# Keeping Athletes and Fans Safe in Sports Facilities

Design Considerations for Athlete and Fan Safety

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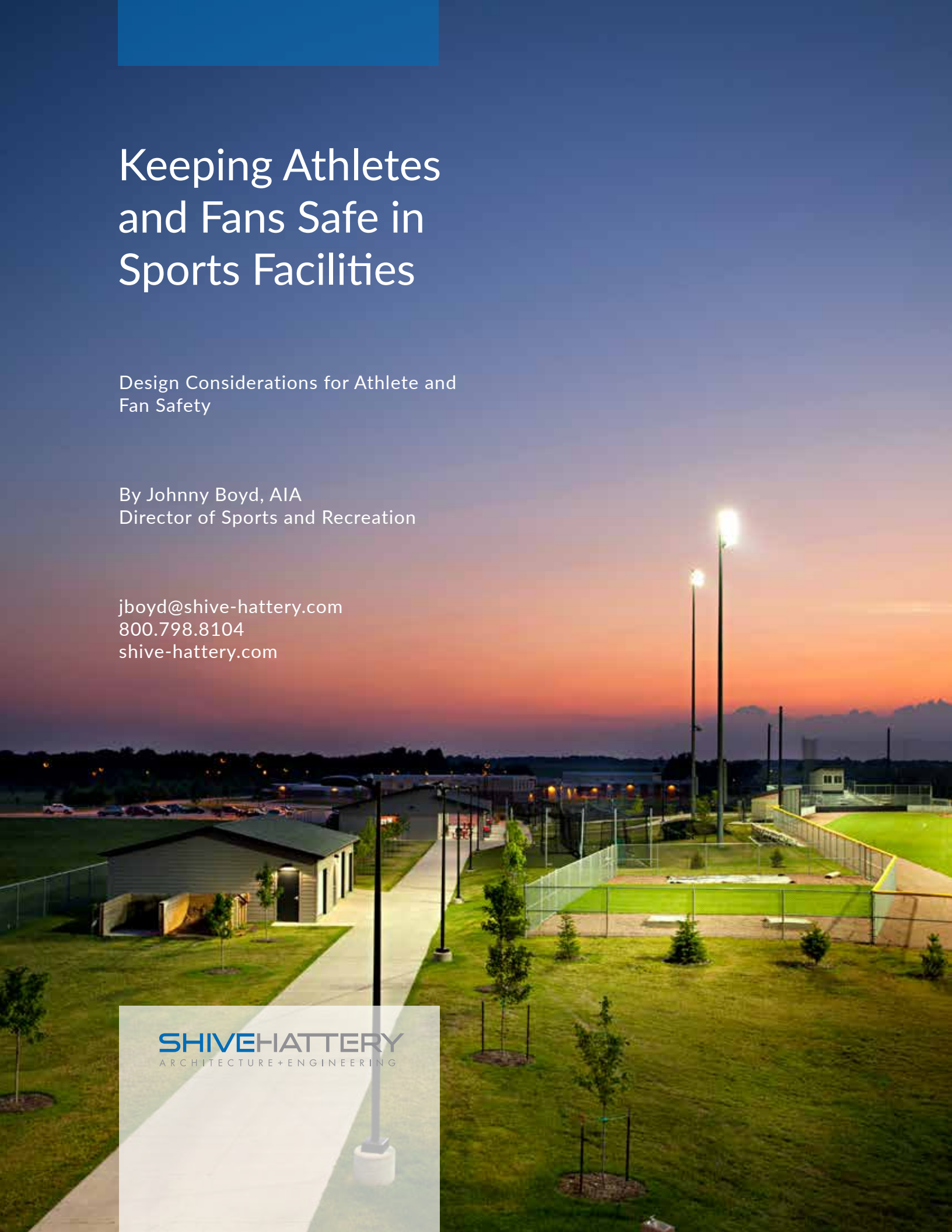

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# KEEPING ATHLETES AND FANS SAFE IN SPORTS FACILITIES

## DESIGN CONSIDERATIONS FOR ATHLETE AND FAN SAFETY

Sports facilities bring all kinds of people together for common causes: friendly competition, health and fun. Ensuring a safe environment for the athletes, fans and coaches who spend time in and around your sports complex is vital to reducing risk, preventing injury and complying with regulations and guidelines.

Here, we've mapped out a few of the most important design considerations that can impact athlete and spectator safety.

# FIELD PLAYING SURFACE AND ORIENTATION

Third-party studies indicate that there is no major difference in safety when choosing between synthetic and natural turf fields. In both cases, maintenance is key to protecting athletes during games or practices.

## SYNTHETIC FIELDS

When selecting synthetic fields, pay attention to the impact rating (also called the "g-max rating"). General requirements state that g-max levels should be at 200 or below; most of today's fields are designed with levels well below this number. The lower the g-max level, the softer the playing surface – and the less chance of concussion or injury if an athlete falls.

Proper maintenance of synthetic fields involves regular testing at the beginning and end of each season to assess g-max and fill-material levels. Based on results, there are ways to quickly redistribute fill and improve field safety. Incorporating shock pads – an underlayment placed between the turf and field's stone base – can also reduce the chance of injury by increasing field resilience.

Although irrigation obviously isn't necessary, synthetic fields do require good drainage systems to quickly "de-water" fields and reduce standing water after rain or snow to make sure no one is playing in slippery or unstable field conditions.

## NATURAL GRASS FIELDS

On natural grass fields, safety factors like divots, worn grass or lack of moisture come into play. After every game or practice, the field should be inspected for wear or damage. Grass growth is dynamic, which means that it requires a regular maintenance commitment. Field testing and upkeep is just as critical for a natural grass field as it is for a synthetic field. Regular watering – whether through irrigation or manually – along with proper fertilizer keeps the field soft, reduces the likelihood of divots forming and promotes healthy grass growth to absorb more impact.

Similar to synthetic fields, good drainage systems for natural grass fields is vital to athlete safety, helping to remove water quickly so players aren't using saturated fields. Not only can wet conditions create more opportunity for sliding and unintentional contact, but playing on wet fields can also prematurely wear out natural grass. When this happens, the grass turf needs to be repaired with sod as required, giving it adequate time to grow and attach so it doesn't slip underfoot when in use.

### FIELD ORIENTATION

Synthetic fields warm up faster and are hotter than natural grass fields. Proper field orientation can minimize the sun's effects and keep playing surfaces cooler. We recommend designing fields that run north and south so athletes don't play into the sun or deal with compromised vision. On natural grass fields, proper orientation can also encourage grass growth and ensure that grass doesn't get baked by the intense heat of the sun.

## ACTIVITY AREAS

Everyone who walks into your sports facility expects a "safe zone" for practicing or competition. Activity areas need to be designed to support safe movement and high rates of activity and speed.

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### FLOORING

Not all floors meet the needs of each sport. Choosing the right floor system based on the type of activity – basketball, volleyball, aerobics or multipurpose activity areas, for example – is the first step toward ensuring safety. No matter what type of floor system you choose, basic force reduction (the kind of impact the floor is designed to handle) and vertical deformation (the amount of "give" a floor has) need to be considered.

Other factors to consider, depending on the activity type, include surface finish effect (response to sliding feet) and ball bounce (suitability for basketball). Any athletic floor, whether wood, synthetic rubber, vinyl or linoleum, should have independent, tested results associated with them to indicate performance levels within each of these areas. Consult your sports architect to ensure proper floor performance specifications.

Once you've chosen a flooring that meets your needs and specifications, proper installation, cleaning and maintenance are necessary to make sure it performs at the highest level possible for as long as possible. One frequent example we've seen involves food. When spectators eat popcorn, it's inevitable that some will spill onto the floor. Because it's popped in oil, popcorn can create a layer of film on the floor. The seemingly obvious cleaning approach is to sweep the popcorn up, but doing this leaves the oil behind. Proper and timely cleaning is key to making sure that no one slips and falls on the floor, whether it's an athlete, coach or fan.

Quality flooring system manufacturers provide cleaning, care and maintenance recommendations for their floor systems. We recommend that all facility owners require the manufacturer and installer to conduct floor maintenance training with maintenance staff so they can follow the recommended guidelines each day.

### CLEARANCE DISTANCES

Planning for adequate clearance or distance between end walls and courts/bleachers, as well as around equipment, can help protect athletes and spectators. Too often, we hear stories about a basketball player being injured after running into an end wall following a lay-up, or someone twisting an ankle as they exit one piece of exercise equipment and step into another.

In Iowa, a minimum of 10 feet is now suggested as the distance between the end of the basketball court and the end wall, giving an athlete the opportunity to slow down before hitting a hard surface wall or bleacher system. For fan and player safety, it's also recommended that bleachers be placed at least 10 feet from the ends and sides of the court to give spectators and coaches a safe walking space, and athletes the chance to reduce speed before entering the crowd.

## LIGHTING

Depending on the sports activities happening inside your facility, there may be lighting recommendations or requirements to follow to ensure that athletes and fans can adequately see. (Football, basketball and volleyball all have specific lighting requirements.) Not only are lighting recommendations based on the type of activity taking place, but also based on whether regional or national television broadcasting is involved.

For example, the Illuminating Engineering Society establishes lighting recommendations for sports facilities; the university/college and high school athletic association having jurisdiction will review these recommendations and issue/publish standards to all participating schools and organizations.

Many of today's sports facilities are investing in high-quality LED lighting due to the level of energy efficiency, flexibility and directional/color-temperature control LED offers for better illumination and more uniform coverage over the playing surface.

Because LED lighting has a higher level of directional control than other options, less stray light is sent into the sky above the fields. While directional control achieves better field lighting and less glare and neighborhood spill-over, tighter direction control can increase the chances of a football, baseball, softball, etc. being lost in the night sky when put into play. Many LED professionals recommend adding LED uplights to light the bottom side of a ball when in flight.

## HVAC CONTROLS

Whether in a gymnasium, on a basketball court or in a fitness area, temperature and humidity control can prevent floors from becoming wet and slippery. Bringing fresh air into a high-activity space and exhausting stale air on a regular basis also ensures proper indoor air quality, reducing the build-up of carbon dioxide and providing more oxygen-rich/energy-giving fresh air. Introduction of fresh air, however, can make temperature and humidity control tricky. For this reason, heating, ventilation and air-conditioning (HVAC) systems should be designed by qualified engineers.

Areas with good indoor air quality/fresh air feature carbon-dioxide levels of between 350 and 999 parts per million (ppm). Poor indoor quality, where occupants complain of drowsiness, poor concentration and other ill effects, find carbon-dioxide levels of 1,000 ppm or above.

# LOCKER ROOMS

Standing water; loose, floor-strewn towels; poorly secured plumbing fixtures; or benches that are too close to lockers can create safety hazards in locker rooms. Locker and shower room spaces should be designed with as much care and thought as other spaces inside your athletic facilities. These spaces should be designed to allow free movement and easy access to amenities without getting in the way of others who may be using the locker room.

## FLOORING

Selecting the right flooring type in a locker room is just as important as the floor you choose for other activity areas. Floor surfaces finished with tile, concrete, rubber, vinyl, etc. each have their proper place and limitations. For example: Polished concrete can be slippery when wet; vinyl can tear at the edges, causing trip hazards and/or trapping water, causing mold/mildew, etc.

Factors to consider when choosing locker room flooring include slip resistance, water resistance and ease of cleanliness. Sometimes different flooring types are selected for each different area within a locker room: shower areas, dry-off areas and locker storage areas, for example. By ensuring that slip-resistant, water-resistant flooring is in place in all the right areas, you can reduce the probability of an athlete falling.

## ADEQUATE CLEARANCE AND SPACE

Providing sufficient square footage inside a locker room allows athletes to move around comfortably while also ensuring safety: making sure there's room for multiple people to sit on a bench without falling, clearance for individual locker doors to swing open and closed without hitting anything or anyone, and satisfactory clearance for other doors in the space (coaches' offices, laundry areas, restrooms, etc.).

Depending on what the room is used for, it's also important to design dedicated areas for all-group huddles or team meetings that can accommodate multiple bodies without players accidentally being pushed or tripping into nearby equipment or lockers.

## HVAC CONTROL

Exposure to mold and mildew buildup can cause health and safety concerns for anyone using locker rooms. To avoid these issues, maintain proper air movement through ventilation, exhaust and conditioning. This ensures that moisture levels are kept in check so no one breathes in poor-quality air or comes into contact with fungi. Sensors can be installed in HVAC systems to monitor humidity levels in locker/shower areas.

Upon registering high humidity levels, exhaust fans can automatically be activated to exhaust humid air while intake hoods open to allow fresh air in. Exhaust air can be routed through energy recovery ventilators (ERVs) to conserve energy.

# TRAINING FACILITIES

Much of what we've mentioned so far in regard to flooring, lighting and HVAC applies to training facilities, too. Selecting the right flooring is important, as is ensuring adequate lighting levels and facilitating proper ventilation and air handling. But there are also special design considerations for training spaces.

### EQUIPMENT CLEARANCE

Giving users enough room to safely get on and off training machines without injury, interfering with someone on a nearby machine, or getting caught on something and falling is important. To achieve appropriate equipment spacing and clearance, we recommend leaving a minimum of four feet on either side between treadmills, stair climbers, spin bikes, elliptical machines, etc., and six to eight feet in front of and behind each piece of equipment. Major egress aisles will be wider. Your sports architect can work with you to review, select and design the placement of equipment to ensure safe clearance.

### VISUAL SIGHTLINES

Because training facilities are often co-ed spaces where limited numbers of staff are providing coaching, management, therapy and rehabilitation, good visual sightlines can help employees keep tabs on many athletes and patrons at once to ensure safety and security (watching someone in a hydrotherapy area while taping another athlete's ankle, for example).

Providing clear visual pathways throughout a training facility can not only help avoid potential injuries by helping staff members spot someone doing something unsafe, but also helps promote a feeling of safety so athletes feel confident in knowing that there are authority figures nearby in case help is needed.

Determining who has access to sports facilities can help you monitor and manage building access points

# FACILITY SECURITY

It takes a series of different components to create a holistic strategic security plan. Safety is at its very best when all of these parts and pieces are designed and integrated together into a sports facility.

### ACCESS CONTROL

Determining who has access to sports facilities can help you monitor and manage building access points, as well as create an accurate plan detailing who enters the building (and when). If athletes or coaching staff members are no longer part of the athletic team, access badges can be deactivated immediately to prevent entry. Contractors or maintenance crews that need to enter the building can do so through temporary badges that only allow access for a certain period of time.

### VISUAL SIGHTLINES

Designing to ensure adequate visual sightlines in public areas of the building ensures visual contact and surveillance between the people in charge (coaches or trainers, for example, or security personnel on game days) and the people who are in their care (athletes and fans).

Creating open spaces that allow clear sightlines as much as possible can prevent suspicious activity, help athletes see courts and fields clearly, and make sure that fans can move out of the way if they can see a ball headed their way.

### VIDEO SURVEILLANCE

Video surveillance can monitor activity and provide notifications of irregular or abnormal patterns in certain areas, ensuring safety for everyone in and around the sports venue. Monitoring camera footage in real time can help keep crowds in check during games, identify possible threats, check for potential disturbances in the stands or pinpoint potential safety risks for players (fans throwing objects onto the field or court, for example). Surveillance systems can also record events for recall later if incidents need to be reviewed for more information.

Depending on the activities happening in your facility, you can integrate video surveillance systems that record clearly in the dark, track moving targets or even read license plate numbers.

### EMERGENCY MANAGEMENT AND CROWD CONTROL

Bringing in crowds of people to your facility – whether it's a group of 350 or a crowd of 70,000 – means that you must be prepared to manage and protect them if an emergency situation occurs. Understanding how people access your building, move around once they're inside, and react and egress can impact design and safety decisions.

3D crowd simulation software can, for example, simulate crowd density and behavior during an emergency. During an incident, the software can predict how and where people will move inside your building, which helps pinpoint places where wider hallways may be needed, more entrances/exits may be needed, or areas where people may not be able to hear or see alarms.

Building codes also help dictate things like emergency lighting requirements, fire alarm placement and door width; working with a sports architect can help you determine where and how these factors should be incorporated for the safest results.

## EXTERIORS

Safety starts long before an athlete or fan enters your building. From the very moment they pull into the parking lot, regardless of the time of day, people should feel safe and comfortable as they approach the facility.

### LIGHTING

Exterior lighting in parking areas, along walkways to and from sports facilities, and at entrances provides protection for athletes and fans coming to and from games and practices in the dark. Ensuring that building entrances, parking lots, and sidewalks are easily accessible and visible from the street can also promote safety and deter potentially dangerous situations by bringing most activity into plain view.

### SIDEWALKS

In areas where people utilize designated sidewalks and paths, it's important to keep up with regular maintenance and stormwater issues, which can lead to erosion. After a few years of neglect, dropoffs at the edges of sidewalks of anywhere between six inches or more can appear on either side of a walkway. If someone steps on the edge of the sidewalk, they could easily fall or twist an ankle.  Regular maintenance, upkeep, and repair work can keep erosion problems to a minimum.


## SAFETY AT ALL LEVELS

Although implementing these practices will create enhanced levels of safety for players, fans and coaching staff, they also require investments and buy-in at all levels – from the head of the organization to the staff running and maintaining the facility and grounds.

Making facility design a priority, implementing all maintenance requirements, dedicating appropriate amounts of space to certain activities, and investing in new technology are all important elements of a commitment to safety and security. While these measures may result in increased costs and more staff, it's also just as probable that these measures will increase facility use, drive increased revenue and lead to higher user retention.

The topics listed here can serve as a starting point for internal and external conversations about making safety a priority. To ensure that initiatives are successful, safety should be an area of focus for everyone at all levels within the organization. Working with Shive-Hattery's sports architects can help you pinpoint potential threats or problem situations, and prioritize initiatives to improve athlete and fan safety.