MUNICIPALITY OF THE DISTRICT OF BARRINGTON

Tender

FOR

Supply and Installation of Dehumidifier for Curling Rink (eg.Cimco Desicon ET)

June 2016

The Municipality of the District of Barrington
Tender Number MoDB-1605
Supply and Installation of Dehumidifier for Curling Rink (eg.Cimco Desicon ET)

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The Municipality of the District of Barrington
Tender Number MoDB-1605
Supply and Installation of Dehumidifier for Curling Rink (eg.Cimco Desicon ET)

Sealed Tenders addressed to:

Rob Frost
Chief Administrative Officer
Municipality of the District of Barrington
PO Box 100
2447 Hwy 3
Barrington, NS
B0W 1E0

marked Tender No. MoDB-1605 "Supply and Installation of Dehumidifier for Curling Rink (Cimco Desicon ET)" will be received until 2:30pm on Thursday, June 30th, 2016. Tenders will be opened publically at 2:45pm on Thursday June 30th, 2016.

The Municipality of the District of Barrington
Tender Number MoDB-1605
Supply and Installation of Dehumidifier for Curling Rink (eg.Cimco Desicon ET)

1. GENERAL

1.1 The work shall include all labour, equipment, materials and incidentals necessary to provide and install a dehumidifier for the Barrington Regional Curling Club located at 40 Park Lane, Sherose Island, within the Municipality of the District of Barrington.

1.2 The Contractor shall guarantee his work against any defects/ defaults for a minimum period of one full year from date of acceptance of the work including the date of acceptance of any corrected deficiencies.

1.3 The Contractor shall indemnify and save harmless the Municipality against and from all damages, claims, suits, demands, actions, judgements, and cost of any kind and description as a result of injury or property damage resulting from the performance of this contract or through any improper or defective equipment used by the Contractor or through any act or omission on the part of the Contractor, his employees or sub-contractors.

1.4 The Contractor shall be paid at the full completion of the project.

1.5 Contractors submitting tenders will only be considered if the required Submission Tender Forms are fully completed and returned to the Municipal Office at 2447, Highway #3, Barrington, prior to the submission deadline.

2. PROJECT DETAILS

2.1 Project will be to provide and install a desiccant dehumidifier such as the Cimco Desicon ET (2600cfm) in the Barrington Regional Curling Club.

2.2 The Barrington Regional Curling Club is a Municipally owned building that has curling programming operated by the Club from September to March each year. The Curling Club is located on Sherose Island as part of the Municipal Recreation complex.

2.3 The Municipality had a study completed by CBCL to determine solutions for humidity issues at the Curling Club. Study is attached.

2.4 Tenders will be evaluated based on the supply and installation of the dehumidifier as Phase 1. Those tendering are also invited to supply information as to the additional and total cost should duct work be added to the project as suggested may be needed in the humidity report.

3. DISCLAIMER

3.1 The Municipality reserves the right to reject any and all tenders, to waive any and all formalities or informalities, and to disregard all non-conforming, non-responsive or conditional tenders. In addition, the Municipality reserves the right to negotiate tender changes with the finalist tenderer, and/or to award a contract to any tenderer in the Municipality's sole discretion. The Municipality reserves the right to reject the tenders of any and all tenderers if the Municipality believes that it would not be in the best interest of the Municipality to make an award whether because the tenders are non-responsive or because the tenders are found to be not responsible or fail to meet any other pertinent standard or criterion established by the Municipality.

The Municipality may conduct such investigations as the Municipality deems necessary to assist in the evaluation of any tender, to establish the best tender and to otherwise make its selection.

4. TENDER EVALUATIONS

4.1 The tenders will be evaluated by representatives of the Municipality of the District of Barrington in their sole discretion.

4.2 The lowest or any tender may not necessarily be accepted. Such things as past performance, workmanship, references, and start/completion dates will be taken into consideration when awarding the tender.

REQUEST FOR TENDERS SUBMISSION FORMS

The Municipality of the District of Barrington
Tender Number MoDB-1605
Supply and Installation of Dehumidifier for Curling Rink (eg.Cimco Desicon ET)

BUSINESS NAME: _____

BUSINESS ADDRESS: _____

_____

MAILING ADDRESS: _____

_____

TELEPHONE NUMBER: _____

FAX NUMBER: _____

EMAIL ADDRESS: _____

CONTACT PERSON: _____

SIGNATURE OF TENDERER: _____

The Municipality of the District of Barrington
Tender Number MoDB-1605
Supply and Installation of Dehumidifier for Curling Rink (Cimco Desicon ET)

MINIMUM STANDARDS

- Workers Compensation Letter
- Proof of Commercial General Public Liability & Property Damage Insurance
- Please provide on your tender costing, start date availability, and projected timeframe for completion of project.
- Please provide pricing based on supply and installation of dehumidifier.
- Please provide separate pricing based on supply and installation of dehumidifier as well as duct work running the length of the ice surface as was suggested may be needed in the humidity report.

Please provide 3 copies of the above information as part of your tender.

Barrington NS Arena and Curling Rink Humidity Study

Final Report

160403.00 • Report • March 9, 2016

Prepared for:
Municipality of the District of Barrington

Prepared by:
CBCL LIMITED
Consulting Engineers

Issued for 100% Final Submission		9-Mar-16	
Issue or Revision	***Reviewed By:***	***Date***	***Issued By:***

CBCL LIMITED
Consulting Engineers

REGISTERED PROFESSIONAL ENGINEER
DATE Mar 9 2016
C. J. Ruddick
9056
PROVINCE OF NOVA SCOTIA

ISO 9001
Registered Company

160403.00

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CHAPTER 1 SUMMARY

1.1 Scope of Humidity Study

CBCL was engaged by the Municipality of Barrington to help deal with ongoing humidity issues at the curling rink and adjacent arena. The curling rink has had excessively high levels of humidity for a number of years. Resulting symptoms include condensation on cold surfaces, frost on the ice surface, and high energy bills. The adjacent arena also experiences issues with humidity but only during the fall and early winter when outdoor humidity levels are too high for the installed capacity of the arena's dehumidification system.

The scope of this mechanical HVAC investigation is to describe the current HVAC systems, as well as define the limitations currently faced by the users. The scope of this study is also to present recommendations regarding upgrades that would help control the indoor humidity levels in the spaces.

Recommendations are summarized as follows:

.1 Install a new Cimco Desicon ET (2600 cfm) dehumidifier in the curling rink.

.2 Consider adding heating to the curling rink.

.3 Consider adding ventilation to the curling rink.

.4 Consider providing insulation and vapour barrier to exposed metal surfaces.

.5 In order to extend the skating rink season into the summer, or to reduce condensation in the shoulder seasons, consider adding a third dehumidifier to the skating rink.

CHAPTER 2 EXISTING CONDITIONS – CURLING RINK

2.1 Envelope

The building is steel framed with a sloped steel framed roof. The exterior siding is metal and the walls are insulated with batt insulation. The insulation is covered on the interior face using a plastic material which also serves as vapour barrier. The roof is insulated in the same way as the walls. A reflective low-emissivity ceiling has been installed below the roof insulation. The building is built as a slab-on-grade with a concrete foundation that does not extend much above grade.

Figure 2-1: Curling Rink

The rink has no exterior windows. The exterior doors consist of a single overhead door and several fire exit man doors. The doors are not used during the curling season and appear to be adequately sealed against unwanted infiltration of outdoor air. There are two doors that link the rink to the bar. They are typically kept closed as much as possible. These doors do not have vestibules.

Figure 2-2: Structure

The metal structure extends through the insulation on both the walls and roof. This creates a thermal bridge conducting heat (and cold) to and

from the outside via the metal structure. When it is colder outside than in the rink, this creates a colder-than-ambient surface where water is more likely to condense. Rink staff report that condensation has been observed dripping from the structure.

Lights and cameras are suspended on metal chains and the chains are connected to the metal structure. The metal chain acts as a thermal bridge in a similar manner to the structure and creates colder-than-ambient surfaces. The rink staff report that condensation has been observed dripping from the lights and cameras.

2.2 Heating

The curling rink is not heated.

2.3 Ventilation

The curling rink is not ventilated.

2.4 Cooling/Refrigeration

The curling rink ice surface is kept at approximately 23.5°F ice surface temperature, as this is optimal for curling. The slab is a concrete slab containing brine piping. The refrigeration plant is an ammonia plant with a single compressor and has no reported issues with keeping the ice surface temperature in the desired range. During times of excessive humidity, the ice can form surface frost which can cause the plant to run harder than it should. This leads to high energy bills.

Figure 2-3: Refrigeration Controller

2.5 Dehumidification

The rink has had more than one dehumidifier but generally the rink has only had a single dehumidifier in use at the far end of the rink. The unit is mounted high and the fan discharge is pointed toward the ice. There is no distribution ductwork attached to the unit. It was not

Figure 2-4: Dehumidifier

possible to access the unit at the time of the visit but the unit is a Cimco model currently loaned/ donated by Cimco because the main unit has failed. The rink staff reports that the size is approximately 6 HP.

2.6 Indoor Conditions

The rink has no form of heating so the internal temperature is dependent on outdoor conditions. That said, the operator reports that the internal rink temperature rarely deviates very much and is typically in the range of -1°C. On the day of the site visit, the outdoor air temperature was 1°C and it was sunny; the indoor rink temperature was -0.2°C.

The indoor relative humidity was measured at 83.1% on the day of the visit. The humidifier was running and no condensation was observed on surfaces. The operator reports that this is a relatively low humidity reading and it is generally in the range of 86% to 94%.

CHAPTER 3 EXISTING CONDITIONS – HOCKEY ARENA

3.1 Envelope

Both the arena and the curling rink are of similar construction. The hockey arena is a steel framed building with a sloped steel framed roof. The exterior siding is metal and the walls are insulated with batt insulation. The insulation is covered on the interior face using a plastic material which also serves as a vapour barrier. The roof is insulated in the same way as the walls. A reflective low-emissivity ceiling has been installed below the roof insulation. The building is built as a slab-on-grade with a concrete foundation that does not extend much above grade.

The rink has no exterior windows. The exterior doors consist of a single overhead door to the ice resurfacing equipment (Zamboni) room and several fire exit man doors, which are typically closed. There are exit doors to the outdoors but these are kept closed. The doors appear to be adequately sealed against unwanted infiltration of outdoor air.

Figure 3-1: Hockey Rink

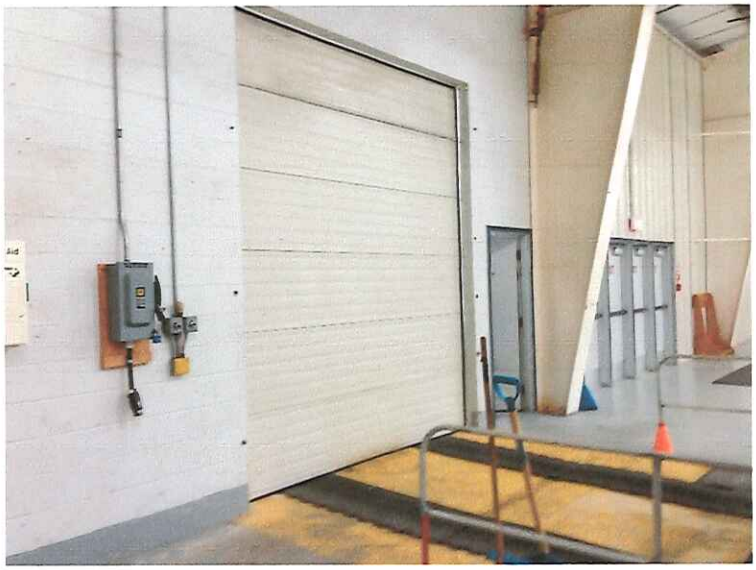

Figure 3-2: Ice Resurfacing

There are a number of doors that link the rink to the change room areas and lobby. They are typically kept closed as much as possible. These doors do not have vestibules.

The metal structure extends through the insulation on both the walls and the roof. This creates a thermal bridge conducting heat (and cold) to and from the outside via the metal structure. When it is colder outside than in the rink, this creates a colder-than-ambient surface where water is more likely to condense. Rink staff report that condensation has been observed dripping from the structure. Drip pans and drainage piping have been installed to deal with this issue.

Lights are suspended on metal chains and the chains are connected to the metal structure. The metal chain acts as a thermal bridge in a similar manner to the structure and creates colder-than-ambient surfaces. The rink staff report that condensation has been observed dripping from the lights.

3.2 Heating

The rink is not heated.

3.3 Ventilation

The rink has two large propeller exhaust fans mounted high at one end of the rink. There are intake louvers mounted high at the opposite end of the rink. These are typically kept turned off and closed except when CO levels rise above the set point. The CO is generated by the ice resurfacing equipment and the ventilation is required for air quality reasons.

Figure 3-3: Ventilation Fans

3.4 Cooling

The slab is a concrete slab containing brine piping. The refrigeration plant is an ammonia plant with a single compressor and has no reported issues with keeping the ice surface temperature in the desired range. The temperature of a hockey rink can vary depending on the users.

3.5 Dehumidification

The arena has two Cimco model MK-VII dehumidifiers installed on service platforms in the corners of the rink. The dehumidifiers were both running during the site visit.

Figure 3-4: Dehumidifier #1

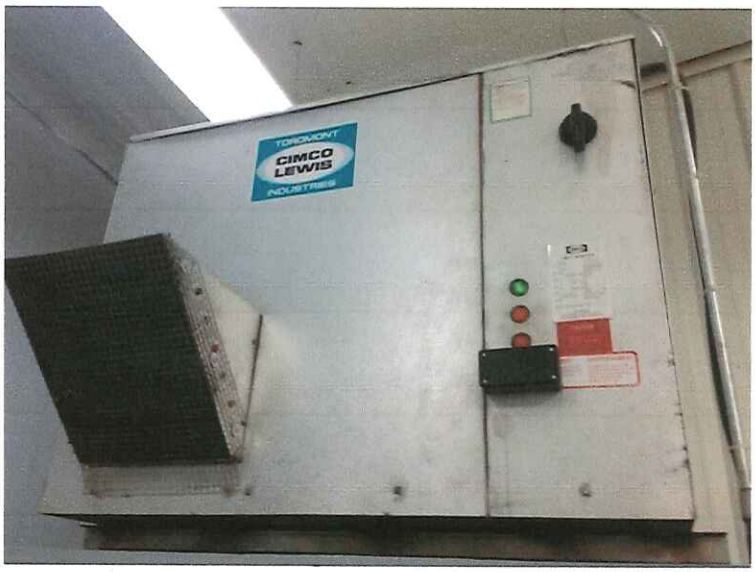

Figure 3-5: Dehumidifier #2

CHAPTER 4 ANALYSIS/RECOMMENDATIONS

4.1 Curling Rink

Condensation or frost occurs when a surface is below the dew point of the surrounding air. The ice is typically maintained at a surface temperature of 23.5°F and to prevent surface frost, the dew point of the air must be kept lower than that. The interior temperature of the rink is generally reported to remain just below freezing, at approximately 30°F. This presents a problem because the refrigerant based dehumidifier loses capacity dramatically at such a low temperature. At a 30°F room temperature, it would require a relative humidity of 74% in order to prevent frost on the ice surface. This is difficult to achieve with a refrigerant based dehumidifier because the air must be cooled to below its dew point in order for the moisture to be evacuated. If the air is already quite cold, dehumidification capacity suffers. Chemical dehumidification using a desiccant, is generally more efficient and effective at lower temperatures since the chemical desiccant absorbs humidity from the airstream uniformly across a range of temperatures.

Generally, curling rink temperatures are kept higher than 30°F. Not only does this aid dehumidification, it also keeps building surfaces warmer and therefore reduces the likelihood of condensation on ceilings, etc. Inside design temperatures are generally anywhere from 40°F to 60°F and many Canadian climate curling rinks add heaters in the form of suspended unit heaters, either gas or electric. Another approach is to integrate heat into the building's ventilation system, where this exists.

In cold winter months, the addition of outdoor air has not only an indoor air quality benefit but it also dehumidifies. That said, it has the opposite effect in shoulder months when the outside air is warm and full of moisture.

Recommendations are as follows:

1. Since the existing dehumidifier has reached the end of its service life, our recommendation is to replace it with a desiccant dehumidifier such as the Cimco Desicon ET. This unit provides 2600 cfm of air and consideration should be given to adding distribution ductwork to give better air distribution throughout the length of the rink. Care must be taken when installing ductwork to avoid low points that could drip condensation on the ice (should it occur). Ductwork is commonly run above the walk platforms instead of the ice for this reason. Also, air distribution should be kept away from the ice surface since air movement at the ice surface can have an effect on ice quality.

2. The desiccant type of dehumidifiers use heat as part of the process so there is a certain amount of heat added by virtue of the dehumidification process. It is not known if this will be enough heat to keep the rink at a temperature above 40°F and if it is not, we would recommend adding heat to the space. This can be either in the form of unit heaters or, if ductwork is added, duct heaters.

3. Consideration should be given to adding ventilation to the rink. If this were a new curling rink, code would require outdoor air supplied to the rink during occupancy. This can be controlled so that it is off during times when it is not required and/or wanted and would have the benefit of providing dry outside air when outdoor conditions permit.

4. Consideration should be given to thermally separating indoor surfaces from outdoor temperatures. This is not an easy task for the structural members that bridge the insulation but suspended equipment such as lights and cameras can be suspended in such a way that cold is not transferred via metal chains.

5. The addition of vestibules would help reduce the amount of moist air that travels between the bar and the rink.

4.2 Hockey Rink

The main source of complaints at the hockey rink is the formation of condensation in early shoulder months. This is largely due to infiltration of warm, humid outdoor air and some of this is unavoidable. There are a number of doors which are constantly opening and closing and other than keeping them closed as much as possible, there is not much else that can be done to help mitigate this source. The largest cause of infiltration would be the door to the ice resurfacing equipment room. It is very important during the shoulder months for this door, as well as the outer door to be kept closed. Care must be taken to ensure they are never open at the same time.

The ventilation system must be able to operate in order to keep adequate indoor air quality. Some rinks temper the outdoor air but for an arena of this type, this is rare.

The condensation that occurs on the steel structure has already been redirected to a drain pan and the addition of the reflective ceiling also generally helps reduce dehumidification loads.

Our recommendation to help reduce humidity levels in the fall shoulder months would be to add dehumidification capacity in the form of a third refrigeration based dehumidifier. This could be located on the platform closest to the arena entrance, although this would be at the expense of some seating.

The humidity issues do appear to be a) temporary (early season only) and b) kept under control by other means (drip trays and vigilant door closing) so for these reasons, it may not be necessary to invest in a third dehumidifier. Having two dehumidifiers is quite common for most arenas of this size and other than the extreme shoulder months, this is not a problem. Should the arena decide to extend operation throughout the summer, then more dehumidification would almost certainly become necessary.

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