## BUILD IT RIGHT THE FIRST TIME!

by

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A study of photographs and films from not too many decades ago reveal that mud-coated players and poor-quality, unsafe playing conditions were a common occurrence. The mentality of decision-makers involved in planning sport facilities was to spend many millions of dollars in the construction of a stadium, while at the same time seeking the cheapest "dirt" possible to place in the stadium floor. It is this floor that is essentially the turfed stage on which the game is played. To a certain extent this mentality still persists today. In addition, many turfgrass managers responsible for the culture of turfgrasses in stadia were poorly trained and poorly paid for the responsibilities they were charged to implement.

Times have changed! In the United States the introduction of artificial turfs, their relatively wide spread use on intensively used stadiums, and their subsequent decline have opened the door in terms of more realistic field construction budgets. There is now an improved willingness to invest reasonable amounts of money in constructing a properly drained, quality root zone capable of providing favorable grass-growing conditions and resultant improved safety for participants. At the same time, major advances have been made in (a) the soil physics of high-sand root zone construction, (b) improved turfgrass cultivars, (c) soil stabilization techniques, and (d) specific cultural practices, such as nutrition and irrigation, that provide an extensive root system and hardy shoots that are best able to survive the intense traffic-divoting stresses.

Unfortunately, the decision-makers involved in writing the specifications and awarding bids for sport field construction may fail to seek out the best available technical information, which all too often results in root zone constructions and turfs that eventually fail. The result is the loss of turf and playing quality, plus increased injuries. Thus, the key factors to consider are now discussed.

### REALISTIC CONSTRUCTION SCHEDULING

Planners must recognize that a realistic time frame must be provided for the planting, establishment, and mature turf stabilization before event scheduling can be initiated. This time frame is determined by the (a) particular turfgrass species, (b) rate of establishment of the species, (c) method of establishment preferred, (d) time of year and the associated temperature conditions relative to the growth optimum of the grass species selected, and (e) availability of a formally trained, fully experienced turf manager capable of managing the type of root zone-turf construction that has been installed. Preferably, this turf manager should be employed and on-site well ahead of the scheduled field completion date.

An innovative dimension which as yet has not been attempted would involve the installation of the turfed portion of the stadium during an early phase of stadium construction. Such a design would allow completion of the remainder of the stadium structure from the exterior, thereby allowing time for establishment, rooting, and mature stabilization of the turf. This strategy would allow an earlier opening date.

### STADIUM DESIGN-FIELD RELATIONSHIPS

Most architects-engineers involved in stadium design lack an understanding of environmental-design needs as related to the interior turfed playing surface. They further aggravate this problem by a failure to seek advice from turfgrass scientists competent on this complex subject.

Some of the major design considerations include the following:

- **Stadium Orientation.** The stadium should be oriented in relation to openings or lower height structures in its upper surrounds, such that the amount of radiant sunlight reaches the largest possible turfed area on the field for the longest diurnal duration, particularly during the playing season.
- **Maximize Field Surface Air Circulation.** An innovative, but needed, consideration is the prevailing winds relative to a stadium that will facilitate air movement across the turf surface. This will avoid the build-up of high temperatures and humidities on the turfed field, which otherwise results in reduced turfgrass health and increased disease activity.
- **Partial Roof Design.** Adequate sunlight is critical for turfgrass growth in a stadium, unless supplemental artificial lighting is to be provided as in domed stadia. For a partial roof design the extent of the roof overhang must allow sufficient radiant light to reach the turfed surface, particularly during the growing season. A turfgrass environmental physiologist can calculate base data on the minimum photosynthetically active radiation (PAR) needed in all parts of the turfed field relative to the actual energy requirements of the turf for both normal shoot and root growth, plus the additional energy required to support new shoot growth needed for recovery from injury during the playing season.

  One additional design dimension that can help is the use of the appropriate translucent panels where a stadium is designed with a large roof overhang. Furthermore, the structural design should allow the periodic cleaning of dirt from these translucent roof panels to facilitate continued transmission of radiant energy to the turfed surface.
- **Non-Turfed Surrounds.** Typically, a diverse range of activities occurs in the stadium, in addition to the actual competitive sport events on the grass field. The severity of traffic stress on the turf can be reduced if a non-turfed surrounds is provided around the perimeter of the actual turfed playing field. This is the area where most of the vehicle, automobile, band, performing act, and turf maintenance equipment traffic activities can be concentrated without adversely affecting the turf.

## ROOT ZONE-PROFILE-DRAIN SYSTEM SELECTION

This author was astonished by one architect's presentation of the design and specifications planned for a stadium. Three hours were spent in discussing specifications for asphalt, concrete, electrical, plumbing and other construction aspects which were addressed in great detail. The architect then said, "of course we will install the turf field," and that completed his presentation. I asked " what are the root zone specification?" His reply was "it will be a good one." I repeated the question again, and again, was told "it would be a good one." I then asked the question "are you aware that specifications for proper root zone construction in terms of particle size distribution and profile construction are needed just like those required for concrete construction in buildings or asphalt construction of roadways." The answer was no. I then asked the question if a drain line system would be installed. The architect's reply was no. I asked why? He said it was too expensive. This obviously indicated no knowledge whatsoever on the subject, as a drainage system is one of the least expensive items to install in a turfed field, and is certainly essential. The decision-makers then decided to have the architect reassess the situation and come back with detailed specifications for a proper root zone-profile construction. The cost for this needed change was surprisingly minimal for the benefits derived, and especially when compared to the disaster that might have occurred without proper specifications.

Root zone construction should be composed primarily of a medium sand particle size range distribution that ensures rapid drainage of excess water downward through the profile and which has minimal proneness to compaction under

intense traffic stress, even in high moisture situations. In addition, a 4 inch (100 mm) gravel or crushed stone drain bed within specific particle size range immediately under the 12 inch (300 mm) root zone profile is essential in most situations. The specific particle size distribution and profile construction specifications depend upon the (a) intensity of traffic, (b) rainfall intensity during the playing season, and (c) other non-sport event activities that are scheduled on the turfed playing field. As the intensity of traffic increases the need for a high-sand root zone and ultimately an interlocking mesh element stabilized root zone are increased. It should be emphasized that the materials selected for root zone construction should meet specifications in terms of both the physical and chemical characteristics.

## TURFGRASS SELECTION

The turfgrass species and cultivar(s) selected should be adapted to the specific climate of the region and capable of sustaining the desired shoot density and growth rate at the mowing height and frequency anticipated for the particular type of sport. In addition, the turfgrass cultivar selected should have the capability of achieving the best possible growth under the climatic conditions during the season when play is scheduled. For example, selection of a cool-season turfgrass cultivar with the best possible ability to grow at suboptimum temperatures is important for sports played in the late-fall, winter, and early-spring periods.

## IRRIGATION SYSTEM DESIGN

The stadium design may result in a differential shadow over the turfed field for a certain portion of the daytime period. This decreases the radiant energy load on the turf which in turn affects the rate of evapotranspiration and allied soil moisture dissipation. Consequently, it is important to design an irrigation system with zonal head design and controls that will allow selective irrigation of only selected portions of the field depending on the degree of shading.

## CONSTRUCTION INSPECTION

It is essential that a knowledgeable on-site **Construction Inspector** be hired as an employee of the stadium owners to ensure that the construction specifications for the turfed field are met. This is particularly critical in terms of the particle size distribution and chemical properties of the root zone mix. The individual components of the mix must be a uniform and possess the specified particle size distribution. This dictates that each individual truck delivery must be monitored.

## QUALIFIED TURFGRASS MANAGER

A significant amount of money can be invested in constructing an intensively used sport field. If properly designed it should perform for an indefinite period of time. However, employment of an improperly trained and/or inexperienced turf manager can lead to disastrous results and even failure of the turfed field. The high-sand root zones with interlocking mesh element construction can provide quality playing surfaces with more than 200 hours of use during a season of competition. This ever increasing intensity of use on sports fields and associated increased income, also justifies a budget that allows the employment of a formally trained, experienced, qualified agronomist to bring out the maximum potential of a properly constructed sports field.

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## UPCOMING JB VISITATIONS:

May 11 to 31 - England.
June 1 to 8 - Italy.
June 10 to 13 - Birmingham, Michigan.
June 19 to 25 - Oregon.
July 8 to 12 - Ohio.

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**Note:** As of May 6 will move our summer office to: 6900 E. Kelenski Drive, Cedar, Michigan, 49621, USA; phone: 616-228-6328; Fax: 616-228-2848