

TOWN OF  
COLCHESTER

RECREATION  
COMPLEX

FEBRUARY, 2023

TOM IRWIN ADVISORS, INC.



# PHASE 1 ATHLETIC FIELD EXISTING CONDITIONS ASSESSMENT REPORT

## FURTHER GUIDANCE

*If you have any questions regarding this document, the actions discussed, or the challenges that you face, please reach out to us. We are eager to help support you and your vision moving forward.*

*We are composed of a unique team of highly qualified professionals who; have consulted on athletic fields globally for FIFA and other governing bodies of sport; have lectured at Universities and in other academic settings; have contributed to the development of many industry and professional standards; have renovated and constructed athletic fields for every level of the game, and, have spent decades carefully and conscientiously managing turf that we care deeply about. We would be honored to provide any assistance, guidance, and advice that you require.*



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# INTRODUCTION:

Tiffany Quinn, Colchester Recreation Director, and her team are committed to providing the entire Colchester community and user groups with high quality safe athletic fields at the Recreation Complex (Rec Plex). They believe the purpose of the Parks and Recreation department is to seek the development of a broad variety of recreation programs, park facilities and services to meet the total needs and demands of the residents of the Colchester community. To accommodate the expectations of the town residents, Tiffany desired to improve the quality and safety of the Rec Plex athletic fields so they could be more resilient when subject to the demanded usage.

Ian Lacy, Tom Irwin Advisors Lead Project Advisors, was contacted and made a site visit with Tiffany and Rich Calarco, L & C Consultants, to discuss the current conditions of all the athletic fields within the complex. It was clear during the site walk that all the fields had challenging natural turf surfaces that were suffering from weed contamination, surface planarity issues and varying turf composition. Of a particular worry was the condition of the baseball and softball infields, which had been rototilled and then seemingly just left. Tiffany explained that the DPW currently maintain the fields and complex and an irrigation proposal had been accepted which would irrigate the entire complex. At the end of the site walk, Ian was able to explain to Tiffany that he felt the most appropriate way forward would be to carry out a feasibility study to better understand the current performance qualities of the fields and how to implement a sustainable Athletic Field Master Plan to guide maintenance tasks which would elevate and create more consistent playing conditions.

The following fields would be included in the study:

- Little League Field R1 (Lighted)
- Majors/IV Baseball Field R2 (Lighted)
- T-Ball Field R4
- Little League/ Adult Softball Field R3(Lighted)
- Multipurpose Field R5 (Partially Lighted)
- Softball/Adult Softball Field R6
- Rectangular Field R7
- Rectangular Field R8 (Lighted)

# MAJOR THEMES

Over time the Athletic Fields have been facing performance challenges. These challenges include poor drainage, compromised natural grass cover and high weed contamination. It is not known what the maintenance approach has been in previous years leading up to the assessment other than regular mowing and lining of the fields.

- High compaction - Compaction relates to the density of the topsoil material which impacts drainage and root penetration. Most of the fields had excessive compaction levels. This was most prevalent at the 3" level where compaction exceeded 300 PSI at all but 4 locations, with some locations exceeding 600 PSI. This is considered very high and a level where air exchange is limited and the turf roots struggle to penetrate any deeper into the profile.
- High surface hardness – Surface hardness is the ability of the field to absorb impact (measured by GMax or gravity) and mitigate injury/concussion. Three fields exceed the accepted safety standard for GMax or surface hardness with average readings of 126, 114, and 118. Two other fields had readings in the 90's. All these readings may be detrimental to field health and create a real concern to the athlete/player safety.
- High weed presence – The presence of weed pressure was excessive at all but one location which can decrease field durability and traction. The weed pressure is predominantly Crabgrass (*Digitaria sanguinalis*) and Clover (*Trifolium repens*). In some areas these weeds exceeded 50% of the test grid. The percentage of desirable grasses is low with many fields having less than 25% desirable grass, one field only had 6.5% at the locations tested.
- Poor Planarity – The consistency or levelness of a field affects athlete footing, ball reaction and growing environment for desirable turf species. Many depressions were observed across the assessed fields which can hold water and create a more desirable growing environment for weeds.
- High clay and silt ratios – The ratio of the topsoil's smallest particles such as silt clay and fine sand will impact drainage, compaction, and hardness. The soils were found to have elevated levels of fine particle sizes, particularly silt and organic matter.
- Inadequate soil nutrition – The soils were tested for nutrient availability to better understand the ability of the desirable plants to access essential nutrients. Most of the soils were deficient in essential nutrients Calcium, Magnesium and Potassium and had elevated levels of Sodium present.
- Low Soil Microbial Activity - The Ratio of Ammonium to Nitrate suggests that there is reduced soil microbial activity. This will directly impact the ability of the plants to access vital soil nutrients and minerals. It will also impact the tilth of the soils and will contribute to poor aerification.

# BACKGROUND

The Colchester Rec Plex was built in the mid 1990's and had a new playscape area constructed within the past two years. Having athletic fields, walking paths, tennis/pickleball courts and a playscape area, the park has something to offer for everyone in the community. About half the fields have lights to allow for night play. Two fields have in ground irrigation (R7 and R8) however they are not active as the original source for water was not adequate and the rotors and nozzles became clogged with silt and pond debris. There are water spigots along the backstop fencing in baseball infields on the South end of the park. There are several storage sheds across the park. Five of the fields have covered dugouts with raised or concrete floors adjacent to the clay infields, however the outfield turf areas are also used for Soccer. Therefore, the fields are subject to year-round use by the community.

We were able to speak to Tim Angell, Colchester Public Works Supervisor of Grounds, in the field as we conducted the assessments. While speaking with Tim, it was apparent that there is a lack of standard operating procedures for maintaining the Rec Plex. He is challenged with an overstretched staff and inadequate equipment to carry out the cultural tasks required to maintain an actively used recreational facility. Tim desires to have the goals of the town administrators and user groups clarified and aligned with the mission statement of his team so they can be better equipped and prepared to create and maintain the playing conditions the community is striving for.

# ASSESSMENT METHODOLOGY

The athletic fields at the Colchester Rec Plex were assessed on December 5th and 6th, 2022 as the first phase of the Feasibility Study. There had been approximately .55" of precipitation in the previous 48 hours and a total of 1.46" in the past week.

There had been several frosts in the weeks prior to the assessment being carried out. Please note that the frosts may have adversely impacted the infiltration rates taken in the field. It is likely that the frosts had created fissures in the soil which would increase the infiltration rate. The laboratory infiltration tests would not display this aberration.

Each field was assessed and scored as a Soccer field. This was due to the fact that all of the outfield areas were used for Soccer. Furthermore, the infields were not in a condition to properly or fairly assess as they had been rototilled and were saturated.

Each field was assessed at three turf locations for the following performance criteria related to Playability, Presentation and Structure:

% Vegetative Cover	1" Soil Compaction	Surface Hardness
% Desirable Vegetation	3" Soil Compaction	Root Zone Depth
% Poa/Weed	Height of Cut	Root Depth
% Bare Area	Quality of Cut	Thatch Depth
Planarity	Rotational Traction	Infiltration Rate (1 Location/Field)
Volumetric Water Content		

In addition to the turf field criteria, photographs and drone imagery were captured to document field observations and take note on the surrounding field infrastructure. Ball roll and bounce were performed on two of the soccer playing areas. Also, if there was an infield present in the field, the depth was assessed using a profile sampler to better understand the layering of infield material. Both infield and topsoil composite samples were collected from each field and sent for laboratory analysis.

- % Vegetative Cover – Measures the percentage of the surface that is covered with any form of vegetation. While weed cover is not optimal, it does prevent erosion, add some player traction, and impact aesthetics.
- % Desirable Grass Species – The current presence of desired grass species for your Athletic Field.
- % Weed Cover – The presence of weed pressure which can decrease field durability and traction.
- Planarity – Is a measurement of the localized undulations in a field measured beneath a 3 Meter straight edge. Undulations are likely to hold water, become worn, and impact athlete gait.
- % Bare Area – The percentage of the field that has lost its vegetative cover, which impacts athlete safety.

- **Compaction 1 and 3" Depth** – The density of the topsoil material which impacts drainage and root penetration.
- **Height of Cut** - The height of cut impacts ball roll and ball bounce and thus impacts playability. It also can impact weed proliferation and turf durability.
- **Quality of Cut** – The cut quality effects the hardness of the plant and the likelihood of disease establishment. It also impacts aesthetics.
- **Rotational Traction** – This is a measurement of the ability of the grass to withstand torque without tear out. It measures the strength of the roots and is a important for player safety.
- **Surface Hardness** – The ability of the field to absorb impact (G-Max) and mitigate injury/concussion.
- **Rootzone Medium Depth** – The depth and consistency of the topsoil which impacts water holding capacity and root mass development.
- **Root Depth** – The extent of root development which impacts plant health and turf stability.
- **Thatch Depth** – The organic matter layer that influences playing conditions.
- **Infiltration** – The rate at which water penetrates the surface of the Athletic Field.
- **Soil Moisture** – The field's Volumetric Water Content which illustrates moisture distribution and uniformity.

The tools used to assist with the assessment were:

**Grass Quadrant** - Used to measure percentages of weed, desirable grass, disease, bare area.

**Penetrometer** – Used for measuring soil compaction which is equipped with a pressure transducer to measure the force necessary to penetrate the soil at varying depths.

**Grass Prism** – A scientific viewing device consisting of a magnifying prism and scale used to measure and evaluate grasses, and, to examine the height and quality of cut.

**Double Ring Infiltrometer** – A device which forces a column of water vertically through the soil profile such that the permeation can be measured.

**Pogo Pro Plus Moisture Probe and GPS**- Used to GPS Map and measure moisture levels in soils.

**Clegg Hammer** – Impact tester for generating Gmax or Surface Hardness ratings.

**Mascaro Profiler** – 12" soil profile extraction tool.

**Torque Meter with Rotational Traction Vanes** – A specially calibrated meter and contact foot which can measure root strength.

**Planarity Straight Edge and Measurement Wedge**– A box beam and measurement wedge which captures localized undulations across the field in multiple directions.

# CRITICAL ANALYSIS

- The planarity across the fields was undulating with high and low spots clearly visible. This was particularly noticeable along the transitions from the infield clay areas to the surrounding turf areas.
- The height of cut was high across the fields, averaging approximately 4". The quality of cut was very poor leaving leaf tips that were jagged and tearing on closer inspection. This may make turf plant metabolism less efficient and more susceptible to disease.
- All the fields displayed below standard desirable vegetative coverage at the tested areas, with all but one field averaging between 59% to 75% desirable coverage. Field R4 was an exception to this and displayed the lowest desirable coverage at 12%, it also had the highest bare area measuring approximately 55%. Fields R2 and R8 ranked as having the next highest bare area measuring 17% and 26% respectively. It should be noted the desirable turf displayed a tufted bunch-type growth habit, being predominantly Tall Fescue (*Festuca arundinacea*).
- Weeds observed in the fields were primarily White Clover (*Trifolium repens*), Broadleaf Plantain (*Plantago major*), Annual Bluegrass (*Poa annua*) and Orchardgrass (*Dactylis glomerata*). There was also a presence of Creeping Bentgrass (*Agrostis stolonifera*), Prostrate Knotweed (*Polygonum aviculare*), Speedwell (*Veronica persica*), Ground Ivy (*Glechoma hederacea*) and Creeping Woodsorrel (*Oxalis corniculata*). There was evidence of summer annual pressure, such as Crabgrass (*Digitaria sanguinalis*), but it had been frost killed. The highest concentrations of weed were along the transitions to infield clay areas.
- Volumetric water content (VWC%) analysis determined a range of averages between fields measuring 29.4% to 48.3%. Fields R1-R6, which are higher in elevation were consistent with VWC% averages between 29.4% and 32.7%. The lower fields, R7 and R8 were more saturated and had VWC% averages of 48.3% and 42.1% respectively.
- Rotational traction scores were generally low, while the root depth was adequate, physically the roots were thin and brittle creating limited anchoring potential.
- Surface hardness ratings were low, this may be attributed to the high height of cut and volumetric water content.
- Topsoil depth was inconsistent across the turf areas of the fields averaging between 5.25" and 9". While soil sampling within the fields, the inconsistency of topsoil depth was confirmed, with some areas measuring 3" of topsoil or less.
- Soil compaction was generally low, being below 200 PSI at both the 1" and 3" depths. This could be attributed to elevated soil moisture levels and recent freeze thaw cycles which likely created fissures in the topsoil. However, field R6 did not follow this pattern as it had an average 3" compaction of 313 PSI, this is likely due to this field having the shallowest topsoil depth. Fields R2 and R4 had the next highest 3" soil compaction registering averages of 222 PSI and 227 PSI respectively.
- Soil analysis determined the textural classification to be a Sandy loam with every field having at least 32% silt content. Additionally, there was at least 13% combined fine and very fine sands bringing the total fine particle content of the soils above 50% in each field.



- The organic matter measured in each field is elevated. A high performing athletic field typically has between 3-5% organic matter. All the fields at the Colchester Rec Plex have between 5.43% (R8) and 7.54% (R6) organic matter.
- Chemical soil testing determined all the fields have adequate soil pH to grow performance turf grass.
- All the fields were deficient in Calcium besides R7. Five fields are deficient in Magnesium (R3, R4, R5, R6, and R7). All but two fields (R2 and R5) are deficient in Potassium.
- Every field had slightly elevated levels of Bicarbonates with the lowest field measuring 68 ppm (R7) and the highest field (R2) measuring 101 ppm.
- The field infiltration testing generated high results with all but three fields (R2, R7, and R8) measuring 9"/hour infiltration or greater. This was further investigated by having the Turf and Soil Diagnostics run an infiltration test on the composite sample from field R1. Our in-field testing determined the infiltration rate to be 33"/hour, however TSD determined the infiltration to be only 0.2"/hour. The lab uses and saturation and compaction standard operating procedure to determine infiltration rate. Due to the field being subject to several freeze thaw cycles prior to testing, fractures in the soil profile likely elevated our field-testing data by increasing percolation potential.
- Infield clay sampling determined the depth of material to differ slightly between fields. However, laboratory particle size analysis confirmed all the infield material meets the ASTM F2107 standard guide for construction and maintenance of skinned areas on baseball and softball fields.
- Most of the transitions of the infield material to the surrounding turf areas did not appear smooth. The clay areas appear to be more elevated than the surrounding turf, however lips at the transition were further elevated creating water pooling within the infield clay areas.
- Ball roll and bounce were low, this is most likely due to the high height of cut.
- Many soccer goals were left in the fields to overwinter.
- The bases were still present in the infield clay areas and were not removed until the second day of testing.
- The infields had been rototilled with the bases still in which created missed areas where weeds were still present.
- The backstop and outfield fencing were bent, rusty, detached from couplers, frost heaved in areas, and had invasive plants growing through or under sections. Most of the backstops only had a minimal overhang, which help to protect fans and park goers as well as parking lots.

# INDIVIDUAL FIELD NOTES AND MAINTENANCE RECOMMENDATIONS

Note: The recommendations below are based solely upon the performance testing and the existing conditions analysis. Full recommendations, which will incorporate data such as soils, drainage etc. from the upcoming Phases will be included in the Solutions Report.

## R1 – Little League

- Highest soil moisture readings taken in the infield turf and shallow center field.
- Left field had a 1.5" depression measuring 4' long.
- Windscreen behind dugout was ripping to shreds.
- Yellow corrugated fence protection in center field had become detached and was laying on the turf.
- More puddling in the infield around first base and the batter's box.

### Recommendations –

- Increase cultural activities of aeration, overseeding and topdressing.
- Fill low spots.
- Lower infield clay and create even transitions to turf areas.

## R2 – John C. McCarthy Memorial Field

- Highest soil moisture readings taken in the infield turf, left field and shallow right field.
- There was a 1.63" depression in center field, which could have been a soccer goal mouth as this is a multi-use field.
- Infield puddling was primarily behind first base and second base.

### Recommendations –

- Increase cultural activities of aeration, overseeding and topdressing.
- Fill low spots.
- Lower infield clay and create even transitions to turf areas.

## R3 – Mary Guarnaccia Parlee Field

- Highest soil moisture readings were taken in shallow right field and deep left center field.
- There is a 1.75" depression in center field, low laying areas in left field had minimal vegetative coverage.
- Infield puddling was concentrated along the third base line and pitcher mound area.

**Recommendations –**

- Increase cultural activities of aeration, overseeding and topdressing.
- Trim overhanging Pine trees along the right field fence line.
- Fill low spots.
- Lower infield clay and create even transitions to turf areas.

**R4 – Tee Ball**

- Highest soil moisture readings were taken in deep center field and shallow left field.
- Most bare area of any field assessed.
- There is a 1.5" depression in shallow center field that is 4' wide.
- Infield puddling was most evident behind second and third base.

**Recommendations –**

- Increase cultural activities of aeration, overseeding and topdressing.
- Wrap the telephone poles along the outfield fence with protective material to decrease risk of injury if a player was to run into them.
- Re-grade outfield turf area which appears to be bowled.
- Lower infield clay and create even transitions to turf areas.

**R5 – Softball/Soccer**

- Highest soil moisture readings taken in shallow left field.
- Significant depressions in deep left and center field, some measuring 2.5" depth or greater.
- Infield puddling most evident around the bases.

**Recommendations –**

- Increase cultural activities of aeration, overseeding and topdressing.
- Re-grade the far soccer field area, furthest from the infield clay area.
- Lower infield clay and create even transitions to turf areas.

**R6 – Softball/Soccer**

- Highest soil moisture readings taken in shallow center field, deep center field and near right foul pole.
- There were stones measuring 4-6" on the surface of the infield and left foul line turf.
- A bare soccer goal mouth in deep center field had been topdressed with crumb rubber.
- There was a 1.25" depression in center field.
- Infield puddling was most evident behind first base and second base.

**Recommendations –**

- Increase cultural activities of aeration, overseeding and topdressing.
- Remove stones on the surface of the playing area.
- Remove crumb rubber and re-grade with soil or sod.

- Lower infield clay and create even transitions to turf areas.

## **R7 – Soccer**

- Highest soil moisture readings taken in the Southwest corner.
- There was a 1.5" depression just South of the center circle.
- The soil had an ammonia like odor, which may indicate an anaerobic growing environment.
- The goal mouth areas had minimal coverage and the South goalmouth had a steep drop-off.
- A field drain in the Northeast corner, off the playing field, had been overgrown with vegetation.
- High netting behind the South goal had tree branches growing into it, the high poles are leaning a bit and could use tension rods.

### **Recommendations –**

- Increase cultural activities of aeration, overseeding and topdressing.
- Deep tine aerate to increase infiltration potential, especially in the Southwest corner.
- Investigate if the irrigation system is salvageable.
- Remove goals from the field during the winter months.
- Trim branches growing into protective netting, and construct tension rods to poles.

## **Field R8 – Football**

- Highest soil moisture readings taken in the Northwest corner.
- There is a 2.5" depression in the Southeast corner.
- There is in-ground irrigation however it is not functional.
- The stairs to access the field from the main park area are at an awkward angle and steps are inconsistent.

### **Recommendations –**

- Increase cultural activities of aeration, overseeding and topdressing.
- Investigate if the in-ground irrigation is salvageable.

# TESTING DETAILS

## FIELD ASSESSMENT BACKGROUND INFORMATION

Tom Irwin Advisors assessed the fields in this study for surface vegetation, soil compaction, surface hardness, soil profile observation, infiltration rate and volumetric water content (VWC%). By taking specific measurements, field quality can be measured and compared to prior years (if testing was carried out) and be used to establish a “current level of quality”. Once the quality level is established it is then possible to evaluate the ongoing maintenance programs and how effective they are.

### PERFORMANCE TESTING:

Maintaining your Athletic Fields to a Performance Quality Standard is essential to providing consistently safe and playable surfaces for your athletes. By meeting these standards, you are providing a sustainable asset to your community. A Core PQS uses objective data to identify the strengths and weaknesses of an Athletic Field. This data can be used to evaluate your current field conditions, justify maintenance decisions, and allocate budget resources.

**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. Typically, a Professional level field which would have scored 54-60 points.*

**B:** *High Standard Rating equals a top-performing field suitable for use in high visibility community events such as varsity sports. Most often a collegiate and high-level high school field which score between 42-53 points.*

**C:** *Standard Rating is acceptable for general recreational purposes under a carefully monitored management plan and with ongoing supportive maintenance. These moderately maintained Municipal fields score between 30 and 41 points.*

**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 and score between 18-29 points.*

**E:** *Below Standard Rating means significant aspects of playability and safety may be seriously impaired. Caution is strongly advised This field requires immediate corrective action and significant rehabilitation to support continued use. These under-maintained fields score between 6 and 17 points.*

**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 usually scoring between 0 and 5 points.*

# APPENDIX

**PQS Report Cards**

**Field Photos**

**Combined Score Sheet**



# INDIVIDUAL FIELD ASSESSMENTS DATA

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

## SOCCER REPORT CARD



# CORE PERFORMANCE QUALITY STANDARDS

TOM IRWIN ADVISORS, INC.



# 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.



# TOOLS AND TECHNIQUES

Tests	Tool	Description
Planarity		<b>A 3 Meter Straight Edge</b> 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		<b>Traction Meter</b> is a tool which measures the rotational resistance and the shear strength of the turf grass surface.
Compaction Rating 1" & 3" Depth		<b>The Penetrometer</b> is the tool of choice for measuring soil compaction. Soil compaction differs from field hardness. Compaction is measured in the pounds per square inch (PSI) required to drive the probe to differing depths.
Surface Hardness (GMax)		<b>The Clegg Hammer</b> is a tool which measures field surface hardness. Surface hardness may contribute to athlete injury and poor playing conditions.
Moisture 2.2" Depth		<b>Pogo Pro+</b> is a tool which measures the Volumetric Moisture Content of a wide range of soils. Soil moisture affects turf grass health and playability. It also measures salinity canopy temperature, soil temperature, and can be used for precision gps mapping
% Weed Cover		<b>The Grass Quadrant</b> is a grid of 100 equal squares used to accurately measure the percent of certain field imperfections.
Surface Debris		<b>Observation and Measurement</b> The Field Technician conducting the test surveys the field looking for and noting obvious deficiencies. These include hazardous debris, bare areas, overall condition, signage, fencing, field markings, goal posts, and other structures.
Turf Infiltration Rate		<b>Double Ring Infiltrometer</b> is a tool which measures the rate of water movement through a limited soil column.

## 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.





# Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R1 LITTLE LEAGUE

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

C

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	D
% Desirable Turfgrass Cover	Grass Quadrant	70%	0	F
Planarity	3 Meter Straight Edge & Wedge	0.9"	2	D
Height of Cut	Grass Prism	4.0	4	B
Rotational Traction	Traction Meter	19 n/M	2	D
Surface Hardness	Clegg/Gmax	54.6 GMax	0	F
% Volumetric Water Content	POGO +	30.8%	3	C
CORE PRESENTATION	Tool	Average Results	Points	D
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	30.0%	0	F
% Bare Area	Grass Quadrant	0.0%	5	A
Vegetative Cover	Grass Quadrant	100%	5	A
CORE STRUCTURE	Tool	Average Results	Points	B
Infiltration Rate	Double Ring Infiltrometer	9.0 "/hr	4	B
Compaction 1"	Penetrometer	155 psi	2	D
Compaction 3"	Penetrometer	172 psi	4	B
Root Depth	12" Profiler	5.5"	5	A
Thatch Depth	12" Profiler	0.3"	5	A
Rootzone Medium Depth	12" Profiler	8.8"	5	A

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80-65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64-47 total points	16 criteria	4 points per criteria achieved
C = Standard	48-31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32-17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		

## R1 Field Photos



*Backstop material shredded*

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*Infield clay collared with weed*

---



*1 3/8" depression in center field*

---



*Good root depth but roots are thin and brittle*

---

# Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R2 BASEBALL & SOCCER

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

**D**

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	E
% Desirable Turfgrass Cover	Grass Quadrant	66.7%	0	F
Planarity	3 Meter Straight Edge & Wedge	1.0"	1	E
Height of Cut	Grass Prism	3.1	3	C
Rotational Traction	Traction Meter	16.3 n/M	2	D
Surface Hardness	Clegg/Gmax	59.8 GMax	0	F
% Volumetric Water Content	POGO +	32.4%	4	B
CORE PRESENTATION	Tool	Average Results	Points	F
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	16.7%	0	F
% Bare Area	Grass Quadrant	16.7%	1	E
Vegetative Cover	Grass Quadrant	83.3%	1	E
CORE STRUCTURE	Tool	Average Results	Points	B
Infiltration Rate	Double Ring Infiltrometer	3.0 "/hr	2	D
Compaction 1"	Penetrometer	147 psi	3	C
Compaction 3"	Penetrometer	223 psi	3	C
Root Depth	12" Profiler	5.8"	5	A
Thatch Depth	12" Profiler	0.6"	4	B
Rootzone Medium Depth	12" Profiler	7.3"	4	B

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80–65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64–47 total points	16 criteria	4 points per criteria achieved
C = Standard	48–31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32–17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		



## R2 Field Photos



*Puddling in the infield*

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*Weed pressure around the pitchers mound*

---



*Center field soil profile, note more stone at 4" depth*

---



*Hole in backstop fencing*

---

## Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R3 BASEBALL & SOCCER

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

**D**

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	E
% Desirable Turfgrass Cover	Grass Quadrant	68.3%	0	F
Planarity	3 Meter Straight Edge & Wedge	0.7"	2	D
Height of Cut	Grass Prism	4.0	4	B
Rotational Traction	Traction Meter	16.0 n/M	2	D
Surface Hardness	Clegg/Gmax	62.6 GMax	0	F
% Volumetric Water Content	POGO +	30.5%	3	C
CORE PRESENTATION	Tool	Average Results	Points	D
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	28.3%	0	F
% Bare Area	Grass Quadrant	3.3%	4	B
Vegetative Cover	Grass Quadrant	96.7%	4	B
CORE STRUCTURE	Tool	Average Results	Points	B
Infiltration Rate	Double Ring Infiltrrometer	36.0 "/hr	5	A
Compaction 1"	Penetrometer	141 psi	3	C
Compaction 3"	Penetrometer	173 psi	4	B
Root Depth	12" Profiler	7.0"	5	A
Thatch Depth	12" Profiler	0.8"	3	C
Rootzone Medium Depth	12" Profiler	8.5"	4	B

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80-65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64-47 total points	16 criteria	4 points per criteria achieved
C = Standard	48-31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32-17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		



## R3 Field Photos



*Bare Areas and weed pressure*

---



*Puddling between 3rd base and pitchers mound.  
Note no overhang on backstop.*

---



*Right field fence leaning due to pressure from  
invasives.*

---



*1 3/4" depression in left field. Note abundance of  
clover.*

---

## Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R4 T-BALL & SOCCER

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

**D**

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	E
% Desirable Turfgrass Cover	Grass Quadrant	11.7%	0	F
Planarity	3 Meter Straight Edge & Wedge	0.54"	3	C
Height of Cut	Grass Prism	3.5	3	C
Rotational Traction	Traction Meter	8.8 n/M	0	F
Surface Hardness	Clegg/Gmax	76.1 GMax	2	D
% Volumetric Water Content	POGO +	29.4%	3	C
CORE PRESENTATION	Tool	Average Results	Points	F
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	33.3%	0	F
% Bare Area	Grass Quadrant	55%	0	F
Vegetative Cover	Grass Quadrant	45%	0	F
CORE STRUCTURE	Tool	Average Results	Points	B
Infiltration Rate	Double Ring Infiltrometer	9"/hr	4	B
Compaction 1"	Penetrometer	162 psi	2	D
Compaction 3"	Penetrometer	227 psi	3	C
Root Depth	12" Profiler	7.3"	5	A
Thatch Depth	12" Profiler	0.5"	5	A
Rootzone Medium Depth	12" Profiler	9.0"	5	A

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80-65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64-47 total points	16 criteria	4 points per criteria achieved
C = Standard	48-31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32-17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		



## R4 Field Photos



*Side view showing infield is higher than outfield.  
Note heavy weed pressure and large amount of bare area*

---



*Puddling in infield*

---



*Left field roots, good depth, but thin and brittle*

---



*Right field bare areas. Also, note telephone poles in field of play. (Upper right)*

---

## Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R5 SOFTBALL & SOCCER

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

**D**

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	D
% Desirable Turfgrass Cover	Grass Quadrant	71%	0	F
Planarity	3 Meter Straight Edge & Wedge	0.8"	2	D
Height of Cut	Grass Prism	4.0	4	B
Rotational Traction	Traction Meter	18.2 n/M	2	D
Surface Hardness	Clegg/Gmax	64.7 GMax	1	E
% Volumetric Water Content	POGO +	31.6%	3	C
CORE PRESENTATION	Tool	Average Results	Points	E
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	20.0%	0	F
% Bare Area	Grass Quadrant	9%	3	C
Vegetative Cover	Grass Quadrant	91%	3	C
CORE STRUCTURE	Tool	Average Results	Points	B
Infiltration Rate	Double Ring Infiltrometer	24"/hr	5	A
Compaction 1"	Penetrometer	137 psi	3	C
Compaction 3"	Penetrometer	207 psi	3	C
Root Depth	12" Profiler	6.3"	5	A
Thatch Depth	12" Profiler	0.8"	3	C
Rootzone Medium Depth	12" Profiler	5.8"	3	C

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80–65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64–47 total points	16 criteria	4 points per criteria achieved
C = Standard	48–31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32–17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		



## R5 Field Photos



*Close up of turf showing poor quality of cut likely caused by dull blades. Note shredded and browned tips.*

---



*Center field bunch type growth habit and bare spaces.*

---



*2 3/8" depression in center field.*

---



*Footprints disturbing saturated infield clay during base removal.*

---

## Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R6 SOFTBALL & SOCCER

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

**D**

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	D
% Desirable Turfgrass Cover	Grass Quadrant	61.7%	0	F
Planarity	3 Meter Straight Edge & Wedge	0.7"	2	D
Height of Cut	Grass Prism	3.5	3	C
Rotational Traction	Traction Meter	19.7 n/M	2	D
Surface Hardness	Clegg/Gmax	72.8 GMax	2	D
% Volumetric Water Content	POGO +	32.7%	2	D
CORE PRESENTATION	Tool	Average Results	Points	E
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	31.3%	0	F
% Bare Area	Grass Quadrant	7%	3	C
Vegetative Cover	Grass Quadrant	93%	3	C
CORE STRUCTURE	Tool	Average Results	Points	D
Infiltration Rate	Double Ring Infiltrometer	36"/hr	5	A
Compaction 1"	Penetrometer	191 psi	1	E
Compaction 3"	Penetrometer	313 psi	1	E
Root Depth	12" Profiler	6.0"	5	A
Thatch Depth	12" Profiler	0.8"	3	C
Rootzone Medium Depth	12" Profiler	5.3"	2	D

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80-65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64-47 total points	16 criteria	4 points per criteria achieved
C = Standard	48-31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32-17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		



## R6 Field Photos



*Tire marks through field. Note right side is darker where irrigation line had been run.*

---



*Stone on the surface of the infield. Note weed presence.*

---



*Stones on the surface of the infield. Likely brought up through rototilling.*

---



*Deep center field soccer goalmouth with crumb rubber top dressing lifted through action of water..*

---

# Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R7 SOCCER

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

**E**

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	E
% Desirable Turfgrass Cover	Grass Quadrant	75.0%	1	E
Planarity	3 Meter Straight Edge & Wedge	1.0"	1	E
Height of Cut	Grass Prism	4.5	4	B
Rotational Traction	Traction Meter	15.8 n/M	2	D
Surface Hardness	Clegg/Gmax	53.8 GMax	0	F
% Volumetric Water Content	POGO +	40.3%	0	F
CORE PRESENTATION	Tool	Average Results	Points	D
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	20.7%	0	F
% Bare Area	Grass Quadrant	4.3%	4	B
Vegetative Cover	Grass Quadrant	95.7%	4	B
CORE STRUCTURE	Tool	Average Results	Points	C
Infiltration Rate	Double Ring Infiltrometer	4.5"/hr	2	D
Compaction 1"	Penetrometer	155 psi	2	D
Compaction 3"	Penetrometer	213 psi	3	C
Root Depth	12" Profiler	6.0"	5	A
Thatch Depth	12" Profiler	0.8"	3	C
Rootzone Medium Depth	12" Profiler	6.0"	3	C

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80-65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64-47 total points	16 criteria	4 points per criteria achieved
C = Standard	48-31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32-17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		



## R7 Field Photos



*Bottom right corner of the field. Drain entirely grown over (center of photo)*

---



*Southern goal mouth heavily worn. Goal left in field.*

---



*High height of cut and poor quality of cut.*

---



*Tufted turf growth. This may cause footing issues.*

---



# Core PQS Field Test for Natural Turf: Soccer

Organization: Town of Colchester Rec Plex

Field Name: R8 FOOTBALL

Date Of Test: 12/5 & 12/6/22

OVERALL GRADE

**E**

GRADE

CORE PLAYABILITY	Tool	Average Results	Points	E
% Desirable Turfgrass Cover	Grass Quadrant	59.0%	0	F
Planarity	3 Meter Straight Edge & Wedge	0.8"	2	D
Height of Cut	Grass Prism	3.5	3	C
Rotational Traction	Traction Meter	15.5 n/M	2	D
Surface Hardness	Clegg/Gmax	56.7 GMax	0	F
% Volumetric Water Content	POGO +	42.1%	0	F
CORE PRESENTATION	Tool	Average Results	Points	F
Quality of Cut		1.0	1	E
% Weed Cover	Grass Quadrant	11.7%	0	F
% Bare Area	Grass Quadrant	26.0%	0	F
Vegetative Cover	Grass Quadrant	70.7%	0	F
CORE STRUCTURE	Tool	Average Results	Points	C
Infiltration Rate	Double Ring Infiltrometer	3"/hr	2	D
Compaction 1"	Penetrometer	107 psi	4	B
Compaction 3"	Penetrometer	188 psi	4	B
Root Depth	12" Profiler	5.8"	5	A
Thatch Depth	12" Profiler	0.6"	4	B
Rootzone Medium Depth	12" Profiler	6.8"	3	C

SCORING KEY	PQS Soccer Field	Total Criteria	Total points available for each criteria
A = Superior	80-65 total points	16 criteria	5 points per criteria achieved
B = High Standard	64-47 total points	16 criteria	4 points per criteria achieved
C = Standard	48-31 total points	16 criteria	3 points per criteria achieved
D = Low Standard	32-17 total points	16 criteria	2 points per criteria achieved
E = Below Standard	16 and below total points	16 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.		

## R8 Field Photos



*Southeast corner, 2 3/4" depression*

---



*Root depth 3 1/2" Roots are sparse..*

---



*4' long depressed area. Heavy weed pressure and tufted growth habit.*

---



*Tufted turf and bare area.*

---

## Combined Score Sheet

	R1	R2	R3	R4	R5	R6	R7	R8
Playability								
% Desirable	F	F	F	F	F	F	E	F
Planarity	D	E	D	C	D	D	E	D
Height of Cut	B	C	B	C	B	C	B	C
Rot Traction	D	D	D	F	D	D	D	D
Clegg 3	F	F	F	D	E	D	F	F
VWC	C	D	C	C	C	D	F	F
Presentation								
Quality of Cut	E	E	E	E	E	E	E	E
% Poa/Weed	F	F	F	F	F	F	F	F
% Bare	A	E	B	F	C	C	B	F
% Veg	A	E	B	F	C	C	B	F
Structure								
Infiltration Rate	B	D	A	B	A	A	D	D
1" Compaction	D	C	C	D	C	E	D	B
3" Compaction	B	C	B	C	C	E	C	B
Root Depth	A	A	A	A	A	A	A	A
Thatch Depth	A	B	C	A	C	C	C	B
Rootzone Depth	A	B	A	A	D	D	C	C





## 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](http://www.tomirwinadvisors.com/engage-with-us)

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