



# Thornhill Community Centre

7755 Bayview Avenue  
Thornhill, Ontario  
L3T 4P1

**Ice Refrigeration System & Heat Recovery Section 15700**



## **Cimco Refrigeration Division of Toromont Industries**

61 Villarboit Cres Unit # 1  
Concord, Ontario  
L4K 4R2



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**Subject: Ice Refrigeration System & Heat Recovery**

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## 1.0 DESIGN

This proposal is generally based on the specifications provided by Aecom on January 17, 2013 titled "ICE REFRIGERATION SYSTEM & HEAT RECOVERY" Section 15700. However, the contents of this proposal (inclusions/exclusions) form the sole basis of our offer and subsequent price.

ITEM DESCRIPTION	CONDITIONS
Rink and Type	Two (2) Concrete Floor Rinks
Operating Time	Year Round
Power Characteristics:	575/3/60 (Power), 120/1/60 (Control)
Plant Capacity @ 10°F E.T./ 95°F C.T.	151 TR (Tons of refrigeration)
Primary Refrigerant	Ammonia (NH <sub>3</sub> )
Cold Floor Secondary Refrigerant	Calcium Chloride
Warm Floor Secondary Refrigerant	Calcium Chloride
Compressor Jacket Cooling	50% Ethylene Glycol

## 2.0 GENERAL

### 2.0 Refrigeration System Scope of Work

- Provide all necessary forces to carry out demolition of all redundant existing refrigeration and domestic water system listed in this proposal.
- All equipment and piping will be disposed of in a proper and safe manner.
- Drain and remove both Brine and Ammonia as required.
- Remove evaporative condensers, condenser water tank, condenser water pumps, and piping.
- All existing glycol and brine expansion and mixing tanks.
- Remove compressor cooling system pumps and associated piping.
- Remove brine chillers, Ammonia piping and brine piping as required.
- Remove all Ammonia suction piping; discharge piping, and isolation valve.
- Remove all Ammonia relief lines, fire line, fire box, dual expansion valves and piping as required.
- Remove eco-saver heat exchangers in refrigeration room and all associated piping, valves and controls.
- Remove existing abandoned water heat reclaim plate and frame heat exchanger, pump and all associated piping, valves and controls.
- Remove existing East pad underfloor heating brine pump and associated piping.
- Re-use existing compressors and supply new oil separators, liquid drain and strainers.
- Supply new Ammonia discharge piping between isolation valves on compressors to evaporative condenser.
- Supply and install new Titanium plate and frame chiller.
- Provide new basket strainer on cold brine piping before the new plate and frame chiller.
- Supply and install new brine piping as required.
- Provide new check valves and a discharge header downstream of pumps.
- Rotate one isolation valve to allow installation of vestibule.
- Supply and install new evaporative condenser and associated water piping and valves.
- Supply and install new condenser water tank, condenser water pump, valves, ultrasonic water level sensor and associated piping and controls.
- Supply and install new chemical treatment system and metering pumps for condenser water biocide and corrosion inhibitors.
- Supply and install complete new compressor cooling system complete with new solenoid valves on each compressor.
- Supply and install new brine expansion, mixing, and overflow tanks.

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- Supply and install new underfloor heating brine pump and associated piping.
- Install new three way valve and dual relief valve for both underfloor heat exchangers.
- Supply and install a new indoor heat reclaim ammonia condenser and connect to existing high stage discharge piping and Ammonia return to new chiller.
- Supply and install power, wiring for primary heat reclaim glycol circulating pumps and new heat reclaim domestic hot water recalculating pumps.
- Supply and install support steel for all new condensers.
  - Clean prep and paint existing steel with 2 coats of epoxy paint.
- Supply and install all new pressure relief valves and Ammonia relief system complete with new header stack and diffuser.
  - Compressor relief valves to be reused.
- Modify existing Cimco 5000E refrigeration control system and programming for new modified equipment.
- Complete all new control programming changes to suit new system and components including heat recovery pumps.
- Provide charge for new system with Ammonia and reuse existing brine charge.
- Supply and install new lockable selector switching and controls to enable selection of either utilizing 200HP compressor system of 230HP compressor system.
- Modify existing Ammonia detection system and interlock with existing exhaust fan and intake louvers.
- Start up and commission refrigeration system and the Ammonia heat reclaim system.
- Supply and install all power and control wiring for heat reclaim system pumps.
  - Pumps by Mechanical.

## 2.1 Codes

Cimco refrigeration will be in accordance with all current applicable regulations, including the following:

- CSA B52-99 Mechanical Refrigeration Code.
- CSA B51-97 Boiler, Pressure Vessels and Pressure Piping Code
- ASME Boiler and Pressure Vessel Code, 2004 Section V111 Pressure Vessels, Div. 1
- Canadian & Ontario Building Code
- Canadian & Ontario Electrical Code
- IIAR Standards
- ASHRAE Standards
- OSHA Regulations
- ANSI B31.5-2001 Refrigeration Piping Code
- CSA and Local Electrical Safety Codes
- Local By-laws and Regulations

## 2.2 Related Work Not Covered or to be Supplied By Others

- All regular work to be performed by our personnel would be during regular working hours.
- Provide a Class T engine room in accordance with CSA B-52 guidelines, including exhaust fan operating controls and interconnecting wiring. Exhaust fan to have rating of CFM.
- Supply forms and templates and level concrete housekeeping bases for equipment and install grouting as may be required.
- Breaking up and removal of existing concrete bases, piers, and rubble.
- Additional or moving specialty valves such as “back flow preventer valves” required by local Public Utilities.
- Installation of all drains required for this project.

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- Cutting, patching, sleeving, sealing and fireproofing of floor, wall and ceiling openings.
- Provide openings to allow entry of equipment into building and to its' final location in the building.
- Make good roofing in refrigeration room once heat reclaim piping and flashing removed.
- Finish painting of piping, insulation and equipment outside refrigeration equipment.
- Refrigeration room eye wash station as required.
- The owner must make the application to the T.S.S.A and for final registration of the pressure vessels supplied as part of the refrigeration system installation.
- All required coring and patching for condenser piping.
- Ethylene glycol for domestic hot water heat reclaim condenser to be supplied by others.
- Excludes oil pot.
- All insulation on reclaim heating system glycol piping.
- All seismic costs if required including but not limited to engineering, materials and labour to meet or exceed local seismic conditions.
- The owner is responsible for ensuring that the area of work is free and clear of asbestos materials. Should any asbestos materials be discovered, all costs associated with work stoppages and the removal and disposal of asbestos by a recognized asbestos abatement company, will be the responsibility of the owner.
- Any material or work not covered in the foregoing quotation or mentioned in the owner's obligations will be the responsibility of the owner.
- CIMCO Engineering reserves the right to change equipment selections of sizing in order to improve design efficiency and operation based upon the quoted refrigeration capacity.

### 2.3 Quality Assurance

- Cimco refrigeration will use only skilled welders, each holding a current, active certificate with TSSA.
- Workmanship throughout will conform to standard of best practice; labour employed shall be competent to do the work.
- The refrigeration system will be commissioned by a qualified ammonia refrigeration mechanic.

### 2.4 Warranty

- Cimco refrigeration will warrant the material and installation specified hereunder against original defects in manufacture and workmanship for a period of two (2) year after acceptance by the Owner.

## 3.0 PRODUCTS – Refrigeration

### 3.1 Ammonia Compressors

- Re-use existing Mycom reciprocating compressors.
- Supply & install new oil separator on each compressor (5).
- Supply & install one (1) suction and discharge gauge.

### 3.2 Evaporative Condenser, Water Pump, and Water Tank

- Supply & install one (1) Evapco evaporative condenser.
  - VFD Drive for condenser fan.
- Supply & install one (1) water pump.
- Supply & install polyethylene condenser water tank.
- Maximum piping allotted is 60' each way from the refrigeration room.

### 3.3 Glycol Chiller, Surge Drum and Ammonia High Side Control



- Supply & install one (1) Titanium Alfa Laval Plate & Frame Heat Exchanger.
- Supply & install (1) vertical surge drum.
  - Surge drum will be equipped with dual pressure relief valves, and a high level safety cut-out switch.
  - Excludes oil pot.

### 3.4 Warm Brine Pump



- Supply & install one (1) S.A. Armstrong pump with motor.
- Base mounted centrifugal design and all iron construction with mechanical seals and stainless steel sleeves.

### 3.5 Domestic Hot Water Heat Reclaim Condenser

- Supply & install one (1) Alfa Laval plate & frame condenser.
- All necessary Ammonia piping, fittings, and valves.
  - Ethylene Glycol to be supplied by others.

### 3.6 Compressor Jacket Cooling System, Pump, and Expansion Tank

- Supply & install one (1) S.A. Armstrong pump with motor.
- Supply & install expansion tank with an initial charge of 50% Ethylene Glycol.
- All necessary in-line air purger and automatic float air cents, with stop valves.

### 3.7 Tower Water Treatment

- Supply & install one (1) tower water treatment system.

### 3.8 5000E Rink Controller

- Modify existing control system as required.

### 3.9 Control Panel

- Reuse existing control panel.
- Supply & install three (3) heat reclaim condenser pump starters (3 HP).
- Supply & install starters for all new refrigeration equipment.
- All control and power wiring for new refrigeration equipment where installed.

### 3.10 Expansion Tanks

- Supply & install one (1) cold floor expansion tank.
- Supply & install one (1) warm floor expansion tank.
- Supply & install one (1) overflow expansion tank.

### 3.11 Ammonia Refrigerant Piping

- Supply & install all required ammonia piping.
- All refrigerant piping and fittings will conform to the latest edition of the ANSI B31.5 Refrigeration Pressure Piping Code and CSA B52 Mechanical Refrigeration Code.

### 3.12 Relief and Fire Lines

- Supply & install all necessary relief valves, fire box, pipe, fittings and valves.

### 3.13 Refrigerant Valves and Controls

- Supply & install all new necessary ammonia isolation valves and control valves. Valves will be manufactured by Hansen or equal.
- All ammonia pressure relief valves will be sized and piped to a suitable location as defined in the CSA B52 Mechanical Refrigeration Code.

### 3.14 Glycol, Brine & Water Piping

- Supply & install necessary glycol, brine and water piping excludes desuperheater and snow melt pit piping.
- Maximum cooling tower piping allotted is 100' each way from the refrigeration room.
- Maximum of 200' of glycol mains each way from the refrigeration room to the rink headers.

### 3.15 Glycol, Brine, Water Valves and Controls

- Supply & install necessary glycol, brine and water valves and controls for safe, convenient operation and maintenance. Butterfly valves will be full lug type with trim selection compatible with fluid being handled lever lock gear operated. Butterfly valves will be Challenger or equal and smaller pipe will be stainless steel ball valves.

### 3.16 Pressure Gauges & Thermometers

- Supply & install all necessary pressure gauges and thermometers.

### 3.17 Insulation

- Exterior pipe insulation to be type 11 expanded polystyrene with a separate vapour barrier to be applied after insulation is banded.
- Interior pipe insulation in refrigeration room to be preformed polysiocyanurate ITW Trymer 2000XP insulation with tongue and groove horizontal joints & ship lap end joints and Vapour Barrier: ITW saran film 560cx. Indoor pipe covering to be vinyl.

### 3.18 Ammonia, and Glycol

- Supply new Ammonia charge and dispose of existing.
- Supply & charge initial of 50% Ethylene Glycol for compressor jacket cooling.
- Reuse existing brine charge.
  - Dispose a maximum of 1,500L of excess Brine.

## 4.0 Options

### 4.1 Filters & Control/Power Wiring

- Provide stainless steel bypass filters for existing (2) brine pumps.
- Provide power and controls to additional pump P-4 serving HWT-2 for preheat of domestic hot water in the fitness centre. Pump to be installed in refrigeration room. HWT-2 to be installed in mechanical closet in fitness centre. Extend control wiring and sensors to tank in mechanical closet.



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## 5.0 PRICING

<b>BASE PRICE – Section 5.8 Ice Rink Refrigeration – Ice Plant</b>	<b>\$ 482,400.00 + HST</b>
<b>Adders</b>	
<b>4.1 – Filters &amp; Control/Power Wiring</b>	<b>\$ 9,610.00 + HST</b>

Price above is in CAD currency and taxes are extra if applicable.







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**To: Dennis Riggs**  
**Town of Markham – Thornhill Community Centre**  
7755 Bayview Ave  
Thornhill, Ontario  
L3T 4P1  
**Subject: Long Lead Time Items**

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Dear Mr. Riggs,

The biggest obstacle we foresee is the current lead time on a Titanium plate & frame heat exchanger and the manufacture has provided an estimated lead time of 16 weeks from the date of order. We believe the schedule is attainable with construction starting April 29, 2013 and start up for June 24, 2013 provided the heat exchanger is ordered no later than February 8, 2013. This will give us enough time to have the chiller delivered and installed for start up. The chiller in the proposal will also match the tonnage of the refrigeration specifications.

On the last note here is the break out pricing for the adder.

Adder 1 – Provide stainless steel bypass filters for existing (2) brine pumps.

Adder 2 – provide power and controls to additional pump P-4 serving HWT-2 for preheat of domestic hot water in the fitness centre. Pump to be installed in refrigeration room. HWT-2 to be installed in mechanical closet in fitness centre. Extend control wiring and sensors to tank in mechanical closet approximately 150’ away.

**Price:**

Adder 1 – Stainless Steel Bypass Filter	<b>\$ 5,423.00 + HST</b>
Adder 2 – Power & Controls to Additional Pump	<b>\$ 4,187.00 + HST</b>

Price above is in CAD currency and taxes are extra if applicable.

Best regards,  
*Jay Szeto*  
Cimco Refrigeration  
Recreation Contract Sales  
(416)-465-7581 Ext 786



**From:** Kara, Tom [Tom.Kara@aecom.com]  
**Sent:** January 22, 2013 5:18 PM  
**To:** Riggs, Dennis  
**Subject:** FW: Thornhill Arena quotation review and budgets  
**Attachments:** Thornhill Community Centre Proposal.pdf

**Dennis**

AECOM have reviewed the attached quotation from Cimco and make the following comments:

- The refrigeration quote addresses accurately the scope of work required by the specifications.
- The exclusions will be completed by the general contractor as part of the work identified.
- The excluded oil pot is not required as Cimco provide a built in oil drain within their surge drum.
- All design features are included as specified.
- The equipment meet the specifications
- The refrigeration upgrade quote from Cimco appears to be fair and reasonable and within anticipated values. Initial budgets were also provided within AECOM letter of June 23, 2012

#### Thornhill Arena Budget Estimate

AECOM Jan 2013	AECOM Estimate	Phase 1 Quote	Phase 2 Quote
Refrigeration System Upgrade Phase 1 brine piping and pumps	\$60,000.00	\$58,000.00	N/A
Refrigeration System Upgrades Phase 2 including chiller, evaporative and heat recovery condensers, ammonia, brine piping and controls	\$500,000.00		\$482,400.00
Mechanical heat reclaim secondary system including, tank, pump, glycol	\$48,000.00		
Mechanical heat reclaim primary system including, tank, pump, glycol	\$25,000.00		
Vestibule	\$15,000.00		
Eye wash, demolition of concrete bases, housekeeping pads, cutting and patching for refrigeration, roofing	\$12,000.00		
<b>Sub Total</b>	<b>\$660,000.00</b>	<b>\$58,000.00</b>	<b>\$482,400.00</b>

#### Separate Pricing

Brine Bypass filter	\$5,000.00	\$5,423.00
Power and controls for Fitness centre heat reclaim	\$4,000.00	\$4,287.00
Mechanical heat reclaim system for fitness centre	\$65,000.00	

Thanks

**Tom Kara P. Eng.**

*Senior Project Manager*


**AECOM**

300 Water Street Whitby, Ontario, L1N 9J2

Phone: 1-905-668-9363 Fax: 1-905-668-0221

Cell: 1-905-767-1890 Email: Tom.Kara@AECOM.com

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