

Understand the
fundamentals of
your
fields and make
sound decisions
based on
objective core
standards

SYNTHETIC SURFACE **REPORT CARD**



CORE PERFORMANCE QUALITY STANDARDS

TOM IRWIN ADVISORS



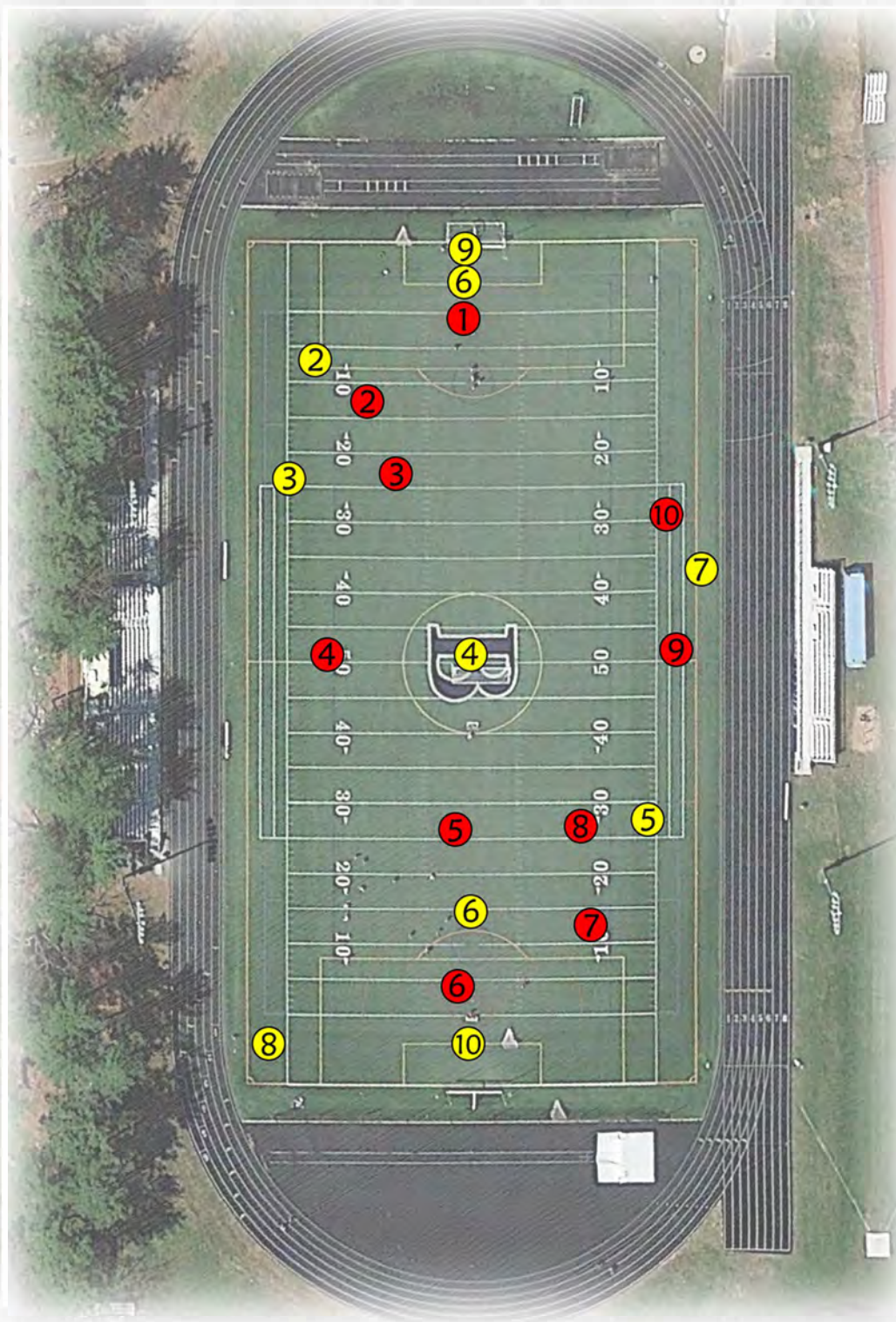


SABOURIN FIELD SYNTHETIC CORE PQS


TEST LOCATIONS

BEDFORD H.S.

BEDFORD, MA



 ASTM Sample Location

 Random Sample Location



NORTH

0' 50' 100' 200'

TOM IRWIN ADVISORS, INC.

Tom IRWIN

WHY IS CORE PQS IMPORTANT?

Ian Lacy, Lead Project Advisor



At Tom Irwin Advisors, we believe the condition of an organization's athletic and recreational fields represents a commitment to their community's health, happiness and well being.

Core Performance Quality Standards (C-PQS), a field assessment approach which scientifically measures a field's existing conditions, helps managers better understand a field's short and long term

needs. C-PQS leads to confident decision making on maintenance or remediation programs while allowing a turfgrass manager to accurately track a field's progress over time.

Core Performance Quality Standards have three key distinguishing characteristics:

They are fundamental and foundational

They measure a field's condition according to key fundamental metrics. These are the criteria that you simply must know and understand to manage safe performance turf that is fit for purpose. The C-PQS score is an average calculated by sampling up to 10 different locations per field for each criteria. This gives TIA clients insights into the foundation of a field's condition according to the factors that matter most to its users and the people who care for it.

They are objective

Core Performance Quality Standards are based on hard data, not subjective opinion. They deliver necessary and vital intelligence that informs decision-making, guides remediation efforts, and enables progress to be measured accurately.

They are a benchmark

By fully capturing the basic condition of a field, Core Performance Quality Standards enable its condition to be compared not only to other fields, but to itself and Full PQS's over time.

C-PQS is a proprietary system of analytics that measures a field's current state of fitness. C-PQS ensures your fields address the relevant requirements of ASTM standards and the protocols ordained by the governing bodies of sport. C-PQS provides objective, repeatable, quantifiable, accurate, and defensible data to support your decision making.

Core PQS Field Test for Synthetic Surface

Organization: Bedford, MA

Field Name: Sabourin Field

Date of Test 08-17-2023







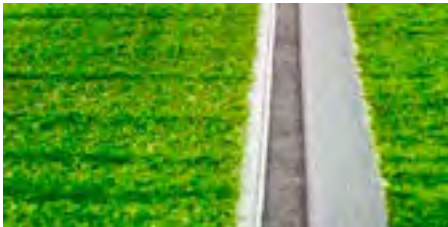

OVERALL GRADE

D

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	C+
Planarity	3 M Straight Edge & Wedge (mm)	7 mm	4	B
Infill Depth	Infill Gauge (mm)	30.00 mm	5	A
Rotational Traction	Traction Meter (N/m)	2.2 Nm	0	F
Surface Hardness	Clegg (Gmax)	103 GMax	0	F
Ball Bounce	Ball Drop from 6’ (in.)	38"	4	B
Ball Roll	Ball Roll Ramp (ft.)	36.7'	1	F
Vertical Deformation	TruFirm (inches)	45.8 %	4	B
CORE PRESENTATION	Tool	Average Results	Points	C+
Field Line Markings	Observation and Measurements	2.95 pts	3	C
Surface Debris	Observation and Measurements	1 %	4	B
CORE STRUCTURE	Tool	Average Results	Points	D
Carpet Fiber Height	Fiber Prism (mm)	.33 "	1	F
Fiber Wear	Fiber Prism (Observation)	2.25 pts	2	D
Seams Condition	Observation and Measurements	3.00 pts	3	C
SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria	
A = Superior	60–49 total points	12 criteria	5 points per criteria achieved	
B = High Standard	48–37 total points	12 criteria	4 points per criteria achieved	
C = Standard	38–25 total points	12 criteria	3 points per criteria achieved	
D = Low Standard	24–13 total points	12 criteria	2 points per criteria achieved	
E = Below Standard	12 and below total points	12 criteria	1 points per criteria achieved	
F = Failing	If any critical criteria score far Below Standard and present a potential safety issue the overall rating of the field must also score an F or failing.			

TOOLS AND TECHNIQUES

Tests	Tool	Description
Planarity		A 3 Meter Straight Edge is the tool which is placed upon the field surface in order to observe and measure surface undulations with a graduated wedge gauge.
Rotational Traction		Traction Meter is a tool which measures the rotational resistance and the shear strength of the turf grass surface.
Vertical Deformation		Vertical Deformation is a measurement of the deformation of a surface when subject to impact and is indicative of compaction and surface stability.
Surface Hardness (GMax)		The Clegg Hammer is a tool which measures field surface hardness. Surface hardness may contribute to athlete injury and poor playing conditions.
Infill Depth		Infill Measurement Gauge is a tool that allows for the precision measurement of the infill and its components. Proper infill depth is vital for maintaining the fields performance.
Ball Roll & Ball Bounce		Ball Bounce Device is a FIFA required device that measures the height of a ball bounce from a predetermined height. Ball Roll Ramp is a FIFA mandated tool that propels a regulation soccer ball from a set height and at a set angle to measure the distance a ball travels with a consistent impetus.
Surface Debris, Field Line Markings Seams Condition		Observation and Measurement The Field Technician conducting the test surveys the field looking for and noting obvious deficiencies. These include hazardous debris, overall condition, signage, fencing, field markings, goal posts, and other structures.
Carpet Fiber Height & Fiber Wear		Fiber Prism is a tool which allows a user to easily measure carpet height of cut while also observing the quality of the fiber. The prism is an optically perfect magnification lens

Field Progress Tracking: Synthetic Surfaces

		Test Date	Test Date	Test Date	Test Date	Test Date
Organization:						
Field Name:		Overall Grade	Overall Grade	Overall Grade	Overall Grade	Overall Grade
		Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
PLAYABILITY	Tool					
Planarity	6-Foot Straight Edge					
Rotational Traction	Traction Meter					
Surface Hardness	Clegg/Gmax					
Infill Depth	Infill Gauge					
Ball Roll	Ball Roll Ramp					
Ball Bounce	Ball rop from 6'					
Vertical Deformation	TruFirm					
PRESENTATION	Tool					
Field Line Markings	Observation					
Surface Debris	Observation					
STRUCTURE	Tool					
Carpet Fiber Height	Fiber Prism					
Fiber Wear	Fiber Prism					
Seams Condition	Observation					

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CORE PQS SUMMARY:

Organization: Bedford, MA

Field Name: Sabourin Field

You have set your vision of producing and providing an Athletic Field that is consistent, durable and of the highest quality possible. You also wish to critically examine the field's condition and, through this knowledge, be proactive in maintenance planning for the future.

To realize this goal Tom Irwin Advisors (TIA) carried out a Core Performance Quality Standards (PQS) assessment on the Athletic Field on 08-17-2023. At the locations tested the grades were:

- The Overall Grade was a **D** or Low Standard
- The Playability Grade was a **C+** or Standard
- The Presentation Grade was a **C+** or Standard
- The Structural Grade was a **D** or Low Standard

General Observations:

The weather was partly sunny and 72F when testing began at 8:15 AM, the carpet temperature was 93F according to an infrared thermometer. When the sun broke through the clouds, a bright shine reflected off the field, likely due to significant carpet fiber layover.

The field had been groomed the day prior using a Redexim Verti-Top. The operator, Jim, mentioned a significant amount of debris was removed. A few windrows of tangled carpet fibers were observed as I set test location markers across the field. The centerline of the field had several unglued/ripped areas in high traffic areas. Additionally, on the edges of the field there are a few elevated infrastructure boxes, some being in the soccer field of play.

The field was very busy before, during and after testing with multiple groups utilizing this community asset.

SURFACE EVALUATION AND RECOMMENDATIONS

SURFACE EVALUATION

The field scored below standard on Rotational Traction, Surface Hardness, Ball Roll, Carpet Fiber Height and Fiber Wear. The main driver of the low scores is the severely laid over carpet fibers, which provide much less cushion and traction for athletes. The reduced friction also increases ball roll to a point where wind and minor undulations can unduly affect its travel during sport. Even some of the better scoring criteria, registered spot readings that are concerning.

For example, Planarity was rated as superior overall, however there is a 1 1/2 inch depression at the left plant leg spot of the West penalty kick spot, which has already been repaired in the past. The depression was filled with loose crumb rubber, when it was removed and tested for Surface Hardness the reading was 253 GMax, which is extremely high.

The East end of the field is also showing some challenges. There is a 6 inch rip along the LAX goalmouth adjacent to a previous glue repair and a chunk of carpet is missing just South of the same goal line along the 10 yards seam. Behind the girls lacrosse goal was very depressed in a 5 foot radius. There is also a rip in the corner of the soccer PK line, appearing depressed with much more crumb rubber loose on the surface. The sideline also displayed signs of wear. Location 7 had good infill depth, but it was mostly packed sand with only about 10 mm of rubber felt closer to the surface. The field is now "showing its age" and when evaluating the individual criteria scores, there are many that are low or hovering in the low to below scores. As we believe the field is on or about 10 years old, it would be prudent to re carpet the field in the next 6 months.

RECOMMENDATIONS

1) *Replace the carpet within the next 6 months, the sub-base material should be regraded as part of the project. It is our opinion that the town should strongly consider the use of a shock pad considering the amount of use the field is subjected to. This would also have benefits of using a carpet with a shorter fiber height (usual for 1.75") with a shock-pad installed against 2.25" for non - shock-pad carpet installs.*

2) As the field has deteriorated since our last testing carried out in 2022, increased frequency of grooming and spot checks should be carried out to encourage consistent play across the entire surface, until the re-carpet is completed

3) The addition/continuation of a magnet sweep will make sure all metal objects will be picked up and removed leaving the playing surface safe for use.

4) Have ripped areas re-glued immediately before they get worse or impact player safety.



ABOUT SHOCK ABSORPTION

The hardness of an athletic field surface is a major driver of concussion risk. The American Journal of Sports Medicine reported that up to 20% of concussion risk in American Football is due to the athletes head impacting the surface. This risk can be mitigated by undertaking proper and timely corrective action. However, in order to undertake corrective action, you must be aware of the hardness of your synthetic or natural grass surface.

There are a number of differing methodologies and devices to test for shock absorption. They all involve the simple concept that shock absorption is quantified by how fast a mass can decelerate from a known velocity to a stop. For synthetic turf the American Society for Testing And Materials (ASTM) has developed two protocols F355 and F1936, for Natural Grass it has developed F1702.

These techniques include differing test devices. The F355 uses a 20 pounds missile that is dropped from a 24 inch height. This test method was developed from auto industry testing with a 20lb mass assumed to the mass of the head and neck region. This was converted to sports by a study measuring the impact experienced by football players. It was determined that a peak gravity reading (Gmax) from the F355 device of 200 or more meant that, "life threatening head injuries were likely to occur". This was adopted as the standard by the Consumer Product Safety Commission for helmets, playgrounds, and other protective equipment.

The Clegg Surface Impact Tester or "Clegg Hammer" uses a 5 pound missile dropped from a height of 18 inches. This device has a lower mass but it has a smaller surface area. The "Clegg Hammer" is the device currently required by the NFL to test all their fields prior to every game. The Clegg can also display data as Clegg Impact Values or CIV these are simply tenths of gravities.

This has resulted in confusion about which device most accurately quantifies shock absorption. The bottom line is that they are, with minor differences, equivalent. The ASTM conducted extensive round robin testing of both devices utilizing seven different testing agencies testing on 15 different surfaces. They concluded that because both devices use the same principle to measure shock absorption, either can be used, regardless of surface type. There is a strong correlation between the data from either device.

The NFL uses a standard of 100 Gmax for the Clegg Hammer. Any point exceeding 100 Gmax on the Clegg requires immediate corrective action prior to play. The F355 standard is <200 Gmax, this equates to 135 on the Clegg Hammer. The Synthetic Turf Council recommends a standard of 164 on the F355 which equates to 105 on the Clegg Hammer. The equation is $\text{Clegg Gmax} = (\text{F355 value} * 0.81) - 27.1$. The strong correlation coefficient of 0.81 means that the Clegg should read within 1-2% of the F355 over the normal range expected.

The all important takeaway is not what device you use to measure shock absorption but that you regularly measure it, regardless of the device, and that you take appropriate corrective action.

How does a Performance Quality Standard Assessment Relate to Field Safety.



A PQS assessment can tell you if your field is conducive to safe playing conditions but it cannot guarantee that the field is "safe". Having a PQS cannot support such a claim because the concept of safety is subjective. A PQS assessment takes a snapshot of the field conditions at representative locations and at a particular moment in time. Conditions can and do change from location to location and from time to time.

An objective measurement system cannot define a subjective term such as "safety"; however what it can do is help to quantify the risk of harm. A PQS is composed of several criteria. Each of these criteria, individually, is conducive to safety because each score represents relative risk. A field hardness rating (gMax) of "A" entails demonstrably less risk to users than a field hardness rating of "D". Each of the component criteria of a PQS assessment contributes to a clear understanding of the relative risk embodied within the playing surface. When all criteria are viewed together, the relative risk is further clarified.

Your fields PQS scores help define the level of risk. With this information field management decisions can be prioritized. The ultimate objective is to reduce risk to as low as reasonably possible.

Another key component of a PQS assessment is that it can help identify hidden or latent defects within the field. These are issues that are not visible to the observer. These include compaction, hardness, and rotational traction. It is important to test for these hidden defects because it bears a direct relationship to liability.

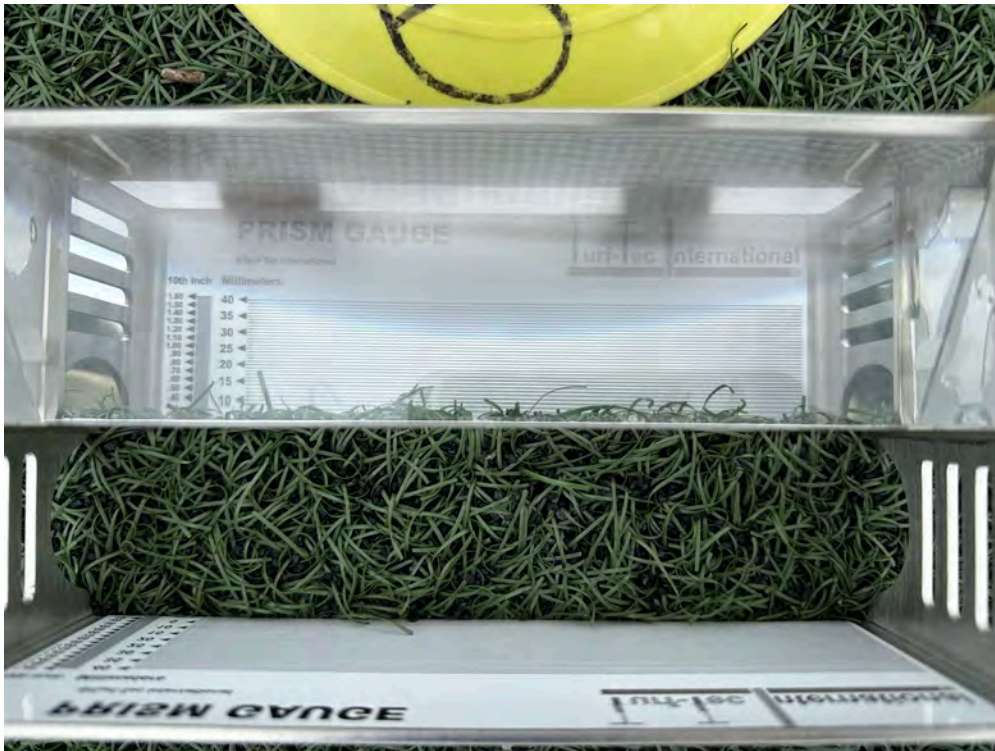
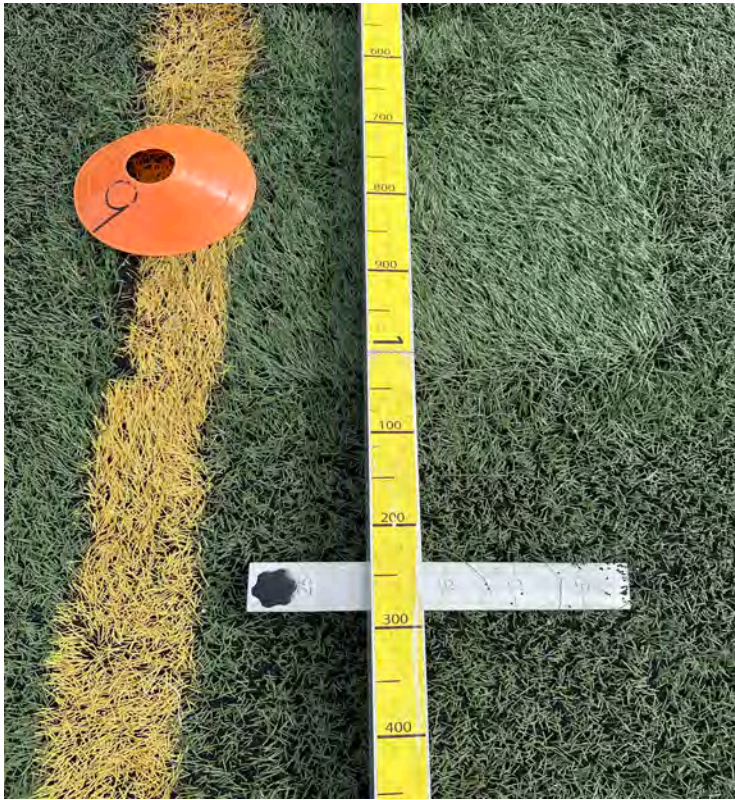
You are responsible for identifying and correcting hidden risks if such risks are usual to the situation. A PQS can help identify unacceptable conditions.

Liability is based upon knowledge of a hazard. Generally you can be held liable for injuries caused by conditions that you knew or should have known were dangerous. "Should have known" typically involves knowledge that would be acquired by a reasonable person acting in due diligence and conducting a reasonable investigation based upon the circumstances at hand. If it is reasonable to assume that a sports field could become overly compacted and therefore present a concussion risk, then a duty to investigate is created. Choosing not to investigate does not reduce your liability.

A PQS can act as the trigger point for further investigations. A PQS can determine if hidden or visible conditions require further investigation.

Finally, a PQS serves as log entry detailing the conditions observed at that point in time. This is a third party evaluation, thus minimizing bias, and increases accountability. Importantly, the process is buttressed by defensible standards. The record keeping can be supplemented by game day checklists or other routine inspections and work orders. Any deficiencies noted should be mitigated and corrected by promptly.

The virtuous circle of investigation, detection, communication, mitigation, correction, and verification can be initiated by a PQS assessment and can help to reduce and manage your risk of harm to all who enjoy your athletic fields.







MOVING FORWARD

There are three subsequent stages following a PQS. The first is the *Curative Action*; following that is the *Preventative Action*; the final stage is *Monitoring*. The Curative Action corrects the most pressing and immediate issues challenging your athletic field. Once the potential for damage is lessened, the next step is the Preventative Action. This step preserves and protects that which you have fought hard to gain. The final step, which restarts the cycle of continuous improvement, is to Monitor and assess the efficacy of your curative and preventative actions. This virtuous cycle results in high level conditions that are sustainable over time with minimal inputs.

The Curative Action

Working with Tom Irwin Advisors will accelerate the immediate steps outlined in the Recommendations section. Following that, a careful reading of the PQS Report Card may inform what needs to be done moving forward however TIA can assist. We can produce an Advisor Action Report. This report not only details the most pressing criteria in need of attention, It also details the related criteria that are impacted and it presents the data in an intuitive visual “heatmaps”. Furthermore each action item includes detailed recommendations and guidance on how to effectively and efficiently implement the curative actions. Sometimes, a resurface or reconstruction is the most effective approach. In that case, TIA can offer guidance in the form of Feasibility Studies, Specification Writing, and Project Advocacy.

The Preventative Action

Once the immediate concerns have passed, prevention is paramount. TIA can help you develop a Comprehensive Maintenance Plan that addresses all critical elements of field management; Maintenance, and Policy/Administration. Furthermore, we can, through our innovative Groundsmanship Program, train your staff in the essentials of professional level athletic field maintenance.

Monitoring

We also believe the continuation of the PQS process will have a significant positive affect on securing the future quality of the surface. The metrics developed by PQS can be useful in a variety of situations. These metrics can be used to make informed decisions on maintenance and management practices. Athletic Field usage can be better controlled over time. Potentially hazardous conditions can be identified and corrective action can be taken in a timely manner. Observations can be logged and documented. By measuring the Athletic Fields’ performance over time, management decisions can be prioritized. The data presented can be used to support the budgetary process, to justify current expenditures, or for data driven planning for future needs. PQS is also useful for benchmarking a recently constructed Athletic Field or for informed cost benefit decisions regarding renovation versus reconstruction.

PQS RATINGS

A: Superior Rating indicates an exceptional field which will demonstrate superior wear tolerance and be able to support prolonged above average usage under normal conditions. Aesthetically, this field is suitable for high-level play. This rating is difficult to achieve and a field may move between Superior and High Standard depending upon the stressors on the surface and varying natural conditions.

B: High Standard Rating equals a top-performing field suitable for use in high visibility community events such as varsity sports. This field should exhibit better than average durability under its current management practices and has a sustainable level of usage.

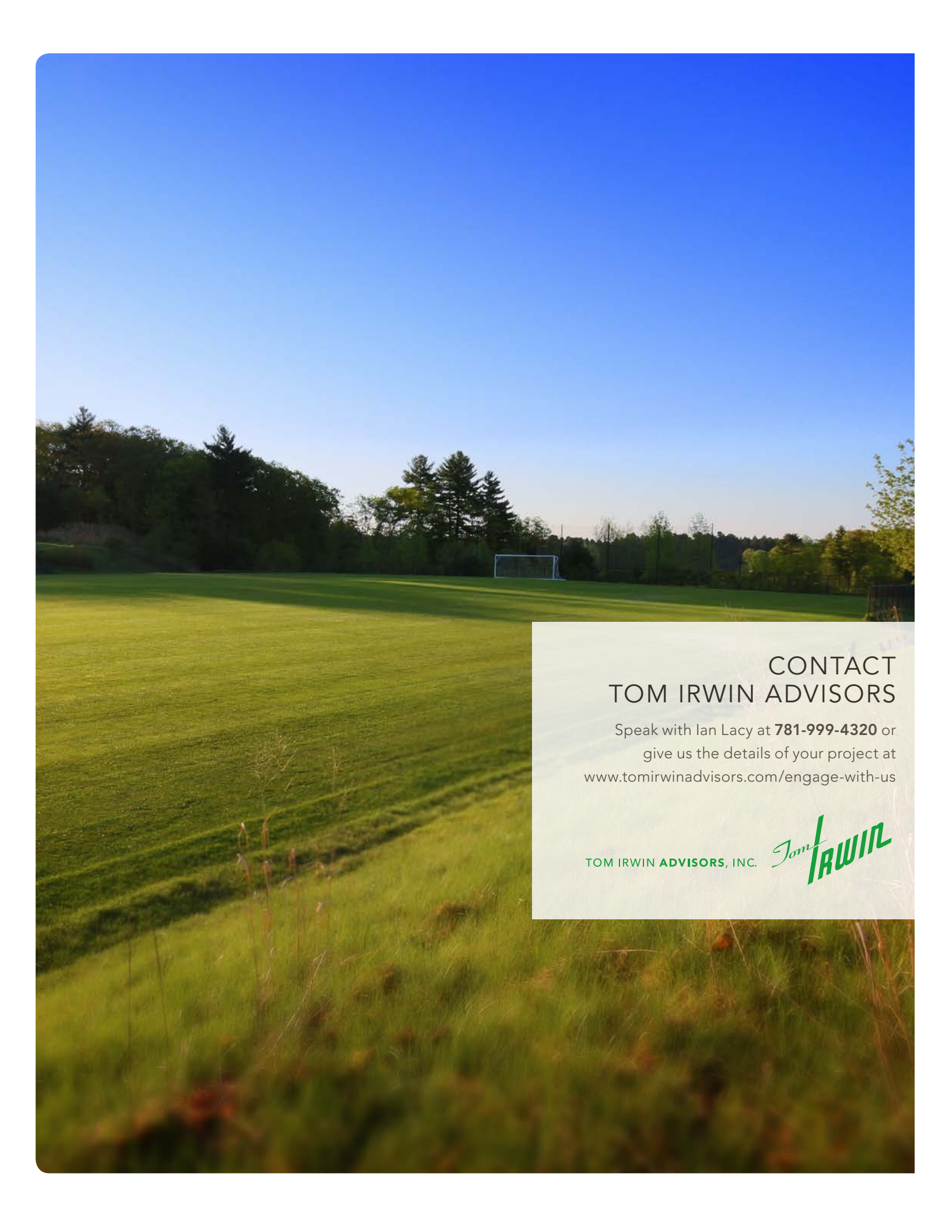
C: Standard Rating is acceptable for general recreational purposes under a carefully monitored management plan and with ongoing supportive maintenance. It will likely wear at an expected rate and have an average lifespan.

D: Low Standard Rating is marginal and indicates a field that is currently fit for purpose but will likely need future remedial work to maintain playability. A Low Standard Field will continue to decline unless additional maintenance efforts and management changes are implemented quickly.

E: Below Standard Rating means significant aspects of playability and safety may be seriously impaired. Caution is strongly advised—use should be determined on a case-by-case basis depending upon the specific criteria scores. This field requires immediate corrective action and significant rehabilitation to support continued use.

F: Failing Rating is reserved for fields that score well Below Standard in one or more critical criteria. It is our opinion that these fields present a clear and significant safety concern. It is recommended that the field be immediately closed to use until properly repaired.





CONTACT TOM IRWIN ADVISORS

Speak with Ian Lacy at **781-999-4320** or
give us the details of your project at
www.tomirwinadvisors.com/engage-with-us

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