Rutgers Corner – The Clegg and measuring playing surface hardness

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A common attribute of heavily-used natural turf fields and worn-out synthetic surfaces is unacceptable playing surface hardness. In the case of natural turf fields, soil compaction and surface hardness are the all-too-often results of the disintegration of turfgrass cover. For synthetic fields, older surfaces are often replaced due to surface hardness issues and subsequent concerns over player safety.

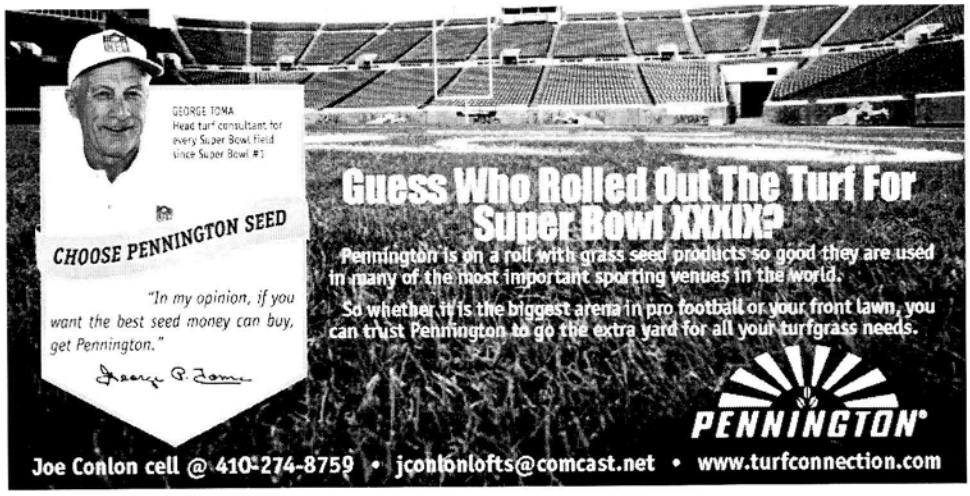
A systematic means is necessary to measure and evaluate the surface hardness of sports fields. The American Society for Testing and Materials (ASTM) has developed a set of procedures utilizing a device called the Clegg Impact Soil tester (CIST) to assess the surface hardness of North American football fields (ASTM F 1936-98).

The Clegg Impact Soil Tester (CIST) is a device that can be used to measure surface hardness. The CIST consists of a cylindrical impact missile enclosed in a tube that creates minimal friction. The missile is dropped at a prescribed height of 2.0-ft on the surface to be tested. The CIST is equipped with an acceleration transducer and a hand-held electronic display that allows the user to record values generated by the CIST in units of G_{max}. G_{max} is a measure of peak deceleration, which is the impact energy of the missile absorbed by the surface. The higher the peak deceleration value (G_{max}) the more energy being returned to the object contacting the surface, or the harder the surface. To put this in perspective, Rogers et al. (1988) found a concrete basement floor produced a value of 1280 using the CIST and was reduced to 260 when the same floor was covered with a carpet pad.

The American Society for Testing and Materials guidelines for testing the surface hardness of North American football fields calls for a "drop test" using the CIST at six specified points throughout a football field, including a goal line, hash mark on the 25-yd line and mid-field at the 50-yd line. According to the specifications, a drop test consists of three successive drops with 3-minute pauses allowed in between individual drops. The G_{max} values are recorded and the 2nd and 3rd value are added and the sum is divided by two and rounded to the nearest whole number. The G_{max} value from the 1st drop is disregarded.

Numerous parameters should be reported at the time of testing. In a natural turfgrass system, the surface temperature of the field should be measured at a depth of 0.5-inch. Additionally, a visual assessment of turfgrass cover (e.g. 25%, 90%, etc.) and soil moisture (dry, damp, wet, saturated, etc.) should be made should be recorded at each test point.

Under a *Performance Requirement* heading described in the ASTM Standard, the average G_{max} value at any single test point shall not exceed 200 when tested from a drop-height of 2.0-ft. The standard further notes that the surface system (natural turfgrass or synthetic) should be replaced either in full or in part if one or more of the tested points



is determined to have an average G_{max} value exceeding 200. ASTM adopted the maximum impact level of 200 average Gmax for use because this value was accepted by the U.S. Consumer Product Safety Commission for similar test methods.

References

ASTM. 1999. Standard specification for shock-absorbing properties of North American football field playing systems as measured in the field. Designation: F 1936-98.

Rogers, J.N., D.V. Waddington, and J.C. Harper. 1988. Relationships between athletic field hardness and traction, vegetation, soil properties, and maintenance practices. Pa. Agric. Exp. Stn. Prog. Rep. 393. ◆

Sports Field of The Year

(F.O.Y.)

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Entries must be received by September 30, 2005

ELIGIBILITY:
*two categories; School or Parks/ Recreation fields only
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*natural grass fields

SEND:
*color photos of your natural grass field (10 maximum)
*name of facility and location
*name of owner
*your name, position and contact number

CRITERIA for awards:
*playability and appearance of the playing surfaces
*based on photos and a site visit by the SFMANJ Award Committee
*feel free to have sports groups in your photo

AWARDS:
Winners will be honored with a plaque at New Jersey Turf Grass Expo in December 2005 and be interviewed for a feature article in SFMANJ "UPDATE" (Also receive a two-night stay at Taj Mahl, Atlantic City and three days of education)

NOTE:
*photos will not be returned and may be used on SFMANJ website and promotional settings. ◆

Question and Answer

Question: How do I calculate the amount of topdressing needed for my athletic field?

Answer: To calculate the amount of topdressing needed for your athletic field multiply the length in feet x width in feet x depth in inches x .0031.

Example: Calculate the amount of topdressing needed to topdress a soccer field measuring 360' x 210' with ¼" topdressing.

210' x 360' x .25" x .0031 = 58.59 cubic yards of material ◆