

## **Sand Cap Built-Up Athletic Field Research**

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### **Introduction**

The typical Michigan high school athletic field serves as a focal point for social gatherings and adds to a sense of community pride. It is typically one of the few fields in town with lights, making it host to a variety of after school and work events including football, lacrosse, soccer, cheerleading, and band. Therefore, having an aesthetically pleasing and functional high school athletic field is often important to a variety of members in the average community. Unfortunately, the majority of Michigan's high school athletic fields are constructed on native soil high in silt and clay. Due to low infiltration rates these fields rely on surface drainage during periods of heavy rainfall, failing to provide adequate drainage of surplus water. Saturated field conditions substantially reduce traction and stability. Reduced stability in combination with heavy use, typical of the fall athletic season, will result in turfgrass failure, decreased overall playability and diminished visual aesthetics.

Current solutions to this problem include complete field conversion to a synthetic or sand-based turfgrass system. The first, most expensive, option is the installation of a synthetic athletic field which ranges from \$600,000 – 1,000,000. The second option is a conventional sand-based field with a gravel drainage layer which will cost from \$400,000 - 600,000, and take your field out of play for half of the year. The third option for sand

based athletic fields is the sand-cap system, in which a small layer of the topsoil is removed, drain tiles are installed, then the topsoil is replaced with a 5-6” layer of specifically blended (well-graded) high sand-based root zone material, for \$150,000 - 300,000. However, all of these renovation options take the field out of play. An alternative renovation process is the installation of intercept drain tiles into the existing field and cumulative sand topdressing applications with a well-graded sand-based material providing a built-up sand-cap system. This is a cost effective solution, costing \$36,000 – 75,000, that never takes the field totally out of play.

The built-up sand-cap system is a natural extension and combination of two currently proven applications. First, the use of repeated sand topdressing in order to develop a sand-based profile has proven to be successful in the golf course industry for over 30 years. Second, sand-based athletic fields are widely used in Michigan and proven to provide a superior playing surface in comparison to native soil fields.

### **Research Objectives**

Beginning in March 2007 a series of research projects were initiated with a variety of objectives critical to the application of this renovation procedure. The objectives of these projects were to, first, evaluate the effects of varying amounts of single topdressing applications on recently established turfgrass health and vigor. Secondly, evaluate the effects of varying cumulative amounts of sand topdressing on surface wear tolerance and stability. Finally, establish an optimum intercept drain tile spacing, in combination with sand topdressing, necessary to improve drainage characteristics and surface wear tolerance.

## **Preliminary Research Findings**

Preliminary findings from research conducted in 2007 showed that as much as ¼” of topdressing can be applied in a single application. As little as ½” of topdressing, in combination with drain tiles will substantially decrease surface moisture conditions, an improvement in drainage characteristics. One inch of topdressing can safely be applied over a one month period without being detrimental to surface strength or stability. A drain tile spacing of 13’, which will substantially reduce installation costs, is adequate to provide sufficient drainage and improved stability when a cumulative sand topdressing depth of 1” has been applied. 2008 results show that when 2” of cumulative sand topdressing has been applied, while surface drainage characteristics continue to improve, no differences are observed in surface strength or stability even in comparison to plots without drain tiles. All cumulative topdressing rates, 1, 2, 3 and 4”, applied over a two year period, increased turfgrass cover and shoot density regardless of the number of cumulative applications.

## **Interpretation**

Preliminary findings observed in this research suggest that increased drain tile spacing and decreased sand layer depth can reduce the cost of these two procedures by up to \$68,000. To install drain tiles and backfill an entire field with 6’ drain spacing’s at approximately \$4 - 5 per linear foot would cost \$48,000 – 60,000, but if drain spacing’s were increased to 13’, which this research suggests if feasible, installation cost could be reduced by as much as \$22,000 – 28,000. Furthermore, reducing the cumulative

topdressing depth from 6” to 2”, at an estimated \$9,000 per inch (labor and material) of sand topdressing, would reduce these costs from \$54,000 to 18,000.

### **Case Studies**

A number of case studies evaluating various drain tile spacing and topdressing depths are currently being conducted throughout the state of Michigan. Drain tile spacing in these case studies includes 6, 7.5, 8, 9 and 10”, while topdressing depths include 1, 1.5, and 2”. These case studies currently include the Okemos High School football, soccer and practice field in Okemos, Mich., the Grand Blanc High School football field in Grand Blanc, Mich., and an Intramural Field on the Michigan State University campus in East Lansing, Mich. Regular evaluation and communication with the necessary parties is being maintained to monitor the progress of these fields over time.