Rain gardens for sports fields?

Storm water pollutants are a major concern in all of our watersheds throughout the United States. It's a national problem that affects everyone from our local watermen to the food we eat. This isn't something dramatic like the BP oil spill, but a daily concern if we don't take the ecological responsibility to act on behalf of our children, to educate them and ourselves on this problem.

PHOTO 1

I'm not a radical activist you'll see protesting with a picket sign on TV; however, I am a person responsible for my own actions and for the way I conduct myself toward the environment. I'll get to my main point: do you know where the storm water ends up after it leaves your sports fields and goes down your drains? Do you ever stop and take a minute to think about the storm water that comes off your buildings, parking lots and roadways during a rain storm? Where does it go? What harm is it causing? How much water can it possibly be? The fact is that all these questions are loaded ones, but to keep this article short and to the point these are the Best Management Practices (BMP) we practice

Consider this: the amount of rainwater collected from one inch of rain on a 1,000 square-foot horizontal roof is roughly 600 gallons. What if you could capture most of it and filter it before it drained?

PHOTO 2

PHOTO 3

here at St Mary's College of Maryland.

Storm water that is not captured by rain gardens or buffer management systems can carry pollutants from vehicles in parking lots, sewage backups, soil erosion, fertilizers, paints, and pesticides to your local watershed. Consider this: the amount of rainwater collected from one inch of rain on a 1,000 square-foot horizontal roof is roughly 600 gallons. What if you could capture most of it and filter it before it drained?

I'm not saying we shouldn't use fertilizers, paints, or pesticides on our sports fields, because I use them to, so please let me explain. We are all environmental stewards whether we think so or not. We don't just take care of sports fields; we also take care of our environment by stopping soil erosion and maintaining a dust collection system and maintaining a water filtration system from our natural turfgrass fields.

When we apply, paint, pesticides or fertilizers to our sports fields, metals, nitrogen and phosphorus can run off from sheet and soil water movement to our local watershed. It might be a small amount of pollutant, but if each small instance were added up across the nation, the amount would be much greater. This is where best practices become important, to enable us to make a positive difference on a large scale. For example we use EPA approved sports turf paints and organic fertilizers to help eliminate our runoff or volatilizations.

We install rain gardens at St Mary's College as part of our landscape plans with every project we do on our campus (photo 1). We just built one for our intramural (Riviera bermudagrass) turfgrass athletic field (photos 2 & 3). Building rain gardens is easy and affordable. Your local extension office can help you with the building plans or visit http://www.co.worcester.md.us/ for downloadable plans of rain gardens.

Another thing you can do is capture your storm water and reuse it as long as it complies with your local and state regulations. At St. Mary's College, we take the nutrients out of the storm water holding pond (photos 4 & 5) by irrigating our


PHOTO 6


PHOTO 7


PHOTO 8


PHOTO 9

The bermuda turf absorbs the storm water pollutants and filters it for our groundwater table. We test the water for levels of ammonia, nitrites, nitrates and phosphorus at the beginning and end of each irrigation session

bermuda turfgrass. The bermuda turf absorbs the storm water pollutants and filters it for our groundwater table. We test the water for levels of ammonia, nitrites, nitrates and phosphorus at the beginning and end of each irrigation session (photos 6 & 7). The results show a slight decrease of pollutants after three irrigation sessions. Approximately 12,000 gallons were used per irrigation session over 53,440 square feet of grass. One thing to note, however, is that phosphorus reduction from the storm water pond was only effective when there was no rainfall. But using storm water for irrigation saves 100% of your local fresh water supply.

We also put our buffing areas to work for us and the environment. We mow the athletic turfgrass to .75 inches and cut the outside perimeter cool season turf at 2.5 (photos 8 & 9). We then install a naturalized area/meadow around the storm water pond to capture any run-off that might occur.


PHOTO 10


PHOTO 11

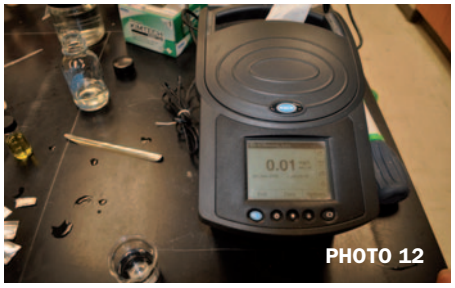


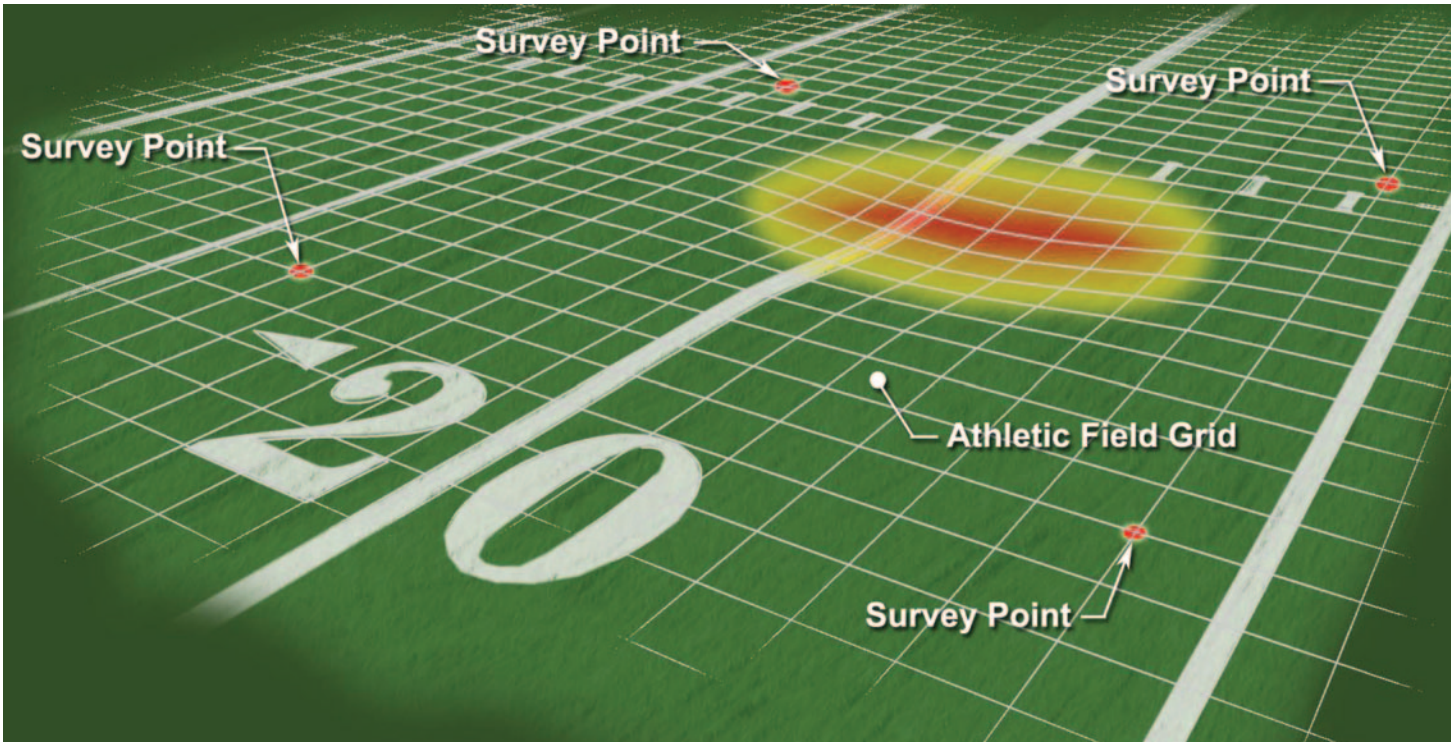
PHOTO 12


PHOTO 13

We place wells for sheet water movement and soil water movement to see how effective our buffer management is (photos 10 & 11). We test for ammonia, nitrites, nitrates, and phosphorus. We apply 46-0-0 before each rain storm. The soil water movement shows little to no movement at all. The sheet water movement wells show high ammonia content in the short grass; medium to low in the perimeter of the higher grass; and zero in the buffer zone with native trees, shrubs, grasses and wildflowers. A HACH testing machine was used for this case study for better accuracy in pollutant readings (photos 12 & 13). However you can use an aquarium test kit from your local pet shop and get similar results.

To get started, take a look at your facility and see the way the water travels in all locations. Where does the water drain from your equipment wash pads, athletic fields, parking lots and buildings? Can you recapture it or at least buffer it? Like anything else, education and experience are key. So if you're reading this, then you care. ■

Kevin Mercer is the superintendent of grounds at St. Mary's College of Maryland.



3D scanning and high definition surveying

for synthetic turf athletic fields, running tracks, and sport courts

>> ATHLETIC FIELD, running track, and sport court surface plane imperfections may remain using traditional point survey methodology due to the spacing of the survey grid. Laser scanning builds an actual topographic model of the surface plane using thousands of tightly spaced points, eliminating "blind spots" common with a traditional point survey grid. These scanner points can be used to create a graphic image of the surface plane without interpolation between the points, providing a composite and complete model of the athletic field or facility surface.

PROPER CONSTRUCTION of aggregate base courses for synthetic turf sports fields and base pavement courses for running tracks and sport courts is critical in the overall success and quality of the finished sports surfacing. Defects in the underlying construction will be reflected in the finished surface, resulting in athletic facility surfaces that have undulations, inconsistent surface plane, and varying cross-slope.

The finished surface product often represents the most significant portion of the project cost, requires strict planar qualities to meet athletic performance requirements and sport's governing body regulations, and is the finished aesthetic in which sports facilities are inevitably judged. To ensure high quality finished surfacing, determining acceptability of the base construction is a crucial step in the construction of synthetic turf athletic fields, running tracks, tennis courts, and sport courts.

Acceptable subgrade tolerance may vary slightly between various athletic facility consultants and owners for finished planarity requirements; however variations are generally very slight. A specification for a synthetic turf field finished aggregate base course typically will be similar to the following accepted industry standard:

Slope: Not less than 0.5% or as scheduled on the Drawings, consistent over the entire subgrade surface plane with a maxi-

◎ **Scanning technology** provides digital terrain modeling as opposed to point by point elevation data. The terrain model creates a detailed record of the actual surface as opposed to point by point information. With digital terrain modeling based upon thousands of closely spaced points, the data gaps with traditional grid as-built surveys are eliminated.

mum deviation from specified slope of 0.1% when measured between two (2) points perpendicular to the crown at an interval between the survey points of not less than of 50 feet.

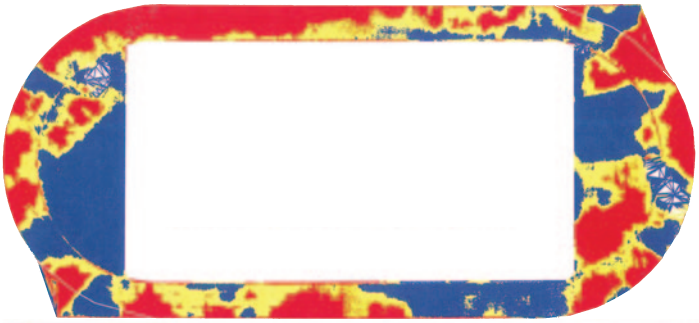
Planarity: The subgrade surface shall represent a true plane free of surface undulation or defect greater than ¼-inch when measured over 10-feet using a straight edge or sting line in any direction on the subgrade or as verified by field survey with a maximum grid interval of 10 feet. All elevations shall be expressed to the nearest hundredth of a foot (0.00).

As evident in the previous example specification requirements for synthetic turf base course construction, the field quality control measurements for acceptance of the synthetic turf field base construction are strict within a specified tolerance range and must be field measured to verify contractor compliance. However, the methodology for field verification as typically included is generally insufficient for proper and accurate confirmation in consideration of the specific and narrow range of the tolerance requirements. The above "visual" methods (straight edge or string line) rely on human judgment and visual interpretation and areas of non-compliance can be easily missed based upon the number of locations selected for visual observation and field survey of the base course.

Visual field observation using "string lines" or a "10-foot straight edge" will provide initial visual evidence related to base planarity acceptability and is commonly used. However, traditional "as-built" surveying will provide accurate elevation data that can be evaluated in consideration of field planarity requirements, slope, as well as relation to design grade and is widely considered superior to "visual observation" alone.

However, areas of undulation, depressions, or other planar deficiencies may still exist between the field survey shots comprising the grid, even at a 10-foot grid interval. Additional drawbacks exist with traditional "as-built" surveying or a combination of both surveying and visual observation, including time delay to schedule and complete the field work, download the survey data and prepare a scale drawing for review, and interpret the data for compliance, which also is subject to "engineering judgment." Further, traditional verification methods may not be cost effective in consideration of the limitations related to the actual accuracy of the evaluation whereby deficiencies may still exist in the completed base construction in spite of the cost associated with the evaluation.

ELA Sport has recognized the "technology lag" of traditional visual observation and surveying for base planarity as compared to the precise tolerances and minimal acceptable variance required for aggregate and paving base construction for athletic facility surfacing. In response to the accuracy limitations and inconsistent results of traditional verification methods, ELA Sport began experimenting with the use of the Leica ScanStation laser scanner to verify as-built aggregate subbase and pavement base for synthetic turf athletic fields and running tracks on several projects in June 2010.



Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	-1.346	-0.021	
2	-0.021	0.021	
3	0.021	0.782	

>> DATA OUTPUT from the laser scanner may be formatted in a two-dimensional image to depict areas of non-conformance based upon requirements specified by the Owner or Consultant. The graphic model of the running track depicts variation in the track cross-slope from a true and constant plane of 1-percent. The laser scan output has been modeled to depict areas beyond the acceptable range of 0.9-percent to 1.1 percent with areas of shallow slope and areas of excessive slope color modeled for ease of identification.

As a significant advance over popular "total station" survey instrumentation, the ScanStation includes a laser scanner for as-built topographic surveys. The advanced capabilities provides up to a maximum 50,000 points per second instantaneous scan rate with elevation accuracy of 6 mm and distance accuracy of 4 mm for all scan points.

When applied to quality control verification of athletic facility base construction, the laser scan technology provides the following advantages over traditional verification methods:

• Scanning technology provides digital terrain modeling as opposed to point by point elevation data. The terrain model creates a detailed record of the actual surface as opposed to point by point information. With digital terrain modeling based upon thousands of closely spaced points, the data gaps with traditional grid as-built surveys are eliminated. Further, interpolation between grid points (where elevation data is averaged) is eliminated as virtually hundreds of elevation points comprise each grid area in comparison to the four corner points of the grid available through traditional survey methods.

• Data acquisition time is reduced by over 75% as compared to traditional field surveying. Due to the instantaneous scan rate available with the ScanStation, thousands of points can be scanned instantaneously as opposed to surveying each point on the field individually.

• When connected to a laptop computer in the field, almost instantaneous feed back can be provided to the Owner, athletic facility

consultant, and contractor. Delays associated with downloading survey data, drawing preparation, and "in office" evaluation can be significantly reduced. Final "hard copy" verification of planarity can be provided in complete, accurate, and final drawing format within 24 hours of the field data collection greatly reducing the time for corrections to be made prior to installation of the final surfacing.

• The field data can be presented in a color coded 3D topographic model and easily compared to the design profile for the athletic facility surface allowing for ready comparison of the as-built condition versus the design condition. Areas of deficiency requiring correction can be readily identified and the volume/area of material required for correction quickly determined.

• With the real time ability to correct planarity issues and with eliminating "data gaps" common in visual or traditional survey verification, corrections requiring cutting and patching the finished synthetic turf or running track surface can be virtually eliminated.

• The time for data collection, visual field verification, and data analysis can be dramatically reduced resulting in cost savings for the quality verification process all while providing more accurate and relevant results. Further, considering the reduction in post surface installation repairs, overall project costs and construction delays can be eliminated and a higher quality finished surface provided.

• The laser scanning technology is also fully compatible with total station surveying permitting integration of the laser scan data with traditional survey data.

The application of laser scanning technology for synthetic turf field, running track, and sport court construction has been undertaken with our survey subsidiary, Land Grant Surveyors (LGS). ELA Sport continues to work with our surveying partner, field and facility contractors, and our clients on the application of 3D laser scanning for as-built planarity verification for a variety athletic facility surfaces.

This new technology was used by ELA Sport on several of our athletic field and track projects during the Summer 2010 construction period with positive results and feedback from our clients and athletic facility builders. Notable projects included survey of the resilient base layer at Villanova University, aggregate base surveys at Crispin Stadium for the Berwick Area School District, Seth Grove Field at Shippensburg University, and the new stadium field at Warwick High School (all in Pennsylvania).

ELA Sport continues to incorporate this advanced survey technology as part of our construction review process and is working to make the highest standard of base quality evaluation available and cost effective from the professional facility level to youth recreational sports facilities. ■

Ernest J. Graham, RLA, is Principal-in-Charge, ELA Sport, Lancaster, PA.

By Norris Legue

>> **ADHESIVE** being applied for a total gluedown by spraying.

More outdoor synthetic turf adhesive information

Editor's note: *Last December we ran an article by Norris Legue, aka the Guru of Glue®, which was well received so we offered him a chance to update us. He is the president of Synthetic Surfaces, Inc., Scotch Plains, NJ*

FIRST LET'S REVIEW some important points from last year's article: It is both the profits from the initial installation and the profits retained by avoiding "call backs" that count. Using an inferior, lower-cost adhesive to "save money" but which instead lowers the finished job's profits because of its difficult handling properties outdoors increases installation time and/or it fails later due to weathering, is not good business. It's penny wise and dollar foolish.

Do not be fooled into believing that an adhesive with the highest strength is the best for installing synthetic turf. Instead of high strength, it is adhesion to the surfaces being bonded, both initially and after weathering that counts. High adhesive strength does not mean good adhesion. As an example, that same high strength adhesive will easily peel off of oil and/or wax-coated steel, "Teflon" and many other surfaces due to poor adhesion.

The most important adhesive property for installing synthetic turf is "high green strength" or high grab. This property is the ability to hold two surfaces together when first contacted and before (still green) the adhesive develops its ultimate bonding properties when fully cured. It is the opposite of an oily/slippery adhesive, regardless of strength after cure.

High green strength adhesives and help fight troublesome turf movement during installation, e.g., turf curl, bubbling, wind lift, creep, slip, wrinkling and buoyancy from rain, whereas an oily/slippery adhesive before it cures does not prevent those unwanted surface movements from the same forces mentioned above.

There is no such thing as a "one size fits all" synthetic turf adhesive. From an adhesive chemical standpoint, there are urethanes, epoxies, silicon/silane, rubber, etc. From a handling standpoint, there are Newtonian liquids, thixotropic liquids, spraying adhesives, hot melt adhesives, one and two-part adhesives, etc. So before selecting, do your homework on what's best for your application.

[Free reprints of the December 2009 article are available from the author upon request.]

ADHESIVE UPDATE

Unless you are a gambler who realizes that you could also lose, don't select an adhesive based on impressive lab test results conducted indoors. The reason is that after weathering, it could deteriorate to become an adhesive "time bomb." Additionally, indoor tests on cured adhesives do not reveal the adhesive's outdoor handling properties when

There is no such thing as a **"one size fits all"** synthetic turf adhesive. From an adhesive chemical standpoint, there are urethanes, epoxies, silicon/silane, rubber, etc.

>> **ADHESIVE** being applied to a white seaming tap from a glue box.

installing at different temperatures, humidity, wind, changing temperatures due to cloud cover and other variable weather conditions.

Regardless of the high quality of the outdoor adhesive selected, don't try and save money on the amount of it used by avoiding a total gluedown in favor of a partial one, such as by "strip gluing," spot, and/or perimeter gluing. The unbonded parts from partial gluing can expand upward from the sun's heat and cause bubbles or wrinkles. These parts also can bunch up underfoot from twisting, turning, sudden stops, etc. And these installations can look awful because a combination of rain water and light "telegraphs" through the turf, to show which parts are bonded and which are not bonded.

Another hazardous way to try to save money on glue is to apply a narrow width of it onto a seaming tape. The narrower the width, the less glue that's used, coupled with a lower seam strength. While the installation initially looks good, seam problems may develop later when athletic traffic is steady. The reason should be obvious because "shear strength" decreases as the width of the adhesive on the tape decreases. Hence a seam with 6 inches of glue on each side will be stronger than one with 4 inches on each side, down to 2 inches, etc. That's one reason why total gluedowns are superior—There's a wide width of adhesive on each side of the seam.

Still another method to try to save money on glue is to substitute a non-curing thermoplastic hot melt adhesive for an adhesive that cures. Not only does the thermoplastic hot melt re-soften from surface heating on sunny days, but also during the initial installation, bonding is slower and more labor intensive. Remember, time is money. Additionally, because a thermoplastic hot melt adhesive is usually applied as a thick film that becomes a very hard in cold weather, I wonder if seams, numbers, and other inserts bonded with them have a higher Gmax and/or hardness underfoot than the other parts of the same field.

There is a debate among professionals about seams joined with mechanical fasteners like sewing, nails and staples versus adhesive bonded seams. I'm uneasy about metals like nails and staples because of lightning possibilities so I won't write more about them.

Glued versus sewn synthetic turf seams is another story. In reality, if done correctly, both methods are adequate for good seam performance but the best by far is a combination of both gluing and sewing seams. I believe that it's more than double than if gluing or sewing alone. However, unless the job is a total gluedown, which is much better than loose-laying turf, doing both difficult. In my opinion, a superior installation is one that is a total gluedown with both glued and sewn seams.

Unfortunately, by trying to save money on glue, some specifiers, contractors and installers have caused glued seams to get a "bad rap." They use a cheap, inferior adhesive and/or not enough of a good adhesive that results in a seam failure. The subject then gets oversimplified and generalized by some into mistakenly concluding that "sewn seams are better than glued seams" without regard to the quality and amount of adhesive used on the failed seams.

>> **ADHESIVE** being applied to seaming tape with a kneel-down trowel.

When it is either gluing or sewing but not both, I prefer gluing over sewing when a good outdoor adhesive and experienced turf installers are used. Why? Gluing spreads seam stress evenly over a large bonding area instead of concentrating the stress at stitching points like sewing, plus sewing leaves unbonded spaces between each stitch. Technical adhesive books and trade magazines confirm the advantage of adhesives bonding over mechanical fasteners.

In breezy conditions, steady winds and/or gusts can be dangerous when sewing; when wind gets under or behind uplifted turf, which then can act like a sail. Wind has temporarily (minutes or days) halted installations because it can break sewing needles and/or injure installers. Even without wind delays, sewing is still slower than gluing. Remember, time is money. Finally, glued seams look better than sewn seams.

It is not just the adhesive component that is the victim of those who oversimplify or generalize negatively about synthetic turf. A poor or failed installation often gets misinterpreted into "synthetics are inferior." We ignore the hundreds of quality installations throughout the world done by experienced installers.

Do not believe that a fast **"snap cure"** adhesive has a high grab and green strength. It's usually the opposite. Such adhesives usually proceed from oily/slippery with no grab to dry with little acceptable working time for bonding in between.

YEAR ROUND BUSINESS

It is becoming increasingly important that synthetic turf adhesives must be usable year round to install turf, even in adverse weather. The reason is that the synthetic turf business for both installation and repair keeps expanding to a point where it is no longer a short seasonal business. That's good profit news for contractors and installers because again, time is money. It translates into more hours each day and/or more days each year for profitable outdoor installations and repairs.

There should not be a lower or higher temperature weather limit on when the adhesive can be used to install or repair synthetic turf, nor should the threat of rain, which may or may not occur, delay an installation. If it is not raining or snowing and the installers can do good work in adverse weather, the adhesive should not prevent them from installing. Adhesives that can only be used in "fair weather" are no longer acceptable.

Do not believe that a fast "snap cure" adhesive has a high grab and green strength. It's usually the opposite. Such adhesives usually proceed from oily/slippery with no grab to dry with little acceptable working time for bonding in between. Conversely, a good high green strength adhesive for installing synthetic turf will not "snap cure" even when hot. Instead, after application its high grab develops quickly and stays that way for bonding for say

>> **ADHESIVE** being applied to seaming tape with a stand-up trowel.

about an hour depending on conditions. This gives installers plenty of working time because the installed turf is being held in place even though the high green strength adhesive has not yet cured.

Do not believe that a hot melt adhesive has "high grab" because in hot weather they tend to stay liquid for an excessively long time, which slows down the installation. Oppositely, in cold weather they often re-solidify before the bond can be made, thus causing a hard lump under the surface.

Variable outdoor weather conditions, as opposed to stable indoor conditions, can affect installation time, labor expense, installation appearance, and profits. Because time is money, proper outdoor adhesive selection is critical. It can be the difference between profit or loss due to the speed of installation, cost of labor, number of call backs, plus finished job appearance and performance.

Architects, specifiers, and installers should keep in mind that selecting a suitable outdoor adhesive for its easy handling and long-term exterior durability, plus installing synthetic turf outdoors using that adhesive is a different world than the indoor installation of synthetic turf and/or flooring. Experienced and successful indoor installers can have disastrous results outdoors by using the same indoor installation techniques and/or adhesives.

Assuming high quality materials and professional installers, the adhesive is the most important component for a profitable outdoor installation. The information provided in this article should be helpful to both not only initially earn good profits but also to later keep them by avoiding call backs. ■

>> **ADHESIVE** being applied for a total gluedown with a stand-up squeegee.

Norris Legue is president of Synthetic Surfaces, Inc., Scotch Plains, NJ. Free reprints of the December 2009 article are available from Norris Legue upon request, info@nordot.com.

THE VALUE OF CERTIFICATION

Under the tarp, checking his "baby," is Ross Kurcab, CSFM, the first-ever Certified Sports Field Manager.

IN ATHLETICS, it's all about the quality of the game. The quality of the sports field is measured by its safety and playability and to some extent its overall aesthetics. To make this happen, someone has to manage and care for the field. Whether this person directs a professional venue or the local recreational field, it is their skill and knowledge that sets them apart, especially when resources are limited. There is a need for qualified sports field managers, knowledgeable of fiscal management, environmental stewardship and agronomy. Having recognized the importance of fostering and improving professionalism within the sports turf industry, the Sports Turf Managers Association developed the Certified Sports Field Manager (CSFM) program.

Certification demonstrates that successful sports field job applicants have the knowledge to deliver safe, playable and attractive sports fields. It also demonstrates to employers a significant commitment to career and competence. Quite simply, in an increasingly competitive and changing work environment, certification is an essential investment in one's professional future.

When you become a CSFM, it means that you have taken your professionalism to the next level. After meeting the credentialing standards of education and experience, the applicant takes a written test. This exam is considered by many to be one of the most difficult in the industry to pass, which is one of the main reasons that those who do pass, display their credentials with pride. The sophistication of the exam development process also contributes to the preferred status of the credentials. Overseen by industry experts, the CSFM exams are specifically based on "real world" responsibilities of sports field management professionals. The program also requires that the CSFM stays current with trends and new development pertaining to sports field management through continuing education as well as an industry service obligation.

Over time, the CSFM designation has gained a reputation among employers, professionals and industry experts as the most respected and preferred sports field management credential. ■

Don Savard, CSFM is athletic facility & grounds manager for the Salesianum School, Wilmington, DE.

5 STEPS to becoming a Certified Sports Field Manager

1. **Visit the STMA website,** click on the Professionalism tab and then scroll down and click in the CSFM Program heading. All of the information that you will need (including forms) is listed there and can be downloaded.

2. **Determine if you meet the experience and educational requirements.** Experience and education are assigned point values. Forty points is the minimum requirement that needs to be attained in order to go to the next step.

3. **Read the CSFM Detailed Competency List.** There are 20 pages that list all of the things that you must know in order to pass the test. Everything on the List is part of the essential knowledge base that every CSFM must possess. Compare your expertise with the List and prepare to increase your understanding where you are weak. A CSFM must be capable of managing different sports on all playing surfaces under extreme conditions. Gather your text books, magazines and online articles. The Study Resource List will help get you started. Start reading!

4. **Prepare and submit your application form and the requisite paperwork.** This includes your resume, completed Educational Requirements Worksheet, your School Transcripts, your signed Code of Professional Practice Form and the application fee. STMA Headquarters will review your application, check your references and notify you of your eligibility to sit for the exam.

5. **Schedule your exam.** You make take your exam locally with a proctor, or take the exam at the National STMA Conference (the advantage being the exam is administered on the first day and the last day giving a chance to retake sections if necessary). The test is a written multiple choice test comprised of four major Sections pertinent for a Sports Turf Manager. Each Section will be graded individually. A passing grade of 80% will be required for each Section. Sections for testing will include:

Agronomics
- Basic horticultural calculations
- Basic soils
- Turfgrasses and their selection
- Turfgrass nutrition
- Water management
- Turfgrass cultural practices

Pest Management - IPM, Cultural, Pesticides
- Weeds
- Insects
- Diseases

Administration
- Budgeting
- Communication
- Supervision/Personnel Management
- Safety/Compliance/ First Aid

Sports Specific Field Management - Field design, layout, dimensions, lining/markings, maintenance, playability, aesthetics
- Baseball/Softball
- Football
- Soccer, Lacrosse, Field Hockey