates property acquisition and removal of the existing homes, there are no adequate services and therefore we have assumed new water, sanitary and storm services will be installed. Again the new storm service will include storm detention and treatment.

Development of the site in this option will cut off the existing electrical service to the ice rink, therefore an allowance for the replacement of this service must be made.

1.3.5.1 Cost Estimates

Site servicing cost estimates were developed for each of the options. These estimates include on-site and off-site costs. Without the benefit of a geotechnical investigation or detailed topographic survey, we have had to make assumptions regarding the earthworks associated with each site. The following table summarizes the assumptions for Priest Valley West, as it relates to the earthworks:

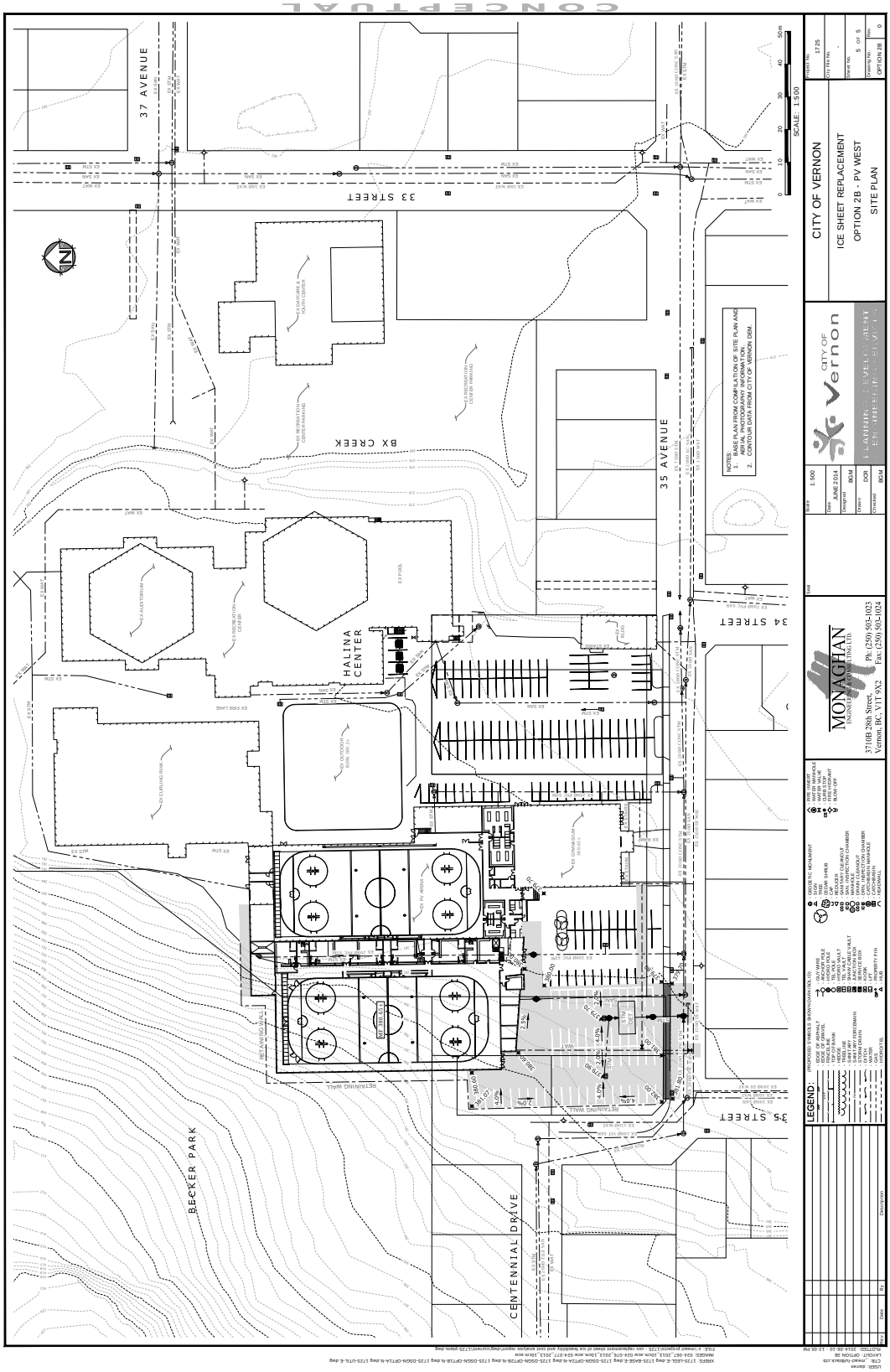
Option	Earthworks Assumptions
PV West	Existing ground surface is excavated to 0.5m below floor slab elevation.

While any site will require detailed geotechnical investigation prior to moving forward, the assumptions for the Kal Tire West and PV West sites have the most potential to be out of line with actual conditions and if these sites are to be considered, should be thoroughly investigated.

Based on the above assumption, a detailed estimate has been developed. Detailed estimates of all options are included at the end of this report. The findings for PV West are summarized in the following table:

Option	On-Site Servicing	Off-Site Servicing	Total Servicing
PV West	$2,826,740	$167,510	$2,994,250

Based on the costs noted above, the most expensive costs are associated with the PV West plan.


CONCEPTUAL
37 AVENUE
33 STREET
BX CREEK
35 AVENUE
34 STREET
35 STREET
HALINA CENTER
BECKER PARK
CENTENNIAL DRIVE
RETAINING WALL
CITY OF VERNON
ICE SHEET REPLACEMENT
OPTION 2B - PV WEST
SITE PLAN
SCALE 1:500
MONAGHAN
3710B 28th Street
Vernon, BC, V1T 9X2
Ph: (250) 503-1023
Fax: (250) 503-1024
LEGEND:
NOTES
1. BASE PLAN FROM COMPILATION OF SITE PLAN AND AERIAL PHOTOGRAPHY INFORMATION.
2. CONTOUR DATA FROM CITY OF VERNON, 2004

1.3.6 Structural

The following summarizes the general type of structure to be used for each arena option. This information is to be used for general budgeting purposes. Soil conditions at the various sites are unknown. This report assumes that each site has reasonable soil conditions, and each option has similar soil conditions to each other. The new structure would be designed to the snow, wind and seismic standards of the 2012 British Columbia Building Code.

The anticipated structure is as follows:

Starting at the foundation:

2 of the sides of the building have full height walls to the roof, while the other two sides have a second floor and then walls to the roof. The lobby end of the building will have full height walls to the roof with a lower roof over the front lobby.

For the typical full height walls, there would be a reinforced concrete strip footing bearing 900mm below grade for frost protection. On top of this footing there would be a 200mm thick reinforced concrete perimeter frost wall with pilasters at the column locations. Bearing on the concrete pilasters would be steel columns. The steel columns would go full height to the roof and support steel wind girts and steel roof beams. Within the beam/columns would be a few bays of HSS cross-bracing for overall lateral support.

Along the two exterior walls that support the second floor there would be a 200mm thick reinforced concrete wall bearing on reinforced concrete strip footings bearing 900mm below grade. This concrete wall would extend up to the underside of the second floor and support a suspended slab. At this level, perimeter structural steel columns, girts and bracing would start and be similar to around the rest of the building, and extend up to support the roof.

The structural steel frame system around the perimeter of the building would support large structural steel fabricated roof trusses spanning across the short direction of the ice surface. These steel trusses would comprise of W-beam top and bottom chords, with HSS diagonals. They would support open web steel joists, spanning the distance between the large trusses. The Open Web steel joists would be spaced at about 1700mm centres and support 38mm steel decking.

There are many rooms around the ice surface. These rooms would be constructed of 200mm reinforced masonry block supported on strip footings, that would bear approximately 450mm below the top of slab-on-grade. There would be a suspended slab system on top of the walls, providing a surface to support the bleachers, as well as a surface for a corridor or future walking path.

The large roof trusses and the exterior wall structure would be designed to support a future suspended walk-way.

The low roof over the lobby end of the building would be constructed of a similar structural steel column/brace frame supporting open web steel joists supporting 38mm steel decking.

The bleacher seats could either be precast concrete or a proprieatory steel/aluminum product.

This option would also have similar challenges to those at Priest Valley East, as it is built against the older existing building and would need the 150mm separation.

Furthermore, there would be a significant retaining wall at this site. We understand that the retaining wall would not be part of the building, as there would be lower access between the building and the retaining wall. Thus this retaining wall would be part of the Civil Engineering package.

Similarly to the Priest Valley East, the access to this site would be challenging for a contractor. Most likely a larger crane would be needed to access both Priest Valley West and East as compared to a stand alone building. This additional factor of complexity would probably be difficult to put a dollar value to, but contractors may shy away from building under such difficult conditions unless they see a significant profit.

Conclusion

From a structural perspective all the options are very similar, with some of the options being more difficult to build because of their locations or close vicinity to other buildings.

1.3.7 Mechanical

Executive Summary

- The new arena HVAC systems will be configured to be utilized for summer ice and also for assembly use when the ice is not in use.
- Natural gas usage for the new arena will be minimized by utilizing reliable sealed combustion, condensing water heating systems for domestic water, ice resurfacing water and hydronic heating systems.
- Outside air consumption for the new arena will be minimized by utilizing conventional demand control and motion control devices on the ventilation system.
- A new water service will be required for fire protection systems to the existing and new arena facility.
- Storm water system on the west side of the building will require significant upgrade to accommodate the addition.
- The sanitary service will need to be upgraded to accommodate the addition.

The addition of the new arena on the west side will require the gas service to be reconfigured to a new location.

1.1 General

S+A Falcon Engineering Ltd. have been retained by MQN Architects Inc. to provide comments on mechanical systems in relation to a new 400 seat Community Arena in Vernon, British Columbia. There are 5 configurations for the facility under consideration.

The purpose of this report is for:

- Developing requirements for the mechanical systems so that five arena options can be assessed.
- Means of assisting the pricing process.

The scope of this commission includes:

- Plumbing Systems.
- Heating, Ventilating and Air Conditioning Systems.
- Exhaust Systems.
- Fire Protection Systems.

The scope does not include:

- Ice Making Refrigeration Systems.
- Civil Works.

1.2 Documentation and Research Resources

The comments in this report are based on:

- Drawings prepared by MQN Architects Inc. for the five options.
- Mechanical tender drawings for the Kal Tire Place dated October 2000.
- Mechanical tender drawings for the Priest Valley Arena and Gym dated September 1978.
- Discussions with the Owner and Consulting Team.

1.3 Building and Systems Descriptions

The project is based 400 seat spectator community NHL sized arena. The base facility program includes; lobby areas, dressing rooms, referee rooms, washrooms, office and ticket sales spaces, concession, janitor rooms, storage rooms,

mechanical rooms, electrical rooms and equipment rooms, refrigeration room and ice resurfacing room.

This report contains comment on the mechanical systems for these spaces.

Other program enhancements could include a combination of; extra office spaces, fitness areas, dedicated team rooms, extra viewing capacity, display areas, walking track, multipurpose, meeting and conference rooms and also a variety of training facilities.

2.0 PLUMBING SYSTEMS

1.1 Water Service

The existing water service is 50mm and is located on the south side of the building near the Gym. This service will need to be eventually abandoned.

This water service is inadequate for domestic water supply and fire protection for the arena addition. A new 150mm water service will be required to a new mechanical room preferably positioned on the south side of the building. This new service will be provided with the necessary cross connection, metering and pressure control systems. Piping will be fed from the new service to the existing arena piping systems.

1.2 Storm Water Service

A series of storm water connections are located on the east and west side of the facility.

The storm water systems on the west side will need to be completely reconfigured to accommodate the addition to the building.

1.3 Sanitary Drainage Service

The existing 100mm sanitary system exits the facility at the south side of the gym. The existing sanitary system is not capable of supporting new loads so a new 150 mm service will need to be brought onto the site.

1.4 Gas Service

The existing gas service location is on the west wall at the south end of the existing arena. The addition of the new arena on the west side will require the gas service to be reconfigured to a new location. The gas service will be upgraded to match the new loads.

1.5 General Plumbing Systems

All drainage systems above ground will be cast iron with mechanical couplings. All drainage systems below grade will be plastic. Drainage systems will be provided with a clean out as the service exits the building.

All hot and cold water piping should be insulated copper. Domestic water supply piping will be configured so that no piping will be constructed or concealed within a masonry wall. Piping systems within masonry walls are subject to premature failure and are extremely difficult to repair.

Hose bibbs will be provided around the facility for cleaning and initial ice making purposes. Hose bibbs will be frost free and vandal resistant. Hose bibbs will be recessed and fit with removable operating handles or keys.

1.6 Domestic Water Heating Systems

A new domestic water heating system will be provided with individual high efficient, gas-fired, heaters and re-circulating

systems for the new arena. The hot water heaters will be sealed combustion with venting systems directed to wall discharge. The hot water systems will be capable of temperatures up to 60 deg C (140 deg F). Expansion tanks will be provided for this system.

1.7 Tempered Water Supply Systems

Large central tempered water recirculation systems are very difficult for building operators to maintain constant temperatures over a wide range of scenarios. We therefore recommend point of use tempered mixing valves for each washroom group and shower groups.

The tempered mixing valve for the change rooms will be mounted at high level in lockable stainless steel service boxes near the shower area.

1.8 Ice Making Water Heating Systems

A new gas fired instantaneous hot water heater will be utilized to provide hot water supply for the ice cleaning equipment systems as a second ice resurfacing room is required. The system will be capable of boosting temperatures from the domestic water service to 60 Deg C (140 Deg F). New 38 mm hot water connection for the ice resurfacing equipment shall be utilized to allow quick fill turnaround.

1.9 Plumbing Fixtures

Plumbing and drainage for fixtures shown on the architectural drawings will be provided, including devices and fixtures required for barrier free access.

All fixtures on exterior walls will require furring and insulation.

We recommend plumbing fixtures if not already installed as follows:

- Water closets: low consumption, floor mounted with battery infrared control type flush valve.
- Urinals: low consumption, wall mounted with battery infrared type flush valve.
- Change Rooms Showers: low consumption, vandal resistant head, with 24 volt electronic timed push button 60 second control. Shower systems will be provided with stainless steel enclosures mounted on block walls, for concealing valves and supply piping.
- Hand Lavatories: counter mounted stainless steel with battery infrared control faucet.
- Combination drinking fountain bottle fillers: refrigerated wall mount.
- Custodian Rooms: Moulded stone, floor mount service sink, wall mounted, manual valve, hot and cold trim with hose connection.
- Plant Refrigeration and both Ice Resurfacing Rooms: Moulded stone, leg mount, double or single compartment service sinks, wall mounted, manual valve, hot and cold trim with hose connection.
- The existing emergency eye wash and safety shower in the vestibule to the Plant Refrigeration Room should remain in service.

1.10 Kitchen and Concession Plumbing Systems

Kitchen or Concession Areas are not intended to be commercial quality. Under this configuration, these systems will not require grease interceptors. However, plumbing fixtures that comply with Health Regulations will be required. Usually, three compartment sinks and a hand lavatory is required unless a commercial quality dishwasher is provided.

3.0 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

1.1 Primary Heating

Primary heating for the new arena shall be provided through gas fired sealed combustion boilers that supply energy to the hydronic heating systems.

Two circulation pumps and piping systems will be utilized to deliver energy to terminal heat transfer units.

1.2 Arena Area

The arena will be served by one or two packaged rooftop gas fired heating and electric cooling units. These units will be able to deliver cooling effect to the arena area when the ice making systems are off. Outside air quantities and dedicated exhaust will be varied by modulating dampers controlled by economizer programs and/or CO, CO_2 and NO_2 sensors. Systems will be activated through the Building Automation System.

Air supply distribution will be through overhead, exposed ductwork and double vane type diffusers. The ductwork will be located generally over the dasher boards and the diffusers will be directed toward the seating area. Air flow at the ice surface is to be kept as calm as possible. Return air will be through ductwork located at low level.

Desiccant dehumidifying equipment will be provided to ensure adequate dehumidification to keep the ice level at 50% relative humidity at 10 deg C (50 deg F) at 1,200 mm above ice level.

The seating area will be heated with gas fired, infrared tubular heaters in eight sections. These heaters will be operated on a demand override for a pre-determined time through the Building Automation System. These units will be separate combustion air systems that draw air directly from outside.

1.3 Lobby Area

The lobby will be served by one packaged rooftop gas fired heating and electric cooling units.

1.4 Team and Referee Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.5 Office, Ticket Sales and Other Small Regularly Occupied Spaces

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Cooling will be provided with ductless split systems.

Outside air will be delivered through the ductless split systems and a constant flow outside air connection.

1.6 Kitchen and Concession

The menu for foods supplied in this area is limited to items that can be cooked without emitting grease laden vapors. Therefore residential style range hoods can be utilized.

1.7 Washrooms and Janitor Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and

stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.8 Storage, Equipment, Mechanical and Electrical Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights or temperature control.

Ice Resurfacing Rooms

New hydronic unit heaters will be utilized for Ice Resurfacing Rooms.

Ice Resurfacing Room will be provided with new dedicated exhaust service. The systems will be controlled by CO, CO_2 and NO_2 and propane sensors to maintain safe levels when ice cleaning equipment is in operation.

1.9 Ice Making Refrigeration Rooms

The existing Plant Refrigeration Room has been provided with two exhaust systems. This system can be upgraded to provide the required ventilation rates for the new refrigeration system capacity

Make up air will be drawn through the existing louver and damper located on the north wall.

Heating for this area is provided through existing electric unit heaters.

1.10 Controls

The control system specifications will be based on a direct digital control Building Automation System, with monitoring and controlling capability for all areas of the complex.

The system will incorporate direct digital control with a networking type system. All wiring, computer terminal, printer and devices required will be supplied for a complete and fully operational system.

4.0 FIRE PROTECTION SYSTEMS

1.1 General

The existing arena has not been provided with a fire protection system. The new and existing arenas will be provided with a fire protection system.

The automatic sprinkler system will be designed and specified to comply with the requirements of NFPA 13 and the British Columbia Building Code. All of the equipment and sprinkler heads incorporated into the system will be ULC and FM listed.

Fire extinguishers will be provided to comply with the requirements of NFPA 10 and the British Columbia Building Code.

A wet type automatic sprinkler system will be utilized for the bulk of the building. Consideration should be made for a dry system in the arena and other nominally cold areas. The sprinkler piping systems for the bulk of this building should be Schedule 40 as this piping system as a longer life expectancy that some of the thin wall systems.

1.2 Hazard Classification

All areas that could possibly be used for exhibition, trade show in the Arena or lobby will be treated as Ordinary Hazard

Group 2.

Storage Rooms, Mechanical Rooms, Custodian Rooms, Concessions and Kitchen Areas will be classified as Ordinary Hazard Group 1.

All other areas will be treated as light hazard.

1.3 Main Sprinkler Station

A new sprinkler station will be required at the same location as the water service on the south end of the building. The sprinkler station will house the required backflow prevention systems. A new fire department Siamese connection will be needed and it should be located with 45 metres of a fire hydrant.

1.4 Fire Hose and Standpipe

It is not anticipated that a standpipe and hose system will be required for the building.

5.0 CONCLUSIONS

Conclusion

The recommendations presented in this Design Brief should be reviewed by the Owner and Design Team. Any recommendation can be incorporated for the pricing process or further development of the design program.

1.3.8 Electrical

1. GENERAL

1. S+A Falcon has been retained by MQN Architects to provide comments on electrical systems in relation to a new 400 seat community arena in Vernon, British Columbia.
2. The purpose of this report is to develop requirements for electrical systems so that 5 arena options can be reviewed.
3. A primary focus of the electrical design should be safety for both the public and for facility operational staff.
4. In consideration of the expected life of this facility, electrical equipment should be selected for energy efficiency, durability and ease of maintenance.
5. Infrastructure should also be included to support temporary events such as trade shows and concerts.

2. SERVICE AND DISTRIBUTION

1. The incoming services for the existing arena is fed underground from a BC Hydro platform mounted transformer bank located outdoor near the northwest corner of the site.
2. The existing main service is rated at 1200A@347/600V 3 phase. The existing service feeds the existing arena as well as the curling rink and community centre.
3. For an additional arena, a new incoming service of at least 1600A@347/600V 3 phase will be required. The service will have a sub feed and reconnect the existing service to new.
4. The existing overhead BC Hydro service and metering system will be removed to suit the new incoming service via BC Hydro pad mounted transformer.
5. 120/208V panel boards will be located throughout the building as required for receptacle and other power loads. 120/208V Panels will generally be located close to loads for user convenience, easy reconfiguration, and lower line losses.
6. Motor control centres will be specified and installed in conjunction with the mechanical equipment layout and design. Motor control centres will be installed as close to the utilization equipment as is practicable.

7. Branch circuit wiring and feeders will be minimum #12 AWG 90°C rated copper wire in EMT or PVC/DB2 below grade. AC90 cable will be permitted for drops to devices on suspended ceilings and for wiring in frame walls. All wiring will be copper.
8. All new distribution equipment will be charged with minimum 25% spare load carrying capacity. All distribution equipment will have a minimum 25% spare device capacity.

3. LIGHTING

1. Lighting levels will be in accordance with the requirements of the Illuminating Engineering Society (IES) recommendations.
2. Main arena lighting will consist of LED "high bays' switched selectively to provide alternate illumination levels. Care will be taken during detailed design to ensure that glare effects of the arena lights are reduced.
3. Concourse lighting and arena bowl lighting will be provide via architectural style fluorescent luminaires providing instant on capability for emergency lighting. Enclosed vandal proof luminaires will be utilized where required.
4. Interior lighting in other areas will be primarily fluorescent with electronic instant start ballasts and T8 lamps with a colour temperature of 3500K. Luminaire types will typically be as follows:
    - Main lobby/concourse – LED down lights and decorative LED/compact fluorescent suspended luminaires.
    - Dressing rooms –vandal proof fluorescent luminaires with polycarbonate lenses.
    - Shower stalls – vapour/vandal proof surface mount fluorescent.
    - Office/meeting areas – recessed fluorescent.
    - Storage/service rooms – fluorescent strip lights with wire guards.
    - Concessions/lounges/ticket offices/public washrooms–2 x 4' fluorescent with framed K12 lens. LED pot lights will be utilized for accent lighting.
5. The building facade and perimeter will be illuminated with recessed or surface mounted "dark sky friendly" down lights to suit the architectural design.
6. Dedicated and controlled outlets will be provided for decorative festival and seasonal lighting.
7. Exit lights will be energy efficient LED type, 2 watts AC. Vandal resistant signs will be specified where necessary.

4. LIGHTING CONTROLS

1. The existing lighting control system will be extended as required to suit the loads of the new west arena.
2. Multi-level switching will be provided for the event floor and concourse lighting.
3. Occupancy sensor switch will be utilized throughout for all offices, change and storage rooms.
4. Exterior lighting will be photocell controlled. Lighting not required to be on all night will be photocell on/Building Automation System off through the lighting control system.
5. Daylight sensors will be installed to switch or dim luminaires in areas where daylighting is available.
6. The lighting control system will interface with the emergency power system, (if generator is installed) to provide for automatic on of all emergency lights during a power failure.
7. Interior and exterior illuminated advertising and building signage will be controlled by the lighting control system.

5. POWER

1. Normal power will be provided to receptacles throughout the facility from local panel boards.
2. Connections will be provided to advertising and information and building signage.
3. Panel boards will be provided near each concession and electrical connections will be provided for all concession equipment included in the design build contract.
4. Connections/power will be provided for score clocks, shot clocks, goal lights and timekeepers bench.
5. All line voltage wiring and controls will be provided for mechanical equipment.
6. 600V feeders/connections will be provided to the refrigeration motor control centre.
7. Show power outlets will be provided for media mobile units.
8. Show/stage power will be provided to fused switch/splitter arrangements for connection of event based equipment and for portable distribution to trade show type booths. Panels will be provided with Camlock style

connectors for connection to the power distribution system by travelling event companies.

6. FIRE ALARM

1. The existing fire alarm system will be replaced and extended into the new and existing arena expansion. A new annunciator will be modified to identify the new and existing zones. Multiple addressable initiation loops will extend out into the building and connect all of the remote devices. Wiring will be in Class A configuration and protected by loop isolation modules to prevent a single wiring fault from disabling other initiation devices.
2. Pull stations will be provided at each exit. Smoke detectors will be installed in stairwells and fire alarm loudspeakers will be located as required for audibility. All loudspeakers will be combination strobe light style for visual indication.
3. Sprinkler system flow, tamper and low pressure switches will annunciate separately.
4. Fire alarm system connection and control of smoke control HVAC equipment will be provided as required by the Building Code and the Code Consultant during detailed design.

7. INTRUDER ALARM SYSTEM

1. The existing security system will be extended into the new arena expansion with building perimeter intruder alarm.
2. The intruder alarm system will consist of monitored door contact switches, glass break detection, and motion detection within critical areas. The system will be armed/disarmed by localized zoned keypads, or by auto arming through system programming.

8. VOICE/DATA COMMUNICATIONS

1. The existing communication system will be extended into the arena expansion.
2. Communications rooms will be located around the facility to minimize wiring runs lengths and to allow for future communications cabling expansion in the facility.
3. Cable tray will be run throughout the building connecting the communications rooms for installation of voice and data network cables as well as for use by media during special events.
4. A 4’ x 4” box complete with single gang plaster ring and minimum 1” conduit run back to the cable tray (or stubbed into the accessible ceiling space) will be provided at each telephone/data and co-ax outlet location.
5. Four twisted pair 24 gauge category 6 cable, insulated, unshielded and FT4 rated will be run from the local patch panel to each voice and data outlet. Cables will be terminated in RJ45 modular jacks at the outlet and at rack mounted patch panels.
6. Interconnection between the communications rooms will consist of 6 strand fiber optic Multimode cables, terminated at each end and tested.
7. A complete coaxial cable network consisting of RG6U coaxial cable, outlets and distribution cabinets will be provided for provision of Cable Television. Outlets will be provided in all lounges, dressing rooms, and meeting rooms.

9. ADVANTGES/DISADVANTGES

The advantages of this proposed site compared to ‘base’ stand alone are the electrical distribution, fire alarm, communication and securities systems are existing. The extension of the existing systems will be required to accommodate the additional arena.

The disadvantages of this proposed site is that a new incoming service would be required. A sub-feed from this main service would then require to be reconnected to the existing main distribution. The BC Hydro incoming service and associated metering would be removed.

1.3.9 Refrigeration

The existing facility consists of three sheets of ice served by a common ammonia refrigeration plant.

- Add the new equipment in the refrigeration equipment room for the fourth sheet of ice including chiller and pumps.
- Rink mains, headers and piping for the new floor.
- The existing refrigeration equipment room would be reused.

Estimated cost of the new refrigeration equipment and rink floor piping: $495,000.

Advantages

- Reduced staffing cost for the refrigeration plant – no additional operator required.
- Reduced construction costs – no additional plant room cost, the existing plant is reused.
- Reduced energy costs – the use of a common refrigeration plant offers a cost of saving of approximately 20 percent in energy cost over stand alone facility.
- Reduced maintenance cost by using common equipment for both ice surfaces.

General Comments

The use of a common plant allows for redundant refrigeration equipment as back up for the operation. The risk of down time when using a common refrigeration system is minimal.

The work required to reach the new West ice surface requires reusing the trench in the existing arena or adding a new trench across the back of the existing arena. This will cause some disruption to the operation of this facility.

1.4 FINANCIAL INFORMATION

INTRODUCTION

The City of Vernon has employed MQN Architects to look at various options to provide a new community arena with an NHL sized ice sheet as well as seating for approximately 400 visitors.

LTA Consultants Inc. has been retained by MQN Architects as part of the consultant team for the project to provide cost consulting and cost planning services for the project.

We have been provided with copies of the architects and engineers conceptual reports for the project. Five potential site options have been identified for the new arena. This report covers option 2A, which comprises an ice sheet expansion to the west elevation of the existing Priest Valley Arena, Vernon, BC. Please refer to the architectural and engineering sub-consultant reports for further information regarding this option.

From the documentation and information provided, we have prepared an opinion of probable costs/conceptual estimate for option 2B (PVW). Please refer to schedule ‘A’ (Pages D1 – D3).

The base line arena specification for this option includes:

- Seating for approximately 400 visitors along one face of the ice sheet;
- NHL playing size ice sheet (200’ x 85’), complete with dasher boards, players boxes, penalty boxes, safety netting, and scoring equipment;
- Four team dressing rooms and two referee/gender neutral dressing rooms.
- Common areas including a front lobby with ticket sales area, concession, washroom facilities and storage areas;
- Ancillary spaces.

The estimate report includes a main cost summary (refer to page A1). The 'estimated costs' for this option are contained in the summary under the following categories:

- Net Building Cost – Estimated construction cost for the new building addition work, including the sub-structure foundation costs, superstructure costs, building envelope costs and interior improvements and finishing costs, including mechanical and electrical;
- Site Development – Estimated construction costs for site improvements, site development, on-site servicing and off-site servicing. This would include any site specific costs relating to an option located on a sloping site, requiring bulk earthwork and retaining walls. All costs for re-constructing exterior parking and paving displaced by the new addition are included under this category;
- Ancillary Work (Interfacing Costs) – Estimated construction costs for renovation work to the existing facility to interface the new building (where applicable). This would include any base building code upgrades required in the existing facility, as a result of the new addition;
- Project Contingencies;
- Estimated soft costs, including design fees, permits and development cost charges.

For option 2B (PVW), four separate price items have been developed for the following 'value added' options:

1. Dryland Training Facility;
2. Multi-Purpose Office Space;
3. Additional Office Space;
4. Elevated Running Track.

Please note, the separate price items are specifically excluded from the baseline estimate.

DOCUMENTATION & INFORMATION

We have been provided with the following documentation and information for the preparation of this opinion of probable costs/conceptual estimate:

- Architect's report and sketch plans, prepared by MQN Architects;
- Structural Engineers Report dated June 10th, 2014, prepared by R&A Engineering (1997) Ltd;
- Mechanical Design Brief dated June 10th, 2014, prepared by S + A Falcon Engineering Ltd;
- Electrical Feasibility Study Report dated June 18th, 2014, prepared by S + A Falcon Engineering Ltd;
- Refrigeration Summary Report dated June 12th, 2014, prepared by Bradley Refrigeration Consultants Ltd;
- Civil Engineers Report, prepared by Monahan Engineering Consultants Ltd;

BASIS OF THE ESTIMATE

Budget Estimate

We have met with the consultant team and reviewed the drawing documentation and information provided to establish the scope and extent of the work.

From the documentation and information provided, we have prepared the enclosed conceptual estimate.

Project Procurement and Pricing

Pricing for this project is based upon our opinion of current June 2014 standard construction industry market costs for this size and type of residential care project in Vernon, BC. It has been assumed that the project will be procured on a fixed stipulated 'lump sum' contract basis, from a competitive bidding field of at least six competent General Contractors. It has also been assumed that a competitive bidding field of at least five competent sub-contractors for each trade will tender for the work and that there will be no 'sole source' bids.

This conceptual estimate attempts to establish a fair and reasonable price for the proposed work and is not intended to be a prediction of 'low bid'.

Contingency Reserves

A Design Contingency Allowance of 10% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the design phase that do not change the project scope. This allowance is ultimately absorbed into the designed and quantified work as more detailed information becomes available and is, therefore, normally reduced to zero at the tender stage.

An Escalation Contingency Allowance of 0% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover price increases in construction costs due to changes in market conditions between the date the estimate is prepared and the date the tender is called.

A Construction Contingency of 5% is included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the construction period which will result in change orders. This contingency is not intended to cover changes in the scope of the work.

Level of Accuracy

This is a preliminary class 'D' opinion of probable cost/conceptual estimate with a level of accuracy of +/-20% 18 times out of 20.

We note that this conceptual estimate report has been prepared from preliminary documentation for cost comparison purposes only, and should not be used for establishing the capital planning purposes for the preferred option.

GST

GST has been included at the full rate payable of 5%.

Excluded Items

The following items are **specifically excluded** from this conceptual estimate:

- Financing Costs;
- Course of Construction Insurance;
- Portering, relocation and temporary accommodation;
- Removal and/or remediation of hazardous materials;
- Special Foundations and Ground Improvement Work;
- Workstations and systems furniture;
- Loose furniture, furnishings and equipment;
- Additional Parking;
- LEED™ certification and registration costs.

OPTION 3 - STAND ALONE

1.1 INTRODUCTION

Option 3, the stand alone facility, investigates a proposed hypothetical arena for a undetermined site.

The hypothetical site would need to be approximately 5 acres in size and would be required to be within the city limits or regional park lands.

The current zoning bylaw requires 1 stall per seat for spectator sports establishments. The proposed 400 seat facility would require an 100 spaces

1.2 DESIGN DESCRIPTION

This option calls for a new Stand alone facility.

For comparison purposes we have proposed a 3449m2 sprinklered building consisting of a steel structure and an insulated metal panel system envelope. The lower 7' of the building envelope is clad with concrete masonry units to help mitigate the potential for damage and vandalism. A 400 seat capacity viewing area with bench type seating has been provided located above the change room facilities.

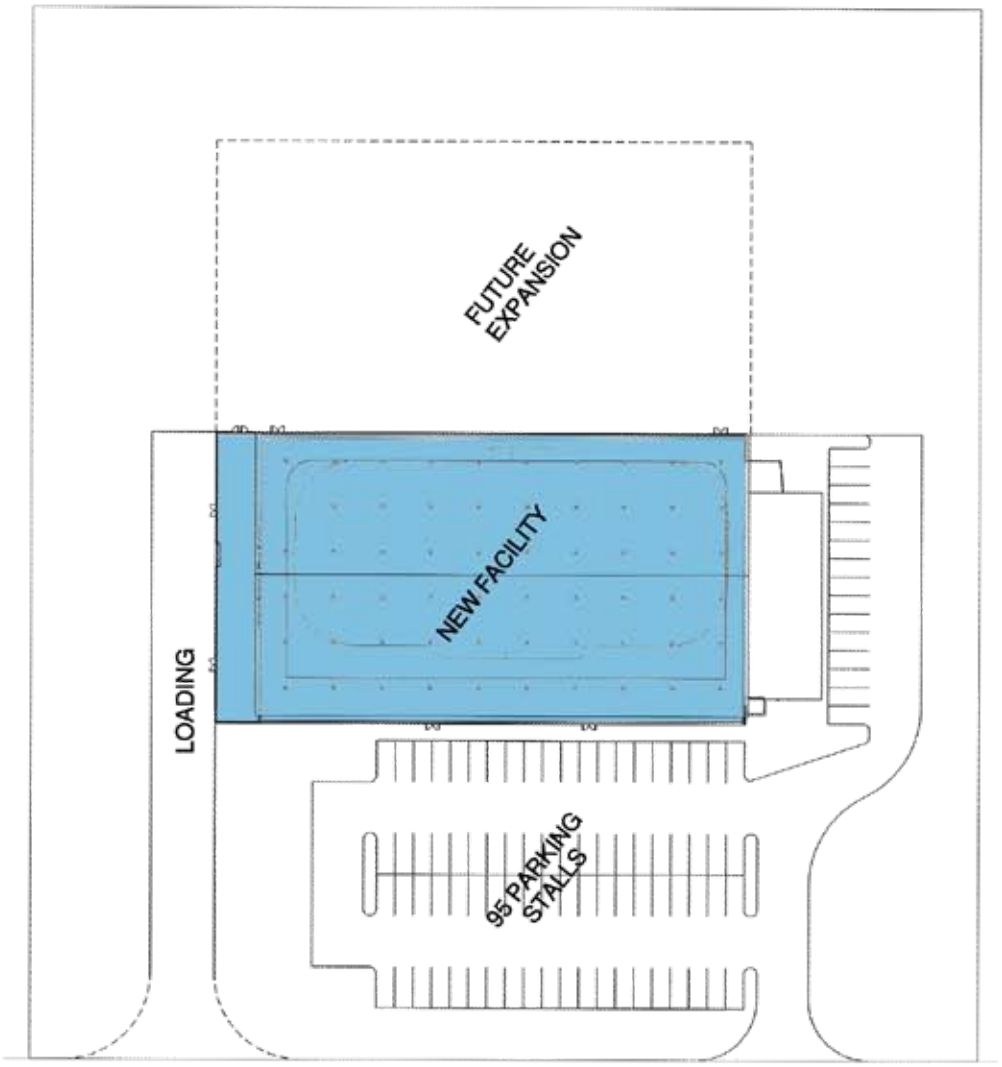
The new facility includes a 400 seating capacity and a standard size NHL ice surface (200' x 85'), complete with dasher board system (with glass), spectator netting along the perimeter, players and penalty benches, and signal and timing devices. Four (4) team dressing rooms each with two (2) shower facilities, two (2) water closet facilities, and single washbasin are provided, along with two (2) referee / gender neutral dressing rooms each with shower facilities, one (1) water closet and, one (1) washbasin.

Along with the necessary support spaces, the following program rooms have also been included in the design: a front lobby area with ticket sales office, office space, dry goods concession, washroom facilities (to BCBC requirements), mechanical and electrical rooms, refrigeration room, ice resurfacing room (with ice dump pit), custodial room, storage room (with mop sink and shelving), and maintenance staff room / equipment room.

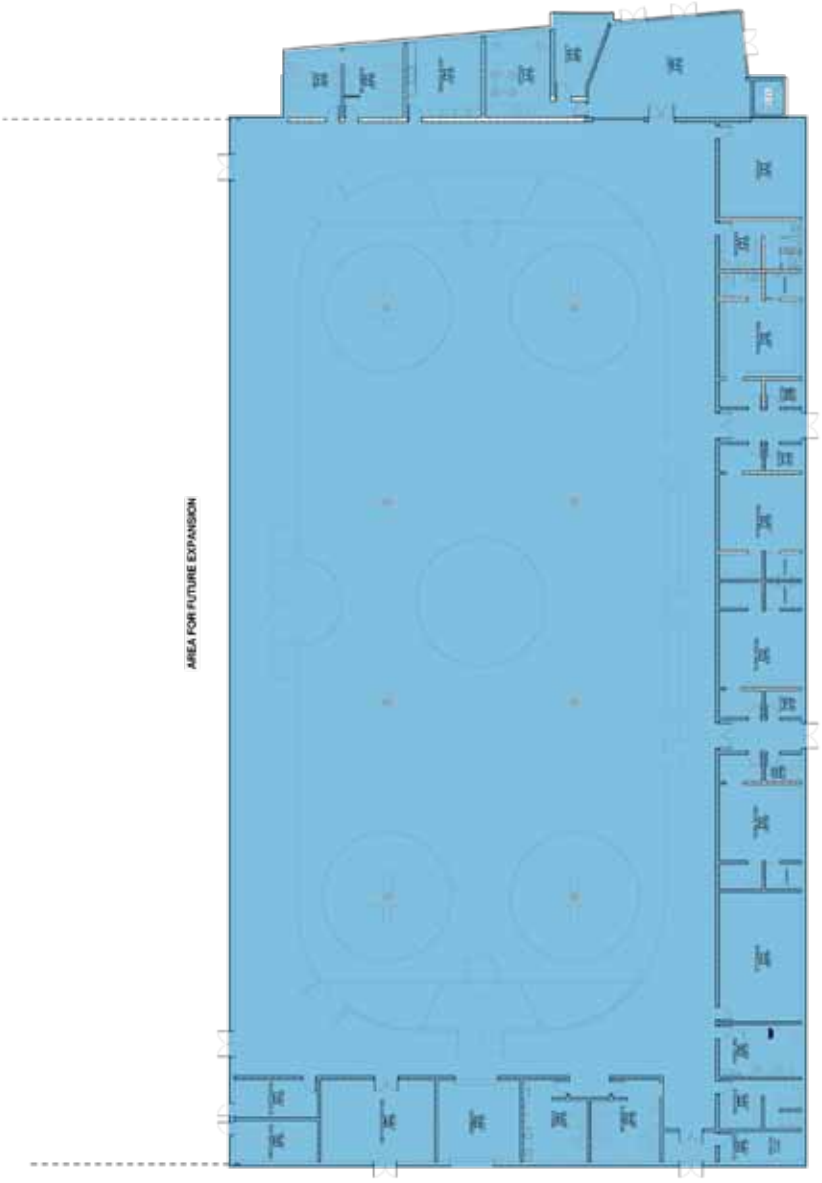
Being hypothetical, depending on the actual site, the proposed option meets all of the program requirements and can provide any number of the "value added" options, including a multipurpose room, fitness training facilities, an elevated walking track, and additional office space, without further significant impact to the parking.

1.3 TECHNICAL INFORMATION

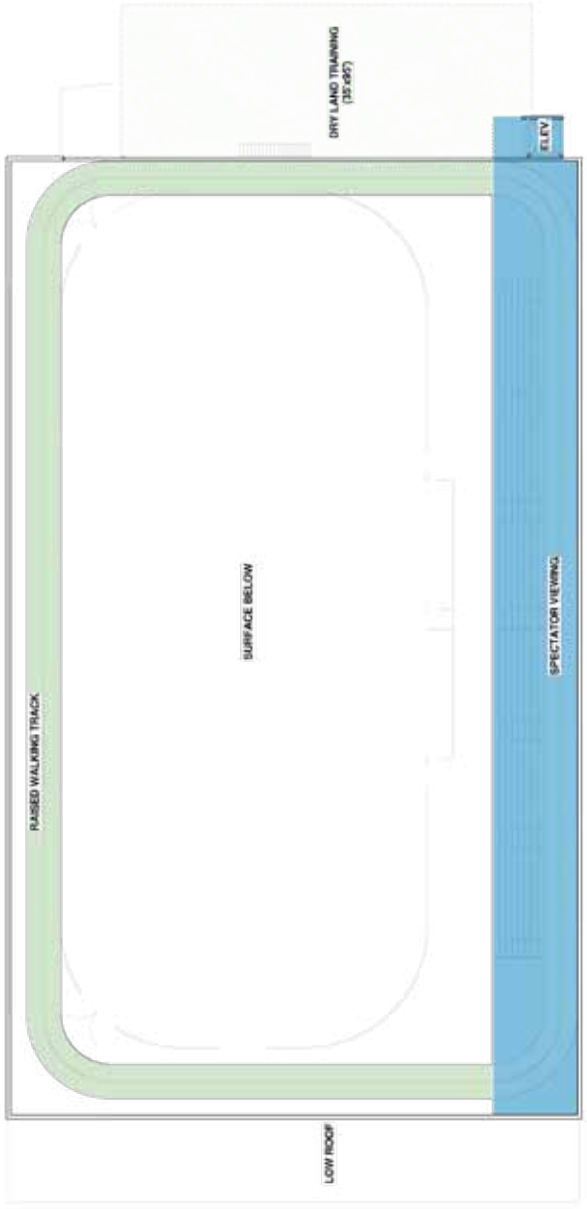
1.3.1 Architectural Site Plan



1.3.2 Main Floor Plan



1.3.3 Second Floor Plan



1.3.4 Perspective

1.3.5 Civil

Without knowledge of the location of the stand alone facility, it is not possible to comment on anything specific. Typically there are 2 items that have significant impacts on the project feasibility. These are the off-site costs and the earthworks associated with the site development. Neither of these costs can be quantified at this time. The estimates we develop for this option will make an allowance for earthworks assuming a gently sloping site to the public ROW and for service connections to existing utilities which have capacity to provide the service.

1.3.5.1 Cost Estimates

Site servicing cost estimates were developed for each of the options. These estimates include on-site and off-site costs. Without the benefit of a geotechnical investigation or detailed topographic survey, we have had to make assumptions regarding the earthworks associated with each site. The following table summarizes the assumptions for the stand alone site, as it relates to the earthworks:

Option	Earthworks Assumptions
Stand Alone Facility	Existing ground slopes from building to road; existing ground is excavated to 0.5m below surface to a suitable subgrade; 30% of the exposed subgrade will have to be over-excavated by 0.6m and replaced with import fill material.

Based on the above assumption, detailed estimates for each of the options have been developed. These detailed estimates are included at the end of this report. The findings for the stand alone facility are summarized in the following table:

Option	On-Site Servicing	Off-Site Servicing	Total Servicing
Stand Alone Facility	$860,930	$41,230	$902,160

1.3.6 Structural

The following summarizes the general type of structure to be used for each arena option. This information is to be used for general budgeting purposes. Soil conditions at the various sites are unknown. This report assumes that each site has reasonable soil conditions, and each option has similar soil conditions to each other. The new structure would be designed to the snow, wind and seismic standards of the 2012 British Columbia Building Code.

The anticipated structure is as follows:

Starting at the foundation:

2 of the sides of the building have full height walls to the roof, while the other two sides have a second floor and then walls to the roof. The lobby end of the building will have full height walls to the roof with a lower roof over the front lobby.

For the typical full height walls, there would be a reinforced concrete strip footing bearing 900mm below grade for frost protection. On top of this footing there would be a 200mm thick reinforced concrete perimeter frost wall with pilasters at the column locations. Bearing on the concrete pilasters would be steel columns. The steel columns would go full height to the roof and support steel wind girts and steel roof beams. Within the beam/columns would be a few bays of HSS cross-bracing for overall lateral support.

Along the two exterior walls that support the second floor there would be a 200mm thick reinforced concrete wall bearing on reinforced concrete strip footings bearing 900mm below grade. This concrete wall would extend up to the underside of the second floor and support a suspended slab. At this level, perimeter structural steel columns, girts and bracing would start and be similar to around the rest of the building, and extend up to support the roof.

The structural steel frame system around the perimeter of the building would support large structural steel fabricated roof trusses spanning across the short direction of the ice surface. These steel trusses would comprise of W-beam top and bottom chords, with HSS diagonals. They would support open web steel joists, spanning the distance between the large trusses. The Open Web steel joists would be spaced at about 1700mm centres and support 38mm steel decking.

There are many rooms around the ice surface. These rooms would be constructed of 200mm reinforced masonry block supported on strip footings, that would bear approximately 450mm below the top of slab-on-grade. There would be a suspended slab system on top of the walls, providing a surface to support the bleachers, as well as a surface for a corridor or future walking path.

The large roof trusses and the exterior wall structure would be designed to support a future suspended walk-way.

The low roof over the lobby end of the building would be constructed of a similar structural steel column/brace frame supporting open web steel joists supporting 38mm steel decking.

The bleacher seats could either be precast concrete or a proprieatory steel/aluminum product.

nto the existing roof. This is usually avoided with new roofs that flatten out near adjacent existing roofs. Though these

Conclusion

From a structural perspective all the options are very similar, with some of the options being more difficult to build because of their locations or close vicinity to other buildings.

1.3.7 Mechanical

Executive Summary

- The new arena HVAC systems will be configured to be utilized for summer ice and also for assembly use when the ice is not in use.
- Natural gas usage for the new arena will be minimized by utilizing reliable sealed combustion, condensing water heating systems for domestic water, ice resurfacing water and hydronic heating systems.
- Outside air consumption for the new arena will be minimized by utilizing conventional demand control and motion control devices on ventilation system.

1.1 General

S+A Falcon Engineering Ltd. have been retained by MQN Architects Inc. to provide comments on mechanical systems in relation to a new 400 seat Community Arena in Vernon, British Columbia. There are 5 configurations for the facility under consideration.

The purpose of this report is for:

- Developing requirements for the mechanical systems so that five arena options can be assessed.
- Means of assisting the pricing process.

The scope of this commission includes:

- Plumbing Systems.
- Heating, Ventilating and Air Conditioning Systems.
- Exhaust Systems.
- Fire Protection Systems.

The scope does not include:

- Ice Making Refrigeration Systems.
- Civil Works.

1.2 Documentation and Research Resources

The comments in this report are based on:

- Drawings prepared by MQN Architects Inc. for the five options.
- Mechanical tender drawings for the Kal Tire Place dated October 2000.
- Mechanical tender drawings for the Priest Valley Arena and Gym dated September 1978.
- Discussions with the Owner and Consulting Team.

1.3 Building and Systems Descriptions

The project is based 400 seat spectator community NHL sized arena. The base facility program includes; lobby areas, dressing rooms, referee rooms, washrooms, office and ticket sales spaces, concession, janitor rooms, storage rooms, mechanical rooms, electrical rooms and equipment rooms, refrigeration room and ice resurfacing room.

This report contains comment on the mechanical systems for these spaces.

Other program enhancements could include a combination of; extra office spaces, fitness areas, dedicated team rooms, extra viewing capacity, display areas, walking track, multipurpose, meeting and conference rooms and also a variety of

training facilities.

2.0 PLUMBING SYSTEMS

1.1 Water Service

A new 150mm combined domestic water supply and fire protection service will be for the new arena and possible future addition. This new service will be provided with the necessary cross connection, metering and pressure control systems.

1.2 Storm Water Service

New dedicated storm water system for the new arena will be needed.

1.3 Sanitary Drainage Service

A new 150 mm service will be required.

1.4 Gas Service

A new gas service will be required.

1.5 General Plumbing Systems

All drainage systems above ground will be cast iron with mechanical couplings. All drainage systems below grade will be plastic. Drainage systems will be provided with a clean out as the service exits the building.

All hot and cold water piping should be insulated copper. Domestic water supply piping will be configured so that no piping will be constructed or concealed within a masonry wall. Piping systems within masonry walls are subject to premature failure and are extremely difficult to repair.

Hose bibbs will be provided around the facility for cleaning and initial ice making purposes. Hose bibbs will be frost free and vandal resistant. Hose bibbs will be recessed and fit with removable operating handles or keys.

1.6 Domestic Water Heating Systems

A new domestic water heating system will be provided with individual high efficient, gas-fired, heaters and re-circulating systems for the new arena. The hot water heaters will be sealed combustion with venting systems directed to wall discharge. The hot water systems will be capable of temperatures up to 60 deg C (140 deg F). Expansion tanks will be provided for this system.

1.7 Tempered Water Supply Systems

Large central tempered water recirculation systems are very difficult for building operators to maintain constant temperatures over a wide range of scenarios. We therefore recommend point of use tempered mixing valves for each washroom group and shower groups.

The tempered mixing valve for the change rooms will be mounted at high level in lockable stainless steel service boxes near the shower area.

1.8 Ice Making Water Heating Systems

A new gas fired instantaneous hot water heater will be utilized to provide hot water supply for the ice cleaning equipment. The system will be capable of boosting temperatures from the domestic water service to 60 Deg C (140 Deg F). New 38 mm hot water connection for the ice resurfacing equipment shall be utilized to allow quick fill turnaround.

1.9 Plumbing Fixtures

Plumbing and drainage for fixtures shown on the architectural drawings will be provided, including devices and fixtures required for barrier free access.

All fixtures on exterior walls will require furring and insulation.

We recommend plumbing fixtures if not already installed as follows:

- Water closets: low consumption, floor mounted with battery infrared control type flush valve.
- Urinals: low consumption, wall mounted with battery infrared type flush valve.
- Change Rooms Showers: low consumption, vandal resistant head, with 24 volt electronic timed push button 60 second control. Shower systems will be provided with stainless steel enclosures mounted on block walls, for concealing valves and supply piping.
- Hand Lavatories: counter mounted stainless steel with battery infrared control faucet.
- Combination drinking fountain bottle fillers: refrigerated wall mount.
- Custodian Rooms: Moulded stone, floor mount service sink, wall mounted, manual valve, hot and cold trim with hose connection.
- Plant Refrigeration and both Ice Resurfacing Rooms: Moulded stone, leg mount, double or single compartment service sinks, wall mounted, manual valve, hot and cold trim with hose connection.
- The existing emergency eye wash and safety shower in the vestibule to the Plant Refrigeration Room should remain in service.

1.10 Kitchen and Concession Plumbing Systems

Kitchen or Concession Areas are not intended to be commercial quality. Under this configuration, these systems will not require grease interceptors. However, plumbing fixtures that comply with Health Regulations will be required. Usually, three compartment sinks and a hand lavatory is required unless a commercial quality dishwasher is provided.

3.0 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

1.1 Primary Heating

Primary heating for the new arena shall be provided through gas fired sealed combustion boilers that supply energy to the hydronic heating systems.

Two circulation pumps and piping systems will be utilized to deliver energy to terminal heat transfer units.

1.2 Arena Area

The arena will be served by one or two packaged rooftop gas fired heating and electric cooling units. These units will be able to deliver cooling effect to the arena area when the ice making systems are off. Outside air quantities and dedicated exhaust will be varied by modulating dampers controlled by economizer programs and/or CO, CO_2 and NO_2 sensors. Systems will be activated through the Building Automation System.

Air supply distribution will be through overhead, exposed ductwork and double vane type diffusers. The ductwork will be located generally over the dasher boards and the diffusers will be directed toward the seating area. Air flow at the ice surface is to be kept as calm as possible. Return air will be through ductwork located at low level.

Desiccant dehumidifying equipment will be provided to ensure adequate dehumidification to keep the ice level at 50% relative humidity at 10 deg C (50 deg F) at 1,200 mm above ice level.

The seating area will be heated with gas fired, infrared tubular heaters in eight sections. These heaters will be operated on a demand override for a pre-determined time through the Building Automation System. These units will be separate combustion air systems that draw air directly from outside.

1.3 Lobby Area

The lobby will be served by one packaged rooftop gas fired heating and electric cooling units.

1.4 Team and Referee Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.5 Office, Ticket Sales and Other Small Regularly Occupied Spaces

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Cooling will be provided with ductless split systems.

Outside air will be delivered through the ductless split systems and a constant flow outside air connection

1.6 Kitchen and Concession

The menu for foods supplied in this area is limited to items that can be cooked without emitting grease laden vapors. Therefore residential style range hoods can be utilized.

1.7 Washrooms and Janitor Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights.

1.8 Storage, Equipment, Mechanical and Electrical Rooms

Heating will be provided with perimeter hydronic heating units. Heating will be controlled through two-way valves and stainless steel vandal resistant room temperature sensors.

Individual roof mounted exhaust fans will be provided for each room. Fans will be controlled through the same motion detectors that control the lights or temperature control.

1.9 Ice Resurfacing Rooms

New hydronic unit heaters will be utilized for Ice Resurfacing Rooms.

Ice Resurfacing Room will be provided with new dedicated exhaust service. The systems will be controlled by CO, CO_2 and NO_2 and propane sensors to maintain safe levels when ice cleaning equipment is in operation.

1.10 Ice Making Refrigeration Rooms

The Plant Refrigeration Room will be provided with two exhaust systems.

- Emergency removal of refrigerant vapours. This system will be operated on high speed as required by a series of refrigerant sensors required by the refrigeration system or a manual override in the vestibule to the Plant Refrigeration Room.
- Heat removal. As the refrigeration plant is intended to operate in the summertime, the heat will be exhausted on either low or high speed as required by the temperature in the room.

Make up air will be drawn through a louvre and damper located above grade level. This louvre will be provided with replaceable filters.

Heating for this area will be provided through new hydronic unit heaters.

1.11 Controls

The control system specifications will be based on a direct digital control Building Automation System, with monitoring and controlling capability for all areas of the complex.

The system will incorporate direct digital control with a networking type system. All wiring, computer terminal, printer and devices required will be supplied for a complete and fully operational system.

4.0 FIRE PROTECTION SYSTEMS

1.1 General

The new arenas will be provided with a fire protection system.

The automatic sprinkler system will be designed and specified to comply with the requirements of NFPA 13 and the British Columbia Building Code. All of the equipment and sprinkler heads incorporated into the system will be ULC and FM listed.

Fire extinguishers will be provided to comply with the requirements of NFPA 10 and the British Columbia Building Code.

A wet type automatic sprinkler system will be utilized for the bulk of the building. Consideration should be made for a dry system in the arena and other nominally cold areas. The sprinkler piping systems for the bulk of this building should be Schedule 40 as this piping system as a longer life expectancy that some of the thin wall systems.

1.2 Hazard Classification

All areas that could possibly be used for exhibition, trade show in the Arena or lobby will be treated as Ordinary Hazard Group 2.

Storage Rooms, Mechanical Rooms, Custodian Rooms, Concessions and Kitchen Areas will be classified as Ordinary Hazard Group 1.

All other areas will be treated as light hazard.

1.3 Main Sprinkler Station

A new sprinkler station will be required as the same location as the water service. The sprinkler station will house the

required backflow prevention systems. A fire department Siamese connection will be needed and it should be located with 45 metres of a fire hydrant.

1.4 Fire Hose and Standpipe

It is not anticipated that a standpipe and hose system will be required for the building.

5.0 CONCLUSIONS

Conclusion

The recommendations presented in this Design Brief should be reviewed by the Owner and Design Team. Any recommendation can be incorporated for the pricing process or further development of the design program.

1.4 ELECTRICAL

1. GENERAL

1. S+A Falcon has been retained by MQN Architects to provide comments on electrical systems in relation to a new 400 seat community arena in Vernon, British Columbia.
2. The purpose of this report is to develop requirements for electrical systems so that 5 arena options can be reviewed.
3. A primary focus of the electrical design should be safety for both the public and for facility operational staff.
4. In consideration of the expected life of this facility, electrical equipment should be selected for energy efficiency, durability and ease of maintenance.
5. Infrastructure should also be included to support temporary events such as trade shows and concerts.

2. SERVICE AND DISTRIBUTION

1. Three phase primary power will be run underground from a BC Hydro supplied outdoor padmounted transformer to the main electrical room.
2. Based on load assumptions, the main service will be rated 1600A@347600V, 3 phase.
3. The main electrical room will contain the main distribution centre, 600V panel boards for lighting and HVAC loads, low voltage lighting controls, dry type transformers, a 120/208V sub-distribution centre, and 208V panel boards.
4. The main distribution centre will be rated 1600A and will consist of a 3P-1600A main breaker, CT/PT section (for utility metering), digital information metering (connected to the Building Automation System), ground fault interruption on the main breaker, TVSS filtering and a circuit breaker distribution section.
5. 347/600V panel boards for lighting, larger HVAC loads and refrigeration will be located in the main electrical room and in the sub electrical rooms as required.
6. 120/208V panel boards will be located throughout the building as required for receptacle and other power loads. 120/208V Panels will generally be located close to loads for user convenience, easy reconfiguration, and lower line losses.
7. Motor control centres will be specified and installed in conjunction with the mechanical equipment layout and design. Motor control centres will be installed as close to the utilization equipment as is practicable. Motor control centres for specialized refrigeration equipment will be connected to the main service.
8. Provision will be made to install power factor correction capacitors, as required, to avoid utility power factor penalties and to improve electrical efficiency.
9. Branch circuit wiring and feeders will be minimum #12 AWG 90°C rated copper wire in EMT or PVC/DB2 below grade. AC90 cable will be permitted for drops to devices on suspended ceilings and for wiring in frame walls. All wiring will be copper.

10. All electrical systems will be designed with minimum 25% spare load carrying capacity. All distribution equipment will have minimum 20% spare device capacity.
11. TVSS filtering will be provided on main bussing and will be integral to the switch gear.

3. EMERGENCY POWER (if desired)

1. An emergency generator will be provided outdoors with a weatherproof enclosure. Natural gas will be the preferred fuel and will be utilized if available in the size required.
2. An automatic emergency transfer switch will be installed in the main electrical room with normal and emergency supplies feeding the emergency power distribution system.
3. Exit signs, emergency and exit lighting, the fire alarm system and the public address sound system will be supplied by the emergency power system. The emergency power system will be designed to provide for safe evacuation of the building during extended power outages.
4. Remote status indication of generator/transfer switch alarm/trouble conditions will be provided.

4. LIGHTING

1. Lighting levels will be in accordance with the requirements of the Illuminating Engineering Society (IES) recommendations.
2. Main arena lighting will consist of LED “high bays’ switched selectively to provide alternate illumination levels. Care will be taken during detailed design to ensure that glare effects of the arena lights are reduced.
3. Concourse lighting and arena bowl lighting will be provide via architectural style fluorescent luminaires providing instant on capability for emergency lighting. Enclosed vandal proof luminaires will be utilized where required.
4. Interior lighting in other areas will be primarily fluorescent with electronic instant start ballasts and T8 lamps with a colour temperature of 3500K. Luminaire types will typically be as follows:
    - Main lobby/concourse – LED down lights and decorative LED/compact fluorescent suspended luminaires.
    - Dressing rooms –vandal proof fluorescent luminaires with polycarbonate lenses.
    - Shower stalls – vapour/vandal proof surface mount fluorescent.
    - Office/meeting areas – recessed fluorescent.
    - Storage/service rooms – fluorescent strip lights with wire guards.
    - Concessions/lounges/ticket offices/public washrooms–2 x 4’ fluorescent with framed K12 lens. LED pot lights will be utilized for accent lighting.
5. Site lighting will consist of either LED luminaires with appropriate distribution pattern mounted on steel poles. Parking lot lighting levels will meet IES recommendations for illumination levels and uniformity. Site lighting will be integrated with the landscape design and low level LED pathway and accent lighting will be provided to suit the design.
6. The building facade and perimeter will be illuminated with recessed or surface mounted “dark sky friendly” down lights to suit the architectural design.
7. Dedicated and controlled outlets will be provided for decorative festival and seasonal lighting.
8. Exit lights will be energy efficient LED type, 2 watts AC. Vandal resistant signs will be specified where necessary.

5. LIGHTING CONTROLS

1. The lighting control system will be designed with energy conservation and ease of operation in mind. The system will incorporate controls of all lighting circuits (except those controlled by local occupancy sensors) through distributed at lighting control relay panels. Centralized control will be provided a predetermined location.
2. Multi-level switching will be provided for the event floor and concourse lighting.
3. Occupancy sensor switch will be utilized throughout for all offices, change and storage rooms.
4. Exterior lighting will be photocell controlled. Lighting not required to be on all night will be photocell on/Building Automation System off through the lighting control system.
5. Daylight sensors will be installed to switch or dim luminaires in areas where daylighting is available.
6. The lighting control system will interface with the emergency power system, (if generator is installed) to provide

for automatic on of all emergency lights during a power failure.
7. Interior and exterior illuminated advertising and building signage will be controlled by the lighting control system.

6. POWER

1. Normal power will be provided to receptacles throughout the facility from local panel boards.
2. Connections will be provided to advertising and information and building signage.
3. Panel boards will be provided near each concession and electrical connections will be provided for all concession equipment included in the design build contract.
4. Connections/power will be provided for score clocks, shot clocks, goal lights and timekeepers bench.
5. All line voltage wiring and controls will be provided for mechanical equipment.
6. 600V feeders/connections will be provided to the refrigeration motor control centre.
7. Show power outlets will be provided for media mobile units.
8. Show/stage power will be provided to fused switch/splitter arrangements for connection of event based equipment and for portable distribution to trade show type booths. Panels will be provided with Camlock style connectors for connection to the power distribution system by travelling event companies.

7. FIRE ALARM

1. A multi-zone, addressable fire alarm panel will be installed in the building. An annunciator will be installed at the main entrance. Multiple addressable initiation loops will extend out into the building and connect all of the remote devices. Wiring will be in Class A configuration and protected by loop isolation modules to prevent a single wiring fault from disabling other initiation devices.
2. Pull stations will be provided at each exit. Smoke detectors will be installed in stairwells and fire alarm loudspeakers will be located as required for audibility. All loudspeakers will be combination strobe light style for visual indication.
3. Sprinkler system flow, tamper and low pressure switches will annunciate separately.
4. Fire alarm system connection and control of smoke control HVAC equipment will be provided as required by the Building Code and the Code Consultant during detailed design.

8. INTRUDER ALARM SYSTEM

1. A security system will be provided with building perimeter intruder alarm.
2. The intruder alarm system will consist of monitored door contact switches, glass break detection, and motion detection within critical areas. The system will be armed/disarmed by localized zoned keypads, or by auto arming through system programming.
3. The security system will be complete with a ULC listed dialer and will be connected to a remote alarm monitoring station.

9. VOICE/DATA COMMUNICATIONS

1. Entrance conduit will be provided for copper and fibre optic service entrance by Telus and Shaw cable.
2. Communications rooms will be located around the facility to minimize wiring runs lengths and to allow for future communications cabling expansion in the facility.
3. Cable tray will be run throughout the building connecting the communications rooms for installation of voice and data network cables as well as for use by media during special events.
4. A 4’ x 4” box complete with single gang plaster ring and minimum 1” conduit run back to the cable tray (or stubbed into the accessible ceiling space) will be provided at each telephone/data and co-ax outlet location.
5. Four twisted pair 24 gauge category 6 cable, insulated, unshielded and FT4 rated will be run from the local patch panel to each voice and data outlet. Cables will be terminated in RJ45 modular jacks at the outlet and at rack mounted patch panels.
6. Interconnection between the communications rooms will consist of 6 strand fibre optic Multimode cables, terminated at each end and tested.

7. A complete coaxial cable network consisting of RG6U coaxial cable, outlets and distribution cabinets will be provided for provision of Cable Television. Outlets will be provided in all lounges, dressing rooms, and meeting rooms.

1.4.1 Refrigeration

For a single sheet of ice with anew refrigeration plant, the estimated cost of the refrigeration system including the rink floor piping would be $750,000. This does not include for the cost of constructing a new 800 square foot compressor room to serve the new compressor room.

The refrigeration estimate includes the following:

- New refrigeration plant with compressors, condenser, chillers and pumps.
- New rink floor including mains, and piping.

General Comments

- Additional operators are required.
- Construction costs would require a new refrigeration plant room.
- The refrigeration system would include the latest developments in heat recovery technology and energy savings options.

1.5 FINANCIAL INFORMATION

INTRODUCTION

The City of Vernon has employed MQN Architects to look at various options to provide a new community arena with an NHL sized ice sheet as well as seating for approximately 400 visitors.

LTA Consultants Inc. has been retained by MQN Architects as part of the consultant team for the project to provide cost consulting and cost planning services for the project.

We have been provided with copies of the architects and engineers conceptual reports for the project. Five potential site options have been identified for the new arena. This report covers option 3, which comprises a new ‘stand alone’ facility at a non-specific site location in Vernon, BC. Please refer to the architectural and engineering sub-consultant reports for further information regarding this option.

From the documentation and information provided, we have prepared an opinion of probable costs/conceptual estimate for option 3 (SAF). Please refer to schedule ‘A’ (Pages E1 – E3).

The base line arena specification for this option includes:

- Seating for approximately 400 visitors along one face of the ice sheet;
- NHL playing size ice sheet (200’ x 85’), complete with dasher boards, players boxes, penalty boxes, safety netting, and scoring equipment;
- Four team dressing rooms and two referee/gender neutral dressing rooms.
- Common areas including a front lobby with ticket sales area, concession, washroom facilities and storage areas;
- Ancillary spaces.

The estimate report includes a main cost summary (refer to page A1). The ‘estimated costs’ for this option are contained in the summary under the following categories:

- Net Building Cost – Estimated construction cost for the new building addition work, including the sub-structure foundation costs, superstructure costs, building envelope costs and interior improvements and finishing costs,

including mechanical and electrical;

- Site Development – Estimated construction costs for site improvements, site development, on-site servicing and off-site servicing. This would include any site specific costs relating to an option located on a sloping site, requiring bulk earthwork and retaining walls. All costs for re-constructing exterior parking and paving displaced by the new addition are included under this category;
- Ancillary Work (Interfacing Costs) – Estimated construction costs for renovation work to the existing facility to interface the new building (where applicable). This would include any base building code upgrades required in the existing facility, as a result of the new addition;
- Project Contingencies;
- Estimated soft costs, including design fees, permits and development cost charges.

For option 3 (SAF), four separate price items have been developed for the following 'value added' options:

1. Dryland Training Facility;
2. Multi-Purpose Office Space;
3. Additional Office Space;
4. Elevated Running Track.

Please note, the separate price items are specifically excluded from the baseline estimate.

DOCUMENTATION & INFORMATION

We have been provided with the following documentation and information for the preparation of this opinion of probable costs/conceptual estimate:

- Architect's report and sketch plans, prepared by MQN Architects;
- Structural Engineers Report dated June 10th, 2014, prepared by R&A Engineering (1997) Ltd;
- Mechanical Design Brief dated June 10th, 2014, prepared by S + A Falcon Engineering Ltd;
- Electrical Feasibility Study Report dated June 18th, 2014, prepared by S + A Falcon Engineering Ltd;
- Refrigeration Summary Report dated June 12th, 2014, prepared by Bradley Refrigeration Consultants Ltd;
- Civil Engineers Report, prepared by Monahan Engineering Consultants Ltd;

BASIS OF THE ESTIMATE

Budget Estimate

We have met with the consultant team and reviewed the drawing documentation and information provided to establish the scope and extent of the work.

From the documentation and information provided, we have prepared the enclosed conceptual estimate.

Project Procurement and Pricing

Pricing for this project is based upon our opinion of current June 2014 standard construction industry market costs for this size and type of residential care project in Vernon, BC. It has been assumed that the project will be procured on a fixed stipulated 'lump sum' contract basis, from a competitive bidding field of at least six competent General Contractors. It has also been assumed that a competitive bidding field of at least five competent sub-contractors for each trade will tender for the work and that there will be no 'sole source' bids.

This conceptual estimate attempts to establish a fair and reasonable price for the proposed work and is not intended to be a prediction of 'low bid'.

Contingency Reserves

A Design Contingency Allowance of 10% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the design phase that do not change the project scope. This allowance is ultimately absorbed into the designed and quantified work as more detailed information becomes available and is, therefore, normally reduced to zero at the tender stage.

An Escalation Contingency Allowance of 0% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover price increases in construction costs due to changes in market conditions between the date the estimate is prepared and the date the tender is called.

A Construction Contingency of 5% is included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the construction period which will result in change orders. This contingency is not intended to cover changes in the scope of the work.

Level of Accuracy

This is a preliminary class 'D' opinion of probable cost/conceptual estimate with a level of accuracy of +/-20% 18 times out of 20.

We note that this conceptual estimate report has been prepared from preliminary documentation for cost comparison purposes only, and should not be used for establishing the capital planning purposes for the preferred option.

GST

GST has been included at the full rate payable of 5%.

Excluded Items

The following items are **specifically excluded** from this conceptual estimate:

- Land Acquisition and Associated Costs;
- Financing Costs;
- Course of Construction Insurance;
- Portering, relocation and temporary accommodation;
- Removal and/or remediation of hazardous materials;
- Special Foundations and Ground Improvement Work;
- Workstations and systems furniture;
- Loose furniture, furnishings and equipment;
- LEED™ certification and registration costs.

CITY OF VERNON ICE SHEET REPLACEMENT PROJECT OPTION 1A KAL TIRE NORTH

OPINION OF PROBABLE COST/CONCEPTUAL ESTIMATE

June 17th, 2014

LTA Consultants Inc
Professional Quantity Surveyors
& Construction Cost Consultants
905 – 1708 Dolphin Avenue
Kelowna, BC V1Y 9S4
T: 250-868-8800
F: 888-371-1458
E: lyndon@ltaconsultants.com
W: www.ltaconsultants.com

Prepared for:

MQN Architects
Suite 100, 3313 32nd Avenue
Vernon, BC V1T 2E1

TABLE OF CONTENTS

INTRODUCTION

The City of Vernon has employed MQN Architects to look at various options to provide a new community arena with an NHL sized ice sheet as well as searing for approximately 400 visitors.

LTA Consultants Inc. has been retained by MQN Architects as part of the consultant team for the project to provide cost consulting and cost planning services for the project.

We have been provided with copies of the architects and engineers conceptual reports for the project. Five potential site options have been identified for the new arena. This report covers option 1A, which comprises an ice sheet expansion to the north elevation of the existing Kal Tire Arena, Vernon, BC. Please refer to the architectural and engineering sub-consultant reports for further information regarding this option.

From the documentation and information provided, we have prepared an opinion of probable costs/conceptual estimate for option 1A (KTN). Please refer to schedule 'B' (Pages A1 – A58).

The base line arena specification for this option includes:

- Seating for approximately 400 visitors along one face of the ice sheet;
- NHL playing size ice sheet (200' x 85'), complete with dasher boards, players boxes, penalty boxes, safety netting, and scoring equipment;
- Four team dressing rooms and two referee/gender neutral dressing rooms;
- Common areas including a front lobby with ticket sales area, concession, washroom facilities and storage areas;
- Ancillary spaces.

The estimate report includes a main cost summary (refer to page A1). The 'estimated costs' for this option are contained in the summary under the following categories:

- Net Building Cost – Estimated construction cost for the new building addition work, including the sub-structure foundation costs, superstructure costs, building envelope costs and interior improvements and finishing costs, including mechanical and electrical;
- Site Development – Estimated construction costs for site improvements, site development, on-site servicing and off-site servicing. This would include any site specific costs relating to an option located on a sloping site, requiring bulk earthwork and retaining walls. All costs for re-constructing exterior parking and paving displaced by the new addition are included under this category;
- Ancillary Work (Interfacing Costs) – Estimated construction costs for renovation work to the existing facility to interface the new building (where applicable). This would include any base building code upgrades required in the existing facility, as a result of the new addition;
- Project Contingencies;
- Estimated soft costs, including design fees, permits and development cost charges.

For option 1A (KTN), five separate price items have been developed for the following 'value added' options:

1. Elevated Running Track;
2. Dryland Training Facility;
3. Multi-Purpose Office Space;
4. Additional Office Space;
5. New Parking Area Adjacent to 43rd Avenue.

Please note, the separate price items are specifically excluded from the baseline estimate.

DOCUMENTATION & INFORMATION

We have been provided with the following documentation and information for the preparation of this opinion of probable costs/conceptual estimate:

- Architect's report and sketch plans, prepared by MQN Architects;
- Structural Engineers Report dated June 10th, 2014, prepared by R&A Engineering (1997) Ltd;
- Mechanical Design Brief dated June 10th, 2014, prepared by S + A Falcon Engineering Ltd;
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- Refrigeration Summary Report dated June 12th, 2014, prepared by Bradley Refrigeration Consultants Ltd;
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BASIS OF THE ESTIMATE

Budget Estimate

We have met with the consultant team and reviewed the drawing documentation and information provided to establish the scope and extent of the work.

From the documentation and information provided, we have prepared the enclosed conceptual estimate.

Project Procurement and Pricing

Pricing for this project is based upon our opinion of current June 2014 standard construction industry market costs for this size and type of residential care project in Vernon, BC. It has been assumed that the project will be procured on a fixed stipulated 'lump sum' contract basis, from a competitive bidding field of at least six competent General Contractors. It has

also been assumed that a competitive bidding field of at least five competent sub-contractors for each trade will tender for the work and that there will be no 'sole source' bids.

This conceptual estimate attempts to establish a fair and reasonable price for the proposed work and is not intended to be a prediction of 'low bid'.

Contingency Reserves

A Design Contingency Allowance of 10% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover unforeseen items during the design phase that do not change the project scope. This allowance is ultimately absorbed into the designed and quantified work as more detailed information becomes available and is, therefore, normally reduced to zero at the tender stage.

An Escalation Contingency Allowance of 0% has been included in this estimate. This allowance is a reserve of funds in the construction estimate to cover price increases in construction costs due to changes in market conditions between the date the estimate is prepared and the date the tender is called.

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Level of Accuracy

This is a preliminary class 'D' opinion of probable cost/conceptual estimate with a level of accuracy of +/-20% 18 times out of 20.

We note that this conceptual estimate report has been prepared from preliminary documentation for cost comparison purposes only, and should not be used for establishing the capital planning purposes for the preferred option.

GST

GST has been included at the full rate payable of 5%.

Excluded Items

The following items are **specifically excluded** from this conceptual estimate:

- Financing Costs;
- Course of Construction Insurance;
- Portering, relocation and temporary accommodation;
- Removal and/or remediation of hazardous materials;
- Special Foundations and Ground Improvement Work;
- Workstations and systems furniture;

- Loose furniture, furnishings and equipment;
- LEED™ certification and registration costs.

RECOMMENDATIONS

A combined summary of all options is included in schedule 'A' of the report (refer to page S1).

From an initial capital cost perspective we recommend that Option 1A (KTN), be further investigated and pursued as the best potential solution. Although Option 2A (PVE), is slightly cheaper, it does not meet the base program requirements. Additionally, the Option 2A (PVE) estimate does not include any cost allowance to replace the displaced exterior ice sheet.

We have also undertaken a very high level review to look at the estimated project costs to carry out a complete renovation to the existing Civic Arena, to include a full NHL playing surface (200' x 85'). Our review and assessment was based on the previous Civic Arena Engineering Assessment undertaken in March 2014 (Carscadden), as well as very preliminary sketch drawings and high level discussions with MQN Architects.

Based on the preliminary documentation provided, as well as our discussions with the Architect, a full expansion of the ice sheet will result in major demolition and alteration work being required to the existing bleachers and associates program spaces located beneath the bleachers. This work would also 'trigger' a number of code upgrades, which would also have to be addressed as part of the major renovation.

Enclosed in schedule 'C' of this report is a 'Main Cost Summary of Estimated Project Costs' for a major renovation to the existing civic arena. The summary includes the major renovation work included within the Engineering Assessment conducted by Carscadden in March 2014, as well as other additional renovations and alterations that would need to be undertaken if this facility was to be expanded to a full NHL playing surface, and the life of the building extended. The 'high level' opinion of probable costs/order of magnitude estimate develops a total project cost in the $14,000,000 range, excluding GST. We note that this estimated cost excludes any upgrades to the existing parking lot, off-site service upgrades (if applicable), as well as lost revenue as a result of this facility being out of commission for a period of approximately 16 months, during the renovation work.

LIFE CYCLE COST ANALYSIS

A Life Cycle Cost Analysis has been prepared for the five new building options, as well as a renovation to the existing Civic Arena, based on a time frame of 40 years. Please refer to Pages LCC 1-3 in schedule 'D' of this report for further information regarding the assumptions and rates used for the calculations.

We note that adjustments have been made to the rates for various options to take into account the operational efficiencies.

SCHEDULE 'A'
COMBINED SUMMARY – ALL OPTIONS

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - ALL OPTIONS

Description		Option 1A - KTN	Option 1B - KTW	Option 2A - PVE	Option 2B - PVW	Option 3
Net Building Cost		$8,578,780	$8,407,476	$7,886,294	$8,503,613	$9,060,642
Site Development		$590,061	$909,072	$599,328	$2,888,828	$1,075,016
Ancillary Work (Interfacing Costs)		$245,438	$350,831	$659,466	$603,580	$0
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,459,213	$1,498,444	$1,417,489	$1,859,383	$1,571,027
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$10,873,492**	**$11,165,822**	**$10,562,577**	**$13,855,404**	**$11,706,686**
GST	5.00%	$543,675	$558,291	$528,129	$692,770	$585,334
ESTIMATED CONSTRUCTION COST (Including GST)		**$11,417,166**	**$11,724,114**	**$11,090,706**	**$14,548,174**	**$12,292,020**
SOFT COST						
Design Fees - Allowance	10.00%	$1,087,349	$1,116,582	$1,056,258	$1,385,540	$1,170,669
Building Permit Fees	1.20%	$130,482	$133,990	$126,751	$166,265	$140,480
Development Cost Charges		$35,662	$34,055	$29,464	$33,140	$33,451
Miscellaneous	1.50%	$163,102	$167,487	$158,439	$207,831	$175,600
ESTIMATED SOFT COSTS (Excluding GST)		**$1,416,596**	**$1,452,114**	**$1,370,911**	**$1,792,776**	**$1,520,200**
GST	5.00%	$70,830	$72,606	$68,546	$89,639	$76,010
ESTIMATED SOFT COSTS (Including GST)		**$1,487,425**	**$1,524,720**	**$1,439,457**	**$1,882,415**	**$1,596,210**
ESTIMATED PROJECT COSTS (Including GST)		**$12,904,592**	**$13,248,833**	**$12,530,163**	**$16,430,590**	**$13,888,230**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE	Option 1A - KTN	Option 1B - KTW	Option 2A - PVE	Option 2B - PVW	Option 3
1) Running Track	$533,447	$533,447	N/A	$561,097	$417,052
2) Dryland Training Facility	$552,005	$552,005	$588,487	$552,005	$552,005
3) Multi-Purpose Room	$59,671	$59,671	$61,334	$59,671	$59,671
4) Additional Office Space	$142,174	$142,174	$146,137	$142,174	$142,174
5) New Parking Area Adjacent to 43rd Avenue	$238,334	$238,334	N/A	N/A	N/A
TOTAL ESTIMATED CONSTRUCTION COST (Including GST)	**$1,525,630**	**$1,525,630**	**$795,959**	**$1,314,947**	**$1,170,902**

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST, but exclude all Soft Costs

SCHEDULE 'B'
OPTION 1A (KTN)

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - OPTION 1A (KTN)

Description			m^2	ft^2
		Gross Floor Area	4,016.00	43,228
		Estimated Value	$/$m^2$	$/$ft^2$
Net Building Cost		$8,578,780	$2,136.15	$198
Site Development		$590,061	$146.93	$14
Ancillary Work (Interfacing Costs)		$245,438	$61.11	$6
Design Contingency, Escalation Contingency and Construction Contingency Allowance		$1,459,213	$363.35	$34
ESTIMATED CONSTRUCTION COSTS (Excluding GST)		**$10,873,492**	**$2,707.54**	**$252**
GST	5.00%	$543,675	$135.38	$13
ESTIMATED CONSTRUCTION COST (Including GST)		**$11,417,166**	**$2,842.92**	**$264**
SOFT COST				
Design Fees - Allowance	10.00%	$1,087,349	$270.75	$25
Building Permit Fees	1.20%	$130,482	$32.49	$3
Development Cost Charges		$35,662	$8.88	$1
Miscellaneous	1.50%	$163,102	$40.61	$4
ESTIMATED SOFT COSTS (Excluding GST)		**$1,416,596**	**$352.74**	**$33**
GST	5.00%	$70,830	$17.64	$2
ESTIMATED SOFT COSTS (Including GST)		**$1,487,425**	**$370.37**	**$34**
ESTIMATED PROJECT COSTS (Including GST)		**$12,904,592**	**$3,213.29**	**$299**

SEPARATE PRICE ITEMS - EXCLUDED FROM THE BASELINE ESTIMATE ABOVE

1) Running Track	$533,447
2) Dryland Training Facility	$552,005
3) Multi-Purpose Room	$59,671
4) Additional Office Space	$142,174
5) New Parking Area Adjacent to 43rd Avenue	$238,334

Note:
The above noted separately priced item includes an allowance for General Contractors Overhead and Fee, Contingency Allowances and GST.

ELEMENTAL COST PLAN

Project Number:	**1427**	**GFA:**	4,016 m^2
Name:	**Option 1 A (KTN)**	**GFA:**	43,228 ft^2
Site:	*Kal Tire Site*		
Date	17-Jun-14		

	Element	Element Quantity		Unit Rate	Element Value	Total	$/m²	$/m²	%
A1	**SUBSTRUCTURE**					**$1,380,773**		**$343.82**	**13.94%**
A111	Standard Foundations	3,481	m^2	$87.48	$304,525		$75.83		
A112	Special Foundations	1,500	m^2	$698.93	$1,048,400		$261.06		
A12	Basement Excavation	3,481	m^2	$8.00	$27,848		$6.93		
A2	**STRUCTURE**					**$1,368,824**		**$340.84**	**13.81%**
A21	Lowest Floor Construction	1,981	m^2	$67.53	$133,781		$33.31		
A221	Upper Floor Construction	535	m^2	$425.45	$227,616		$56.68		
A222	Stair Construction	1	No	$12,500.00	$12,500		$3.11		
A23	Roof Construction	3,549	m^2	$280.34	$994,927		$247.74		
A3	**EXTERIOR ENCLOSURE**					**$1,785,180**		**$444.52**	**18.02%**
A312	Structural Walls Below Grade	0	m^2	$0.00	$0		$0.00		
A321	Walls Above Grade	2,159	m^2	$433.40	$935,720		$233.00		
A322	Structural Walls Above Grade	0	m^2	$0.00	$0		$0.00		
A323	Curtain Walls	74	m^2	$1,012.16	$74,900		$18.65		
A331	Windows & Louvers	93	m^2	$500.00	$46,500		$11.58		
A332	Glazed Screens	0	No	$0.00	$0		$0.00		
A333	Doors	8	lvs	$2,075.00	$16,600		$4.13		
A341	Roofing	3,549	m^2	$193.75	$687,610		$171.22		
A342	Skylights	0	m^2	$0.00	$0		$0.00		
A35	Projections	106	m^2	$225.00	$23,850		$5.94		
B1	**PARTITIONS**					**$224,900**		**$56.00**	**2.27%**
B111	Fixed Partitions	1,217	m^2	$152.26	$185,300		$46.14		
B112	Moveable Partitions	2	No	$3,500.00	$7,000		$1.74		
B113	Structural Partitions	0	m^2	$0.00	$0		$0.00		
B12	Doors	26	lvs	$1,253.85	$32,600		$8.12		
B2	**FINISHES**					**$370,739**		**$92.32**	**3.74%**
B21	Floor Finishes	2,996	m^2	$50.87	$152,397		$37.95		
B22	Ceiling Finishes	736	m^2	$92.31	$67,942		$16.92		
B23	Wall Finishes	4,016	m^2	$37.45	$150,400		$37.45		
B3	**FITTINGS & EQUIPMENT**					**$639,920**		**$159.34**	**6.46%**
B311	Metals	4,016	m^2	$20.00	$80,320		$20.00		
B312	Millwork	4,016	m^2	$30.00	$120,480		$30.00		
B313	Specialties	4,016	m^2	$20.00	$80,320		$20.00		
B32	Equipment	4,016	m^2	$69.42	$278,800		$69.42		
B331	Elevators	1	no	$80,000.00	$80,000		$19.92		
B332	Escalators & Moving Walkways	0	no	$0.00	$0		$0.00		
B333	Materials Handling Systems	0	no	$0.00	$0		$0.00		
C1	**MECHANICAL**					**$1,131,070**		**$281.64**	**11.42%**
C11	Plumbing and Drainage	4,016	m^2	$34.67	$139,240		$34.67		
C12	Fire Protection	4,016	m^2	$26.00	$104,430		$26.00		
C13	HVAC	4,016	m^2	$220.97	$887,400		$220.97		
C14	Controls	4,016	m^2	$0.00	$0		$0.00		
C2	**ELECTRICAL**					**$526,110**		**$131.00**	**5.31%**
C21	Service & Distribution	4,016	m^2	$26.00	$104,430		$26.00		
C22	Lighting, Devices & Heating	4,016	m^2	$80.00	$321,280		$80.00		
C23	System & Ancillaries	4,016	m^2	$25.00	$100,400		$25.00		
Z1	**GENERAL REQUIREMENTS & FEES**					**$1,151,265**		**$286.67**	**11.62%**
Z11	General Requirements	10.00%			$742,752		$184.95		
Z12	Fee	5.00%			$408,513		$101.72		
	Sub-total Net Building Cost					**$8,578,780**		**$2,136.15**	**86.58%**
Z21	Design Contingency Allowance	10.00%				$857,878		$213.62	8.66%
Z22	Escalation Contingency Allowance	0.00%				$0		$0.00	0.00%
Z23	Construction Contingency Allowance	5.00%				$471,833		$117.49	4.76%
	NET BUILDING COST					**$9,908,491**		**$2,467.25**	**100.00%**

	Project Number:	**1427**			**GFA:**	4,016 m^2			
	Name:	**Option 1 A (KTN)**			**GFA:**	43,228 ft^2			
	Site:	*Kal Tire Site*							
	Date	17-Jun-14							
	Element	**Element Quantity**		**Unit Rate**	**Element Value**	**Total**	**$/m²**	**$/m²**	**%**
D1	**SITE DEVELOPMENT**					**$510,875**		**$127.21**	
D111	Preparation	5,000	m^2	$39.10	$195,500		$48.68		
D112	Hard Surfaces	2,036	m^2	$84.39	$171,825		$42.79		
D113	Improvements	5,000	m^2	$2.68	$13,400		$3.34		
D114	Landscaping	5,000	m^2	$2.00	$10,000		$2.49		
D12	Mechanical Site Services	5,000	m^2	$19.03	$95,150		$23.69		
D13	Electrical Site Services	5,000	m^2	$5.00	$25,000		$6.23		
Z1	**GENERAL REQUIREMENTS & FEES**					**$79,186**		**$19.72**	
Z11	General Requirements	10.00%			$51,088		$12.72		
Z12	Fee	5.00%			$28,098		$7.00		
	Sub-total Site Development					**$590,061**		**$146.93**	
Z21	Design Contingency Allowance	10.00%				$59,006		$14.69	
Z22	Escalation Contingency Allowance	0.00%				$0		$0.00	
Z23	Construction Contingency Allowance	5.00%				$32,453		$8.08	
	SITE DEVELOPMENT					**$681,520**		**$169.70**	
D2	**ANCILLARY WORK**					**$212,500**		**$52.91**	
D211	Demolition	0	m^2	$0.00	$0		$0.00		
D212	Hazardous Materials	0	m^2	$0.00	$0		$0.00		
D22	Alterations	400	m^2	$531.25	$212,500		$52.91		
Z1	**GENERAL REQUIREMENTS & FEES**					**$32,938**		**$8.20**	
Z11	General Requirements	10.00%			$21,250		$5.29		
Z12	Fee	5.00%			$11,688		$2.91		
	Sub-total Ancillary Work					**$245,438**		**$61.11**	
Z21	Design Contingency Allowance	10.00%				$24,544		$6.11	
Z22	Escalation Contingency Allowance	0.00%				$0		$0.00	
Z23	Construction Contingency Allowance	5.00%				$13,499		$3.36	
	ANCILLARY WORK					**$283,480**		**$70.59**	
	CONSTRUCTION COST (Excluding GST)					**$10,873,492**		**$2,707.54**	
	GST	5.00%				$543,675		$135.38	
	CONSTRUCTION COST (Including GST)					**$11,417,166**		**$2,842.92**	

Code	Description	Quantity	Unit	Rate	Extension
	A1 SUBSTRUCTURE				
	A111 STANDARD FOUNDATIONS				
	Perimeter strip footing	269	m	191.74	$51,578.06
	Perimeter strip footing (Retaining)	0	m	357.52	$0.00
	Extra over allowance for working adjacent to existing structure	24	m	250.00	$6,000.00
	Interior Strip Footing/Slab Thickening	287	m	78.87	$22,635.69
	Perimeter Pad footings	15	No	4,115.10	$61,726.50
	Perimeter Pad Footings	10	No	2,270.26	$22,702.60
	Interior Pad Footings	10	No	4,115.10	$41,151.00
	Perimeter foundation wall	269	m^2	259.04	$69,681.76
	Perimeter foundation wall (Retaining)	0	m^2	341.94	$0.00
	Concrete column	35	No	302.84	$10,599.40
	Elevator pad footing and pit walls	1	No	5,000.00	$5,000.00
	Perimeter weeping tile	269	m	50.00	$13,450.00
	TOTAL - A111 STANDARD FOUNDATIONS				**$304,525.01**

Code	Description	Quantity	Unit	Rate	Extension
	A1 SUBSTRUCTURE				
	A112 SPECIAL FOUNDATIONS				
	Grading levelling	1,500	m^2	10.00	$15,000.00
	Excavate to reduce levels and overburden replacement - allowance only, scope and extent unknown at this time	750	m^3	80.00	$60,000.00
	New ice sheet; 150mm thickness concrete, mesh reinforcing, bar reinforcing, power trowel finish, poly vapour barrier, 100mm rigid, poly vapour barrier, 300mm sand bedding, heating pipes, brine lines and 75mm bedding sand	1,500	m^2	590.00	$885,000.00
	Perimeter cub/foundation detail	160	m	115.00	$18,400.00
	Engineering/soft costs	1	l/s	70,000.00	$70,000.00
	TOTAL - A112 SPECIAL FOUNDATIONS				**$1,048,400.00**

Code	Description	Quantity	Unit	Rate	Extension
	A1 SUBSTRUCTURE				
	ALL BASEMENT EXCAVATION				
	Grading leveling	3,481	m^3	8.00	$27,848.00
	TOTAL - ALL BASEMENT EXCAVATION				**$27,848.00**

Code	Description	Quantity	Unit	Rate	Extension
	A2 STRUCTURE				
	A21 LOWEST FLOOR CONSTRUCTION				
	Slab on Grade	1,981	m^2	66.27	$131,280.87
	Miscellaneous pads and bases	1	l/s	2,500.00	$2,500.00
	TOTAL - A21 LOWEST FLOOR CONSTRUCTION				**$133,780.87**

Code	Description	Quantity	Unit	Rate	Extension
	A2 STRUCTURE				
	A221 UPPER FLOOR CONSTRUCTION				
	Upper Floor Structure Comprising:				
	64mm Reinforced Concrete Topping	535	m^2	35.00	$18,725.00
	38mm Metal Decking	535	m^2	40.00	$21,400.00
	Structural Steel	26,750	kg	4.60	$123,050.00
	Upper Floor Structure - Running Track (Refer to Separate Price)				
	64mm Reinforced Concrete Topping	658	m^2	Excluded	$0.00
	38mm Metal Decking	658	m^2	Excluded	$0.00
	Structural Steel	29,610	kg	Excluded	$0.00
	Upper Floor Structure - Dry Land Training Facility (Refer to Separate Price)				
	64mm Reinforced Concrete Topping	293	m^2	Excluded	$0.00
	38mm Metal Decking	293	m^2	Excluded	$0.00
	Structural Steel	14,650	kg	Excluded	$0.00
	Extra Over Cost Bleacher Structure Comprising:				
	Pre-cast concrete	177	m^2	250.00	$44,137.54
	Structural Steel	4,414	kg	4.60	$20,303.27
	Structural Steel Analysis				
	Metal deck area	535.00	m2		
	Steel weight	26,750.00	kg		
	Weight of steel (kg) per m2 of deck area	50.00	kg/m2		
	Structural Steel Cost	$144,450.00			
	TOTAL - A221 UPPER FLOOR CONSTRUCTION				**$227,615.81**

Code	Description	Quantity	Unit	Rate	Extension
	A2 STRUCTURE				
	A222 STAIR CONSTRUCTION				
	Stair flight	1	Flt	12,500.00	$12,500.00
	TOTAL - A222 STAIR CONSTRUCTION				**$12,500.00**

Code	Description	Quantity	Unit	Rate	Extension
	A2 STRUCTURE				
	A23 ROOF CONSTRUCTION				
	Main Pitched Roof				
	Metal decking; acoustic deck	2,828	m^2	50.00	$141,400.00
	Structural steel	141,400	kg	4.60	$650,440.00
	Mono Pitch Roof at Entrance and Zamboni				
	Metal decking	721	m^2	40.00	$28,840.00
	Structural steel	32,445	kg	4.60	$149,247.00
	Allowance for Glue laminated/wood detailing/features	1	l/s	25,000.00	$25,000.00
	Structural Steel Analysis				
	Metal deck area	3,549.00	m2		
	Steel weight	173,845.00	kg		
	Weight of steel (kg) per m2 of deck area	48.98	kg/m2		
	Structural Steel Cost	$969,927.00			
	TOTAL - A23 ROOF CONSTRUCTION				**$994,927.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A312 STRUCTURAL WALLS BELOW GRADE				
	Included with element A111 Standard Foundations	0	m^2	-	$0.00
	TOTAL - A312 STRUCTURAL WALLS BELOW GRADE				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A321 WALLS ABOVE GRADE				
	Exterior Walls - Insulated Panels/Masonry	2,105	m^2	430.00	$905,150.00
	Extra over cost for feature walls at main entrance	191	m^2	125.00	$23,814.96
	Interfacing wall with existing facility	54	m^2	125.00	$6,754.87
	TOTAL - A321 WALLS ABOVE GRADE				**$935,719.83**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A322 STRUCTURAL WALLS ABOVE GRADE				
	Nil	0	m^2	-	$0.00
	TOTAL - A322 STRUCTURAL WALLS ABOVE GRADE				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A323 CURTAIN WALLS				
	Structural curtain wall glazing; Kawneer 1602 series; anodised finished; low E coating	74	m^2	850.00	$62,900.00
	Fully glazed aluminum doors in curtain wall system; 100mm frame; hardware				
	Single	0	No	2,000.00	$0.00
	Double	2	Pr	4,000.00	$8,000.00
	Auto assist	1	No	4,000.00	$4,000.00
	TOTAL - A323 CURTAIN WALLS				**$74,900.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A331 WINDOWS AND LOUVERS				
	Double glazed sealed units; Low E glass; clear anodised aluminum frames; Kawneer series 5500 ISOWEB or equivalent	93	m^2	500.00	$46,500.00
	TOTAL - A331 WINDOWS AND LOUVERS				**$46,500.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A332 GLAZED SCREENS				
	Included with Element A323				$0.00
	TOTAL - A332 GLAZED SCREENS				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A333 DOORS				
	Hollow metal insulated core man door and pressed steel frame; paint finish and hardware				
	Single	0	No	1,200.00	$0.00
	Double	3	Pr	2,200.00	$6,600.00
	Overhead Doors	2	No	5,000.00	$10,000.00
	TOTAL - A333 DOORS				**$16,600.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A341 ROOFING				
	Pre-finished metal roofing; insulated	2,828	m^2	210.00	$593,880.00
	2 Ply SBS torch on roof finish; insulated	721	m^2	130.00	$93,730.00
	TOTAL - A341 ROOFING				**$687,610.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A342 SKYLIGHTS				
	Nil				$0.00
	TOTAL - A342 SKYLIGHTS				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	A3 EXTERIOR ENCLOSURE				
	A35 - PROJECTIONS				
	Soffit Finish	106	m^2	225.00	$23,850.00
	TOTAL - A35 - PROJECTIONS				**$23,850.00**

Code	Description	Quantity	Unit	Rate	Extension
	B1 PARTITIONS & DOORS				
	B111 FIXED PARTITIONS				
	Masonry block partitions	718	m^2	180.00	$129,240.00
	Masonry block partitions; elevator shaft	77	m^2	180.00	$13,860.00
	Drywall and steel stud partitions	422	m^2	100.00	$42,200.00
	Balustrade at Running Track and Viewing Area - **Refer to Separate Price**	180	m	Excluded	$0.00
	TOTAL - B111 FIXED PARTITIONS				**$185,300.00**

Code	Description	Quantity	Unit	Rate	Extension
	B1 PARTITIONS & DOORS				
	B112 MOVEABLE PARTITIONS				
	Counter shutter	1	No	3,000.00	$3,000.00
	Overhead Door	1	No	4,000.00	$4,000.00
	TOTAL - B112 MOVEABLE PARTITIONS				**$7,000.00**

Code	Description	Quantity	Unit	Rate	Extension
	B1 PARTITIONS & DOORS				
	B113 STRUCTURAL PARTITIONS				
	Nil	0	m^2	-	$0.00
	TOTAL - B113 STRUCTURAL PARTITIONS				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	B1 PARTITIONS & DOORS				
	B12 DOORS				
	Interior doors				
	Single	18	No	1,100.00	$19,800.00
	Double	4	Pr	2,200.00	$8,800.00
	Auto Assist	1	No	4,000.00	$4,000.00
	TOTAL - B12 DOORS				**$32,600.00**

Code	Description	Quantity	Unit	Rate	Extension
	B2 FINISHES				
	B21 FLOOR FINISHES				
	Sheet vinyl, including allowance for base	231	m^2	70.00	$16,170.00
	Sports flooring; including allowance for base	963	m^2	125.00	$120,375.00
	Sports flooring at Running Track; including allowance for base - **Refer to Separate Price**	658	m^2	Excluded	$0.00
	Sealed concrete	1,321	m^2	12.00	$15,852.00
	TOTAL - B21 FLOOR FINISHES				**$152,397.00**

Code	Description	Quantity	Unit	Rate	Extension
	B2 FINISHES				
	B22 CEILING FINISHES				
	Suspended T-Bar Ceiling	231	m^2	32.00	$7,392.00
	Suspended Drywall Ceiling	505	m^2	60.00	$30,300.00
	Exposed steel structure - unfinished	3,249	m^2	-	$0.00
	Bulkheads and Features	1	l/s	5,000.00	$5,000.00
	Special ceiling finish in change areas	505	m^2	50.00	$25,250.00
	TOTAL - B22 CEILING FINISHES				**$67,942.00**

Code	Description	Quantity	Unit	Rate	Extension
	B2 FINISHES				
	B23 WALL FINISHES				
	Paint	4,016	m^2	25.00	$100,400.00
	Special wall finishes	1	l/s	50,000.00	$50,000.00
	TOTAL - B23 WALL FINISHES				**$150,400.00**

Code	Description	Quantity	Unit	Rate	Extension
	B3 FITTINGS & EQUIPMENT				
	B311 METALS				
	Miscellaneous metals allowance	4,016	m^2	20.00	$80,320.00
	TOTAL - B311 FITTINGS & EQUIPMENT				**$80,320.00**

Code	Description	Quantity	Unit	Rate	Extension
	B3 FITTINGS & EQUIPMENT				
	B312 MILLWORK				
	Millwork	4,016	m^2	30.00	$120,480.00
	TOTAL - B312 MILLWORK				**$120,480.00**

Code	Description	Quantity	Unit	Rate	Extension
	B3 FITTINGS & EQUIPMENT				
	B313 SPECIALTIES				
	Specialties	4,016	m^2	20.00	$80,320.00
	TOTAL - B313 SPECIALTIES				**$80,320.00**

Code	Description	Quantity	Unit	Rate	Extension
	B3 FITTINGS & EQUIPMENT				
	B32 EQUIPMENT				
	Rink Boards, Players Benches, Penalty Box	1	l/s	200,000.00	$200,000.00
	Rink Nets	1	l/s	20,000.00	$20,000.00
	Score Boards - 4 sided	1	No	N/A	$0.00
	Score Board/Shot Clock - Flat	2	No	15,000.00	$30,000.00
	Seats	384	No	75.00	$28,800.00
	TOTAL - B32 EQUIPMENT				**$278,800.00**

Code	Description	Quantity	Unit	Rate	Extension
	B3 FITTINGS & EQUIPMENT				
	B331 ELEVATORS				
	Elevator; 2 stops	1	No	80,000.00	$80,000.00
	TOTAL - B331 ELEVATORS				**$80,000.00**

Code	Description	Quantity	Unit	Rate	Extension
	B3 FITTINGS & EQUIPMENT				
	B332 ESCALATORS & MOVING WALKWAYS				
	Nil	0	No	-	$0.00
	TOTAL - B332 ESCALATORS & MOVING WALKWAYS				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	B3 FITTINGS & EQUIPMENT				
	B333 MATERIAL HANDLING SYSTEM				
	Nil	0	No	-	$0.00
	TOTAL - B333 MATERIAL HANDLING SYSTEM				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	C1 MECHANICAL				
	C11 PLUMBING & DRAINAGE				
	Plumbing	3,481	m^2	40.00	$139,240.00
	TOTAL - C11 PLUMBING & DRAINAGE				**$139,240.00**

Code	Description	Quantity	Unit	Rate	Extension
	C1 MECHANICAL				
	C12 FIRE PROTECTION				
	Fire Protection	3,481	m^2	30.00	$104,430.00
	TOTAL - C12 FIRE PROTECTION				**$104,430.00**

Code	Description	Quantity	Unit	Rate	Extension
	C1 MECHANICAL				
	C13 HVAC				
	HVAC	4,016	m^2	150.00	$602,400.00
	Refrigeration equipment - Estimate provided by Bradley Refrigeration	1	l/s	415,000.00	$415,000.00
	Deduct Cost of Brine Lines Included with Element A112	1	l/s	(130,000.00)	-$130,000.00
	TOTAL - C13 HVAC				**$887,400.00**

Code	Description	Quantity	Unit	Rate	Extension
	C1 MECHANICAL				
	C14 CONTROLS				
	Included in element C11	4,016	m^2	Included	$0.00
	TOTAL - C14 CONTROLS				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	C2 ELECTRICAL				
	C21 SERVICE & DISTRIBUTION				
	Service and Distribution	3,481	m^2	30.00	$104,430.00
	TOTAL - C21 SERVICE & DISTRIBUTION				**$104,430.00**

Code	Description	Quantity	Unit	Rate	Extension
	C2 ELECTRICAL				
	C22 LIGHTING & POWER				
	Lighting	4,016	m^2	60.00	$240,960.00
	Power	4,016	m^2	20.00	$80,320.00
	TOTAL - C22 LIGHTING & POWER				**$321,280.00**

Code	Description	Quantity	Unit	Rate	Extension
	C2 ELECTRICAL				
	C23 SYSTEMS & ANCILLARIES				
	Systems; fire alarm, security, voice/data,	4,016	m^2	25.00	$100,400.00
	TOTAL - C23 SYSTEMS & ANCILLARIES				**$100,400.00**

Code	Description	Quantity	Unit	Rate	Extension
	Z1 GENERAL REQUIREMENTS & FEES				
	Z11 GENERAL REQUIREMENTS				
	General Conditions	10.0%			$742,751.55
	TOTAL - Z11 GENERAL REQUIREMENTS				**$742,751.55**

Code	Description	Quantity	Unit	Rate	Extension
	D1 SITE DEVELOPMENT				
	D111 PREPARATION				
	Pre-Load - **Specifically Excluded**	1	l/s	Excluded	$0.00
	Removals	1	l/s	50,000.00	$50,000.00
	Common excavation - on-site disposal	3,800	m^3	10.00	$38,000.00
	Common embankment - fill	3,500	m^3	25.00	$87,500.00
	Miscellaneous site demolition	1	l/s	20,000.00	$20,000.00
	TOTAL - D111 PREPARATION				**$195,500.00**

Code	Description	Quantity	Unit	Rate	Extension
	D1 SITE DEVELOPMENT				
	D112 HARD SURFACES				
	On-Site				
	Asphalt parking area c/w gravels	400	m^2	50.00	$20,000.00
	Asphalt parking area regrade/pave	1,500	m^2	30.00	$45,000.00
	Parking curb	0	m	65.00	$0.00
	Concrete sidewalks/main entrance paving	710	m^2	100.00	$71,000.00
	Line painting	1	l/s	1,500.00	$1,500.00
	Off-Site				
	Removals	1	l/s	5,000.00	$5,000.00
	Concrete curb and gutter	105	m	65.00	$6,825.00
	Road replacement and removal	300	m^2	75.00	$22,500.00
	TOTAL - D112 HARD SURFACES				**$171,825.00**

Code	Description	Quantity	Unit	Rate	Extension
	D1 SITE DEVELOPMENT				
	D113 IMPROVEMENTS				
	Flag poles	1	No	3,000.00	$3,000.00
	Miscellaneous pads and bases	1	l/s	3,000.00	$3,000.00
	Bollards	4	No	600.00	$2,400.00
	Miscellaneous site furniture	1	l/s	5,000.00	$5,000.00
	Retaining wall	0	m^2	400.00	$0.00
	TOTAL - D113 IMPROVEMENTS				**$13,400.00**

Code	Description	Quantity	Unit	Rate	Extension
	D1 SITE DEVELOPMENT				
	D114 LANDSCAPING				
	Landscaping - nominal allowance	1	l/s	10,000.00	$10,000.00
	TOTAL - D114 LANDSCAPING				**$10,000.00**

Code	Description	Quantity	Unit	Rate	Extension
	D1 SITE DEVELOPMENT				
	D12 MECHANICAL SITE SERVICES				
	On-site				
	Storm				
	PVC Main	90	m	220.00	$19,800.00
	PVC Service	10	m	150.00	$1,500.00
	Manhole complete	1	No	5,000.00	$5,000.00
	Manhole complete - build on existing	2	No	6,000.00	$12,000.00
	PVC catchbasin lead	30	m	110.00	$3,300.00
	Catchbasin	3	No	1,500.00	$4,500.00
	Sub-total	**$46,100**			
	Sanitary Sewer				
	PVC forcemain	115	m	150.00	$17,250.00
	PVC service	15	m	120.00	$1,800.00
	Tie into existing manhole & re-bench	1	No	2,500.00	$2,500.00
	Lift station complete	1	l/s	15,000.00	$15,000.00
	Sub-total	**$36,550**			
	Domestic Water				
	Dopmestic water	1	l/s	7,500.00	$7,500.00
	Sub-total	**$7,500**			
	Gas	1	l/s	5,000.00	$5,000.00
	TOTAL - D12 MECHANICAL SITE SERVICES				**$95,150.00**

Code	Description	Quantity	Unit	Rate	Extension
	D1 SITE DEVELOPMENT				
	D13 ELECTRICAL SITE SERVICES				
	POWER				
	Hydro Service Connection Fee	1	l/s	N/A	$0.00
	LIGHTING				
	Remove and replace parking lighting	1	l/s	25,000.00	$25,000.00
	TOTAL - D13 ELECTRICAL SITE SERVICES				**$25,000.00**

Code	Description	Quantity	Unit	Rate	Extension
	Z1 GENERAL REQUIREMENTS & FEES				
	Z11 GENERAL REQUIREMENTS				
	General Conditions	10.0%			$51,087.50
	TOTAL - Z11 GENERAL REQUIREMENTS				**$51,087.50**

Code	Description	Quantity	Unit	Rate	Extension
	D2 ANCILLARY WORK				
	D211 DEMOLITION				
	Nil				$0.00
	TOTAL - D211 DEMOLITION				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	D2 ANCILLARY WORK				
	D212 HAZARDOUS MATERIALS				
	Removal of hazardous materials - **Specifically Excluded**	1	l/s	Excluded	$0.00
	TOTAL - D212 HAZARDOUS MATERIALS				**$0.00**

Code	Description	Quantity	Unit	Rate	Extension
	D2 ANCILLARY WORK				
	D22 ALTERATIONS				
	Allowance for interfacing new arena with existing	115	m^2	500.00	$57,500.00
	Alterations to existing exterior stairs	1	l/s	125,000.00	$125,000.00
	Re-configure existing combution air and vent - allowance	1	l/s	30,000.00	$30,000.00
	TOTAL - D22 ALTERATIONS				**$212,500.00**

Code	Description	Quantity	Unit	Rate	Extension
	Z1 GENERAL REQUIREMENTS & FEES				
	Z11 GENERAL REQUIREMENTS				
	General Conditions	10.0%			$21,250.00
	TOTAL - Z11 GENERAL REQUIREMENTS				**$21,250.00**

Code	Description	Quantity	Unit	Rate	Extension
	SEPARATE PRICE #1				
	RUNNING TRACK				
	Upper Floor Structure - Running Track				
	64mm Reinforced Concrete Topping	658	m^2	35.00	$23,030.00
	38mm Metal Decking	658	m^2	40.00	$26,320.00
	Structural Steel	29,610	kg	4.60	$136,206.00
	Balustrade at Running Track and Viewing Area - **Refer to Separate Price**	180	m	500.00	$90,000.00
	Sports flooring at Running Track; including allowance for base	658	m^2	110.00	$72,380.00
	Lighting - allowance	658	m^2	50.00	$32,900.00
	Sub-total				**$380,836.00**
	General Conditions	10.0%			$38,083.60
	Construction Management Fee	5.0%			$20,945.98
	Sub-total				**$439,865.58**
	Design Contingency Allowance	10.0%			$43,986.56
	Escalation Contingency Allowance	0.0%			$0.00
	Construction Contingency Allowance	5.0%			$24,192.61
	Sub-total				**$508,044.74**
	GST	5.0%			$25,402.24
	TOTAL - SEPARATE PRICE #1				**$533,446.98**

Code	Description	Quantity	Unit	Rate	Extension
	SEPARATE PRICE #2				
	DRYLAND TRAINING FACILITY				
	Structural Allowance	293	m^2	450.00	$131,850.00
	Exterior Envelope Allowance	293	m^2	400.00	$117,200.00
	Interior Partition and Doors - Allowance	293	m^2	75.00	$21,975.00
	Sheet vinyl, including allowance for base	293	m^2	70.00	$20,510.00
	Suspended T-Bar Ceiling	293	m^2	35.00	$10,255.00
	Painting - allowance	293	m^2	25.00	$7,325.00
	Miscellaneous - allowance	293	m^2	20.00	$5,860.00
	Mechanical - allowance	293	m^2	150.00	$43,950.00
	Electrcial - allowance	293	m^2	120.00	$35,160.00
	Sub-total				**$394,085.00**
	General Conditions	10.0%			$39,408.50
	Construction Management Fee	5.0%			$21,674.68
	Sub-total				**$455,168.18**
	Design Contingency Allowance	10.0%			$45,516.82
	Escalation Contingency Allowance	0.0%			$0.00
	Construction Contingency Allowance	5.0%			$25,034.25
	Sub-total				**$525,719.24**
	GST	5.0%			$26,285.96
	TOTAL - SEPARATE PRICE #2				**$552,005.20**

Code	Description	Quantity	Unit	Rate	Extension
	SEPARATE PRICE #3				
	MULTI-PURPOSE ROOM				
	Gross Floor Area	**30**	**m^2**		
	Structure - allowance	30	m^2	300.00	$9,000.00
	Architectural - allowance	30	m^2	450.00	$13,500.00
	Mechanical - allowance	30	m^2	450.00	$13,500.00
	Electrical - allowance	30	m^2	220.00	$6,600.00
	Sub-total				**$42,600.00**
	General Conditions	10.0%			$4,260.00
	Construction Management Fee	5.0%			$2,343.00
	Sub-total				**$49,203.00**
	Design Contingency Allowance	10.0%			$4,920.30
	Escalation Contingency Allowance	0.0%			$0.00
	Construction Contingency Allowance	5.0%			$2,706.17
	Sub-total				**$56,829.47**
	GST	5.0%			$2,841.47
	TOTAL - SEPARATE PRICE #3				**$59,670.94**

Code	Description	Quantity	Unit	Rate	Extension
	SEPARATE PRICE #4				
	ADDITIONAL OFFICE SPACE				
	Gross Floor Area	**70**	**m^2**		
	Structure - allowance	70	m^2	300.00	$21,000.00
	Architectural - allowance	70	m^2	450.00	$31,500.00
	Mechanical - allowance	70	m^2	475.00	$33,250.00
	Electrical - allowance	70	m^2	225.00	$15,750.00
	Sub-total				**$101,500.00**
	General Conditions	10.0%			$10,150.00
	Construction Management Fee	5.0%			$5,582.50
	Sub-total				**$117,232.50**
	Design Contingency Allowance	10.0%			$11,723.25
	Escalation Contingency Allowance	0.0%			$0.00
	Construction Contingency Allowance	5.0%			$6,447.79
	Sub-total				**$135,403.54**
	GST	5.0%			$6,770.18
	TOTAL - SEPARATE PRICE #4				**$142,173.71**

Code	Description	Quantity	Unit	Rate	Extension
	SEPARATE PRICE #5				
	NEW PARKING AREA ADJACENT TO 43 AVENUE				
	Common excavation - on-site disposal	2,300	m^3	10.00	$23,000.00
	Common embankment - fill	0	m^3	25.00	$0.00
	Miscellaneous site demolition	1	l/s	10,000.00	$10,000.00
	Asphalt parking area c/w gravels	1,400	m^2	50.00	$70,000.00
	Parking curb	200	m	65.00	$13,000.00
	Concrete sidewalks	150	m^2	100.00	$15,000.00
	Line painting	1	l/s	2,500.00	$2,500.00
	Retaining wall	20	m^2	400.00	$8,000.00
	PVC Main	30	m	220.00	$6,600.00
	PVC catchbasin lead	5	m	110.00	$550.00
	Catchbasin	1	No	1,500.00	$1,500.00
	Relocate/lower 200mm PVC service	1	l/s	10,000.00	$10,000.00
	Landscaping	1	l/s	10,000.00	$10,000.00
	Sub-total				**$170,150.00**
	General Conditions	10.0%			$17,015.00
	Construction Management Fee	5.0%			$9,358.25
	Sub-total				**$196,523.25**
	Design Contingency Allowance	10.0%			$19,652.33
	Escalation Contingency Allowance	0.0%			$0.00
	Construction Contingency Allowance	5.0%			$10,808.78
	Sub-total				**$226,984.35**
	GST	5.0%			$11,349.22
	TOTAL - SEPARATE PRICE #5				**$238,333.57**

SCHEDULE 'C'
EXISTING CIVIC ARENA

MAIN SUMMARY OF ESTIMATED PROJECT COSTS - EXISTING CIVIC ARENA

Description	Estimated Value	$/m²	$/ft²
	Gross Floor Area	3,307.45	35,601
Civic Arena Engineering Assessment Report - Carscadden Report	$5,600,000	$1,693.15	$157
Total - Engineering Assessment Report	**$5,600,000**	**$1,693.15**	**$157**
Additional Items (Within 10 Years)			
Seismic Upgrade	$1,416,593	$428.30	$40
Washroom Facility Addition	$1,263,496	$382.02	$35
Renovation/Conversion of Existing Change Rooms	$428,304	$129.50	$12
Exterior Envelope Upgrade	$1,130,722	$341.87	$32
HVAC Upgrade	$651,633	$197.02	$18
Electrical Upgrade	$283,319	$85.66	$8
Total - Additional Items (Within 10 Years)	**$5,174,066**	**$1,564.37**	**$145**
NHL Ice Sheet Expansion			
Extra Over Cost NHL Ice Sheet Expansion	$685,286	$207.19	$19
Elevator	$261,265	$78.99	$7
Bleacher Renovations	$2,135,094	$645.54	$60
Total - NHL Ice Sheet Expansion	**$3,081,645**	**$931.73**	**$87**
Total - All Renovations/Upgrades	**$13,855,711**	**$4,189.24**	**$389**

SCHEDULE 'D'
LIFE CYCLE COST ANALYSIS

NPV AT THE FOLLOWING OPERATING YEARS

	Option 1A	Option 1B	Option 2A	Option 2B	Option 3	Renovated Civic Arena
Gross Floor Area (m^2)	4,016	3,835	3,318	3,732	3,767	3,307
Year						
0	$12,904,592	$13,248,833	$12,530,163	$16,430,590	$13,888,230	$14,000,000
5	$15,077,348	$15,432,866	$14,608,724	$18,555,964	$16,195,744	$16,278,734
10	$17,250,104	$17,616,898	$16,687,285	$20,681,338	$18,503,257	$18,557,467
20	$21,595,617	$21,984,963	$20,844,407	$24,932,086	$23,118,284	$23,114,935
30	$25,941,130	$26,353,028	$25,001,529	$29,182,834	$27,733,311	$27,672,402
40	$30,286,643	$30,721,093	$29,158,651	$33,433,582	$32,348,338	$32,229,869

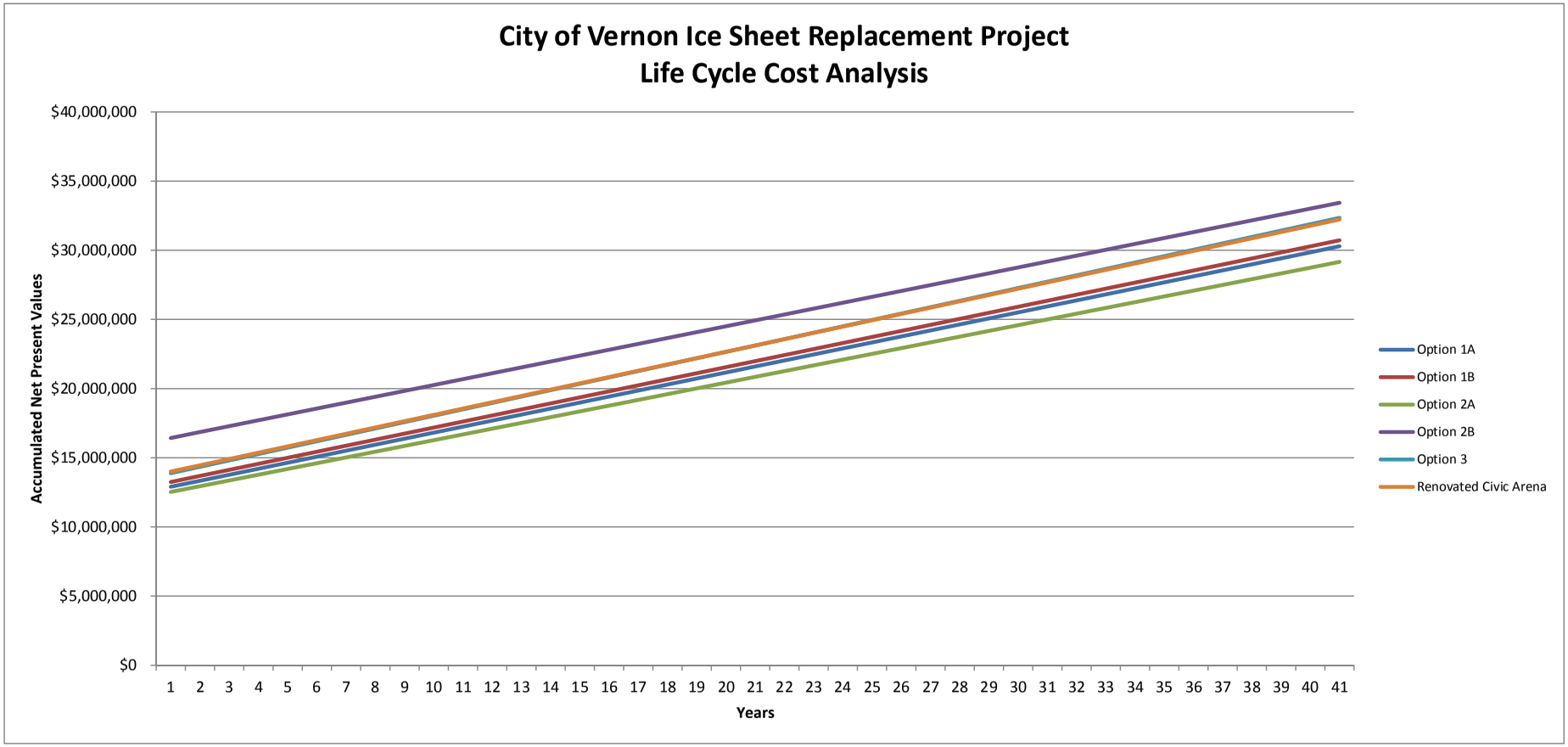
Notes:

1) The Net Present Value (NPV) at year 40 represents the total current cash value of all estimated expenses for the facility, including the initial capital cost, as well as the on-going maintenance/operational costs, over the 'life cycle' of the building (40 years);

2) A discount rate of 5%, and price escalation rate of 5%, has been used for all options;

3) Adjustments have been made to the various options to take into account the operational efficiencies.

4) Option 2B and the Existing Civic Arena have the highest initial first cost. When tracked across the anticipated life of the building, Option 2B, Option 3 and the Existing Civic Arena are the most costly options.


City of Vernon Ice Sheet Replacement Project
Life Cycle Cost Analysis
Accumulated Net Present Values
$40,000,000
$35,000,000
$30,000,000
$25,000,000
$20,000,000
$15,000,000
$10,000,000
$5,000,000
$0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
Years
Option 1A
Option 1B
Option 2A
Option 2B
Option 3
Renovated Civic Arena

MQN Architects - Vernon

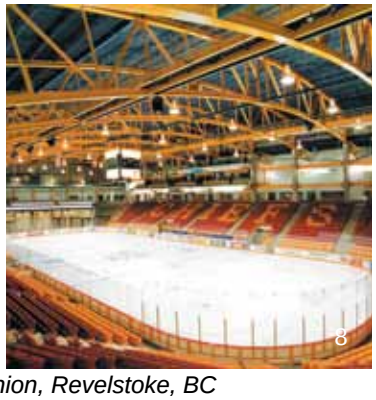
Suite 100 - 3313 32nd Avenue
Vernon, British Columbia
Canada V1T 2E1

t: 250-542-1199
f: 250-542-5236

MQN*i* Interiors - Vernon
Suite 100 - 3313 32nd Avenue
Vernon, British Columbia
Canada V1T 2E1

t: 250-542-8085
f: 250-542-5236

www.mqnarchitects.com



3. Sparwood Secondary School, Sparwood, BC. 5. Revelstoke Credit Union, Revelstoke, BC
7. Private Residence, Vernon, BC 8. Prospera Centre, Chilliwack, BC