

Natural v. Synthetic Turf Athletic Fields

Undertaking an athletic field construction project requires thorough research to choose the playing surface for the field that best aligns with the athletic program's goals and budgets. The factors typically involved in the decision-making process include coach/player preference, public opinion, sports being played on the field, number of uses per year on the field, maintenance requirements / capabilities, annual operating budget, climactic conditions and installation costs. When considering the construction of a competition level athletic field, it is important to understand the basic differences, and advantages/disadvantages, between natural turf and synthetic turf fields.

Natural Turf Fields

Environmental Benefits

- A natural turf field reduces excess stormwater surface runoff by allowing water to infiltrate into the soil. Also, the surface temperatures of natural grass are markedly cooler than synthetic turf.

Limitations

- Overuse and excessive traffic on natural turf can lead to compaction and bare spots. Inclement weather can lead to overly saturated soils or standing water, which limits playability, or the fields may experience irreparable damages if played on when saturated.

Turfgrass Types: Cool Season and Warm Season

- Cool Season grasses, prevalent in the northern regions of the U.S., typically consist of Kentucky Bluegrasses, Perennial Ryegrasses, and Tall Fescues. They have an optimal growing temperature of 60 to 75 degrees and experience growth in both the spring and fall. The choice of grass type is based on wear resistance, winter tolerance, sun tolerance, drought tolerance, and aesthetic appearance / richness of color.
- Warm Season Grasses prevalent in the southern regions of the U.S. are the Bermudagrasses. They have an optimal growing temperature of 80 to 95 degrees with a growing season that begins in the spring and continues through early fall. Bermudagrasses are dense, low growing, have a nice aesthetic appearance, and excellent drought and wear tolerance. These grasses will turn brown during the dormancy period and require overseeding.

Natural Turf Field Construction

- Natural turf athletic fields can generally be classified into three types of construction:
 - **Natural with Native or Amended Soil:** Most of today's fields are constructed in this manner, as they are the least costly to construct. These fields tend to be prone to compaction and drainage problems. The surface must be adequately sloped to effectively shed water.

Natural v. Synthetic Turf Athletic Fields

Page 2

- **Sand Cap Over Native Soils:** A layer of imported sand-based rootzone is placed over the existing native field soil profile. This type of field has better internal drainage and less susceptibility to compaction. Irrigation, as well as an increased attention to maintenance, is required.
- **Sand-Based Rootzone:** The native soil is replaced entirely by a sand-based rootzone and is placed over a stone drainage layer. A subsurface drainage system collects infiltrated water. This type of field has excellent internal drainage and requires irrigation and intensive maintenance. A field of this caliber is primarily intended for Collegiate or Professional sports.

Irrigation

- To properly maintain and keep the field in optimal playing condition, field irrigation is imperative. These systems can be either in-ground or above ground. The in-ground systems allow for flexibility of watering by zones, as well as pre-programming options or operation by wireless controller. An above-ground system, such as a water reel, is less costly and is portable. Quick acting couplers are needed throughout the field to accommodate above-ground systems.

Maintenance

- The goals of maintenance are to support a consistent and attractive playing surface, promote player safety, and protect the turf and root systems. A typical maintenance plan would consist of regular mowing, fertilizing, weed control, pest management, aeration, topdressing, seasonal resting, and irrigation.



Athletic Field Sod Harvesting at Farm



Natural Turf Irrigation

Synthetic Turf Fields

Benefits

- A synthetic turf field provides a durable playing surface with a grass-like look and requires lower maintenance than natural turf. Synthetic turf fields are well drained, can be plowed in snowy conditions, have near all-weather availability for play, and the field lines and markings can be permanently inlaid, which eliminates the need for continual re-stripping with paint.

Limitations

- Synthetic turf fields are more expensive to install than natural turf fields. They have a higher surface temperature and do not filter air or water pollutants as natural turf does.

Elements of Synthetic Turf Fields

- **Turf Carpet:** The carpet fiber materials are manufactured from either polyethylene, polypropylene or nylon materials and are produced into fiber strands known as “slit film” or “monofilament.” The turf system is generally chosen based on which fiber type is optimal for the sport(s) being played on the field. The blending of slit film and monofilament together, known as a “dual fiber” system has become popular for multi-sport fields since it provides a versatile playing surface and is durable.
- **Turf Infill:** The most common infill material typically consists of a blend of silica sand and recycled crumb rubber (SBR). As the synthetic turf industry has progressed with thorough research, a number of “alternate” infills have been developed and introduced to the market and appear to offer viable options for consideration. Some of these include:
 - Thermoplastic Elastomers (TPE) – extruded plastic pellets
 - Acrylic Coated Sand
 - Ethylene Propylene Diene Monomer Rubber (EPDM)
 - Recycled athletic footwear (sneakers)
 - Organic – walnut shells, cork granules and coconut fiber /cork blends



Organic Infill Materials

- **Impact Attenuation Pad:** The attenuation pad is a resilient layer that is incorporated between the base stone and the turf carpet. This layer helps to support performance characteristics, control ball bounce, and is designed to reduce player impact and injuries.

Synthetic Turf Field Construction

- Construction of a typical synthetic turf field includes the following:

Natural v. Synthetic Turf Athletic Fields

Page 4

- Top soil removed to a depth of about 18 inches
- Concrete anchor curb constructed around the field perimeter
- Drainage pipe installed every 15-20 feet across the field
- Free-draining stone base installed over laser graded subgrade
- Crown of 0.5% maintained across the field
- Turf carpet installed on top of the stone base
- Field lines and markings permanently inlaid
- Turf Carpet “infilled” with either a blend of silica sand & crumb rubber or an “alternate” infill



Stone Sub-base and Perimeter Concrete Nailer Installation for Synthetic Turf



Completed Synthetic Turf Field

Cost Comparison

Budgetary constraints are often a primary factor in selecting either natural or synthetic turf for an athletic field playing surface. While natural turf fields have a lower initial cost, they require a high level of maintenance to keep the turf in playable condition, and the costs associated with the maintenance can be burdensome. Synthetic turf fields are significantly more expensive to install; however, they require limited maintenance over the life of the field, the surface is more consistently uniform, and these fields are not subjected to the usage limitations of natural turf fields.