Synthetic Turf[SM]
COUNCIL

Guidelines for Synthetic Turf Base Systems

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1. BACKGROUND

1.1. INTRODUCTION

The purpose of these voluntary guidelines is to enable owners, buyers, designers, and contractors of synthetic turf to better understand the range of decisions and variables that comprise the "base" of a synthetic turf installation.

1.2. OBJECTIVES

The unseen base for synthetic turf is equally as important as the surface that is seen and used. Both the success and failure of a turf installation is as likely to be contributed to the base as the surface. If the base was poorly designed or constructed, it will reflect to the surface. It is the intent of this document to increase the awareness of all involved in the many aspects needed to create a successful synthetic turf project through a good base system. Through this increased awareness the industry will continue to improve its quality and enhance its reputation as a long term positive contributor to our built environment.

These voluntary STC Base Guidelines will help owners, designers, and contractors pause and consider how their site and project will be impacted by the following:

* The existing soil composition
* The existing drainage patterns
* The site surroundings
* The proposed drainage system
* The type of stone used in the base system
* The planarity of subgrade soils
* The planarity of the stone base

As you review this guideline, stop and consider how each principle may correlate to your project.

The intent of this document is not to prescribe a method of designing or constructing a base, as that is unique to each project and situation, but to offer guidance and concepts to consider as you plan for this investment and contribution to the spaces that our family and friends will use and enjoy well into the future.

2. TERMINOLOGY

Aggregate: A component that resists compressive stress, such as sand, gravel, or crushed stone.

Base System: A designed system of materials that provide porosity and stability such as soil, crushed aggregate, geotextiles, and drain lines.

Drainage System: A method of removing surface and subsurface moisture / water.

Infill: Loosely dispersed materials that are added to the synthetic turf system near the surface and within the turf fibers.

Geo-fabric: Typically defined as any permeable textile material used to increase soil stability, provide erosion control or aid in drainage.

Geotechnical: Of or relating to practical applications of geological science and are concerned with the analysis, design and construction of foundations, slopes, retaining structures, embankments, tunnels, levees, wharves, landfills and other systems that are made of or are supported by soil or rock.

Groundwater: Water held underground in the soil or in the pores and crevices in rock.

Hydrology: The branch of science concerned with the properties of the earth's water, especially its movement in relation to land.

Organics: The organic matter component of soil, consisting of plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by soil organisms.

Permeability: The rate at which water flows through a surface or system cross-section or components of the cross-section.

Planarity: Uniformity of the surface as compared to certain fixed predetermined points or prescribed slopes.

Proof Rolling: A process where compacted soil is checked for soft areas in order to supply a balanced support system for synthetic turf.

Runoff Coefficient: A dimensionless coefficient relating the amount of runoff to the amount of precipitation received. It is a larger value for areas with low infiltration and high runoff (pavement, steep gradient), and lower for permeable, well vegetated areas (forest, flat land).

Shock Absorbing System: Component(s) that add resiliency to the system.

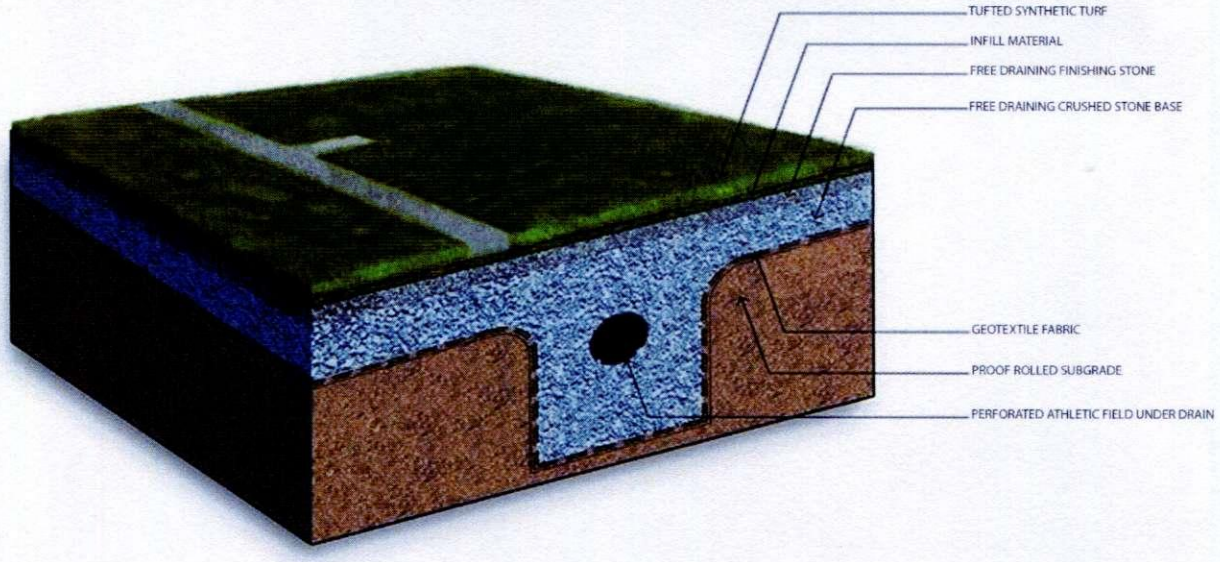
Sub-grade: A stable foundation onto which the base materials and field systems are installed.

3. FUNCTIONS AND COMPONENTS OF A STONE BASE SYSTEM

When it was first introduced, the so-called 3rd generation synthetic turf system proclaimed its ability to provide the highest quality player experience while having the ability to sustain intense levels of play in all weather conditions.

Over the years, research has allowed impressive advancements in the physical characteristics of these playing surfaces, emphasis being put on both wear resistance and an increase in the overall quality of the player's experience. And the safety of the players has been the focus of intense research and development efforts by all the major industry players.

Most of the development efforts have been afforded by turf manufacturers and those of associated system components (drainage pads and accessories, infill, etc.). But one component of the synthetic turf system that is critical to the overall performance of the resulting playing surface has long been overlooked. The stone base is an integral part of the overall system, as it ensures the integrity of some of the most essential properties of the system, such as long term surface stability and planarity. The base is also the most critical component of these system's drainage properties, which is one of their main selling points.



4.5.2 Storm water management

Most administrations require that measures be taken to manage storm water collected or generated in most types of new civil engineering projects. Specific regulations are set at most state and local levels. Any project affecting natural surface runoff is subject to these regulations and appropriate management measures must be implemented in the design.

These measures are meant to control the transport of sediments, pollutants and other undesirable elements into stream, lakes or the potable water system. They are also intended to limit the strain on existing storm water systems caused by any addition of impervious surfaces in the environment. A synthetic turf surface acts just like an impervious surface, since the rain water it collects is most often redirected directly into the rain sewer system instead of being left to percolate into the soil.

Synthetic turf systems must integrate storm water management considerations and must be designed to reduce runoff on site and ultimately downstream by providing storage capacity and limiting the rate at which drainage water is released.

Synthetic turf systems take into account storm water management and are designed to reduce runoff both directly onsite and indirectly downstream by providing storage capacity within the stone base and by limiting the rate at which water is discharged from the field. Some fields provide efficient means for ground water discharge.

4.5.2.1 Storm water management (Flow control and water detention)

The huge volumes of water collected by synthetic sports field drainage systems can very rarely be fed into a municipality's storm water system without some kind of flow control measure being put into place. This implies that the flow of water coming out of the system is restricted so that it will not exceed a rate that is determined by the authorities. This evacuation rate is most often less than the rate at which water accumulates in the drainage system. The system must be designed to store the excess water while it is being evacuated. Therefore, most, if not at all, modern turf drainage systems must be designed with flow control mechanisms and water detention structures.

Some jurisdictions will allow the base's inherent storage properties (through pore space of the stone mass) to be considered in the detention calculations. This implies sophisticated calculation approaches and methods. Unfortunately, some others do not recognize the permeable stone base's specific water flow properties and require that drainage design be approached in a more simple and traditional manner, which results in detention when it may not be necessary.

The project civil engineer should check whether there is an increase in the post development flow, and provide for flow reduction or storage measures in accordance with the local regulatory requirements.

Where the available space is sufficient, the storage can be done in ponds or other such outside structures. In such cases, the detention pond's optimal surface level must be below the sports field drainage system's lowest point, so that the accumulated water remains below the stone base.

But, in most cases, this is not possible. Sports fields are often built in tight spaces and there is little or no space to build these storage ponds. In such cases, the storage must be done below ground, close to or even under the playing surface, in closed tanks or stone filled trenches. The storage structure must be constructed very carefully so that there is no movement or settling that can affect the surface's planarity.

This aspect of a project's design is best left up to engineers or other competent experts. Although the calculations may seem simple, they involve the integration of many different parameters and the demonstration must be made to authorities of the accuracy of the calculation process and its results.

4.5.3. Drainage pipe network

Most, if not all, turf construction systems rely on some kind of pipe drainage network to move water through, under and out of the stone base. There are many