



*Civil Engineering, Landscape Architecture,  
Survey, Planning & Program Management*

3030 LBJ Freeway, Suite 100  
Dallas, TX 75234  
Office: 972.488.3737  
Toll-free: 1.877.488.3737  
ceieng.com

ANALYSIS OF GRANULAR-INFILL SYNTHETIC TURF  
  
AS  
  
SPORTS FIELD SURFACE  
  
VS  
  
HIGH PERFORMANCE / SAND BASED NATURAL GRASS  
  
FOR  
  
SPLENDORA ISD

PRESENTED BY: JEFF BRESEE, P.E.  
CEI ENGINEERING ASSOCIATES, INC.  
DALLAS TEXAS

#### ABOUT THE AUTHOR

Jeff Bresee, is a Licensed Professional Civil Engineer who has dedicated his practice to the Synthetic Turf, Track & Tennis Court Industries and has been the Engineer of record for over 600 outdoor sports facility projects of all types across the State of Texas and surrounding states. Now in his 25th year of such service, Mr. Bresee appreciates the opportunity to be of service to you and your school and hopes that you find the information contained herein valuable.

The following analysis has been comprised for the review of Splendora Independent School District for the consideration of options for surfacing for the surfacing of their sports fields.

Options considered in this analysis are for industry standard surfaces that are proven to yield quality/high performance surfaces that are compatible for the play of competition sports and activities. The surfaces included are sand-based natural grass and granular-infill synthetic turf (GIS Turf). This analysis will consider total costs, field usage/return on investment and player safety for each surfacing option.

### COMPARISON OF COSTS

Both construction and maintenance costs were estimated for this comparison with the following design criteria and assumptions being used:

1. Field Size is that of the standard inside area of a 400-meter track, being 100,000 square feet.
2. The life cycle of a sand-based natural grass field is 20 years.
3. The life cycle of a GIS Turf field is 10-years for turf carpet and 40-years for underlying sub-grade and drainage layers.
4. The synthetic turf field will include a shock absorbing pad system that has a life cycle of 20-years.
5. The sand-based natural grass field will require a real-mower for proper maintenance and at least 3 mowings weekly during active grass growth periods.
6. All maintenance costs are based upon average costs for each type of field for southeast Texas.

#### MAINTENANCE COST – ANNUAL CARE OF SAND-BASED NATURAL GRASS FIELD

| ITEM  | COST        |
|---|-------------|
| Fertilizer, Pesticide, Herbicide, Etc.                    | \$2,000.00  |
| Top Dressing, Aeration & Minor Grass Replanting/Resodding | \$10,000.00 |
| Water   | \$25,000.00 |
| Annual Maintenance Equipment Upkeep                       | \$1,000.00  |
| Field Paint Materials                                     | \$1,500.00  |
| Irrigation System Upkeep                                  | \$500.00    |
| Labor - Mowing and Other Care                             | \$17,500.00 |
| Labor - Painting and Game Prep                            | \$7,500.00  |
| Annualized Cost of Maintenance Equipment Purchases        | \$5,000.00  |
| Total Estimated Annual Maintenance Cost                   | \$70,000.00 |

**TOTAL COSTS – FIRST 10-YEAR PERIOD**

| <b>ITEM</b>   | <b>COST</b>           |
|---|-----------------------|
| <b>NATURAL GRASS FIELD</b>                                  |                       |
| Initial Cost of Construction For 20-Year Life Cycle Field   | \$700,000.00          |
| Total Cost of Annual Care Over 10-Year Life                 | \$700,000.00          |
| <b>Total Cost - Natural Grass Field Over First 10-Years</b> | <b>\$1,050,000.00</b> |
| <b>GIS TURF FIELD</b>                                       |                       |
| Initial Cost of Construction For 10-Year Life Cycle Turf    | \$1,400,000.00        |
| Total Cost of Annual Care Over 10-Year Life                 | \$50,000.00           |
| <b>Total Cost - GIS Turf Field Over 10-Year Life Cycle</b>  | <b>\$1,450,000.00</b> |

Initial construction costs were estimated for each option and include for both along with the assumptions for the life expectancy for each option. As can be seen, despite the higher cost of annual maintenance that natural grass requires, the total cost of synthetic turf is approximately 40% higher than that of natural grass over the first 10-year period. However, as the synthetic turf replacement cost is considerably less than the initial cost, the long-term total cost for each option shows that after 20 years, GIS turf is the lesser cost option.

**TOTAL COSTS – SECOND 10 YEAR PERIOD**

| <b>ITEM</b>   | <b>COST</b>           |
|---|-----------------------|
| <b>NATURAL GRASS FIELD</b>                                  |                       |
| <b>Total Cost - Natural Grass Field Over First 10-Years</b> | <b>\$1,050,000.00</b> |
| <b>GIS TURF FIELD</b>                                       |                       |
| Cost of GIS Turf Field Replacement                          | \$650,000.00          |
| Total Cost of Annual Care Over 10-Year Life                 | \$50,000.00           |
| <b>Total Cost - GIS Turf Field Over 10-Year Life Cycle</b>  | <b>\$700,000.00</b>   |

As can be seen, the cost of GIS Turf over the second 10-year is less than that of natural grass. Given that this will continue to be true for subsequent periods out to the 40-year mark where the full life cycle for each option concludes.

#### 40-YEAR CYCLE CUMMULATIVE COSTS

| NATURAL GRASS FIELD |                |
|---------------------|----------------|
| Years 0-10          | \$1,050,000.00 |
| Years 10-20         | \$2,100,000.00 |
| Years 20-30         | \$3,150,000.00 |
| Years 30-40         | \$4,200,000.00 |
| GIS TURF FIELD      |                |
| Years 0-10          | \$1,450,000.00 |
| Years 10-20         | \$2,150,000.00 |
| Years 20-30         | \$2,850,000.00 |
| Years 30-40         | \$3,550,000.00 |

As can be seen, the long-term costs associated with GIS-Turf is less than that of sand-based natural grass by approximately 15%

\*NOTE: For fields that lie inside of a 400-meter track, the elimination of natural grass near the synthetic track surface will enable it to last longer (water overspray causes calcification and premature hardening of the track surface). Also, grass growing up through the edge of the track surface and pests such as fire ants cause breakdown in the track surface. Synthetic turf eliminates these hazards.

#### COMPARISON OF FIELD USAGE/RETURN ON INVESTMENT

When considering return on investment for a sports field, the amount of use that can be provided without significant harm to the surface is paramount. Sand-based natural grass is the most durable grass surface available yet, given that it is a living organism that is damaged as a result of foot-traffic/field use, limitations exist as to both the duration and the type of use that it can experience while maintaining safe conditions. GIS Turf has similar limitations, but they are much less than that of sand-based grass and can withstand, at minimum, 200% more traffic than what a sand-based natural grass field can withstand. Thus, when considering a return on investment in terms of cost-per-use, GIS Turf has a significant advantage over sand-based grass. Using said 200% increase in field usage provided by GIS Turf and the costs listed above, GIS Turf offers the following return on investment advantage over sand-based natural grass.

| Cost-Per Use Advantage of GIS Turf<br>Over Sand Based Grass |         |
|---|---------|
| Years 0-10  | 144.83% |
| Years 10-20   | 195.35% |
| Years 20-30   | 221.05% |
| Years 30-40   | 236.62% |

## **SAFETY**

Both types of surfaces are proven in their ability to provide added safety as both are designed to prevent foot-lock (where an athlete's cleat becomes trapped in the ground surface during rotation, resulting in foot, ankle and knee injuries) and impact injuries. Multiple studies have been conducted comparing the safety of GIS Turf to sand-based grass, most notably the NFL's 2023 study. This NFL study concluded that the rate of injuries is similar, or that there is no notable difference. However, it is important to note that this NFL study only compared results experienced on NFL fields which have low field use rates and very high maintenance budgets. Studies performed that compare safety results on high school fields, such as Dr. Bill S. Barnhill's study conducted on Amarillo ISD's Dick Biven's Stadium, show significant reduction in injuries that result due to GIS Turf being installed. It is our opinion that the difference in results between these two studies is related to the degree of field use and the degree of field maintenance. Thus, it is likely that Splendora ISD will experience results more similar to that of Dr. Barnhill's study than that of the NFL study and therefore, GIS Turf will likely provide the District a more safe option than that of sand-based grass.

## **CONCLUSION**

This analysis has compared the costs and benefits of GIS Turf to high-performance, sand-based grass as a field surface. In doing so, we find GIS Turf to be the more advantageous option for Splendora ISD. However, we understand that there are other factors to be considered and that the weight of making this type an investment is significant. With such, we do not make a formal recommendation to the District but rather, we hope that the District will find this analysis to be of value in making their decision.