



Cherokee High School
Lenape Regional High School District



Lenape Regional High School District
Home of Lenape, Shawnee, Cherokee, Seneca, and Sequoia

Cherokee – Turf Evaluation

Sabrina Thomas
Thomas Testing, Inc



Independent Sports Surface Testing
"Safety IS the Game"

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February 26, 2019

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Constance L. Stewart
Business Administrator/Board Secretary
Lenape Regional High School District
93 Willow Grove Road
Shamong, New Jersey 08088

Re: Fiber Wear Evaluation Report For Cherokee High School Turf Field

Dear Connie:

As you know, this firm was engaged to perform fiber wear evaluation services for the Lenape Regional High School District Board of Education ("Lenape District") with respect to the synthetic turf fields located at Shawnee High School in Medford, New Jersey ("Shawnee Field") and Cherokee High School in Evesham, New Jersey ("Cherokee Field"). The following is our report, which includes the results of our evaluation of the Cherokee Field.

The Cherokee Field

The installation completion date for the Cherokee Field was September 17, 2009. The field is used as a multi-purpose field, primarily for high school athletic events including football, soccer, lacrosse and field hockey. It is also used for community athletic events and is generally used five (5) days per week, spring and fall, and approximately three (3) days per week during the winter and summer. In addition, the field is used for non-athletic events such as graduation exercises, and high school and community celebrations, etc. See attached Appendix I - Client Interview.

The field is a synthetic turf field, which consists of a drainage layer, a multi-layered backing system and synthetic grass blades that are infilled (i.e., loose particles are brushed into the synthetic turf carpet) with sand and/or granulated recycled rubber or other infill material that provides necessary uniformity and resiliency of the surface.

It was reported to us, that the field has been maintained by the Lenape District's buildings and grounds personnel in accordance with the guidelines issued by FieldTurf, the manufacturer.

The field is exposed to the usage set forth above, as well as the weather. The use and weather, including the constant exposure to the sun, causes synthetic turf fields to deteriorate and compact over time, affecting their playability. There are certain tests that can be performed to determine the current playability of synthetic turf fields, vis a vis the safety of the athletes and individuals utilizing the fields.

Site Observation Visit

A site observation visit was performed December 20, 2018, on the Cherokee Field. Upon entering the infilled synthetic sports field stadium, John Belle, Sabrina Thomas and Thomas J. Miller (myself), evaluated the turf surface via a visual survey. This is a dual tone turf alternating between an "olive" green and a darker green. We scanned the field from the top of the stairs leading to the field and noticed a mottled appearance of the field. After visiting the field, we observed that almost all of the fibers were fine textured and laying over. -The varying direction of fiber layover was responsible for the mottled appearance from the top of the stadium.

The grass blades, unmagnified, did show signs of excessive wear/splitting.

Upon closer examination of undeteriorated examples, we noted that the installed individual grass blades had a crescent shaped blade with a central spine on the concave face. Owner provided documents identified this product as a "FieldTurf" FTOM-1F carpet. Based on physical appearance and the date of installation, it is assumed that these blades are the mono-filament "Dura-Spine" FieldTurf fiber. Almost all of the original "grass blades" examined had split down each side of the central spine and the pieces broken down (fibrillated) further into thin fibers. Once these grass blades have split and fibrillated, the fiber pieces have a greater tendency to lay down.

The condition of the surface was similar throughout the field with small portions along the edges having remnants of the original "blade" condition. The blade fibrillation and attendant lay down poses two problems. First, according to sources from FieldTurf, the design philosophy of the relatively light tufted pile weight (often 30-35 ounces per square yard) and dense, heavy infill (usually close to 50% sand and 50% rubber by volume) is that the cleats embed and grip in the infill, not the grass blades. The laid down fibers will impede, if not preclude this ability. Second, fibers that are lying horizontally will wear more rapidly. This layover condition would be a deviation from the expected performance and durability of the product, which translates into a noteworthy decrease in the longevity of the surface.

Colored fibers were worn down/broken down and degraded differently than the green fibers in most areas. In some cases, these turf areas had only nubs remaining. In contrast, most green fibers located in the major play area of the field have become thin, fine, hairy from the cracking or splitting away from center "spine". Fibers in some areas can also be "broken off" fairly easily with a fingers grip.

The fiber/infill depth analyses results were outside normal limits, especially in the high usage zones of the goal mouths/ center of the field. This would be primarily along the longitudinal center section of the field. - See attached Appendix II - Field observation 12-20-18 @ Cherokee H.S. sheet. Generally, manufacturers recommend 1/2" to 3/4" of exposed fiber. Our observations noted exposed fiber lengths in excess of 3/4" in most areas where fiber remained.

Testing/Analysis

A. Gmax Testing

In connection with our evaluation, various testing was conducted at the Cherokee Field on December 20, 2018, including Gmax testing. Gmax testing is designed to determine whether fields are performing the way they should with respect to impact/shock absorption. This testing provides a numerical frame of reference with respect to utilizing the surface being tested to ensure the safety of the athletes and individuals using the fields.

Specifically, Gmax is a numerical value that is used to determine surface hardness, in this case playing fields. The harder the surface, the greater amount of impact that is transferred to a player instead of the surface. The Gmax value applies to both artificial and natural turf fields. Here, the testing methods employed were the standard test methods utilized for shock/absorbing properties of playing field surfaces, as measured in accordance with ASTM Standard F355 and ASTM Specification F1936. For synthetic surfaces, ASTM standards require that the Gmax value be less than 200 g's for any tested location on the field. The average Gmax value for this field should be less than 175 g's, which is the maximum current anticipated/promulgated standard proposed by ASTM for synthetic turf fields. The Gmax test results for the Cherokee Field averaged in the 180's. See attached Appendix III – Gmax Test Results.

B. Turf Fiber Analysis For The Cherokee Field/Report By Hans J. Kolitzus¹

The product under inspection is artificial turf with infill. The tuft rows are spaced by 20mm and the stitch number is 170 /m (total number of stitches per m²: about 8,500). Each tuft consists of 12 filaments. The individual filaments are 1.5mm wide and max. 0.20mm thick (spine = 0.20mm; "wings" = about 0.05mm). The fiber length above primary backing is 60mm.

When inspecting the structure of the pile layer it is typical that the lower 40mm of the fibers are bent by max. 45 deg and the upper 20mm are split and form branches to various directions. This is caused by the fact that the infill was 40mm deep/thick which stabilized the lower part of the fibers so far. The split free ends of the fibers have formed an aspect/appearance of a soft tight carpet.

A fiber loss cannot be realized from the samples since the fibers are well fastened in the backing. However, it is probable that the split free ends of the fiber's loose parts as a consequence of wear and tear by the sportive usage. In order to estimate the remaining lifetime, the amount of fiber remainders per month could be determined. The answer results from a comparison of the fiber debris and the total amount of fibers of the synthetic turf carpet.

Following from the above observations it is clear that the product is severely damaged. The degree of fiber splitting is extraordinary and an indicator that the fibers are defective by design. This means

¹ The report by Mr. Kolitzus is limited by the fact that his comments are based on analyzing several square feet of unfilled samples, as opposed to inspecting the field; and, in the context of FIFA Gmax guidelines, not the promulgated ASTM guidelines. However, the points of intersection are far more important. It is agreed that the "product is severely damaged" and that the "degree of fiber splitting is extraordinary". And while the surface may have some limited future utility, the most viable solution would be a replacement of the surface."

that the fibers are designed and manufactured in a way which caused inevitably premature deterioration. There is a technical analysis of a very competent fiber manufacturer in Germany explaining this.

Although the field may be further used for a period of time, the playing surface does not meet the criteria of a standard or the conditions of this site specification any longer. A complete refurbishment (i.e., exchange of infill, etc.) would be useless. The alternative would be a replacement of the surface.

Summary/Recommendation

Since this is an infilled synthetic turf product, expectations are that the field would be resilient over the life of the product, which is represented to be a minimum of 8 years. While our observation visit was conducted at the beginning of the tenth year in the life of this field, it was reported to us that the observed conditions of significant degradation and layover were noted and memorialized a number of years ago, within the eight (8) year warranty period.

The tests performed show that the existing infill (the loose particles that are brushed into synthetic turf carpet) for the Cherokee Field has a high sand content, which is exhibiting characteristics that trigger Gmax values to become elevated and potentially contributing to fiber breakdown. Furthermore, the tests performed show that a substantial portion of the original fiber has degraded to a point where impact attenuation is limited, and the field is beyond the normal wear and tear of a playable infilled synthetic turf field.

Based on the prior observations reported to us regarding premature degradation, the preceding report, the Gmax testing cited above and the physical evidence in the field, it is our professional opinion, the Lenape District, multi-purpose field, manufactured by FieldTurf, and installed at Cherokee High School is not performing to the expectation for an infilled synthetic turf field.

Furthermore, based upon the results of the Gmax testing, the initial fiber test review, the fiber wear analysis and the fiber/infill depth analysis, it is our professional opinion that this field must be replaced. It is also our professional opinion, and recommendation, that the Cherokee Field be closed to any further activities that involve physical contact, i.e., the possibility of an athlete or individual impacting the field surface as a result of an activity such as football, soccer, lacrosse, field hockey, etc. After the repairs are made where the samples are taken, the field, however, may be used for activities/events not involving physical contact such as marching band or graduation exercises, as the condition of the field does not pose any significant health or safety risk for this type of use. It will be up to the LRHSD to monitor and supervise compliance with this exception.

If you have questions or need additional information, please feel free to call or e-mail.

Sincerely,



Thomas J. Miller, PE, CME, PP
President

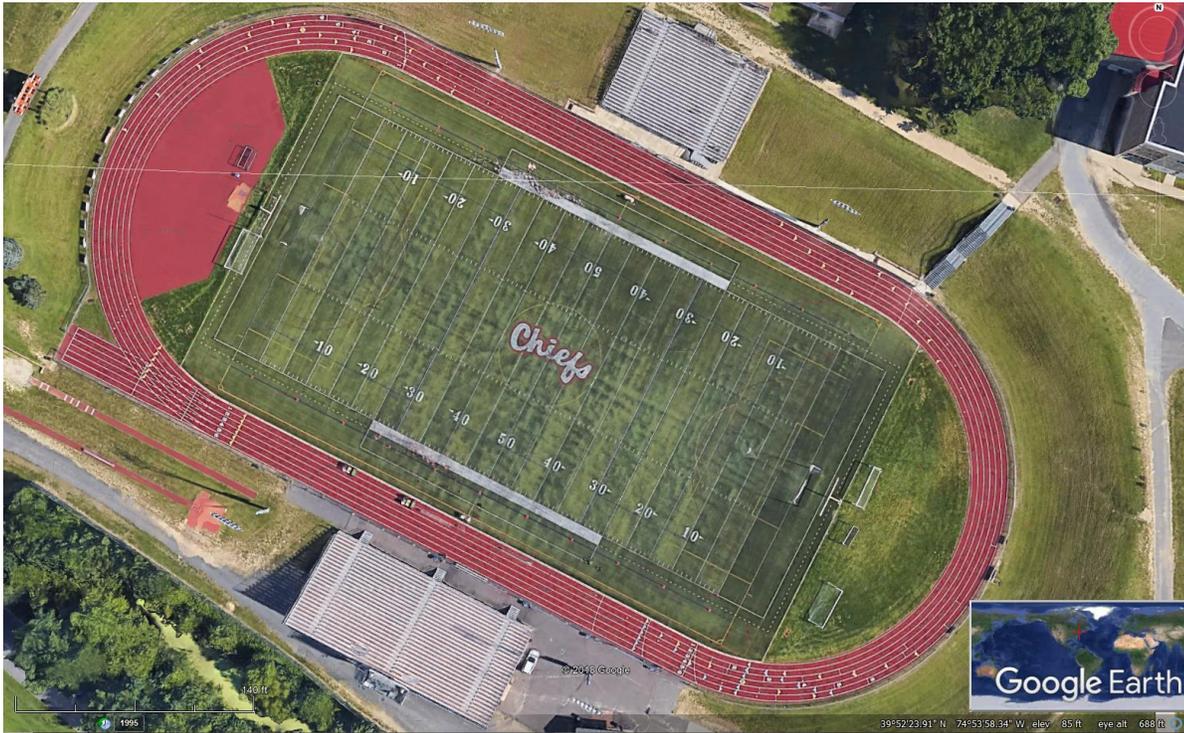


Sabrina Thomas, Thomas Testing, Inc.
President



L. John Belle II
Supervising Engr.

Cc: Mr. Drew Dinger, AIA, The Design Collaborative - Architects & Planners, P.A. (via e-mail) Mr. Anthony Voiro, C.E.F.M., Director of Buildings and Grounds (c/o Drew D.)



CLIENT INTERVIEW		
Primary Field use(s)	Per district representative	High School Football, Pop Warner football, Flag football, Boys & Girls Lacrosse, Boys & Girls Soccer, Field Hockey.
Schedule of Maintenance	Per district representative	Field is groomed 3 times per year
General usage frequency(s)	Per district representative	5 days per week – spring and fall Approximately 3 days per week – winter & summer
Client comments	Per district representative	Obvious signs of tearing and missing blades as well as crumb rubber ponding.
Evaluator comments	TJM, JB & ST	Documents indicate on-going maintenance.
Test(s) conducted	ST	Field infill depth, Gmax testing

VISIBLE TURF AND FIELD CONDITIONS

<p>C</p>	<p>Center Area: The green turf around the fifty-yard line (football) was worn as described previously as were the Inlays.</p> <p>For review by Hans J. Kolitzus - two typical defective sections of about 1 sft (13" by 13" square, sideline sample was larger). The 1st sample taken around the 45 southeastern yard line and the 2nd sample near midfield, along the edge adjacent to the track on the Home side of the stadium.</p>	
<p>PK</p>	<p>Penalty Kick: Same condition as above (Note: Picture from northeast corner of the field). These areas appeared more compacted with fiber on their side.</p>	
<p>S</p>	<p>Sidelines: Same condition as above with the exception of a thin band of more intact fibers along the curb.</p>	
<p>GA</p>	<p>General Areas: As previously described.</p>	

<p>I</p>	<p>Inlays: The condition of the inlays varied from somewhat better to considerably worse than the green turf dependent on color more than location. The order of deterioration (worst listed first) by color is as follows: red; yellow; orange; white then blue</p>	
<p>E</p>	<p>Entrances: One would typically expect entrance areas to be in poorer condition. However, the field was so severely deteriorated there was no difference in appearance.</p>	