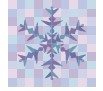


Natural Ice Rink Management



Neighbourhood and local outdoor ice rinks have played a large role in the development of skating and hockey players in Canada. Volunteers from community associations manage most of local the natural ice surfaces in Calgary. These rinks are situated in community leased sites, adjacent to community centres, or in local neighbourhood tot lots. As it becomes more difficult to manage resources such as: land availability, equipment, costs and volunteers, it is a greater challenge to maintain outdoor ice. Changing climatic weather patterns in Calgary also have an impact on the success of seasonal outdoor ice.

These outdoor ice surfaces provide many active experiences for local community residents as well as to the volunteers that manage them. Some of the rinks cater to shinny hockey players, some to pleasure skating for families, especially children. The nature of the rink (boarded or non-boarded) determines the type of activities that are supported by that facility.

There are a number of published references available for making and management of artificial ice. The standards for creation and maintaining indoor ice are more consistent given the level of control in an indoor, environmentally controlled facility. Standards and trying to adjust to environments make it harder to attain good ice surfaces in an outdoor ice. As a result, less information is available to assist those facility managers and providers. "It has been stated that ice-making is more related to an art than science."

This information aims to give community and neighbourhood groups an understanding of what needs to be considered in the creation and management of an outdoor natural ice surface. **Part "A"** addresses planning and establishing an outdoor rink site. **Part "B"** looks at the ongoing management of the outdoor facility.

Part A



Step 1 - Assessing the Need

Prior to developing the facility it is important to recognize why the surface is being considered. Here are some questions to consider prior to committing resources to develop and maintain a community outdoor ice rink:

- Is there lack of similar existing facilities in proximity to the defined service area?
- Who and how many will be served by providing this service to community members and potentially to other users(??)
- What benefits will be realized by creating a facility of this nature?

The rationalization process can be as long or as short as needed, but the results should give a clear understanding of how the new surface will contribute to meeting the objectives of the sponsoring community group.

Step 2 - Project Feasibility

Proper planning and assessment of available resources are needed to attain a quality and successful program or facility. Do not only consider the start-up costs in developing a site but also the ongoing cost of operating the facility on an annual basis. These would include:

- Capital costs (land, design, permits, equipment, materials, etc.)
- Operating (water, lighting, equipment and materials)
- Human resources - ongoing maintenance whether through volunteers or a paid contractor

NOTE: Currently all capital and operating costs are borne by the community group developing and operating the facility on City-owned land. The City may loan equipment and will permit the use of new sites, given a demonstration of the need and organizational ability of the sponsoring group. These things need to be considered well in advance of developing the program or facility .

Step 3 - Site Selection and Support Facilities

Selecting the site involves a number of considerations. When City-owned land is considered for the proposal, Calgary Parks will review the site and advise the group of any concerns regarding:

- Suitability of site and location
- Planning constraints (e.g. trees, proximity to water source, utilities and other amenities)
- Permits and other land agreement considerations such as: lease/license of occupation requirements

It is important to know the soil and rock formations around the site of the rink. These formations influence the drainage and stability of the surface. The design needs to account for these aspects as well as the climate.

The ground should be level and flat, free of debris, rocks and stumps. The surface characteristics may also affect quality of ice. Smooth surfaces, light in color, will enhance the durability of the ice through the season. Dark surfaces under the ice will retain heat from the sun and create uneven spots.

Proximity to leafy trees may also affect ice quality as loose leaves on the ice release heat when decomposing.

In terms of overcoming the climate, design of the rink could also enhance ice quality. To help protect ice, utilize any available source of shade. If possible the long axis of the rink should be oriented in a North/South direction. This orientation will help reduce the effects of Chinook winds. It will also reduce the number of south-facing boards which tend to reflect the heat of the sun's rays.

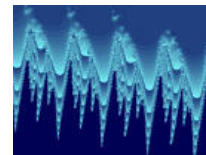
Access to the rink facility also needs to be part of the planning considerations. Access to maintenance and services such as power and water are just as important as access for users and spectators. Easy access to support facilities assists management and use of the surface.

There must be a ready supply of water, preferably from a controlled source with a regulator. **With the onset of new environmental water management legislation, it is important that the flow of water be regulated – especially preventing backflow.** NOTE: Street hydrant use is not permitted to be used as a primary source. Groups are encouraged to install water access from adjacent buildings and if none are available, with an outdoor winterized service – all costs borne by the group. Please contact Calgary Parks, who will comment proposal and approve site and water source.

Step 4 - Sources of Funding

Funding sources for initial capital and ongoing costs can be identified at all different levels. The proportion of funds that need to be raised from the community and other sources (government and non-government) needs to be identified along with strategies to acquire them prior to start up of an outdoor facility. Often a project can be funded through several sources:

- Membership support
- Donations
- Grants
- Program revenue
- Venue sponsorship
- Recruitment of large volunteer base to manage human resource costs



Step 4 – Risk Management

The potential for liability highlights the need for all organizations involved in a public or quasi-public facility to have the appropriate insurance to cover liability claims.

If a facility user is injured as a result of the condition of the sports surface it may result in potential legal action against the owner or operator of the facility where the injury occurred. Depending on the particular circumstances, the user might be able to claim that injury was due to the negligence of any one or more of the owner, operator, club or organization.

The risk of liability can be reduced in several ways. These include:

- Ensuring the surface and facility are well maintained and that users are warned of any inherent dangers in its use;
- Ensuring the facility is managed with competent trained staff/volunteers,
- Ensuring the facility is used for the purpose for which it was designed and dangerous objects and situations are removed
- Ensuring the sponsoring organization carries out their responsibilities on a regular basis

Part B

Starting the Ice Making Process – Ice Management Tips

The perimeter of the rink should be banked with loam, snow, rink boards or a combination of these to contain the water for ice build-up. Telephone poles or ties laid on edge will also contain the water.

If the rink is situated on turf, the grass should be mowed to a low height to minimize the amount of water used to build up a layer of frost. A heavy layer of snowfall should be cleared or compressed prior to applying the first flood.

Temperature plays an important part in the start-up of building the ice. There should be 3 - 4" of frost in the ground and ambient temperatures should consistently be at least -7 C to -12 C before starting the ice-making.

Build up a two inch (5cm) layer of frost in the soil by thoroughly soaking the ground when freezing weather is expected. The objective is to form an ice seal. This will help in to retain the water to make the ice. Once the seal is established, ice can be continually built up. Using a layering technique the ice can be built up to a thickness of 3" - 5" (7.5cm to 12cm) and once made, is extremely durable.

Avoid attempting to build the ice by fast flooding an entire area. Do not use large open hose methods (eg. 4" snake skin without nozzle) allowing the water to pour onto the ground. The flowing water may thaw the frost in the soil and drain through the soil. Total flooding is the slowest and least desirable method of building the rink ice.

The most suitable temperature range for building up the ice layers is between -7 C to -17 C.

Floodwater from the main (4.4^o C) contains enough heat that it will melt the ground frost. Use a flood nozzle to direct the water into the air so the water can chill before reaching the ground.

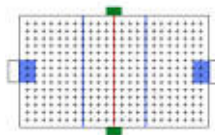
When the air temperature is around freezing, a fine spray is used to build up the ice surface. As air temperature decreases, the water droplet size should increase - use a coarser spray.

Use a gradual spray technique to get a layering effect of the ice. The objective is to build the ice up. Do not try to do it all in one night of flooding. Each layer is built upon the previous and allowed to set before the next flood is applied.

Water is applied in a spraying motion and not just spewed across the ice. Again the objective is to obtain a smooth surface through a gradual filling of voids in the ice. A constant water pressure will help in getting an even spray with no "freeze-ups".

Positioning

Start at one end of the rink and apply an even spray across the width, covering a strip five to eight feet wide. Progressively work down the ice surface, watering in overlapping strips until the entire rink has been covered. Remember to keep the spray moving, which is essential for a good ice surface. The end of the rink that was started should be frozen by the time the other end is reached.



Hose Handling

Avoid dragging the hose through freshly flooded areas. Drag the hose behind you or have a helper take up the slack in the hose as you move backwards. In addition, the hose will cut into the ice if it is allowed to sit too long in one place during flooding. **Hint: Have a partner keep the ice moving for you or wrap the hose with a rope, thereby insulating the hose off the ice surface.**

Do not leave the nozzle or hose unattended. If not being used during the flooding, make sure the nozzle/hose is outside the rink so that there is no excess build-up of water and ice. Again leaving the hose on the ice will cut into the freshly flooded surface.

Ensure hose leaks are repaired as excess water/ice build up can occur at these points.



Hoses

Use good quality rubber hose with a diameter of 1" - 1.5" (2.5 - 4.0 cm).

Use a reel for easy handling, drainage and storage of the hose. Before storing, drain the hose to prevent freeze-ups and possible splitting. It is ideal to store the hoses in a heated room.

Watch for leaks in the hose as well as at joints and couplings to the nozzle.

Nozzles

Avoid plastic nozzles which tend to freeze and crack in the cold if dropped. Whatever you use, the intent is to diffuse water in a spray. Without the spray - ice production will be poor. If possible a shut off valve, close to the nozzle head is ideal.

Surface maintenance

Thoroughly clean the ice surface of snow, ice chips and dirt before each flood. Remove snow from the ice surface as soon as possible.

Have a good selection of level scrapers - quality steel hand scrapers, shovels and ice edging tools with sharp edges to pick up snow and ice. Sweepers and snow throwers are an asset in reducing the labour required.

Using a good stiff corn broom, sweep the ice all around the rink at the base of the boards. This area is seldom skated on and can build up into a ridge. Use an edging tool to remove any high spots. Scrape the rest of the surface using a steel scraper or shovel. Clear the ice of all ice scrapings.

Pull the hose onto the ice but leave the nozzle hanging outside of the boards or banks - then turn on the water. The hose should be manually controlled at all times.

Using the same flooding technique as described earlier. Make sure the edge of the water coat will butt to the adjacent flooding strip to prevent forming ridges. But do not try to apply too wide a strip.

With experience the icemaker will be able to judge the best strip width. The speed of the work will depend on the temperature. Again the ideal air temperature is between -7^o C to -17^o C.

Flooding should occur in late evening, night or early morning. Make sure the surface is frozen and set before applying the next coat.



Shell Ice

Shell ice is a condition where air pockets are formed between layers of ice. They are found as white patches on a set surface and are caused by improper flooding and inadequate banking.

Too much water applied during a flood (simply poured onto the surface causing excess) will create shell ice. The surface freezes but the water underneath drains away leaving a shell.

Inadequate banking causes seepage allowing water to escape from the rink during flooding. The banking should be secure enough to hold water in place until it freezes.

To repair shell ice, chip down to the air pocket and fill with slush to patch and cover the area. Depending on the depth, this may have to be repeated a number of times, gradually. Flood to smooth the top surface.

To repair major cracks and cuts, fill these with slush made with snow and warm water in a slush bucket. Simply applying water to the crack will not rectify it.

Lighting

Lighting is essential for the functional use of the outdoor rink. Design for lighting and layout should be done by qualified personnel and should not be attempted by the non-professional.

The purpose of lighting is to improve safety in use of the facility by improving visibility on the ice surface. Reducing shadows created by boards and nets will enhance activity safety as well as the play of the game. Depending on the nature of the activity that the rink is supporting will determine the amount of lighting required.

Again consult with a professional to determine the type, design and the amount of illumination required for the facility.

Volunteers Management

Community groups utilize volunteers for many of their programs and operations including maintenance of outdoor ice rinks.

Because of the nature of the work involved, rink maintenance volunteers endure working in harsh conditions and odd hours. As a result it is harder to retain some of those volunteers.

Remember these points in planning your volunteers program for the rink.

- Recruiting – recruit from the base of regular users of the facility wherever you can.
- Orientation - outline responsibilities and purpose of the facility and organization
- Training - make sure jobs are outlined well and training is available for new volunteers
- Supervision - a team approach enhances the job. It assists in coordinating scheduling.
- Recognition - a little can go a long way.



General Safety

Always be safety conscious and dress appropriately for the job and the weather. Proper footwear, outerwear, and gloves are essential in working in outdoor winter conditions.

Work in teams to match the intensity of the work and conditions, especially with heavy hoses on a slippery surface.

Make sure all volunteer are registered and know their rights and responsibilities within the program.

Proper signage should be in place outlining rules for use and scheduling of activities so there is no conflict amongst users.

References

This paper is a summary of the matters relating to outdoor ice rinks. The material should not be used or relied upon solely as a substitute for professional advice and experience.

No responsibility is taken by the author or by The City of Calgary for the accuracy of the content of this paper.

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Contacts

Parks Community Liaison, Calgary Parks, North Division	221-3955
Parks Community Liaison, Calgary Parks, Central Division	221-4560
Parks Community Liaison, Calgary Parks, Central Division	221-3530

Neighbourhood Services, Centre Division	268-2574
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Neighbourhood Services, East Division	221-3600
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