Synthetic turf field bases ARE IMPORTANT!

Editor's note: *This article was written by Dan Sawyer, CEO of Brock International, which manufactures synthetic turf field base systems, and Grove Teates, president of Alpine Services, Inc., builder of natural turf and synthetic turf athletic fields.*

A **SYNTHETIC TURF FIELD** is only as good as the base it's built on. Yet the base is often sacrificed in the essence of time, and may not be properly designed and inspected. Spending time on base design, from writing a tight specification, contractor pre-qualifications, and construction oversight avoids costly, complicated and sometimes catastrophic field failures that can arise. Base design and field validation are the most important components of any field, proven by the number of base-related failures.

A great base starts with a great specification, one that specifies a high level of excellence for all potential bidders, and one that is *inspected* and *enforced* during the construction process.

A high level of experience. As the synthetic industry has matured in the past decade, it is not difficult to find contractors who have built not one or two, but have successfully done dozens of properly built field projects. These are the types of contractors you want to bid your project, so set your prequalification based upon excellent grading, compaction, people, etc. Be aware that a contractor may have built many fields, but not necessarily many good fields—volume does not equate to excellence. Take the time to check his consecutive references.

The planarity spec for the field should be tight. This is not a parking lot, but something much more precise. A spec-

A great base starts with a great specification, one that specifies a high level of excellence for all potential bidders, and one that is *inspected* and *enforced* during the construction process.

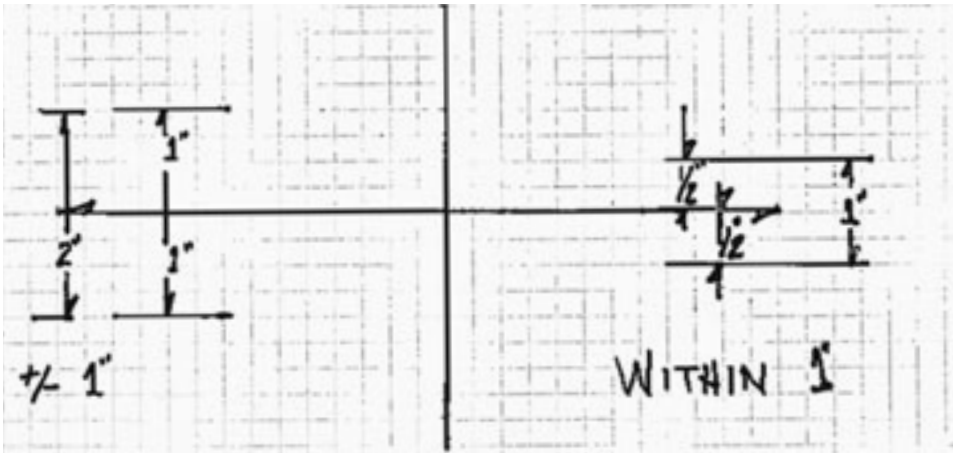
THE PRIMARY GOALS OF A PROPER BASE ARE:

- **STABILITY.** The sub-base must be properly compacted to greater than 95% standard proctor in order to support the relevant loads on the field, which are the athletes themselves, and the occasional maintenance equipment.
- **DRAINAGE.** This is a tricky one and where pre-qualifying contractors is essential.
- **PLANARITY.** This is the trueness of the surface.
- **HEAVING.** A 6 to 8-inch stone base will NOT be enough weight to stabilize the soil.

ification of +/- ¼ inch over the *plane of the field* is achievable by a qualified laser grader (be sure to check the quality of the laser system). The laser source should be accurate to at least 10 arc seconds at 3,000 feet; it should have been calibrated within the past 6 months.

Wording of the specification is important: *within* ¼ inch over the plane of the field is really + or – 1/8 inch from absolute; +/- 1/4" *from* absolute is a total tolerance (deviation) of ½ inch—a significant difference that most designers are unaware of (see diagram). The issue is significantly magnified if a designer still uses a horizontal distance of 10 feet.

Make sure the specification includes proof rolling of both the sub grade and the top surface. Note that 95% compaction on stone means that the stone has been crushed and hydraulic conductivity has been compromised. The designer must be very specific concerning the number of passes with a given weight roller.



PRIMARY GOALS

The primary goals of a proper base are:

Stability. The sub-base must be properly compacted to greater than 95% standard proctor in order to support the relevant loads on the field, which are the athletes themselves, and the occasional maintenance equipment. You are not building a parking lot designed to support huge static loads, nor are you building a road. But the base does need to be stable enough for moderate vehicles for short durations. Ensure that proof rolling is part of the specification for both the sub-grade AND the stone layers. This will also avoid the finger-pointing after a base is approved, and subsequently disturbed when the turf is laid. If the base is compacted properly, then it should not shift during turf installation. Some more rigid underlayment systems also help protect the base during turf installation, since tire loads are not directly on stone.

Drainage. This is a tricky one and where pre-qualifying contractors is essential. Drainage and compaction are conflicting interests. On the one hand, you want water to flow efficiently through the base material, which means open pores and spaces in the rock. But compaction will decrease the pore space and thereby decrease drainage. And overworking the stone can lead to "choker layers" forming, which cause ponding. So how do you get a base that is both compacted AND drains well? That is the art of building a stone base, and not everyone can do it.

Planarity. This is the trueness of the surface. The sub-base and surface should be on grade to specified tolerances as described above. This can be simply checked using simple devices. Having a laser on a machine does not guarantee quality. Owner confirmation of the specifications of both surfaces is most important. Specifications should be no greater than +/- ¼ inch when measured vertically over the plane of the field and must also state that the vertical distance is

measured from the "absolute" plane. Good grading is enhanced by using dual, high-end readers mounted on a wide blade (the wider the better, see photo). Improper grading shows through the turf in terms of crooked lines and other visible defects. The greatest turf on earth can look terrible over a poorly graded base. Conversely, average turf can look fantastic over a great base.

Heaving. A 6 to 8-inch stone base will NOT be enough weight to stabilize the soil. In addition, having a stone base below the field that is designed to store water for environmental reasons only compounds the problem of frost heaving, since it is the water that is freezing and causing the problem. Alternative methods described below should be considered in northern climates if frost heaving is an issue.

BASE DRAINAGE

There are two basic strategies to approaching the base drainage issue. The more traditional method is to remove a depth of existing material, dispose of it, and replace it with a more stable stone material. The idea is to allow the water to permeate through the turf, "store" it in the stone base, and then let it outflow off the site. Specifying the proper stone, minimizing the segregation of it during handling and placement is important, as well as over-compaction.

The second and growing trend is to use a prefabricated base "panel" or board that replaces much of the stone and drainage work required with a stone base. The idea is to move the water laterally to the perimeter drains within the board, negating the need for stone to conduct water to a drain system. Some systems offer the drainage and stability of a stone base, but can increase frost protection by acting as an insulator. A 1-inch thick panel may offer the equivalent insulation as 10 inches of stone when the stone is dry, and far more when the stone is wet, since water is a temperature conductor. Some boards also incorporate shock-absorbing qualities to increase the safety and longevity of the field. The panel systems may cost more at the outset, but they are used under multiple turf cycles, so cost savings are realized down the road. They can also be simpler and faster to build. However, the base below them still needs to meet the compaction and planarity requirements as stated above.

Although the surface directly below the panel system does not need vertical drainage, it must be solid and stable in order for the system to work. Planarity should not exceed +/- ¼ inch over the plane of the field (total ½-inch tolerance), but tighter is even better. In no case can *the total tolerance from absolute exceed the thickness of the drain board*; to exceed the total tolerance when measured against the board thickness means that the board will be installed in a hole or depression deeper than the height of the panel/board and the water cannot escape, regardless of the drain characteristics of the drain board.

The supplier of the panel or other drainage system should have a good inspection and quality assurance program and assist the designer and builder in executing a proper foundation for their system. Installing turf over these systems is also a different procedure, so make sure the turf supplier has best practice recommendations for installing turf over a board system, and has had experience in using your chosen drain system.

In today's economy, more contractors bid on synthetic turf projects than the industry has historically experienced in the past. Many of these contractors have little or no experience in building good bases; many designers do not know how to write meaningful specifications. Beware, the lowest bidder may mean the lowest quality, the greatest risk, and will often cost you MORE money in the end unless pre-qualifications are both stringent and enforced, and the specification is tight. There is no reason why you can't get both a quality and an affordable field, that is built on time, when you demand due diligence of your designer, contractor, and drain supplier. ■

Dan Sawyer is the CEO of Brock International, www.brockusa.com; Grove Teates is president of Alpine Services, Inc., www.alpineservices.com.