

# How do you mark your lines?

How do you mark your foul lines and batters box for baseball and/or softball? Do you use limestone, aerosol paint, bucket paint or something else? What equipment do you use to put it down?

**JIM WIGGINS,  
Tomball (TX) School District**

First we nail drag and then smooth the dirt areas. We water dirt zones if needed and proceed with stringing out the base-lines and using the batters box templates (see photo). The final step is using Beacon Pro Chalker with the 2-inch or 4-inch line option. We prefer the 2-inch lines as they use far less chalk and have less build up and residue. Upon completion of markings we will sometimes give field a light watering to hold markings if windy or dry that day. The foul lines are painted using our Graco FieldLazer, from the back edge of our infield dirt to the fences on the grass areas of the field. These lines are 4 inches wide and painted usually every 2 weeks. We chalk the dirt areas every game, which translates to at least two times a week, sometimes three.

We use Diamond Pro field marking chalk, Pioneer Bright Stripe bucket paint, and sometimes Pioneer Max aerosol if field is wet from rain for quick results and set up.

Equipment: Beacon Pro Chalker, Graco FieldLazer, Pioneer Max Aerosol paint buggy, Tomark Batters box templates.

**JOSHUA KOSS,  
San Diego Jewish Academy**

- We pull our lines tight while the bases are in.
- After our lines are lined up correctly and secured tight, we remove the bases and brush back the calcined clay along the line with a broom (at least 4 inches).
- After it is completely clean of calcined clay and debris, we water it down with a watering can. After the water percolates into the dirt, we paint the line twice.

We use aerosol on the dirt, bucket paint in certain circumstances, but very rarely. Time is of the essence. It's much quicker to paint the lines with aerosol than to mix up some paint for such minimal painting.

Equipment: We use a 2-can aerosol striper. If the lines do not get painted straight, we will use a stencil and stencil it out by hand. Time does not allow for us to stencil, so very rarely do the lines not get painted straight. Depending on turf conditions, we will use our airless sprayer with a stencil to paint the lines in the grass. But like I said, it is time consuming to mix up a bucket of paint for such minimal painting.

**CRAIG SCHLENDER,  
Mary Rountree Evans Field,  
Baraboo, WI**

We use a chalk type line for our lines and batters boxes on the infield mix and the foul lines and coaches boxes are painted.

For the infield mix lines we use Sparkle # 6 this gives us a nice bright white line that stays put very well. During tournaments when we have many games in one day we will spray the lines lightly when watering the infield and this will set the line so it will last more than one game in many cases and only touchup is necessary for the next game.

We use World Class and Pioneer paints to do the lines on the grass.

We use a Stream Liner applicator to apply the chalk and normally a 2 inch line for the infield mix lines.

We will do a 4-inch line for high profile games; the Stream Liner applicator gives us that option.

Our painted lines on the grass are done weekly with a CO2 bulk mixed paint

sprayer that we use on all of the fields in the system. During the heavy grass growing season we will touchup the lines as needed with aerosol cans.

During real heavy use periods during the high growth times we may take a push mower and mow the foul lines a bit shorter before spraying the lines to get a longer lasting line. We have also used a growth retardant mixed in with the paint but you have to be very careful when applying this not to overdo it. This can happen when you have to redo a line or an equipment problem happens.

**ERIC BLANTON,  
Reno Aces**

We mark our foul lines via string line and batters boxes via stencil.

We use aerosol paint.

We use an aerosol paint striper.

**RON HOSTICK,  
San Diego State**

Baseball lines: aerosol with a 4-wheel painter, box only; gypsum with a 2-wheel chalker.

Softball we use all aerosol with the 4-wheel painter

**BART PRATHER,  
Mississippi State**

We chalk everything in the dirt areas and paint all grassed areas.

We use limestone chalk on dirt and concentrate paint (mixed one to one ratio) on grass.

Walk behind chalker and FieldLazer for painting.

**ERIC HANSEN,  
Los Angeles Dodgers**

Our outfield foul lines are painted by hand with a 4-inch roller. Our baselines and boxes are painted pregame with white aerosol paint using a paint striping machine. The thin lines of our box are created by turning the aerosol can sideways.

**I still like using chalk over paint because I think it stands out better than paint and I don't mind picking it up after games.**

**— Josh Klute**

**JOSH KLUTE,**  
**Haymarket Park, Lincoln, NE**

I mark my lines with plus 5 chalk while using a string line with pre-measured anchors in the ground for the string to set in. I use gravity drop boxes for my batters and catcher's boxes, but for the baselines I use a walk behind chalker. I still like using chalk over paint because I think it stands out better than paint and I don't mind picking it up after games.

**PETER THIBEAULT, CSFM, Noble & Greenough School, Dedham, MA**

To mark out the fair/foul lines we use a spool with cable that we can pull very tight. The best part on using this is the cable lies really flat in the turf and skin. For the batter boxes we made templates out of 1 x 3 stock and use a nail to trace then paint as well. The paint tends to hold up well even when we have to re-apply water.

We started about 4 years ago using aerosol to mark the skins. I could never get the chalk to come out real smooth and always seemed messy.

Doing this early in the morning when moisture tends to be highest is easiest for us. Painting instead of chalking requires careful moisture management in the skin to work best

We use Max aerosol field marking paint with a max aerosol striper. Both are Pioneer Athletics models and the cool thing is that they offer an aerosol chalk now so one machine can do both.

I'm not trying to promote any vendor but we have tried a few and Pioneer tends to offer great service for us.

**MONTY SOWELL,**  
**Northwest Arkansas Naturals**

We paint all our lines using World Class Athletic bucket paint.

We use a Model 120 Trueline Stripper made by Turfco Manufacturing to paint with. It is undoubtedly one of the greatest pieces of equipment we own.

**GRANT SPEAR,**  
**CSFM, UNLV Athletics**

We paint baseball and softball lines using a combination of aerosol and bucket paint. We run string along the lines and paint with a sprayer before the start of home stands then remark the lines in the dirt during pregame with the aerosol paint. ■

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# Gallery of mowed patterns

*Editor's note: Occasionally we like to highlight readers' work in offering pleasing aesthetics by mowing patterns into their grass. Here's our latest gallery:*

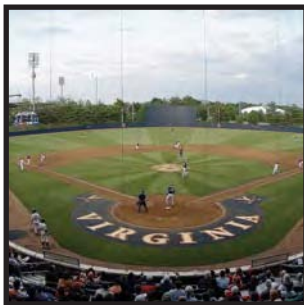


**MURRAY COOK** of The Brickman Group and former STMA president has been involved with baseball and the Olympics since the sport began being a part of the

Games. He said, "We did this for the 2000 Summer Olympics but after the first few games we were asked by the technical delegates to remove the rings because they were concerned the ball would turn in a circle when hit in the outfield. True story!"



**KYLE WATERS**, The Home Depot Center, Carson, CA



**JESSE PRITCHARD**, Sports Turf Manager, University of Virginia



**ALAN SIEBERT**, CSFM, Peoria Sports Complex, Peoria, AZ



**JOSH SLAYBACK**, City of Clayton, MO



**CHRIS MAY**, Claude Smith Field, Mercer University, Macon, GA. May is now sports turf manager for The Westminster Schools in Atlanta.



**SCOTT FALAHEE**, Frank Joranko Field, Albion College, Albion, MI



**LUKE YODER**, Petco Park, San Diego



**BRADLEY KIRKLAND**, Plainsman Park, Auburn University



**DINO PICHA**, St. Mary's University's Divis Field, St. Louis MO

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# Working with school boards and administrators



» MIKE TARANTINO, director of maintenance and operations, Poway (CA) School District.

**T**HIS IS A VERY BROAD SUBJECT and is highly subjective. We all know no two people are alike and this holds true for school board members and administrators. All of us involved with K-12 schools should know that boards' and administrators' number 1 goal is education; what we have to make them understand is that a safe and aesthetically pleasing school is paramount to teachers, students and the community.

There has been a lot of research on the correlation of well-maintained schools vs. student achievement that dates as far back as the 1920's. Let's face it, we have come a long way since then, however, one thing remains: schools are the hub of the community and are not just a place for education to occur but also a place for children and adults to play.

Did you know that children spend up to 24,000 hours at school (K-12)?

With that introduction, I can only relate my relationship with my school board, administrators and the community and how it

came about. I have broken this out in to several key headings and subheadings.

**Communication.** GET OVER YOUR FEARS! The school board, administrators and community members are all human beings. After all, they hired you to do a job. Do not be hesitant to approach them with an idea that could benefit the school community. Remember that a majority of their time is spent on improving education and your sports fields may be the furthest thing from their mind but remember to relate your idea to how this will enhance the learning quality of the children, improve staff morale and provide a recreation area for the community.

**Become visible.** Attend school board meetings. Yes, these are usually held in the evening, but deal with it and go. Make weekly meetings or do a weekly report to your supervisor, director or superintendent, let them know what you are doing to improve the school community. Attend local youth and or adult recreation meetings, offer to present at these meetings and most importantly, listen to their needs. Make sure to follow up with requests from these groups because no one likes being ignored.

Visit your school sites and make sure not to ignore anyone. Visit with the coaches, teachers, principals and the children. Everybody's opinion is important and everybody wants their opinion heard. I have learned more from coaches about the little things in the way to prepare their field for their particular team than I have from any book. I like to call communication the art of listening, understanding and then responding; do this and people will begin to recognize you and what you do.

**Documentation.** School boards, admin-

istrators and community members are results driven and want documentation or proof. Document your successes to better handle the "what have you done for me lately" syndrome. Take pictures of your projects start through finish, include team work in the pictures, include equipment used owned, rented or borrowed. Finally, write a report to go with the pictures along with costs of the project. Have an end goal in mind. This could be as simple as showing what you can do to improve the school community or as ammunition if you want to purchase a piece of equipment, for example, document the rental cost vs. purchase. Provide a cost analysis if this is your goal. Show man hour savings and the number of additional projects you could complete with this particular piece of equipment. Here is an example:

A 10-acre field will take the 60-inch deck mower approximately 3 hours and 15 minutes. An 11-foot deck mower will mow the same 10 acres in approximately 1 hour and 15 minutes, a 2 man/hour savings per 10 acres. If the operator mows 100 acres the savings will be 20 man hours.

Twenty man hours x \$480 (20 hrs. x \$24.00/ hr.) per 100 acres x 52 weeks equals \$24,960 per year. The 11-foot deck mower could pay for itself in approximately 2 years, or a gain of 1,040 man/hours per year.

## DOCUMENT YOUR FAILURES

I know what you're thinking, I can't show my failures. Yes you can, but you need to show and let the school board, administrators and the community know what you learned from that mistake. Some of my biggest successes came from failures.

Use tools that are available to you, like

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**Visit your school sites and make sure not to ignore anyone. Visit with the coaches, teachers, principals and the children. Everybody's opinion is important and everybody wants their opinion heard.**

soil sampling and the Playing Conditions Index (PCI). I cannot believe how many of us don't use these FREE resources, yes free. Wait a minute soil sampling cost money, you say, but if you talk to your suppliers many will offer this service to you for free. I perform soil sampling once a year on my high profile play fields and every other year on my multi-use recreational sports fields. These soil samplings dictate what needs to be done on my fields and in many ways provides documentation for budgeting purposes (fertilizers, soil penetrants, etc.).

The PCI is simply a great tool provided by the STMA. This is documentation at its best. If you haven't used the PCI, you should. The PCI can provide documentation on the safety, playability and aesthetic quality of your sports fields. I have begun to document other information on the PCI. I now record weather, products used (fertilizer, pesticides), seed variety if a renovation; topdress material, irrigation schedule, suppliers etc. If you can, include pictures with the PCI when submitting this documentation to the school board, administrators and the community.

**Maintenance standards.** If you don't have them, develop them and share them. These are simple maintenance guides, the "what we are going to do and the when we are going to do it." These standards answer our customers' questions and lessen the amount of phone calls to the school board and the administrators from our customers, the schools and the community. These standards need to be shared with your staff; they will serve no purpose if your own staff doesn't know what they are.

**Get out of your box.** With the state of the economy many of us are being asked to do more. Jobs are being eliminated and those survivors are taking on additional responsibilities. As budgets continue to tighten, sports turf managers are now often being asked to become facility managers, especially at K-12 facilities. I hope you view your stay at your organization as an educational adventure and a means to grow. You should have been watching your peers manage facilities so that you were ready to advance or simply help out with a problem/crisis that wasn't yours to manage.

The natural disasters that plague our

country are a good example—would you sit back and watch as your facilities were being destroyed or would you be on the frontline? When rebuilding occurred did you just worry about your sports fields or did you assist in bringing normalcy to your facility? School boards and administrators are well aware of those that support this type of effort, while you may not get the "thank you"

you were looking for, believe me, your actions or inactions are noticed.

Although every situation is different, you must be able to adapt to your situation. It is all communication. ■

*Michael Tarantino is director of facilities for the Poway School District, Poway, CA, and sits on the STMA Board of Directors.*

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# Understanding field hardness test reports

**S**PORTS SURFACE IMPACT TESTING (field hardness) has become an integral part of the synthetic maintenance process. Test results can indicate that a field is in good condition, as well as pinpoint areas of concern.

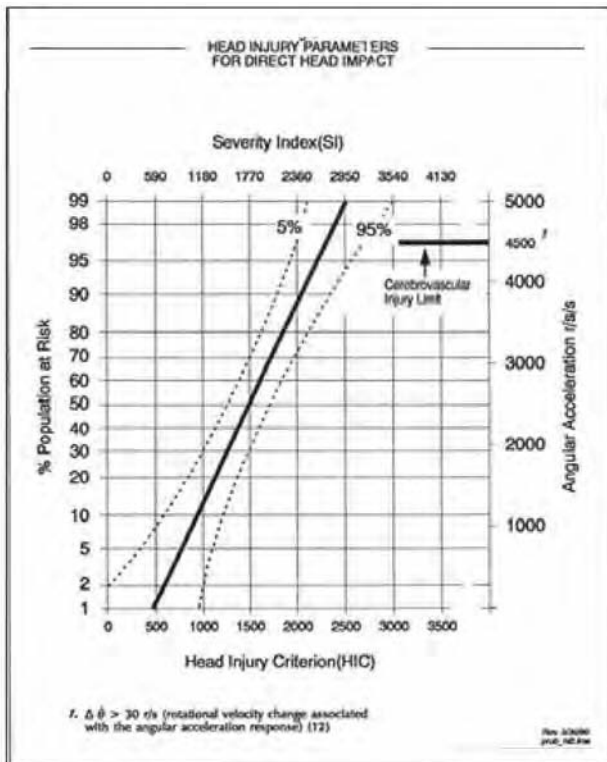
The Synthetic Turf Council recommends a minimum testing frequency to be at the end of year 1 and the end of year 3. Other industry experts and/or field specifications often recommend annual testing. That's a lot of data! Due to the large amount of data, the test reports may be somewhat difficult to interpret. In this article, we'll break down the field hardness test report, so that the field manager can understand it better and find the information that is most important for success.

The field hardness test report is a two-page report (see Figures 1 and 2). This report includes field conditions and test results from evaluations performed at multiple locations on a single field. In Figures 1 and 2, we have divided the test report into five sections to aid in finding informa-

>> Figure 1.

SPORTS SURFACE IMPACT TEST REPORT					
Soccer Complex City, State		Section 1			
Test Date: March 15, 2011	Weather Conditions: Temperature: 43 - 45° F Cloudy		Report Date: March 18, 2011	Humidity: 61 - 67%	
Testing performed for Blank High School					
Test Method: ASTM F1936: Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field					
Section 2					
Summary of Results: End A is the West end and Side C is the South side of the full-size field (white boundaries).					
		Va fps	gmax ms	tmax ms	Surface Temp (° F)
Point 1	Penalty Kick Line, End A, Center of Field Total 5.8 cm depth; Infill 3.1 cm depth	11.58	96.0	8.0	48
Point 2	63' from center of field to corner of Penalty Box, Side C, End A Total 5.6 cm depth; Infill 2.8 cm depth	11.58	99.3	7.4	48
Point 3	75' from Half-Way Line to End A, 40' from center of field to Touch Line C Total 5.7 cm depth; Infill 3.0 cm depth	11.70	103.2	7.8	46
Point 4	Half-Way Line, Center of Field Total 5.6 cm depth; Infill 3.2 cm depth	11.37	100.2	8.1	48
Point 5	75' from Half-Way Line to End B, 63' from center of field to Touch Line D Total 5.8 cm depth; Infill 3.5 cm depth	11.30	90.7	8.6	48
Point 6	1/2 the distance from Penalty Restraining Arc to leading edge of Penalty Box at End B, Center of Field Total 5.6 cm depth; Infill 3.4 cm depth	11.84	92.9	7.8	48
Point 7	Goal Line, End B, 5' Outside Touch Line C Total 5.3 cm depth; Infill 3.2 cm depth	11.21	117.3	7.3	46
Point 8	Corner Kick Area (Yellow Field), End B, Side D Total 5.6 cm depth; Infill 2.8 cm depth	11.67	105.2	8.4	46
Point 9	3' from Goal Line to Half-Way Line, End A, Center of Field Total 5.2 cm depth; Infill 2.9 cm depth	11.39	97.7	8.0	43
Point 10	15' from Goal Line to Half-Way Line, End B, Center of Field Total 5.5 cm depth; Infill 3.2 cm depth	11.44	102.3	7.4	46
Section 3					
Conclusion: Under the test conditions reported above, all test points met the requirement of < 200 average G max when tested in accordance with specification F1936.					
Test results reported herein reflect the conditions of the tested field at the time of testing and at the temperature reported.					
Operator Signature Duane K. Otto					

>> Below: Figure 3. Graph from research published in February 1990 by Voigt R. Hodgson, Ph.D., Director Biomechanics Laboratory, Department of Neurosurgery at Wayne State University Detroit, Michigan in his paper titled Impact, Skid And Retention Tests On A Representative Group of Bicycle Helmets to Determine Their Head-Neck Protective Characteristics.



>> Below: Figure 2.

SPORTS SURFACE IMPACT TEST REPORT					
Soccer Complex City, State		Section 4			
Test Date: March 15, 2011	Weather Conditions: Temperature: 43 - 45° F Cloudy		Report Date: March 18, 2011	Humidity: 61 - 67%	
Testing performed for Blank High School					
Test Method: ASTM F1936: Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field					
Section 5					
		Va fps	h ft	gmax	HIC
1	Penalty Kick Line, End A, Center of Field	11.54	2' 1"	86.4	213.1
2		11.89	2' 1"	93.9	244.5
3		11.46	2' 0"	98.1	260.8
Av23		11.58	2' 1"	96.0	252.7
2	63' from center of field to corner of Penalty Box, Side C, End A	11.77	2' 2"	88.2	222.7
2		11.75	2' 2"	97.8	259.5
3		11.41	2' 0"	100.9	273.5
Av23		11.58	2' 1"	99.3	266.5
3	75' from Half-Way Line to End A, 40' from center of field to Touch Line C	11.27	2' 0"	87.4	219.9
2		11.77	2' 2"	99.7	271.8
3		11.63	2' 1"	106.7	304.8
Av23		11.70	2' 2"	103.2	288.3
4	Half-Way Line, Center of Field	11.46	2' 0"	84.8	205.2
2		11.49	2' 1"	97.5	259.6
3		11.24	2' 0"	102.9	283.0
Av23		11.37	2' 0"	100.2	271.3
5	75' from Half-Way Line to End B, 63' from center of field to Touch Line D	11.42	2' 0"	78.2	182.9
2		11.32	2' 0"	90.0	234.2
3		11.29	2' 0"	91.4	237.3
Av23		11.30	2' 0"	90.7	235.8
6	1/2 the distance from Penalty Restraining Arc to leading edge of Penalty Box at End B, Center of Field	11.50	2' 1"	83.3	209.9
2		11.45	2' 0"	92.2	245.6
3		11.83	2' 2"	93.6	250.7
Av23		11.84	2' 1"	92.9	248.1
7	Goal Line, End B, 5' Outside Touch Line C	11.17	1' 11"	99.8	264.7
2		11.08	1' 11"	116.7	335.4
3		11.34	2' 0"	117.8	337.8
Av23		11.21	1' 11"	117.3	336.6
8	Corner Kick Area (Yellow Field), End B, Side D	11.33	2' 0"	92.4	238.6
2		11.76	2' 2"	103.6	290.9
3		11.59	2' 1"	106.7	299.7
Av23		11.67	2' 1"	105.2	295.3
9	3' from Goal Line to Half-Way Line, End A, Center of Field	11.36	2' 0"	83.5	205.5
2		11.26	2' 0"	95.8	257.5
3		11.53	2' 1"	99.6	273.4
Av23		11.39	2' 0"	97.7	265.5
10	15' from Goal Line to Half-Way Line, End B, Center of Field	11.78	2' 2"	93.3	238.9
2		11.44	2' 0"	99.8	268.3
3		11.44	2' 0"	104.7	284.2
Av23		11.44	2' 0"	102.3	276.3

tion and explaining the data. Figure 1 is the first page of the report, and Sections 1 to 3 are found on page 1. Figure 2 is the second page of the report, and Sections 4 and 5 are found on page 2.

Section 1: Basic information regarding when and where the test was performed. Also included are the weather conditions during testing.

Section 2: This section has summaries of testing performed and test results. This is the heart of the test report, and contains the information that will likely be of most interest to sports turf managers.

- **Testing Method:** Testing is typically performed according to guidelines detailed in ASTM F1936. F1936 provides specifications for equipment to be used, how and where tests are to be performed, and field performance requirements.

- **Point:** Testing points refer to locations on the field where test measurements are performed. Different locations are specified per ASTM F1936 for different types of fields (football, soccer, lacrosse, etc.). Typically eight test points are specified by the method and two additional points are tested at the discretion of our field technician. If desired, additional points can also be tested and reported.

- **Total Depth and Infill Depth:** This information can provide insight for evaluating problems or trouble areas. Depths are typically not mandated, but turf manufacturer specifications often indicate acceptable fiber lengths, infill material, and infill depths. Total Depth is the depth from the top of the turf to the backing (synthetic fields) or soil (natural turf fields). Worn or lost turf can cause a harder or softer field and impact performance. Infill Depth is the depth of infill materials that are between the turf fibers. Infill is used to provide desired playing conditions, and can act to protect turf fibers. Typical infill materials include sand, rubber, and other materials. Most, but not all, synthetic fields have infill material. Uneven infill depths can lead to varying hardness and performance. Loss of infill may also lead to turf damage, and is a significant cause of variance in field performance.

- **Gmax** is the maximum value of G encountered during an impact. G is the ratio of magnitude of missile acceleration during impact to the acceleration of gravity, ex-

pressed in the same units (G, being a ratio, is unit less). The number reported here is the average of the second and third drop at each test point. The maximum impact level of <200 average Gmax, has been accepted by the U.S. Consumer Product Safety Commission. ASTM F1936 states that: "According to historical data, the value of 200G is considered to be a maximum threshold. Values of 200 Gmax and above are considered values at which life threatening head injuries maybe expected to occur." Project specifications may require a lower maximum impact level. For example, many experts recommend Gmax values no higher than 170 on fields where sports without helmets are played.

- **Vo fps:** impact velocity, velocity of the missile (in feet per second) as it impacts the surface of the field. This is not a measurement of the turf, but an indicator of whether test was performed properly. If impact velocity is not acceptable our field technician will rerun tests at the test point.

- **Tmax ms:** time (milliseconds) to im-

act maximum (Gmax). Used in calculations for Head Injury Criterion.

Section 3: Statements regarding whether Gmax results are less than 200 and that report reflects condition of field. Signed by field technician.

Section 4: Same as section 1. Basic information regarding when and where the test was performed, at the top of page 2.

Section 5: Test results from the individual test drops at each test point.

- Test point location and individual test results with the average (2nd and 3rd drops) are reported for Gmax and Vo fps (impact velocity).

- Drop height is 2 feet. This is the distance that the test missile is dropped during the test procedure. ASTM F1936 states: "The test method incorporated into this specification (Procedure A of Test Method F355), has been used to test the impact attenuation of athletic fields for over 30 years. The development of this 2-ft fall-height method can be traced back to the Ford and GM crash-dummy tests of

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» Turf Diagnostics technician measuring field temperature and infill depth as part of a field evaluation.

the 1960's, medical research papers from the 1960's and 1970's, and a Northwestern University study in which an accelerometer was fixed to the helmet of a middle line

backer to measure impacts received during actual play. This study found the typical head-impact to be 40 ft/lb, which is equivalent to the impact generated by dropping a 20 lb missile from a height of 2 feet, the requirement specified in Procedure A of Test Method F 355.”

• Head Injury Criterion (HIC) is a measure of the likelihood of head injury arising from an impact. HIC is a measurement of impact severity based on published research describing the relationship between the magnitude and duration of impact accelerations and the risk of head trauma. At the 2012 STMA Conference, Dr. Andy McNitt of Pennsylvania State University indicated a near perfect correlation between Gmax and HIC for sports fields (i.e. high Gmax = high HIC; low Gmax = low HIC). HIC is used to assess safety related to vehicles, personal protective gear, and sport equipment. Because there is limited research regarding sports fields, data from the auto industry and others is used to provide insight into injury risk. The higher the HIC

value, the greater the risk of injury (see Figure 3 below).

Turf Diagnostics believes that the Gmax values should be the key indicator of field hardness for the turf manager. Individual test points with Gmax above 200 or a Gmax average of greater than 170 for the entire field suggest that maintenance practices, such as grooming and topdressing, are required.

We also believe that the field manager should pay particular attention to infill depth. For consistency in play, infill depth should be uniform over the entire field. Changes to infill depth over time should also be noted. Infill depth tends to decrease over time and should be replenished as part of a synthetic turf maintenance program. ■

*Sam Ferro is the president of Turf Diagnostics & Design, which performs field hardness testing on fields throughout the US as well as testing of soils, sands, aggregates and amendments for natural and synthetic turf fields.*

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