Restoring synthetic surfaces after floods

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In "After the Flood," in the November 2005 issue, I focused on restoration of natural grass surfaces. The lack of information on restoring artificial surfaces has made this follow-up article challenging to write. While there is some good information concerning the restoration of the first generation nylon surfaces, there is almost no technical information on the restoration of the new in-filled synthetic surfaces. The information, although fragmented and inconsistent, may help shape a process to restore a synthetic surface that has been heavily damaged by a flood event.

The process of assessing the damage of a synthetic surface begins with the same basic steps as outlined in the first article including documentation for insurance purposes, sampling for environmental contamination and controlling access to the site. Once the assessment is completed, the process for restoring synthetic turf departs quickly from that for natural grass.

Natural grass surfaces can be milled to remove the contamination and adding new growing media to match the existing.

Collected fibers

High traffic area

Low traffic area

Portland, OR is home to one of the oldest outdoor FieldTurf installations in the world, **Strasser Field**. Debbie Kneeshaw maintains Strasser Field and the East Delta Sports Complex for City of Portland Parks and Recreation, and says the field was installed in October 1997. "After 5 years the field fibers began to break down from play, age, and maintenance. The fiber is intended to 'fibrillate' and we have experienced a 3/4-inch loss of fiber length in the goalmouths from over-fibrillation," she told an audience of STMA Conference attendees.

Fibers in collection tray

Fibers in dumpster

Synthetic surfaces must have the contamination completely removed without damaging the carpet fiber, backing or infill materials. This represents a significant challenge that should only be attempted by experienced and qualified professionals. Although manufacturers indicate they can restore infilled systems, we were unable to find anyone who had ever attempted such a restoration.

The rubber and sand infill act as a filter removing silt and sediment as floodwater travels vertically down through the surface, allowing the sediment to accumulate vertically through the infill profile. The sediment will not penetrate very deep as long as the floodwater is calm and not turbulent. The problem we anticipate is that rubber infill can float. Moving floodwater can easily scour and relocate material, especially small rubber particles. If heavy scouring occurs, silt and sediment can be mixed throughout the entire profile all the way to the carpet backing making restoration virtually impossible. Initial assessments should determine to what depth sediment has contaminated the infill materials, and subsequently, if restoration is even possible.

Removing sediment

Sediment removal is likely a two step process. The first step is removing as much of the sediment as possible from the surface. The second step involves removing the sediment contamination from the infill materials. It is critical that sediment removal is carefully managed so that no additional contamination occurs as a result of the restoration process. Silt and sediment in the profile will degrade drainage performance and ultimately shorten the life of the system.

Selection of equipment for removal from the field surface will depend on the depth of the sediment accumulated on the athletic surface. Depths of an inch or more can be managed the same as snow removal by using a rubber tipped blade. A single pass with the snow blade should remove as much silt from the surface as possible. To reduce further contamination of the surface is to use equipment with low impact flotation tires.

After the carpet fiber is exposed and you have an understanding of the depth of contamination, removal of sediment from the infill can begin. If the silt has not penetrated deeply in the profile, a power sweeper (Laymor for example) or similar equipment can be used to sweep the contaminated infill from between the fibers to the required depth. Before attempting to complete this process over the entire field, the operator should experiment by sweeping small areas with varying moisture levels. A surface that is too wet or dry may allow the sediment to fall deeper into the profile further damaging the infill. Some of the earlier Polyethylene carpet fibers may not tolerate repeated brushing of the surface required to remove the contamination. Exceptional care should be taken so that the carpet fiber is not damaged during this process.

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Deeper contamination may require total removal of the infill. This is best accomplished by entrusting this task to a specialized company. These specialists have access to vacuum cleaners using for street cleaning operations that can remove the infill materials without damaging the carpet fiber.

The question is how much sediment is required to degrade long-term system drainage and field performance. Residual impurities will impact performance by providing a media for biological activity and reducing water movement through the profile and backing. The ability of the system to drain vertically can be greatly impacted by silt. In the marketplace drainage through the carpet backing is accomplished one of two ways, either by punching 1/4-inch perforations into the backing or by having a permeable backing. A permeable backing will act as a filter trapping sediment and causing blinding of the drainage capability. It may only take a small film of sediment to drastically impair drainage performance in permeable backing systems, rendering them useless. Permeable backing systems should protect the base material from contamination, since silt is trapped above the carpet and does not travel into the granular base. This allows the carpet to be removed and a new surface to be installed without base reconstruction or modification.

The systems that use perforations in the backing are much more tolerant of contamination because the larger perforations are not clogged by silt. However, it is difficult to know if this enhanced permeability will simply relocate the silt to the base aggregate creating problems below the carpet. Field bases constructed with fine finished stone layers (#9, #10, or #11 stone gradients) are going to more readily trap silt possibly impairing drainage performance. Until more definitive testing is completed, it is speculation as to what level of contamination will impact drainage performance requiring carpet replacement. Periodic infiltrations tests on the surface before and after restoration will allow the turf manager to monitor the change in system performance.

Cleaning, disinfecting and sterilizing

It is important to consult with manufacturers regarding cleaning and surface restoration procedures. Warranty conditions will typically demand manufacturer approved maintenance protocols. Although in reality, under these conditions most manufacturer warranties may be void.

Flood impurities intermingle with infill materials, detracting from its playability, creating exposure to bio-contaminants and causing inconsistent and hard spots in the playing surface. Depending on the type of bio-contaminants complete removal of the infill materials may be necessary in order to effectively clean or disinfect the carpet fiber. A few specialized companies have machines that use rotating nozzles and variable pressure jetted water to drive the dirt particles from the surface while picking up the dirty water using a vacuum cleaner (vortex process). Other types of special equipment (such as a sweeper-vacuum fitted with two contra-rotating brushes) are available to carry out the required in-depth suction cleaning of the surface. Conventional unmodified road-sweepers and sweepers designed for large areas are seldom suitable because of their high surface load and because they usually lack the tolerances necessary for cleaning synthetic surfaces.

Cleaning is the removal of debris reducing the amount of organic matter that could contribute to the proliferation of bacteria and diseases. Natural grass surfaces have a microbial activity that is self-cleaning. Synthetic fields promote conditions of warmth and moisture that can foster bacterial growth, while lacking the ability to self clean. The more debris that is removed at the cleaning stage, the more effective the disinfectants are. Cleaning is best done with hot, soapy water and rinsing with clean water to flush contamination from the surface. Completely rinse out all soap residues as some ingredients may interfere with the work of the disinfectant. Soap residual can also leave the playing surface slippery.

Almost any good liquid soap can be used for cleaning. Simple Green™ and regular dishwashing soap both work. Always dilute products such as Simple Green according to manufacturer's directions. Antibacterial soaps are generally ineffective. They are not disinfectants and should not be used in place of a proper disinfectant.

Disinfecting is the removal of organisms present on the surface that can cause infection or disease. Disinfecting is useful against a number of bacterial and viral microorganisms. Sterilization is the killing or removal of all disease causing organisms. Often the same products may be used to disinfect and to sterilize. The difference is in the strength of the solution and/or the amount of time the solution is left in contact with the surface.

According to the International Hockey Federation in their Handbook for the Care and Maintenance of Synthetic Turf Pitches, "The agent of choice is a quaternary ammonium chloride, which is marketed by the firm Bayer under the name "DIMANIN." In addition to it's purely algaecidal action, the quaternary salt is also absorbed onto the pile fibers significantly extending its long term action and also reduces electrostatic charge build-up." As with all controlled chemicals, strictly observe the safety guidelines specified by the manufacturer when working with the undiluted liquids.

Disposing carpet and infill materials

A problem to contend with after the carpet has been replaced entirety or portions of the SBR infill materials have been removed, is the disposal of the carpet and infill materials. Manufacturers claim that the rubber infill can be reclaimed and reused, but cost considerations will likely preclude this from happening. New rubber infill costs about $0.12 per pound. Picking up 125 tons of infill material from the carpet fiber and cleaning it for less than $0.12 a pound is not economically. It is important to remember that manufacturers are in the business of selling new fields not saving old fields.

The SBR rubber used in the infill is made from recycled tire scraps ground into small particles. SBR rubber can contain toxic heavy metals such as lead, zinc, chromium, mercury and barium. As a result, many state statutes define tires (either whole or in pieces) as a "special waste" that requires special handling in a landfill. Eleven states no longer permit the landfilling of waste tires at all, and 17 states allow waste tires to be disposed of only in "monofills."

Some states allow for rubber tires to be used in an energy recovery plant. Rubber tires have a very high BTU content which makes them a good source of fuel for cogeneration (the joint production of useful heat and electricity) incinerator facilities or other industries that require incinerators, such as paper mills or cement kilns. It is uncertain if infill materials contaminated with sediment would qualify for incineration. Disposal of carpet and infill materials will require some research of state statutes to determine the proper handling of these materials.

When it comes to restoring a flood damaged synthetic field, you are basically on your own. The manufacturers and industry professionals have limited knowledge and experience to guide you along the way. The process is going to require careful planning and experimentation to determine the best course of action. Realize you are in uncharted territory, take it slow and be deliberate in your efforts.

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