ONTARIO RECREATION
FACILITIES ASSOCIATION INC.

Suggested Guidelines For Evaluating Arena Boards and Glass

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SUGGESTED GUIDELINES
FOR
EVALUATING ARENA BOARDS AND GLASS

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ORFA.COM

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SUGGESTED GUIDELINES FOR EVALUATING ARENA BOARDS & GLASS

INTRODUCTION

Due to the changes in sport activities accommodated in facilities specifically arenas, safety of players and spectators has become an issue. This is due, in part, to the age of many arenas, combined with various and non-standard building practices used during the construction of the facilities.

Consequently, the industry is experiencing an increase in the number of injuries, some fatal, sustained by spectators and players alike. This has resulted in an increased concern for potential litigation.

In Canada, several ongoing claims for injuries has brought this issue to the forefront. At the 1999 Annual Forum of the Canadian Recreation Facilities Council, (C.R.F.C.) the need to develop specific guidelines to determine the safest height for glass for arena facilities was identified.

C.R.F.C. is a network of Provincial and Territorial recreation facility associations from across Canada. This volunteer organization is working collectively to improve the recreation facility industry.

In response to the need for owners and operators to demonstrate a duty of care to users of their facilities, the Ontario Recreation Facilities Association recommends the following guidelines and facility analysis to help reduce unnecessary risks and assist in maximizing the safety of our patrons.

The main objective of this process is to ensure that the arena facility has taken all reasonable steps to minimize risk to user groups and spectators.

Please read through the following guidelines in evaluating your facility and set up your own committee or task force to implement the recommendations attached. Designate one person to implement these guidelines in your facility.

Once you have completed the evaluating process and have determined that your facility does not meet the recommended guidelines, or that, there is a consistent problem with pucks/balls leaving the playing surface, you must take corrective measures to prevent this from re-occurring.

Such corrective measures would include:

- install safety protective netting in appropriate locations, or
- increase glass height, or
- increase glass height and install safety protective netting, or
- plan for future capital expenditures to increase glass height

For all new dasherboard retrofits or new construction please review attached appendix B - Dasherboard Systems.

EVALUATING YOUR PREMISES

- Are the persons who are responsible for the maintenance of the board and glass system aware of the following:
- The age and type of construction of your facility's board and glass system?
- The exact height of glass as measured from the ice surface to the top of the glass?
- The exact height of glass measured from the concrete floor on the spectator (off ice) side to the top of the glass?
- The type and dimensions of the spectator seating?
- Is the board and glass system removable or permanent?
- Can the existing board system support an increase to glass height?
- Does the seating cause any risk to the spectator at any point?
- Are all of the exposed supports padded?
- Are you aware of the facility requirements necessary for the type of programs that you are scheduling?
- Do you have access to information about programs offered at your facility or specific playing guidelines for that activity?
- Do you actively review accident/incident forms involving participant and or spectator injuries? Is this done to the extent that a summary of incidents/accidents received in your facility reveal recommendations and or changes to be made in either the programming or the structure.
- Is there a design problem noticed through consistent spectator or player injury and what action is to be taken.

Site Visit

Self-assessment is an important step in effectively evaluating your facility. A planned walk through of your playing surface is mandatory in the assessment process. For your self-assessment you will require a measuring tape and equipment such as a hockey or lacrosse stick. It is recommended that you invite key personnel such as the Fire Department, Building Department, Joint Health and Safety Committee and or insurance advisors, to join this step of the process. All are excellent resources with an interest in accident prevention and should be utilized.

1. Evaluate your dasher boards
    - Measure outside surface to top of glass shields
    - Measure ice side surface to top of glass shields
    - Width of dasher boards
    - Height of dasher boards
    - Type and condition of facing
    - Are shield supports intact?
    - Condition of dasher board (stability)
    - Loose gates, hinges, latches should be identified
    - Condition of lexan and/or board advertising kits
    - Are board advertising shielding in tact

2. Inspect safety protective netting
    - Inspect netting for tightness/tension
    - Inspect netting for wear, holes, torn or cuts
    - Inspect netting connection cables and clamps
    - Inspect netting mesh hole size

3. Draw a map of your arena and mark in the following areas:
    - Players boxes
    - penalty boxes
    - camera and media areas
    - gates and resurfacer gates (note if machine gate is a lift gate or a swing gate)
    - seating areas
    - concession areas if applicable
    - opening to outside corridors or lobby
    - areas along the dashers where there is no shielding separating the ice from the spectator area
    - steps or risers in the spectator area

4. Look for any gaps or spaces in your shielding system that may allow objects or sticks to leave the playing area without going over the shields. Gates are especially bad for this. Use the stick and a puck to confirm whether this is possible. Mark these areas on the floor plan with a large "X".
5. Look for ice- side deviations that may cause a stick, blade or body part to become caught and thereby result in an injury. Mark these problem spots on the ice side of the floor plan with an "X".

Observations

The following are guidelines to assist you in summarizing the state of your arena and identifying potential risks. This information will help you to establish your Action Plan. Review the following possible conclusions drawn from the data gathered.

General Evaluation

Note any consistencies in player or spectator injury observed by staff or user groups.

- Are there any programming issues that may pose a hazard to public safety?
- Should there be any policies or procedures implemented to protect user groups and spectators. (e.g. ensuring that all gates are closed during practice sessions.)
- Is netting installed over end boards where spectator seating is located and/or at spectator walkways, stairs or steps?

Boards/Glass Evaluation

- In the data sheets, highlight the existing problems by marking an "X" on your drawing.

- Check the outside measurement of the dasher system. Compare to the inside and measure the shield height.
- Is the height of the dashers on the spectator's side of your arena shorter than the ice side? If yes, are patrons at risk when standing or sitting around the rink?
- Are the patrons of your rink protected from the risk of a flying puck or stick while standing or sitting in any part of your arena?
- Are there any gaps where pucks or other objects can go through?
- Can a flying puck or ball get into an adjacent traffic area?
- Are there any gaps or weak spots in the boards that will cause a player to become injured or allow for a stick to get caught?

Action Plan

From the above summary, list your specific problem areas that need to be addressed. For every problem, identify and list possible solutions that may or may not be feasible including any associated costs and ease of implementation.

Example:

Problem: Gap in glass

Solution: 1. Replace and fix shield supports
2. Stop playing activity
3. Replace glass

From your list of possible solutions, pick the most feasible considering budget, safety, liability, time constraints and ease of implementation. This plan will outline the steps your organization will need to take to establish the most appropriate levels for glass that are consistent with industry practices and legislation under the occupiers liability act. Be resourceful in dealing with the problem since the ideal solution may take several years to achieve. It is strongly recommended that any board or glass deficiencies or recommended upgrades determined from your evaluation process, should be incorporated into your capital budget submission each year. This will serve notice to the importance of the matter.

Recommended Guidelines For Community Arena Events

After collaboration with facility personnel, agencies, manufacturers and national sport organizations, the Ontario Recreation Facilities Association recommends the following guidelines for all recreation arena facilities.

- Each facility must post the following signage in a highly visible area:
  Patrons Entering These Premises Voluntarily Assume All Risks and Dangers Incidental to any Game or Event.
- Prior to the game/event and before the beginning of each period of any sporting event the following announcement is highly recommended for broadcast over the facility public address system.
  Attention Fans! - "Be aware that pucks/balls/sticks/equipment may leave the surface at anytime which can cause serious injury. Please pay attention to the activities on the playing surface at all times!"

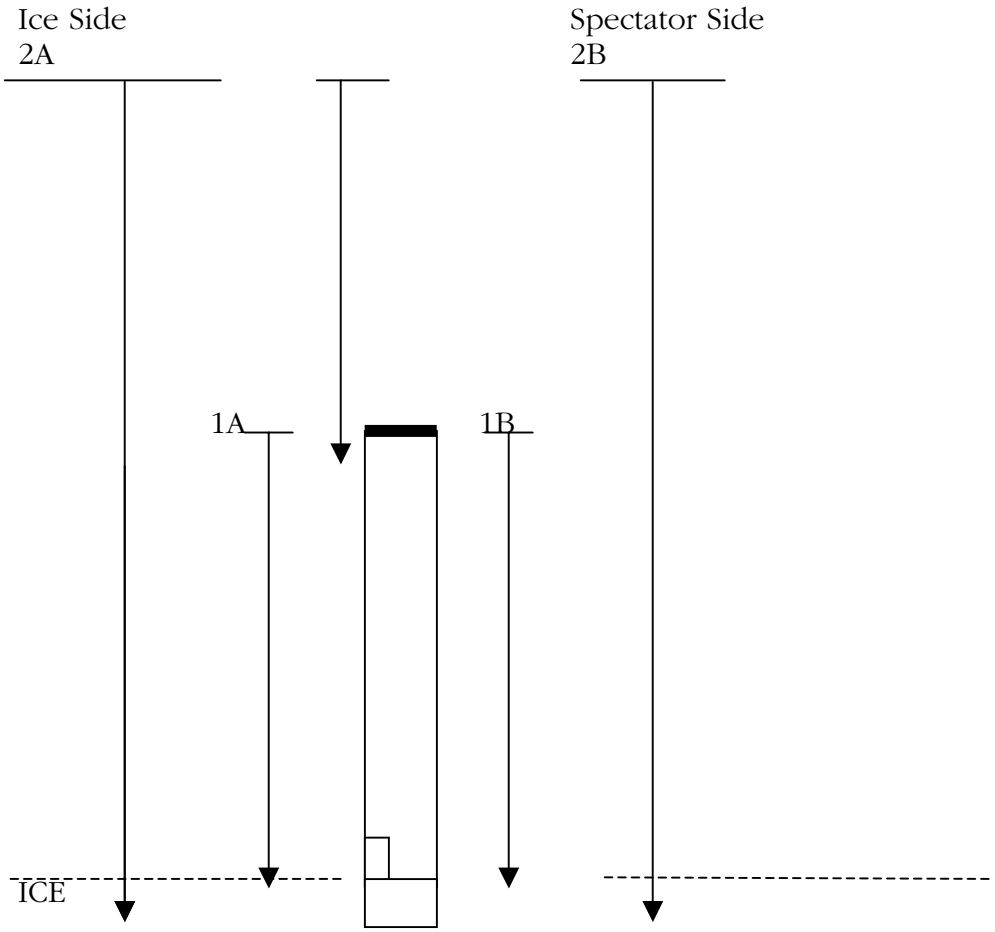
- Where tickets are sold, please indicate the following disclaimer somewhere on the portion retained:
  The facility owners /arena and/or host club/organization shall not be held liable for any injury that may occur at the event taking place on this date. Each patron assumes all risks and dangers associated with this spectator event/activity.
- Meet with each user group annually to discuss pending changes to their sport or activity, facility layout, as well as to review any facility operational concerns and risk management techniques.
- Report each incident and/or accident by filling out the appropriate form(s). Staff training is required on how to properly assess the situation and to take the appropriate actions. This process should be in accordance with the Employer's recognized policies and procedures.
- For all new or major retrofits to a community arena facility with spectator seating of 1500 or less: glass should be a minimum of four (4) feet in height or a height that will provide a minimum clearance of eight (8) feet as outlined in item 1.1; glass should be 1/2 inch in thickness from radius to radius. (1/2 inch in thickness for tempered or acrylic glass.)
- For all new or major retrofits to a community arena facility with spectator seating of more than 1500: glass should be a minimum of six (6) feet in height or a height that will provide a minimum clearance of ten (10) feet as described in item 1.2; glass should be 1/2 inch in thickness from radius to radius (1/2 inch in thickness for tempered or acrylic glass).
- For community arena facilities with seating for 1500 or less, all other remaining perimeter glass should be a minimum of six (6) feet in height with 5/8 inch in thickness for tempered and 1/2 inch in thickness for acrylic glass.
- For community arena facilities with seating for more than 1500, all other remaining perimeter glass should be a minimum of eight (8) feet in height with 5/8 inch in thickness for tempered and 1/2 inch in thickness for acrylic glass.
- All players benches and penalty benches shall have protective glass of the same height as the adjoining board glass along the ends and back of the bench to protect spectators in walkways, alleys and seating area. In front of the home and visitors penalty boxes the glass shall be continuous and be the same height as the adjoining board glass. It is recommended that all timekeepers boxes be totally enclosed with protective glass. For consistency and fairness of play, glass installation and height should reflect the installation at the opposite end.
- Protective netting is strongly recommended to be installed from the top of the glass to a height as to adequately protect all spectators in the arena proper (seated or mobile) especially at arena ends/boards. The safety netting should not exceed a 1 1/2 inch x 1 1/2 inch opening. Refer to appendix A.
- Arena Board height should be consistent with recognized industry standards of a minimum of 42 inches to a maximum of 48 inches. For community arenas where majority of its primary users are minor hockey (boys or girls), the desired height of board from the floor surface to top of sill is 48 inches.

- For all existing community arenas, it is strongly recommended that every precaution reasonable be taken in the protection of the spectator and participant, whether it is an increase in glass height or the installation of the preferred safety netting or a combination of both.

Measure:

- measure height of dashers from top of topsill to ice (1A) and top of topsill to the base of the dasher (1B)
- measure total height of dasher system from top of shields to ice (2A) and from top of shields to surface behind the dashers (2B).
- measure top of shields to topsill for shield height at both the sides and the ends.

FIGURE 1



Calculate:

- on a flat floor 1A and 1 B should be equal, less the thickness of the ice. If there is a difference its probable that the dashers sit on a curb. This should be noted.
- an elevated walkway will be evident if there is a difference between 2A and 2B. This should be noted and taken into consideration when determining a safe shield height.

1.1 Seating 1500 or less - It is strongly recommended that an 8 ft. clearance be achieved on both sides of the boards (8 ft. clearance from lowest point of ice/surface/floor to top of glass/shield).
1.2 Seating 1500 or greater - It is strongly recommended that a 10 ft. clearance be achieved on both sides of the boards (10 ft. clearance from lowest point of ice/surface/floor to top of glass/shield).

Risk Maintenance

Scheduled inspections of board and glass systems are an important risk management tool. The inspection report should identify components that require ongoing assessment such as glass supports, spacers, checking boards for cracks, loose fitting or projecting screws and nails. Be sure that all board advertising kits and lexan coverings are inspected. The inspection should also include the safety netting for tears, holes and weak spots in the mesh netting.

These reviews should be conducted on a daily and/or weekly basis. Staff should be trained to recognize the potential hazards that may exist in their facility. It is important to provide staff with the necessary resources such as policies, procedures and training to address any facility concerns that may affect the operation. Program requirements must be known and understood by all in order to facilitate a safe activity for all.

It is recommended that facility owners develop a daily and/or weekly inspection checklist to be completed by identified staff. This will facilitate the evaluation of your facility safety program and take appropriate action when it is required.

Conclusion

These guidelines will serve to enhance your current risk management program and improve the public safety within your facility. Once you have evaluated your facility, we encourage you to take the necessary steps to protect your organization, your patrons and your users from undue harm. It is your responsibility to take every precaution necessary to provide a safe facility environment for all of your patrons.

APPENDIX A – PROTECTIVE SAFETY NETTING

It is strongly recommended that high quality protective safety netting be installed to adequately protect all spectators at the ends and corners of rinks where seating is permitted (such netting to extend to the full width of the ice surface 75 feet to 100 feet). The netting shall be of sufficient strength and durability to ensure the adequate shielding of spectators sitting in the ends and corners of the lower bowl (seats) from pucks/balls which leave the playing surface.

It is strongly recommended that when arenas install protective safety netting that the following guidelines be implemented:

1. The netting manufacturer and/or installer must certify in writing that the netting to be installed will be of sufficient strength and durability to ensure the adequate shielding of spectators sitting in the ends and corners of the lower bowl (seats) from pucks/balls which leave the playing surface.
2. The manufacturer and/or installer must expressly agree, in writing to assume responsibility for any and all liability that may arise in the event of a failure of the netting installed.
3. It is mandated that the protective netting have a maximum mesh stretch size of 3 1/4 inches (measured inside to inside), and a break strength that is, at a minimum, sufficient to withstand and restrain pucks travelling at the speeds at which pucks typically leave playing surfaces.
4. With respect to netting installation, the following shall apply: nets shall be attached to the spectator side of the shielding system (e.g. glass) and shall be hung in a vertical manner or angled back away from shielding and back towards the spectator seating. No part of the net shall protrude past the shielding and over the ice surface.

SAMPLE FORM FOR PROTECTIVE SAFETY NETTING

(To be completed for each type of protective safety netting to be installed)

Company Information:

1. Company Address:

_____

2. Company name:

_____

3. Person to contact at your company:

_____

4. Telephone Number:

_____

5. Fax number:

_____

6. Email address:

_____

Netting Information:

1. Manufacturer of protective safety netting:
_____

2. Phone number of net manufacturer:
_____

3. Break strength of netting:
_____

4. Model number of netting (if applicable):
_____

5. Stretch mesh of netting (indicate whether inside/inside or centre/centre:
_____

6. Yarn thickness of netting:
_____

7. Yarn type of netting:
_____

8. Colour of netting:
_____

9. Any additional relevant information regarding netting:
_____

Description of Installation in an Arena:
Please describe the finish for the top, bottom and side edges of the protective safety netting:

- Top:
- Bottom:
- Sides:

Please describe the connection of the top of the net to the upper support and the bottom of the net to the lower support (if any).

- Top:
- Bottom:

Please describe the way in which the net will be tensioned.

_____

Other comments:
_____
_____
_____

Signed by manufacturer: _____

Signed by witness: _____

Date: _____

APPENDIX B - DASHERBOARD SYSTEMS

Introduction

Dasherboards are a key component of every arena with little understanding of their purpose and design. As the concern for spectator safety continues to rise as an issue, and litigation-surrounding lack of protection mounts, the dasherboard system will continue to be analyzed and evolve. Dasherboards play a key role in the protection of participants, spectators and workers during sporting events, which have an object in play. Although boards and glass are a primary part of a protection system, they must be enhanced with protective netting for an ultimate protection system. Originally designed for the sport of ice hockey, they now are used in lacrosse, broomball and other sports such as tennis for protection.

This module will breakdown and discuss the various components required for a proper dasherboard system. It will provide you with the information you require to ensure your next purchase, retrofit program or facility evaluation is complete with current information.

History

The word *dasherboard* has always been questioned as to its origin and what it means. The best we can determine is that it is derived from the word dashboard, that is defined as a screen on the front of a usually horse-drawn vehicle to intercept water, mud, or snow. This word was created in 1846, which would make it a current term used when the first rudimentary boards were erected around outdoor rinks. Like anything else, standard materials would have been used for a new application like a rink. The “er” is probably the local dialect added from the area where the first boards were constructed.

For hockey and all its related components, going from an outdoor sport to an indoor sport in the 30’ft.s was a major step because it provided new challenges, specifically making ice and improving game conditions. Since the inception of the original burst of indoor rinks prior to the 50’ft.s, there has been roughly a twenty-year cycle in the major construction of rinks. These cycles have consistently brought new technology and designs improving the arena environment and especially dasher construction.

During the fifties, dasherboards were constructed much like the wooden fences used outdoors, the main purpose being to contain the puck. The materials used were the off-the-shelf wood materials with basic hardware that was adapted to the boards. Year after year, the rinks were repainted and maintained for the following year.

Once more shots were coming up off the ice, chain link fencing was introduced to keep the puck from going out of play. There are arenas, which still utilize these original components.

In the sixties, companies in the plastic industry began servicing local arenas with acrylic (Plexiglas) panels to replace the chain link fences. This eliminated the safety hazard from the broken chain link while simultaneously allowing the spectators a better view. During this period, custom aluminum extrusions were experimented with to hold the acrylic panels in place. Shield height of 2’ft.(609mm) on the sides and 4’ft.(1220 mm) to 5’ft.(1525mm) on the ends was standard. In Ontario, Canada during this era an industry was born that has grown in 1999 to over $80 million in sales of dasher systems and their

related components. Today, 16+ companies manufacture a variety of dasherboard systems.

The next product in the dasherboard evolution saw an industry switch to 1/4"(6mm) polyethylene. The polyethylene was used to cover the plywood, improving not only the appearance of the boards, but also eliminated the necessity to paint.

The seventies benefited from the second major boom in arenas. Government funding assisted the development of leagues and construction of rinks. Companies with experience in supplying rinks worked closely with communities to build what was a first at the time - a complete system. This system was referred to as the "Vallance" system named after its designer Doug Vallance. Many of these Vallance systems are in use today, updated only superficially with items such as a new facing. The system comprised of a post on 4'ft.(1220mm) centres with three stringers (originally wood). A 2"(50mm) x 6"(152mm) wooden board was secured on top and 3/4"(19mm) plywood was placed on front. The system was covered with 1/4"(6mm) polyethylene. Using standard component sizes made sense because of the availability, especially in remote arenas. The dashers were built on the perimeter pad.

Variations of this basic design were introduced during the seventies with a wide variety of hardware, supports and anchoring systems being experimented with. Tempered glass was introduced as a more durable shield, and the design of shield supports continued in search of the ultimate one.

In the U.S., the Fiberglas system was introduced and formed a template for many rinks large and small across the country. Prefabricated systems were a more acceptable means of building dashers in the U.S. than in Canada.

Between the seventies and the nineties many advances continued to take place. 1/2" (12mm) Polyethylene became a replacement for wood altogether due to its low maintenance and ease to work with (also because plastic companies were driving rink development). Steel replaced wood on the dasher system frames to extend the life of the system.

In the mid seventies, the first pre-manufactured system in Canada was installed at the Winnipeg Arena. This heavy frame was simply a copy of the permanent systems in the rinks. Frames were 4'ft.(1220mm)x 8'ft.(2440mm) because of material size. Tempered glass was used in this installation. As larger buildings were opening up to many new events the demand for prefabricated, systems increased.

By the mid eighties there were various manufacturers building systems that were still primarily built in place (B.I.P.) in Canada, and a pre-manufactured variation of the BIP system or Fiberglas in the U.S. As a way to reduce weight, the first aluminum system was built in the eighties in Western Canada for export to China. Again, the design of this system was experimented with, but based from the original design of the built in place system. Advertising was introduced onto the face of the dashers in the NHL during this period. This was a breakthrough and provided an extra revenue stream to these arenas/teams. This was soon carried down to the community rinks where local companies provided additional funds for arenas and teams alike.

The first seamless glass dasher system was designed by an engineering firm and built at Sask Place in Saskatchewan. This was a revolutionary heavy framed prefabricated steel design. The glass was held in place by two large steel angles, which sat on top of each other. The glass was at the front of the dasher system. Since this time the Seamless glass, systems have been redesigned and introduced into all levels of hockey. The advantages of this system are improved spectator visibility and sightlines.

The nineties produced another boom in arena development. This current boom covered wider demographics both in the size/type of facility and the geographic location. The nineties also produced a boom in major sized arenas that has never been experienced before. New arena development had shield heights that were more specific to the size of the building. Large arenas were installing 6'ft.(1828mm) high on the sides and 8'ft.(2440mm) high on the ends. Most new community rinks were installing 4'ft. high on the sides and 6'ft.(1828mm) high on the ends.

Community arenas face a variety of designs that were introduced during the nineties. New designs introduced in the nineties include:

- Lightweight aluminum frames 5" (127mm) wide
- Aluminum frames made from engineered tube
- Lightweight steel angle frames
- Pultruded Fiberglass frames
- Steel framed Seamless systems
- Combining seamless at the sides with regular supported acrylic shielding at the ends.

Large arenas require a strong design using lightweight materials and the customization to ensure the boards are able to interface with the many new arrangements on the event floor. The role the Dasherboard plays has increased significance in the design process and the importance of coordinating dashers with the seating, staging, refrigeration and operations staff became paramount to ensuring a smooth conversion of the arena. For this reason procurement of dashers was moved forward in the overall construction schedule of a new arena.

Operators and architects must have the ability to work with the dasher manufacturer early in the process to ensure the system will work. In a design-build project the dashers should be held out as a decision made by the owner due to the impact they have on the quality of play and safety of the players and spectators.

Current Trends

The conversion requirements in both large and small arenas will advance again due to technological changes in other areas of the arena and the increased number of secondary market arenas making use of the ice for multiple activities. Smaller shows are looking for smaller, more community oriented facilities to have a variety of venues, which will provide added revenue streams for the community arena that has the ability to utilize its space. This will impact how the dashers are incorporated into the rink.

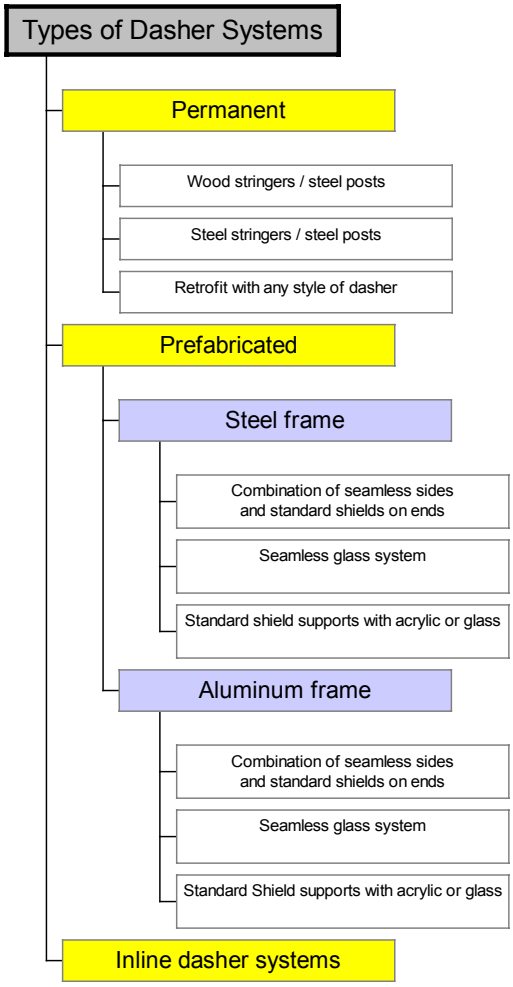
Event Floor Ice Covers have made it easier to accommodate events and owners are looking for an improved system to use the ice retainer to double as an ice cover retainer.

Introduction of LED video signage, rotational signage and other forms of advertising will improve the revenue streams that are generated from the dashers. This will impact the play of the boards.

New clear shield supports, new dasher facing and newly developed materials for improved frame design are being engineered to improve the play of the game and the safety of the players. The seamless glass systems will continue to be reviewed and improved upon, especially in large professional arenas and the trade off increased spectator visibility versus player comfort will be analyzed more thoroughly. There is no doubt that increased visibility will directly impact spectator attendance especially in smaller markets and smaller rinks.

Current standards concentrate on size of rink, height of glass and location of boxes. Nothing has been published and accepted in a standard that addresses the load requirements and performance criteria required in a dasher system.

Thorough design and testing should determine what materials are acceptable and suitable for use in this industry.



Engineered solutions will be the answer to dasherboard development rather then the price point design policies we have recently been experiencing. Currently, new materials are being developed that can be designed specifically for the needs of a dasher system. To ensure manufacturers of dasher systems conform to minimum construction levels, standards must be set which are performance based and provide a minimum level of quality. New constructors of facilities contemplating a refurbishing are encouraged to contact several dasherboard suppliers to discuss specific needs and applications.

BASIC TYPES OF DASHERBOARDS

Dashers fall into two general categories:

- Built in place dashers (B.I.P.) Permanent
- Prefabricated dashers

Prefabricated dashers make up the majority of systems sold into the industry, whether in a retrofitted building or a new building. Prefabricated dashers come in a variety of design materials and are outlined below.

Build on Site (Permanent) Dasherboard Systems

Permanent Dasherboard systems are constructed completely at the building site. Standard installations have steel posts installed around the proposed perimeter so as to not to interfere with refrigeration system. Horizontal stringers made of galvanized steel or pressure treated wood are then attached to create a “fence” around the surface. Gates may be either purchased through a supplier or crafted by the contractor. A surface cladding is then applied to the fence. Common installations include 3/4-inch (19mm) plywood with a 1/4-inch (6mm) white polyethylene being applied. However, newer constructions have had 1/2-inch (12mm) polyethylene only being. This system has a life expectancy of 15-20 years under normal conditions. The advantage of this system is that with instruction and/or supervision it can be built locally through a community group to reduce the cost of the system. It is still an ideal system for remote areas that are burdened with the high cost of transporting a complete package. Many existing systems that were built in place will remain this way due to some of the uneven curbs that exist in older rinks. Installers experienced in this type of system are able to work with a local crew, purchase materials locally and will require 4 to 6 weeks to complete an installation from scratch (working with a 4 person crew).

Pre-Fabricated, Demountable Removable Dasherboard Systems

Prefabricated dashers are made from the following materials

- Steel
- Aluminium
- Fiberglass

Trained trades people manufacture these dasherboard systems according to detailed specifications under tight guidelines in a controlled environment. The advantage of this type of system is the ease in handling during the installation and if it ever needs to be moved. The frame construction is anchored to the concrete using bolts, which provides more movement in the boards then is experienced in the B.I.P. systems that are permanently anchored. The frames are designed to fit the buildings configuration in

advance and are based on 96"(2440mm) frames as a standard. Gate sections are prefabricated and fit in place prior to installation. The shield layout is done in advance and support holes are usually drilled in the shop prior to shipment.

The design of the frame at present (except for fibreglass) has not evolved much beyond the original B.I.P. design. Each frame is 6"(152mm) wide (standard) with 2-end plates, 3-front stringers and 1-top back stringer. The bottom stringer serves a dual purpose by becoming part of the anchoring system as a tube or in conjunction with a similar stringer on the back of the dasher to house a plate that the anchor bolt is drilled into. As each panel is completed, it is checked and prepared for shipping to the construction site. When ready for installation, a trained team of up to 4-persons attends the site and anchors the system to floor in about 350-man hours.

Dasherboard Components

Several factors control the choice of materials to be used in dasherboard construction. Regrettably, most times it is the budget, which dictates the final product. Other factors include proposed building use. What will the building be used for? Will it be multi-use where the dasherboard system is removed and reinstalled on a weekly basis? Is it a 7-month operation for ice sports only? Will it be converted during ice in or ice out times to allow large crowds to attend special events? If building or upgrading a dasherboard system, the persons involved should truly spend, some time identifying what the building could be used for. Regardless of the initial intended use, many times after construction, facility operators are pressured into providing service for non-traditional use events. Building codes, fire regulations and egress legislation should all be factored when determining dasherboard construction. The installed man gates may meet the set requirements for limited sporting events but may limit the attendance levels of special events as ice exit doors limit egress. A system, which has panels easily removed, might better serve the operation.

Dasher Frames

As previously indicated, systems may be crafted from fibreglass, wood, steel, aluminium or any combination of all three. Choosing the right material for your operation is crucial to life expectancy, customer satisfaction and maintenance. Both steel and aluminum frames have a heavy duty and a lightweight design depending on the manufacturer. It is important for the operator to compare the frame designs before looking at the price and decide what the preference is.

Aluminium, being a lightweight structural alloy is generally more flexible then steel systems. Aluminums do not need galvanizing except when in extreme conditions and is generally regarded as lower maintenance material. It's primary reason for being used in a dasher frame has always been the ability to handle the lighter frame when taking the dashers in and out. It is important that an aluminum frame is properly welded to ensure its long-term stability.

Properly prepared **steel** can also provide a quality product. Steel systems, must be galvanized or have a "powder coated" paint applied to protect the steel from moist conditions. Steel is an easier product to weld and is stronger then aluminium. Steel dashers are generally less expensive then an equal aluminium design. Many rinks are

now combining both aluminium and steel to provide a solid system that has lightweight sections where the frames need to be moved in and out.

Wood applications are generally for projects with a very small budget and are usually better served in outdoor applications.

Fiberglass frames have been in existence in various designs for over 30 years. They have not been proven to hold up over a long time in a rigid indoor Ice Hockey environment.

This material is ideally suited to outdoor applications due to its ability to withstand the elements and not react to temperature changes as plastics and metals do. Fiberglass system is ideally suited for inline and recreational ice hockey settings.

Dasherboard Cladding

Options for the surface of a dasher frame are as follows:

- Plywood with 1/4"(6mm) polyethylene
- 1/2" (12mm) Polyethylene
- 1/2"(12mm) Ultra high molecular weight polyethylene (UHMW)
- Fibreglass/Urethane

Traditional construction involved plywood and a polyethylene combination as discussed earlier. The sounds of this type of construction are closely related to the history of hockey itself. Although wood is higher maintenance and will absorb water, this combination of materials still provide excellent puck play.

The industry standard for dasherboard cladding has become a 1/2-inch (12mm) polyethylene. It is easy to handle and work with and is cheap. From its inception into this industry, polyethylene's reaction to temperature has always been an issue. It also absorbs more energy and does not rebound the puck like the former wood systems did. The advantages of polyethylene are it's low maintenance, long product life and reasonable cost. These advantages generally outweigh the negative factors.

UHMW is a tighter specification and more consistent form of polyethylene. It eliminates inconsistencies found in polyethylene which can ranges from high to medium high density depending on the amount of regrind in the material.

Fibreglass or fibreglass/ urethane materials are lighter weight and can be designed to provide better puck play. These materials do not react to temperature, but are generally more expensive. Fiberglass cladding is the preferred outdoor material.

Dasherboard Sills, Sill Bands and Kick Plates

To provide a quality installation several items are applied to the board construction once complete. The top of the dasherboard system will have a sill plate applied so that the shielding has a quality surface on which to rest. A high-density 1/2-inch (12mm), 3/4-inch (19mm) or 1-inch (25mm) polyethylene material can be applied. Again, a wood/ polyethylene combination can be used as a cost saving measure. The sill band, which lies directly below the sill plate facing the ice surface, is usually 2" (50mm) wide and placed for cosmetic reasons only when using a wooden topsill.

The kick plate is installed at the bottom of the cladding and provides a safe operating distance for the ice resurfacer to run along while not interfering with the actual board cladding. Kick plates are 8"(200mm) high with a thickness ranging from 1/4-inch (6mm) to 1/2-inch (12mm), however 1/2-inch (12mm) is the industry norm. In sand floors the kick plate is often extended down an additional 2"(50mm) to 3"(76mm) to provide or hold in a moisture barrier.

Dasherboard Anchoring Systems

Types of anchoring systems are as follows:

- Permanent
- Cast-in-place
- Epoxy (drill-in)

All refrigerated slabs have an expansion joint around them that acts as a separation between the freezing floor and the perimeter concrete. When the dashers are installed onto the refrigerated slab the expansion joint is located directly behind the dasher on the spectator side. When the dashers are installed onto the perimeter slab, the expansion joint is located in front of the dashers on the ice side. Dashers, which are installed on the refrigerated slab, will have refrigeration pipes located directly below the installation. When the dashers are installed onto the perimeter slab, they must be cantilevered out over and across the expansion joint a distance far enough to allow the refrigeration system to create solid ice to the face of the dasherboard. Galvanizing, zinc plating or using stainless steel is recommended for all anchors installed into concrete.

- Permanent anchors are welded or fixed in place under the center posts of a Built-in-place dasher system. These anchors are installed prior to the posts being set in place and are located on the perimeter slab. Generally, a curb accompanies this type of construction and the posts are able to fit close to the edge.
- Cast in place anchors are used when the dashers are to go on the refrigerated floor. These anchors are generally made up of a 5/8"(15mm) thread-coupling bolt attached to a threaded rod and welded onto a bottom plate. The design allows the anchor to be laid out on the insulation and between the pipes prior to the concrete being poured. The anchor layout must be drawn in advances and should be coordinated with the refrigeration and seating contractors to ensure the anchors are in the right place. The threaded rod allows the adjustment of the anchors prior to the pour to ensure everything is level. Levelling of the anchors is best done with a laser device.
- When placing the dashers on the perimeter pad a drill in concrete anchors are used either with epoxy or without. The anchor should be a minimum 3"(76mm) long with a minimum 5/8"(15mm) thread. Epoxy provides a stronger set in the concrete and is recommended. The anchor layout can be done at the time of the dasher installation, but should still be laid out in advance by the manufacturer.

The anchoring system and installation can be the difference in a straight and true dasher installation that lasts. Care must be taken to ensure the anchor install is right and all parties involved in the project give it the attention it requires.

Protective Shielding

There are three main types of protective shielding used in arenas, they are:

- Chain link fence (outdoor)
- Acrylic
- Tempered Glass

Chain link fence, tempered glass and acrylic are all used to top rink dasherboards. The original idea to such an addition was not spectator safety but to keep the puck in play, thus reducing game time. The added benefit was spectator safety. Hardly two arenas are created equal when it comes to shielding installations. With no "standards of construction" in place, their size and type, all too often fell victim to budget limitations.

Chain link fence is primarily used in outdoor construction. It is very durable and can withstand much abuse. Owners of a chain link fence system, much like their glass counterparts, must set into action a comprehensive inspection process to ensure that no parts of the fence have loosened posing a safety risk to players or spectators.

Acrylic shields are light and easily handled for facility with quick changeover schedules. When using acrylic shielding it is recommended that 1/2-inch (12mm) thickness be used to surround the entire arena. Some major league arenas are starting to use 5/8"(15mm) acrylic at the ends due to the increased impact of the puck. Acrylic must be cleaned with a mild soap if any and water. Dissolvent or chemicals will weaken the plastic and can breakdown the shields over time. Acrylic provides higher optics than tempered glass or polycarbonate and like other materials, it does not provide a clear view when viewed from an angle. It is also easily replaced when broken. Due to acrylic's ability to flex, there must be a small channel on the top sill or a groove in the top sill to prevent the bottom from bending inward too much. This is generally regarded as a good practice for all shields.

Tempered glass is heavy and is not easily handled, however, it is extremely easy to maintain and will not scratch. Tempered shields can be cleaned with any glass cleaner or dissolvent. When using tempered glass it is recommended that 1/2"(12mm) is used on sides and 5/8" is used on the ends radius to radius. This is due to the impact strength difference between tempered and acrylic glass. Broken tempered glass will leave millions of small pieces. Personal Protective Equipment such as safety glasses, CSA approved footwear, hardhat, gloves and long sleeved shirts should be worn when working with any type of shielding.

Other types of shielding, which have been introduced include laminated safety glass and polycarbonate. However, both have been found to have limitations and presently are considered cost prohibited to be utilized.

Weights of Glass:

Tempered Glass	7lbs per square foot @ 1/2-inch thick (34.22kg per square metre @ 12mm thick)
	8.5lbs per square foot @ 5/8-inch thick (41.57kg. per square metre @ 15 mm thick)
Acrylic Glass	3lbs per square foot @ 1/2-inch thick (14.67kg per square metre @125mm thick)
	4lbs per square foot @ 5/8-inch thick (19.56kg per square metre @15mm thick)

Heights of Glass:

The height of shielding in any arena is dependant on a variety of issues including dasher height, amount and location of spectator seating, height of perimeter pad surrounding the dashers, type of sports or level of competition being played in the arena. Currently spectator arenas use 8'ft.(2440mm) high shields on the ends and 6'ft.(1828mm) high shielding on the sides. Community rinks vary, but the norm is 6'ft.(1828mm) high on the ends and 4'ft.(1220mm) high on the sides. The architects, operators and insurance company should review this decision in a new building prior to commitment to purchase. Information for evaluating arena boards and glass is available through the O.R.F.A. office.

Protective Safety Netting

To properly protect spectators it is a recommendation of O.R.F.A. that protective safety netting be placed in new or retrofitted facilities from the top of the shielding to a height that adequately protects all spectators. Netting is available in black, white or clear monofilament. The netting should be a 1"(25mm) to 1 1/2"(38mm) opening with a maximum mesh stretch size of 3 1/4" (82mm) measured inside to inside, to prevent the puck from penetrating. Generally, the netting is attached to the top of the shield supports and attached to the ceiling struts by a cable or a conduit that is formed to match the radius.

Shielding Supports

The types of shield support range from one manufacturer to another, but can be broken down into the following categories:

- Standard aluminum 2-piece tube support
- 2-piece aluminum quick release support
- One piece aluminum support
- Clear polycarbonate supports
- Seamless glass systems

Shielding support selection must be made with consideration of many factors. Players and coaches want flexible, forgiving shields that provide absorption with the added benefit of "good bounce."

Facility managers/supervisors prefer light materials with ease of handling for quick changeovers. Television contracts, owners and spectators want clear unobstructed site lines.

The most common installation of an aluminium support is in the middle of the dasher system through the top sill extending from inside the dasherboard panel to a height of not less than 13"(330mm) from the top of the shield. The support is generally mounted on the middle stringer in a cup or bracket. Such supports allow for easy shield repair and/or removal. All aluminums shield supports require a gasket to protect the shielding from breakage along the edges.

- two-piece aluminum support is a standard in community rinks. It is a round support that is approximately 2"(50mm) wide and contains a rounded faceplate. The front plate is then screwed into the body of the support and can be removed to replace the shield.
- quick release support is a two-piece aluminium support with no mechanical fasteners. Designed to allow for quick changeovers it is accepted for high conversation facilities. The faceplate is flat to reduce puck bounces.
- one-piece solid aluminum shield support is a typical H design that is used in lightweight inline applications. Similar one-piece supports are used for gate terminations or any point where the shielding ends.
- clear polycarbonate support is designed as a one-piece support to use as an alternative to the seamless system. It provides a relatively clear view and plenty of flex.
- seamless glass systems have been very popular over the last few years. Tempered glass must be used because of its ability to remain rigid without a vertical support. The support mechanism for the shields is a combination of a top clip, a bottom clip and the shield groove. The top clip is generally manufactured from lexan and prevents the shields from separating. The shields are also supported at the bottom in a groove that is at least 4" (100mm) deep. This channel is the key to providing movement in the shields. Bottom clips are also required to space the glass properly ensuring the tempered glass does not come in contact with each other, which could instantly shatter the glass.

Players, Penalty and Timekeeper Boxes

Sometimes forgotten during the early planning stages, these areas are an integral part of the playing area and dasherboard system. Most common layouts finds players boxes on one side of the surface while the penalty boxes being separated by the timekeepers box on the other side. Constructors are encouraged to seek out all current sporting rules as some leagues and governing bodies have specific requirements to be met to sanction larger events.

A standard length of a player box is 30'ft.(11.8m). This allows a full complement of adult hockey players in full gear to sit. Depth is no less than 5'ft. (1525mm) with a preferred depth of 8'ft.(2440mm). Floors of the boxes are always covered with resilient rubber flooring. The floors can be raised 6"(152mm) to 8"(200mm).

Raised floors allow for easy removal for changeovers and provide easy access to the ice from the boards. Benches are typically 9"(228mm) wide and a height of at least 24"(609mm) above the flooring. The benches are mounted to the concrete floor or

inserted into bench bracket supplied by the manufacturer. It is strongly recommended to include floor drains in the concrete floor of the players and penalty box bench areas. Player's gates must have 1 door on each end for player to get on the ice. It is preferred that both gates are in the neutral zone.

Penalty boxes are typically 8'ft.(2440mm) long placed on either side of a 6'ft.ft.(1828mm) long timekeepers box. There is a table in the scorekeeper's area and there should be access to penalty boxes for closing the gates after the players leave. It is recommended that the timekeeper's box be totally enclosed with protective glass.

All players benches and penalty benches shall have protective glass of the same height as the adjoining board glass along the ends and back of the bench to protect spectators in walkways, alleys and seating area. In front of the home and visitors penalty boxes the glass shall be continuous and be the same height as the adjoining protective glass. For consistency and fairness of play, glass installation and height should reflect the installation at the opposite end.

The box areas need to be reviewed and laid out properly for functionality and access points prior to construction.

Gates

The following is a chart detailing the standard types and sizes of gates found in most arenas. Sizes may vary with each facility depending on the age of the system and access to the rink. In new construction, the gate location should be reviewed with your local fire marshal to ensure it complies with fire escape regulations.

Types of Gates	**Gate Sizes**	**Hinge Type**
Double swing machine gate	120"(3048mm)	HD adjustable
Overhead lift machine gate	120"(3048mm)	
Player/Penalty box gate	34"(863mm)	Piano Hinge
General access gate with 4"(100mm) to 8"(200mm) threshold	36"(914mm)	Pin Hinge or Standard hinge
General access gate c/w 4" (100mm) or less threshold	48"(1220mm)	As above
Double swing access gate	72"(1828mm)	Pin hinge or adjustable hinge
Lift-out /Concert gate	48"(1200mm)	Polyethylene slide track

All gates, which contain shielding, must have an ice side door release mechanism that allows players to easily exit the ice area. Most systems are crafted as to allow the player to work the mechanism with their hockey gloves on.

Man and machine gates that are properly installed with quality hardware will provide years of worry-free use. Experienced dasher suppliers will recommend or have standard installation practises that will eliminate many chronic problems.

Gates must be properly aligned and balanced to function properly and should be checked regularly as part of your maintenance program.

An item often missed on access gates is a gate stop located at the lower part of the gate to prevent it from being pushed out too far and stressing the gate latch. It is important to keep the gate stop tightened in order to maintain proper movement of the gate.

On a new installation once your gate locations are selected, extra anchoring points will help to ensure that the dashers and the gates stay in alignment and provide the added stability needed in corner locations or wide gate openings. When retrofitting an existing set of dashers with new gates reinforcement of the dasher section surrounding the gates must be considered for the same reasons as indicated above.

Vertical lift gates are considered an efficient alternative for the machine gate because they operate quickly under push-button control and can be operated by one person. Most lift gates are self-levelling with adjustable hardware for ease of operation and maintenance. Vertical lift gates are available in an electric, hydraulic lift or the original chain hoist. It is recommended that this item be purchased from an experienced reputable supplier and a rigid maintenance contract is secure through a local company.

Hardware

There are a number of hardware designs that are specific to a particular manufacturer and some that are generic in design. It is important when contemplating your dasher system that the hardware is reviewed to ensure it meets your facility users approval and is a sound design.

There are some common elements for all:

- galvanized hardware to ensure rust resistance
- sturdy steel construction
- easy, non-grease lubrication should be used; nylon bearings built into a hinge is an advantage.
- latches should be easy to operate with a hockey glove or by a small child.

Standard types of hinges are:

- piano hinge
- pin hinges, 2 per gate, available with self-lubricating features and easy lift off
- heavy-duty adjustable hinge, used for large gates that can be adjusted vertically and horizontally to properly, align the gate.

Latches

Most latches are gravity latches that are simply pushed down or lifted up. This reduces the amount of moving parts and ensures the latch will be down to fit into the strike plate attached to the dasher frame.

Goal judge boxes
Goal judge boxes are required at a certain level of play. This box should be constructed of similar materials as the dasher and can be permanent or removable. Size of goal judge box is typically 48"(1220mm) x 48"(1220mm) with a side gate for easy access. The goal judge box must be designed to fit the facility.

Storage
If your system is removable, be sure to include dasher and shield carts as part of the original purchase. The dasher carts are a simple flat bed with removable posts that are stackable. Generally, 9 carts are required to store an entire dasher system. Glass storage carts are available in a few designs. A frame carts are the most common and come in a large and small size for end and side shields respectively. Proper straps should be used to secure the glass in place when on the carts. Whether empty or full these carts are bulky and require adequate storage. A forklift, complete with glass lifting attachment, is a proven time and money saver to such systems.

Backer panels - Backers are either permanent or removable and can be made out of anything from plywood to polyethylene. Backer panels are used to close in the back of the dashers. Although the purpose of these panels is primarily aesthetic, they can serve a few functions outside the obvious aesthetical value. Backer panels help to reduce maintenance in your arena by eliminating the debris that can get into the back of the dashers. They can help deaden the sound of the boards in some arenas and are now being used for extra advertising space.

Insulation - Where heat is being transmitted from an outside area it will sometimes cause a softening of the ice in the affected area. Insulation can be added inside the boards to reduce the heat being transferred to the ice surface.

Rink dividers - Small thin dasher walls that separate the ice into 2 or 3 areas for shared practices, youth hockey and 3 on 3 Hockey. Dividers are made out of a variety of materials and are quickly becoming a revenue generator in many rinks.

Ice Dam - 1"(25mm) polyethylene or a steel ring that is placed under the dashers to maintain the ice when the dashers are removed is known as an "ice dam". The ice dam is strongly recommended for buildings that are converting to a different venue and taking out sections or all dashers while leaving the ice in place. Ice dams should be independently anchored from the dashers. A current trend is to use a 2"(50mm) ice dam to help retain the ice covers. In open areas that are to be used as load in spaces, the ice dam can be constructed with a beveled ramp to cover the expansion joint to make the transition easier.

Preparing Architectural Specifications for Dasherboards

Installation of new dasherboard systems as well as retrofits/repairs to existing systems requires attention to detail! Determining the proposed use, actual size and special needs of the operation will all play a role in costing. Working closely with a proven "ice arena" architect or consultant can be advantageous in some projects. Draft a specification that is performance based and provides minimum acceptable materials. Let the manufacturers provide you with their proposals for your building to learn the features that differentiate the various designs and manufacturers.

Notify all potential suppliers of what you require and the specific timelines well in advance so that you can review the received proposals in a timely basis. The lead-time on a dasher system ranges from 6 weeks to 16 weeks based on time of year, time taken to get proper shop drawings prepared and administration of a contract.

The following table contains measurements in both imperial and metric conversions. Information is current at time of printing (04/2002).

General Facts: Dasherboards

Facility Type	Size of Ice Surface l x w	Radius of Corners	Height of Dasher	Height of Shield	
				Sides	Ends
Community * Facility Seating 1500 or less	190'ft x 90'ft	28'ft to 32'ft	48"inches	48"inches	72"inches
	58m x 26m	8.5m to 9.7m	1220mm	1220mm	1828mm
Community * Facility Seating more than 1500	190' ft x 90' ft	28'ft to 32'ft	48" inches	72"inches	96" inches
	58m x 26m	8.5m to 9.7m	1220mm	1828mm	2440mm
Community Facility	200'ft x 100'ft	32'ft	48" inches	48"inches	72"inches
	60m x 26m	9.7m	1220mm	1220mm	1828mm
Community+ Facility	185'ft x 85'ft	28'ft	48" inches	48"inches	72"inches
	56m x 26m	8.5m	1220mm	1220mm	1828mm
NHL Facility	200'ft x 85'ft	28'ft	42"inches	60-72"inches	96"inches
	60m x 26m	8.5m	1066mm	1524-1828mm	2440mm
Olympic Facility	200'ft x 100'ft	28'ft	48"inches	36"inches	72"inches
	60m x 26m	8.5m	1220mm	1m	2m
A.S.T.M. Guide	200'ft x 100'ft	28'ft	40-48"inches	36"inches(min)	72"inches (min)
	60m x 30m	8.5m	1016-1220mm	914mm (min)	1828mm (min)

*Recommended new municipal standard
+Old municipal Standard

Dasherboard Advertising

The 1972 Russia-Canada hockey series introduced the world to arena dasherboard advertising. Dasherboard advertising is a true revenue generator for all involved. Larger facilities may continually change advertisers based on events while smaller operations may contract on a yearly basis. Considering the average installation and upkeep costs of a complete dasherboard system, a facility manager can easily recoup actual installation costs and upkeep costs with a quality-advertising program. Managers must review planned advertising concepts with users as some organizations have clear policy on acceptable forms and content to be displayed during significant events. Professional hockey allows a maximum of 17-advertisements to be placed while community rinks have been known to accept 50 advertisers. Determining the number of ads and installation format will be influenced by several factors; price, length of advertising contract and expected presentation. The following are the four basic dasherboard advertisement formats.

Permanent Advertisement or Polycarbonate Advertisement Panels
Accepted in most community arenas as a "full-season" permanent advertisement. It is not scheduled to be removed for one entire operating season and is usually controlled under strict contract. Some facilities control the selling, installation and maintenance of such arrangements while others sub-contract the responsibilities, accepting a percentage of the rental fees. These decisions must be made by determining how much time a facility might afford to the set requirements for a successful program.

Advertisement is usually applied to a sheet of ABS material, covered with a 3/16" sheet of polycarbonate and then installed in a method to replace existing dasher cladding material. The installation must be smooth to ensure that no player becomes entangled during play.

Vinyl Coated Advertisements
Constructed as a stick-on advertisement made of heavy vinyl these types of ads are placed on to existing dasher cladding thus making them easily replaced when damaged. Having a high clarity for the advertisement while affording flexibility to the facility makes this type of advertising appealing.

Vinyl Banner Advertisement
Usually used for one-time events, a 4mm(0.16") ad is applied to vinyl banner and then placed over the existing dasher cladding. Replacement ads must be considered to replace damaged units between periods. Such advertising is also considered to have a high clarity value and offers much flexibility to the facility.

Rotational Advertisement Systems
This concept is borrowed from the professional basketball circuit. A mechanically driven system is mounted within the dasherboard system and protected with a piece of 1/2"(12mm) polycarbonate. Requiring 110v electrical access, these units are controlled by a computer or automated time device that scrolls advertising on demand. The flexibility of such units is huge as it allows a facility to generate revenues in many different manners.

Regardless of which system is chosen; to be successful a detailed maintenance and upkeep schedule must be crafted and adhered to!

Conversion of Your Dashers

In order to maximize the use and revenue potential of an arena it is important to consider the most effective way to convert a rink to a concert hall, basketball court, trade show or other viable venues.

The following are the basic items that need to be considered when looking at alternate uses for your Arena:

Ensure the dasher system is prefabricated or at least partially prefabricated in the area that the dashers are to be removed. Aluminum dasher systems are a lighter alternate to the heavier steel dasher systems. The system must be a solid aluminum design to withstand being taken up and down a multiple of times

Ice covers were developed to cover the ice and eliminate the need to remove the ice for an alternate event. A good ice cover will be strong enough to withstand heavy machinery and provide the needed insulation, without freezing to the ice. These covers are typically 1"(25mm) thick and go down after the ice event prior to any thing being placed on the floor. Once the cover is laid out then the floor is ready for use for a concert or other event.

Ice Dam is typically a 1"(25mm) thick perimeter ring that is placed under the dashers. It is generally necessary in spectator buildings. The primary purpose of the ice dam is to maintain the edge of the ice in areas where dashers are being removed. This ice dam can also act as a thermal break between the floor and the dasher, it can be extended to cover the expansion joint and be ramped in vomatories. The ice dam should be independently anchored to the floor so it will not move when boards are removed. If independent anchors are not available, then the dasher anchor can be used. Standard material for an ice dam is High Molecular weight Polyethylene or galvanized steel.

Shield carts are required or should be used to properly store the shielding during a conversion. A typical shield cart is an "A" frame design. There are large and small carts for the end and side shielding respectively and they are typically on casters.

"Lift out sections" need to be designed into the perimeter ring where aisle ways come down to the dasherboards to provide the necessary traffic flow onto the floor. These lift out gates are a smaller section within a standard frame that are easily removed to provide an opening and are generally only used when the arena is in a non-ice event. It is important to have these sections properly aligned and have the right threshold height that aligns with the first riser of the seating. Building codes need to be reviewed and seating, companies should be consulted on the location and size of the lift out sections. Some buildings have up to 14 lift out sections in the dasher system.

Player and penalty boxes should be easily demounted with removable floors and benches. Most prefabricated systems are designed with raised floors in the boxes and the benches are designed to fit into sockets on the floors.

Depending on the seating system being used in your facility and the type of set up required, certain dasher sections would need to be removed and stored away. Dasher and shield carts are used to move them out quickly and store them away.

This is a brief overview of the steps taken to convert a 5,000-seat arena from hockey to basketball.

A typical conversion will require 40 to 80 man-hours based on 2 to 3 working crews.

- Final scrape of the ice after the game without a flood
- One crew begins laying the ice cover starting at the far end and working towards the machine gate
- Second crew takes out the shielding and remove the shield supports
- Lift out sections and vomatory sections to be removed
- Player benches and floors to be removed
- Basketball floor to be placed on top of the ice cover

- Court side seating to be placed on the floor and aisle steps

Dasher Maintenance

Dasher manufacturers will provide a maintenance manual for your system to outline what steps should be taken to maximize the life of your dashers and minimize your chances of breakdown. Dashers should be inspected on a frequent basis to look for loose bolts; hardware and areas that may have been weakened from play or ice resurfacer. Shield supports and gasketing should also be checked monthly to look for any signs of loosening, which can lead to glass breakage. All hinges and hardware that moves should be lubricated or inspected monthly. This will prevent hinges from wearing down and gates coming loose. On an annual basis, the dasher system should be reviewed thoroughly and repaired as required.

Proactive Risk Management

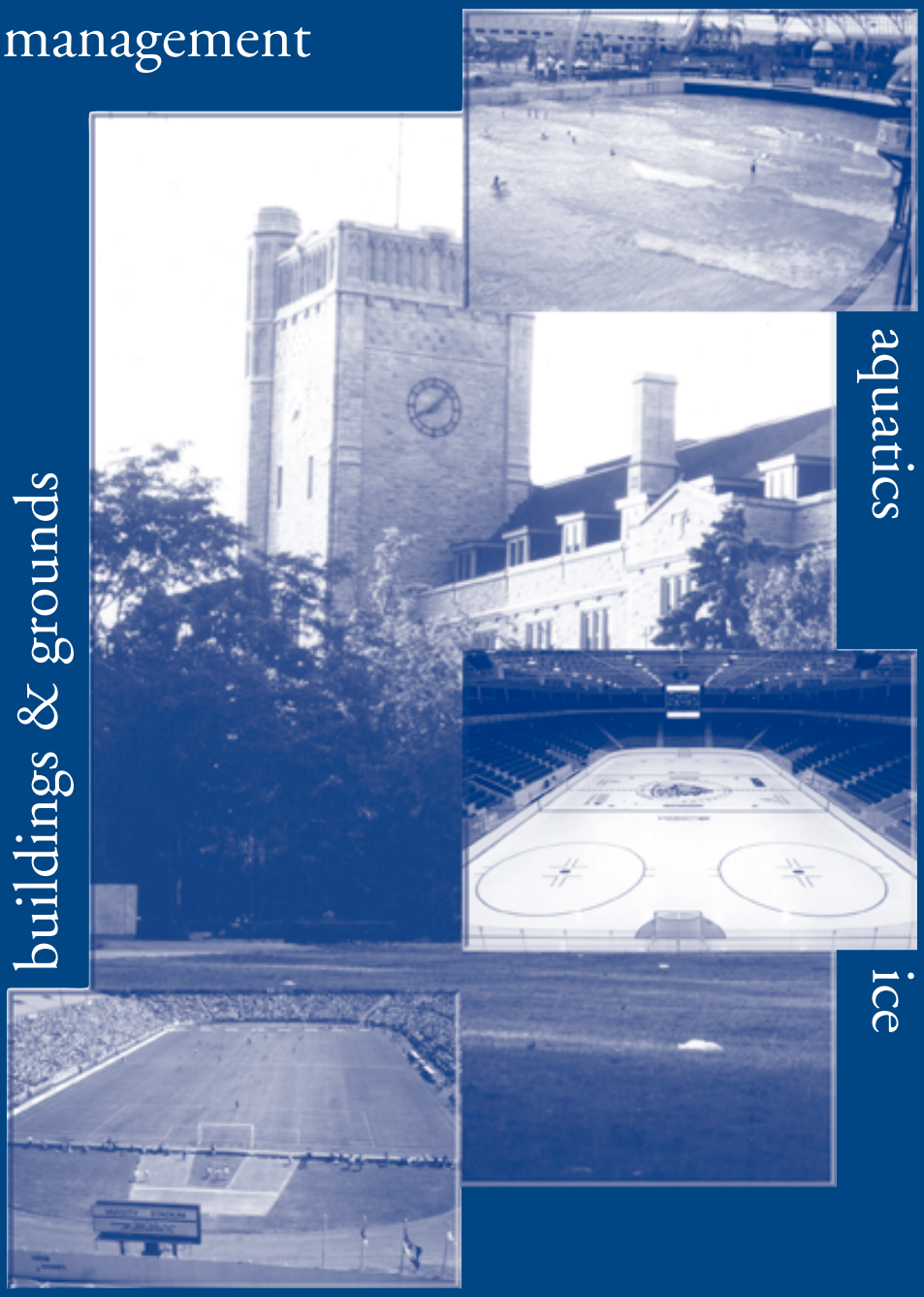
Litigation continues to mount against facility operators directly related to dasherboard and shielding heights and maintenance. Improvements to the equipment used in sporting events, the general increased size of players and the expected compensation from those who are injured requires that those responsible for building operations take all reasonable precautions to ensure patrons and staff are protected. Scheduled inspections of board and glass systems are an important risk management tool. The inspection report should identify components that require ongoing assessment such as glass supports, spacers, checking boards for cracks, loose fitting or projecting screws and nails. These reviews should be conducted on a daily and/or weekly basis. Staff should be trained to recognize the potential hazards that may exist in their facility. It is important to provide staff with the necessary resources such as policies, procedures and training to address any facility concerns that may affect the operation. It is recommended that facility owners develop a daily and/or weekly inspection checklist to be completed by identified staff. This will allow you to evaluate your facility safety program and take appropriate action when it is required.

The following are accepted recommendations for community rink operations for new construction and retrofits.

Objectives

- The operator/manager will ensure that the arena facility has taken all reasonable steps to minimize risk to the user groups and spectators.
- Facility assessments are conducted and updated annually and that arena staff are trained and knowledgeable about minimizing and eliminating risk.
- Program requirements are known and understood by all staff and risks reduced through the implementation and or changes required.

management



buildings & grounds

aquatics

ice

"To Be The World–Class Leading Authority Dedicated To The Recreation Facilitation Profession."