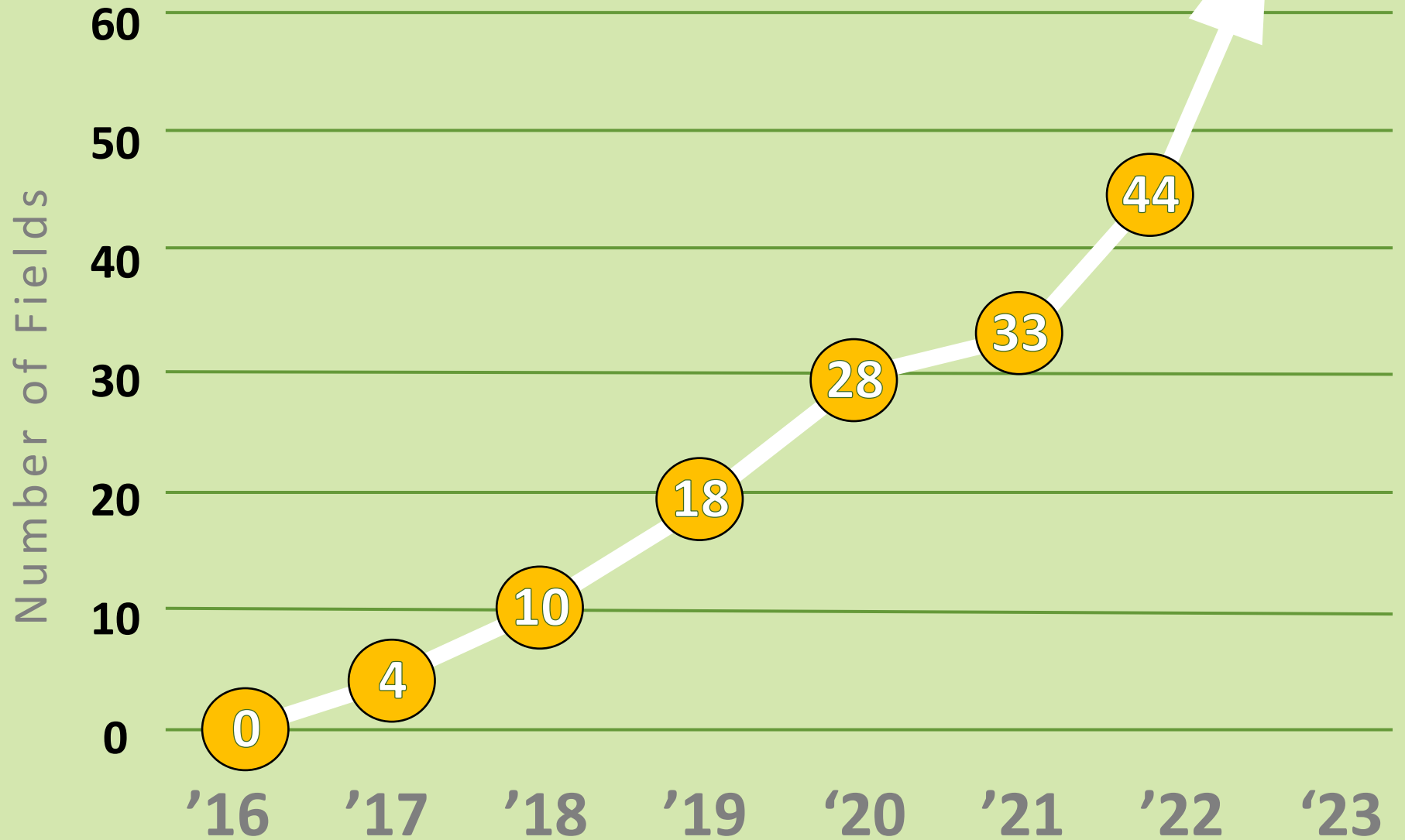
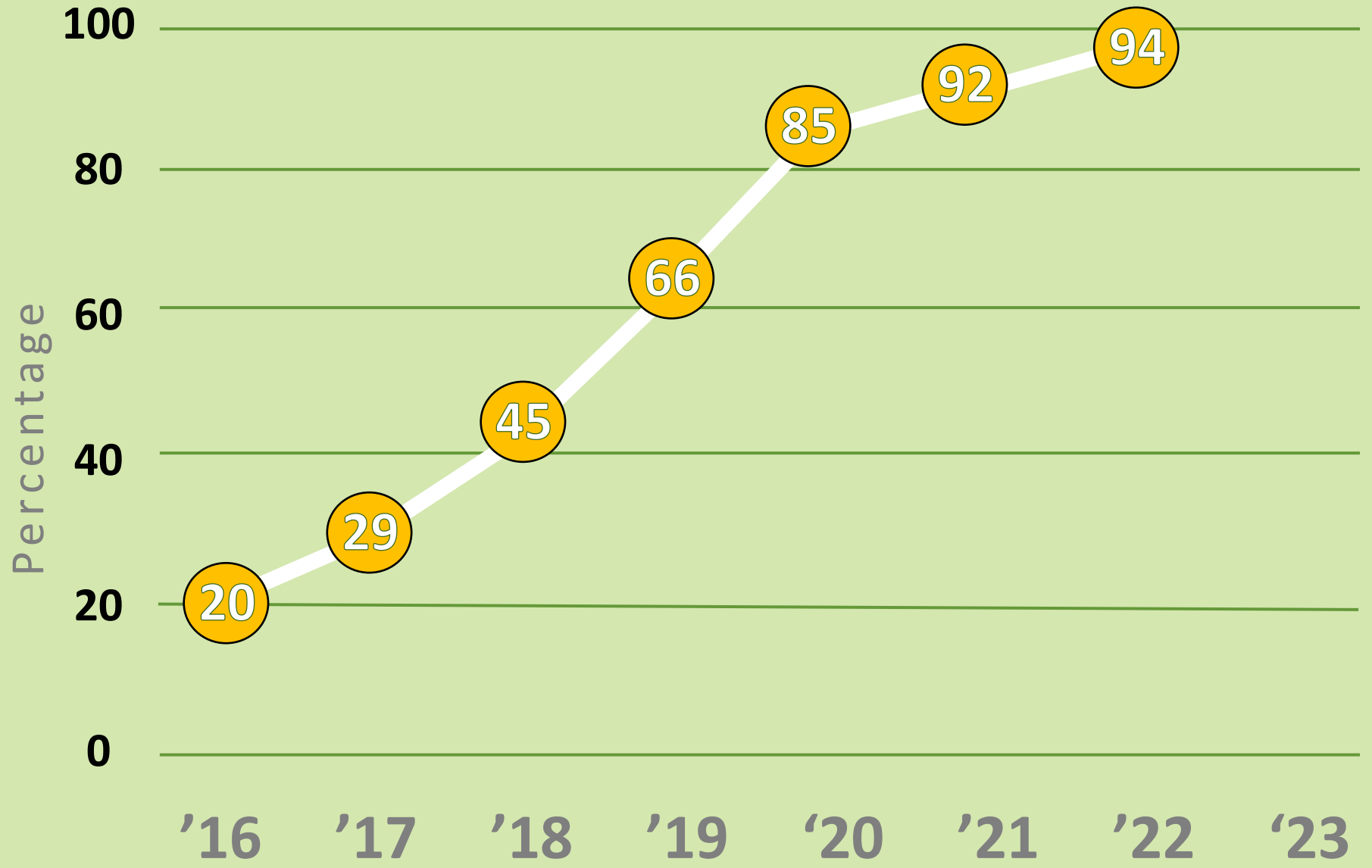


**Number of
Artificial
Turf Fields
with
Shock
Pads in
WI**



Percentage
of Bids
with
Shock Pads
Included
in *Spec* in
WI



MODERN ARTIFICIAL TURF

3 POINTS OF SAFETY



IMPACTS



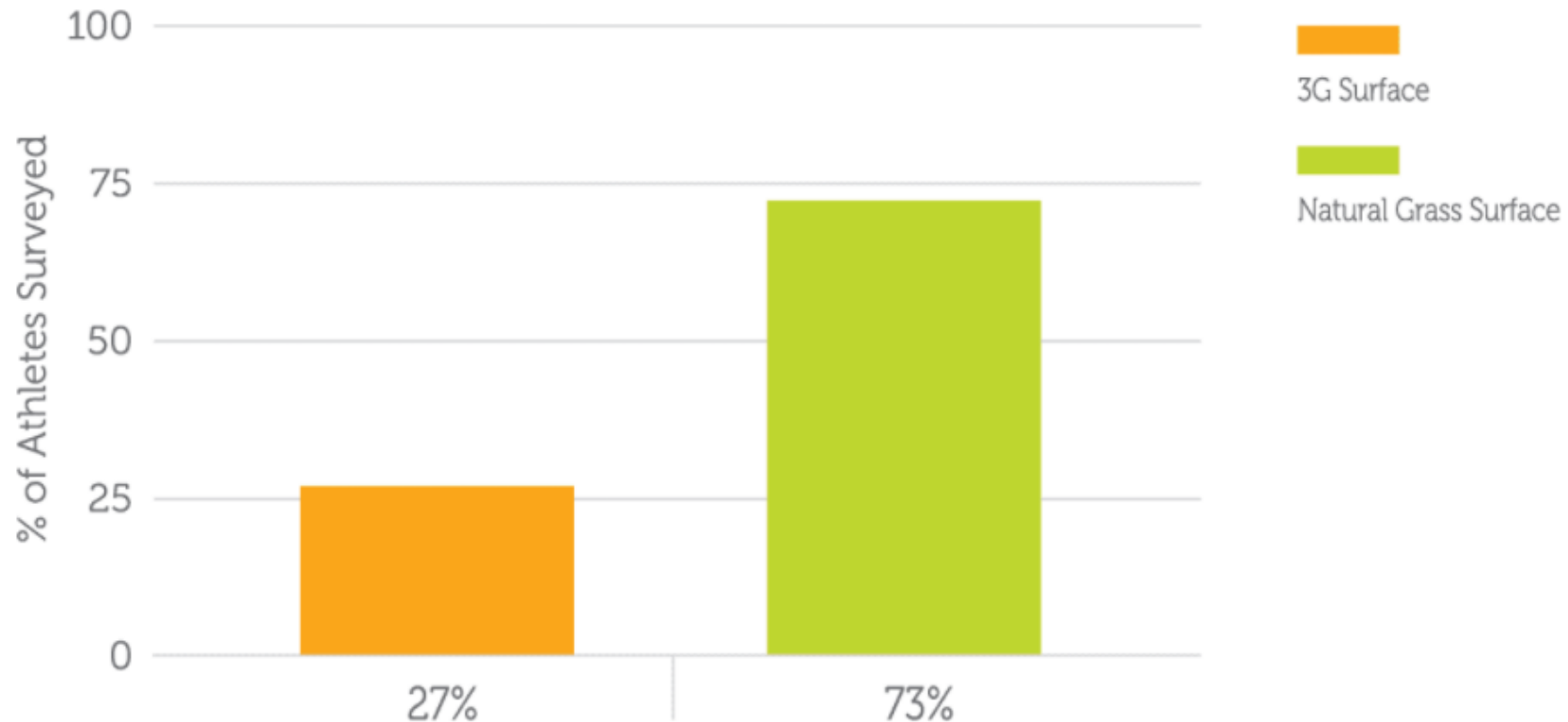
HEAT



TRACTION

WHAT DO PLAYERS PREFER?

If given the choice of playing on a natural grass surface that deteriorates throughout the season or a 3G surface that maintains its quality which would you choose?





1. IMPACTS



- PREVENTING CONCUSSIONS IN SPORTS HAS BECOME A NATIONAL PRIORITY
- STUDIES SHOW 1 IN 5 CONCUSSIONS OCCUR BY A HEAD TO SURFACE IMPACT
- HIGHER ENERGY IMPACTS BETWEEN THE BODY AND THE SURFACE ALSO TAKE THEIR TOLL

GMAX; F355-A MISSILE



- Surface stiffness test
- Flat missile
- Drops a 20 lb. from just 2 feet high
- The higher the GMax value, the harder the surface
- A good natural grass field (the benchmark for a quality athletic field) will produce a GMax below 100, and often below 80

HIC; ASTM F355-E MISSILE



- Head impact test
- Hemisphere projectile (curved like a human head)
- Drops a 10.1 lb. multiple times from increasing heights
- Determines the Critical Fall Height of the surface
- The higher the Critical fall height achieved, the safer the surface

AAA "TRIPLE A"; F3189 MISSILE



- Stiffness underfoot test
- Flat missile
- Vertical deformation
- Energy restitution
- Force reduction



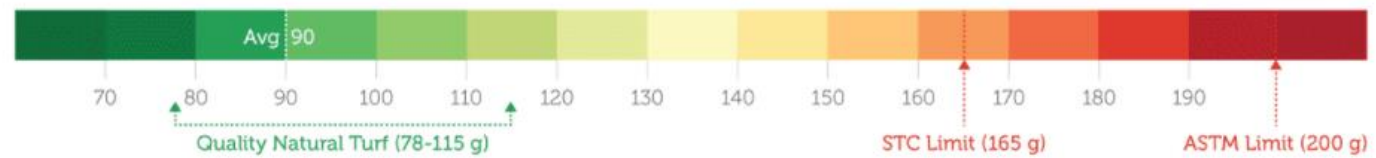
ONE TURF CONCEPT: THE NEW STANDARD

- Player performance and ball interaction requirements
- Guidance on ensuring the longevity of the field through undertaking laboratory testing which simulates the wear and degradation of the individual elements due to climatic conditions
- Identification tests to ensure that the surface tested in the laboratory matches that installed on the field
- Guidance for those fields looking to achieve certification from one or more international federations with the identification of additional requirements that are insisted upon by each individual federation

[SPORTS LAB WEBSITE](#)

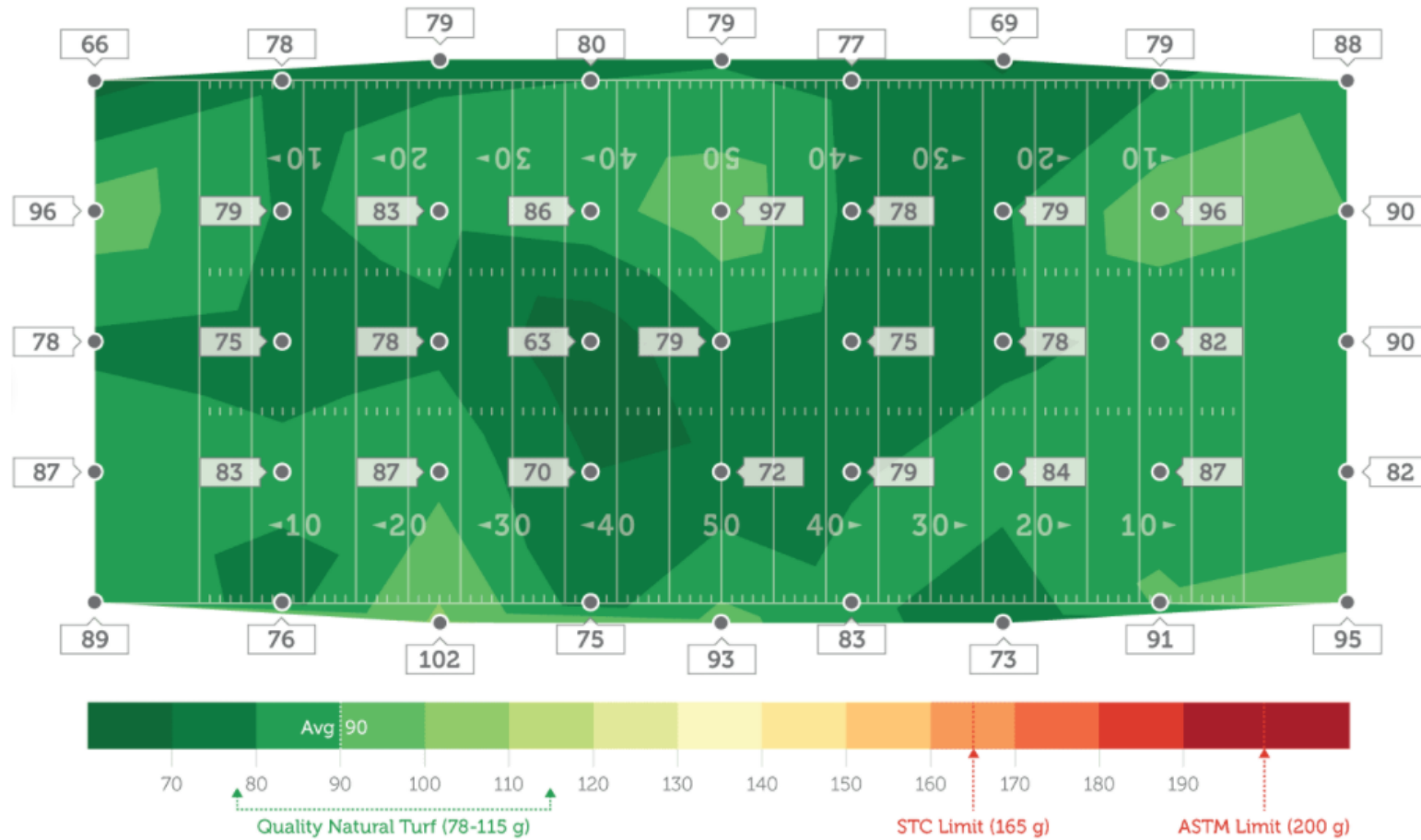
Tested - April, 2020; **Natural Turf**

College Football Practice Field



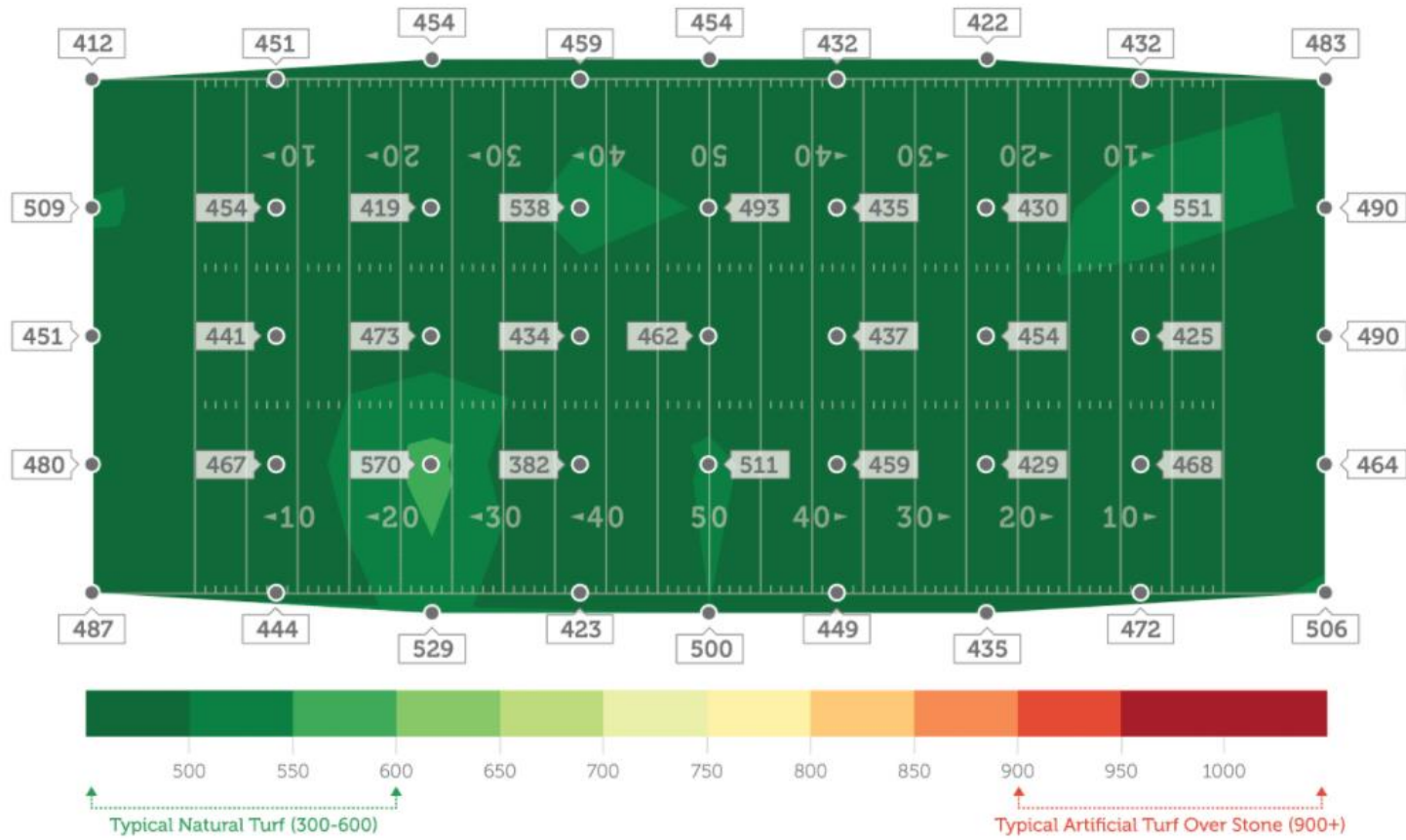
GMax Test Results - April, 2020; **Natural Turf**

College Football Practice Field (CO)



HIC Results 1.3 m Drop - April, 2020; **Natural Turf**

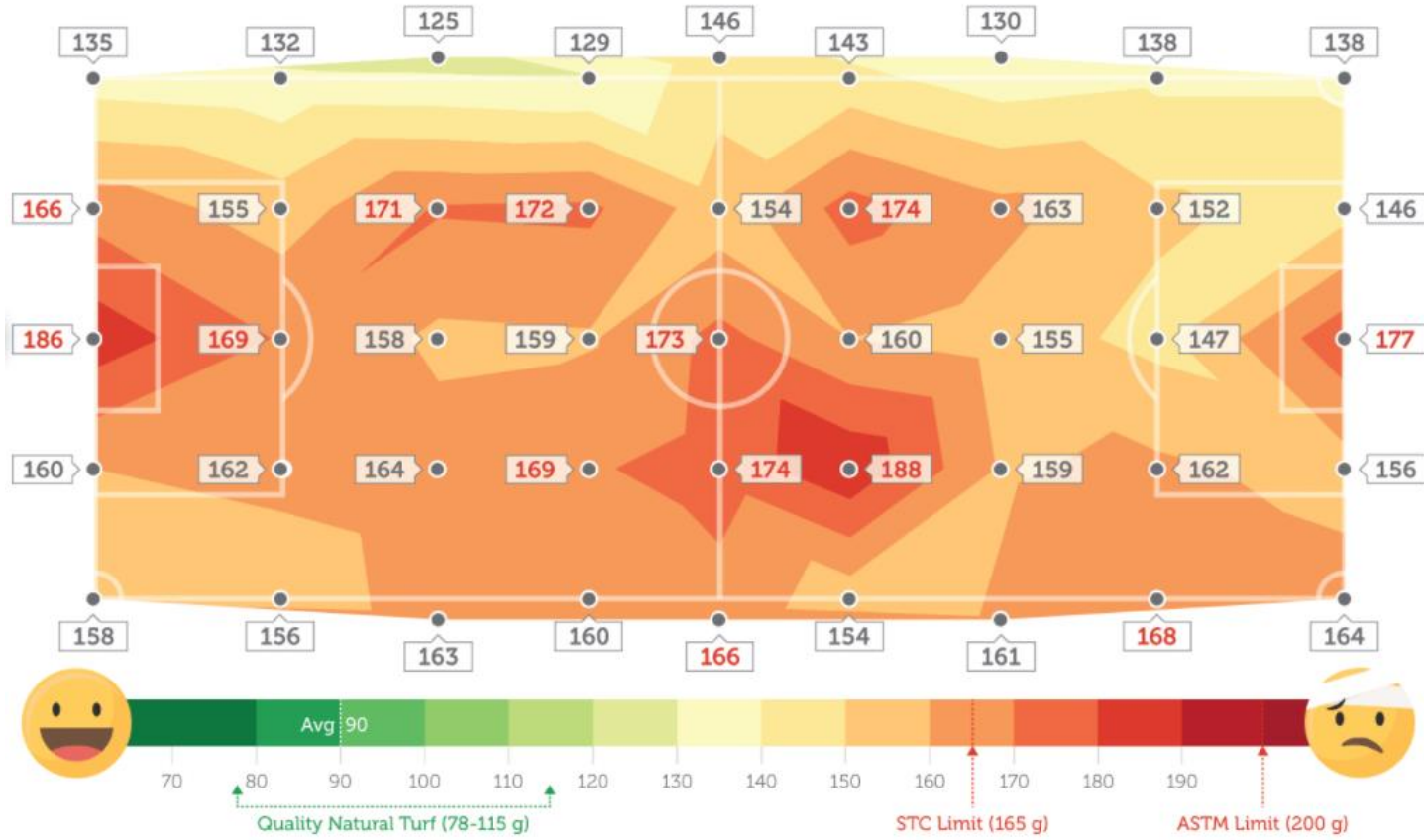
College Football Practice Field (CO)



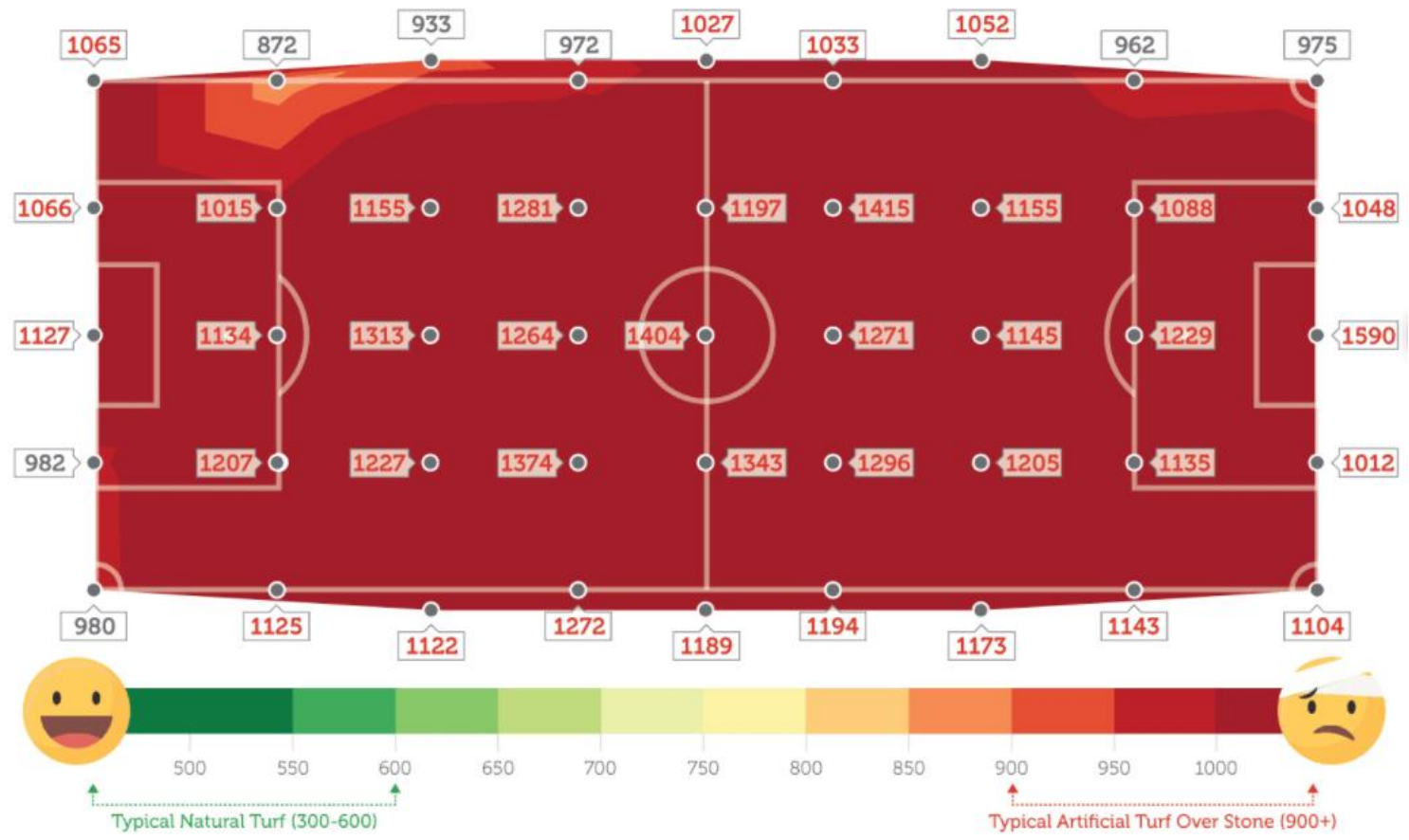
2" Turf; Sand/Rubber + Cooling Agent

GMax; No Pad

HS Soccer/Lacrosse Field (IL) - Built 2017 (3 Years Old)



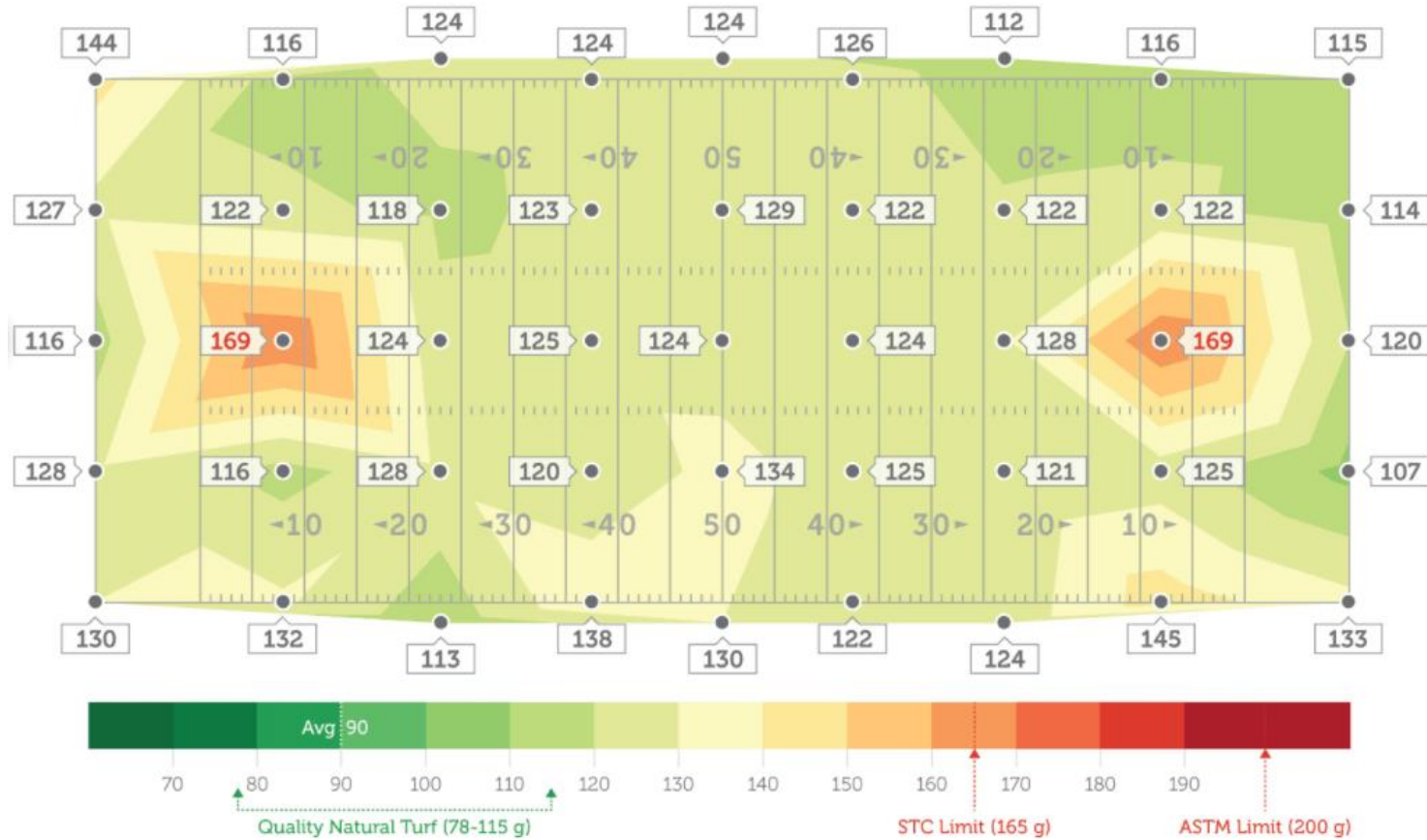
2" Turf; Sand/Rubber + Cooling Agent
 HIC Results 1.3 m Drop - April, 2020; No Pad
 HS Soccer/Lacrosse Field (IL) - Built 2017 (3 Years Old)



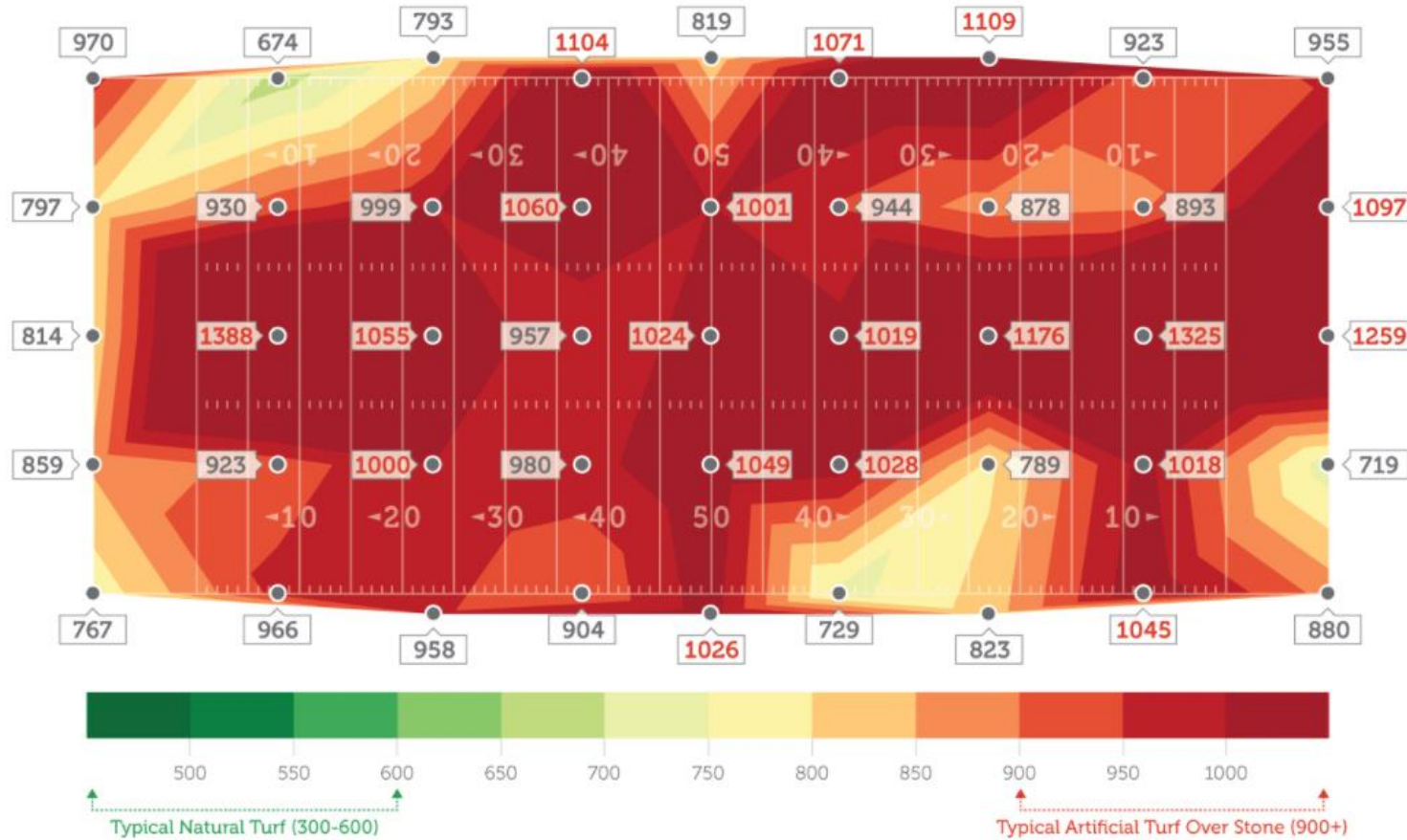
2" Turf; Sand/Rubber Infill

GMax; No Pad

HS Football Field (IL) - Built 2018 (2 Years Old)



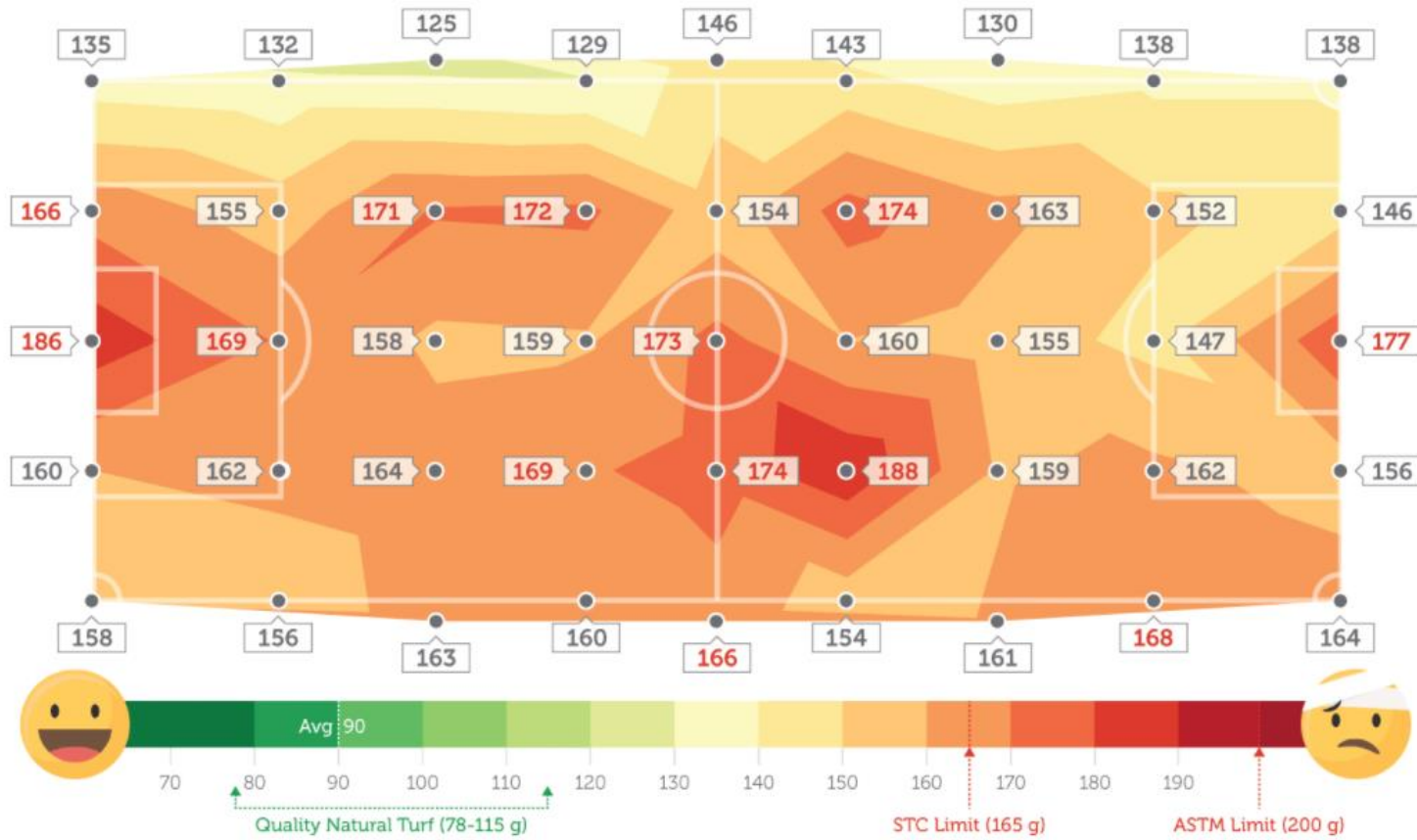
2" Turf; Sand/Rubber Infill
 HIC Results 1.3 m Drop - April, 2020; No Pad
 HS Football Field (IL) - Built 2018 (2 Years Old)



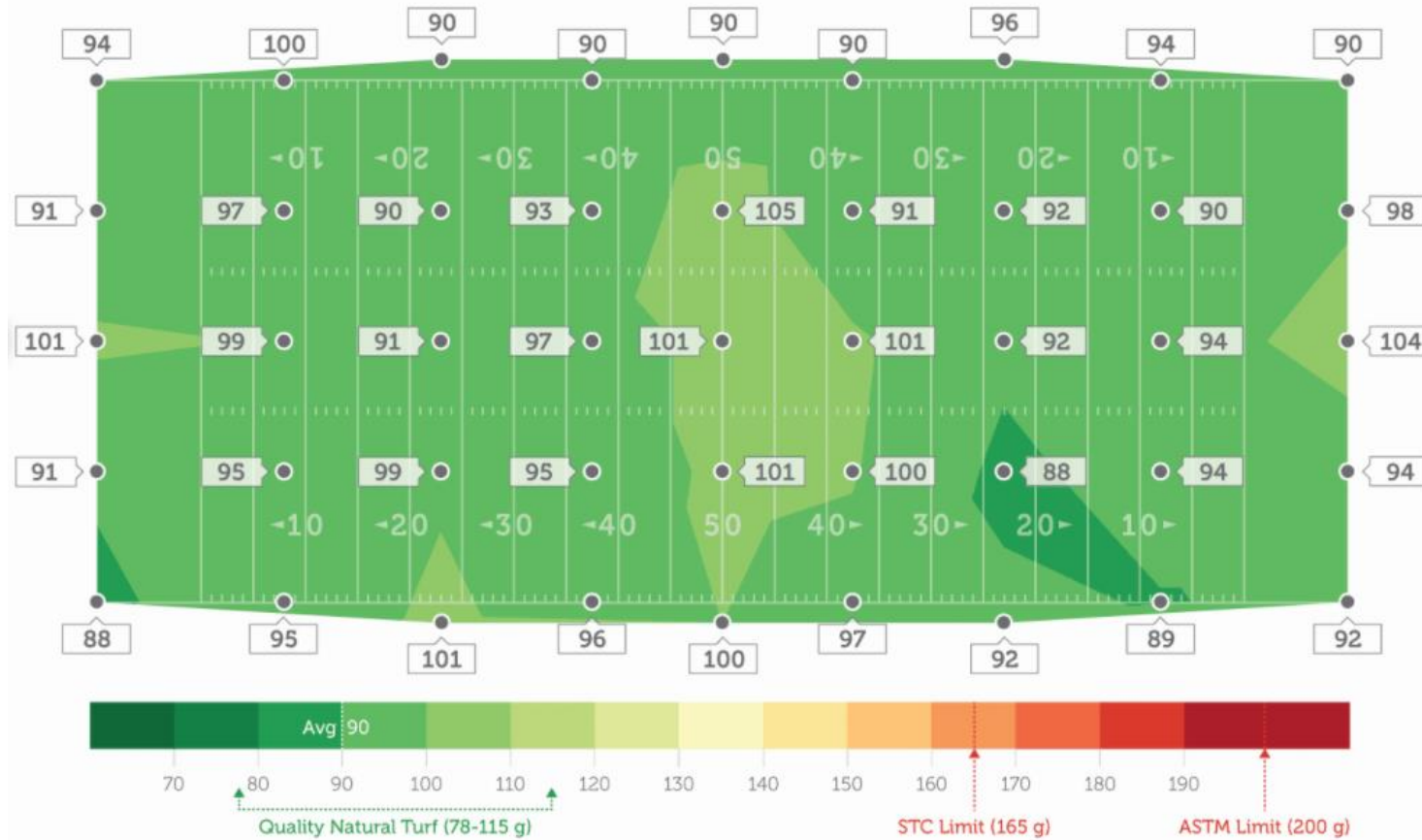
2" Turf; Sand/Rubber + Cooling Agent

GMax; No Pad

HS Soccer/Lacrosse Field (IL) - Built 2017 (3 Years Old)

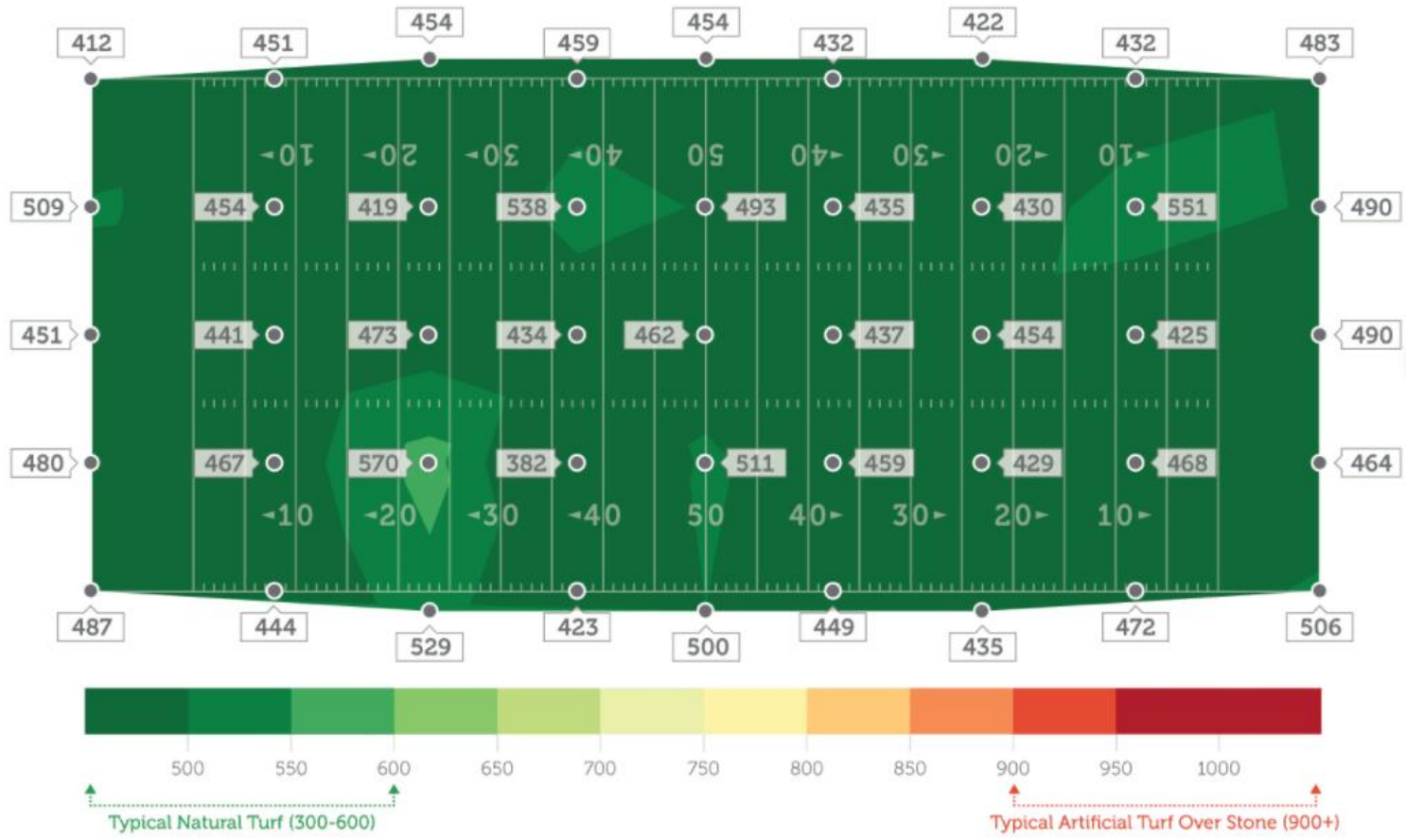


2" Turf; Sand/Rubber Infill
 GMax; With 14mm EPP Shock Pad
 HS Football Field (IL) - Built 2017 (3 Years Old)

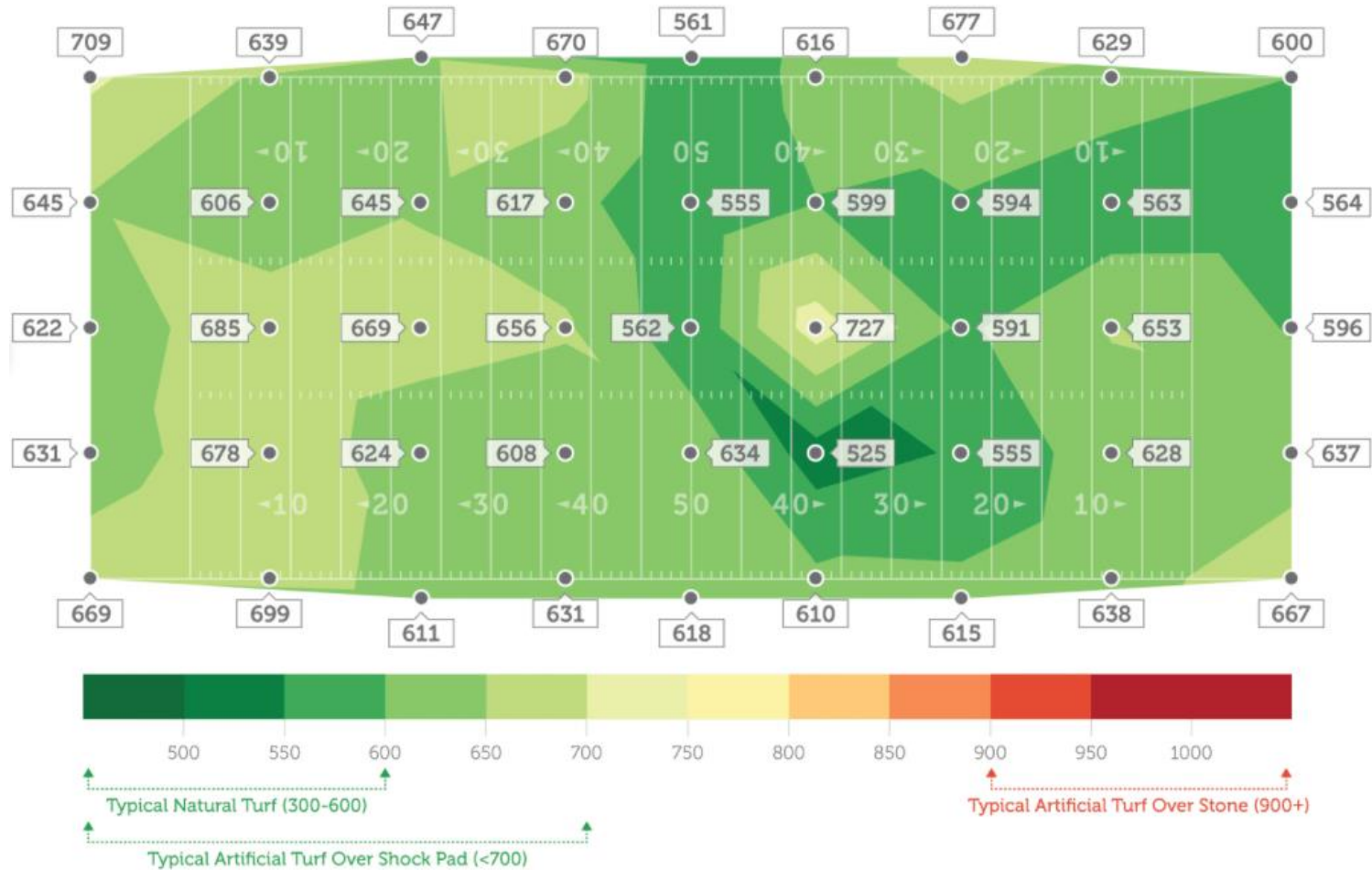


HIC Results 1.3 m Drop - April, 2020; **Natural Turf**

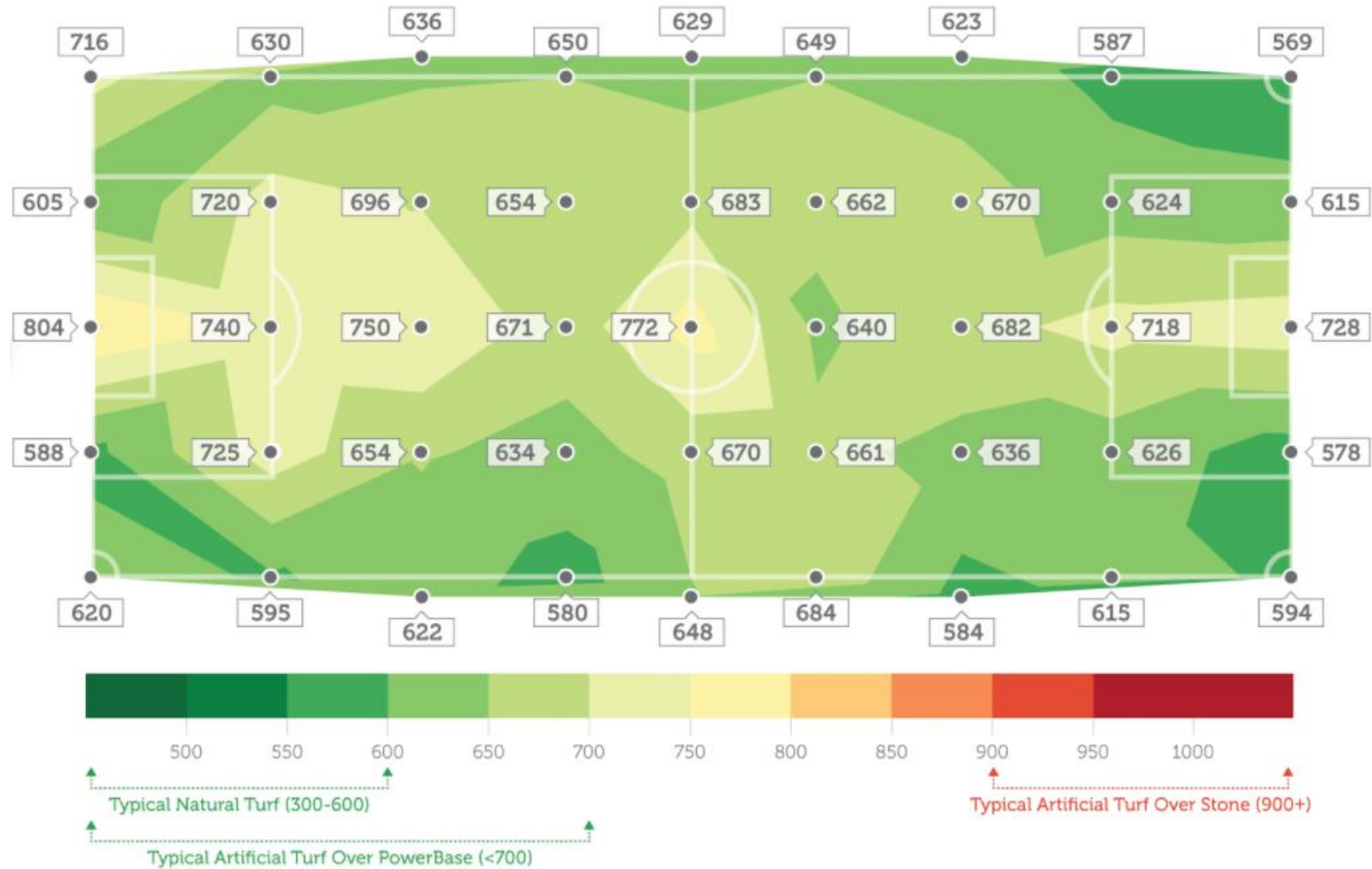
College Football Practice Field (CO)



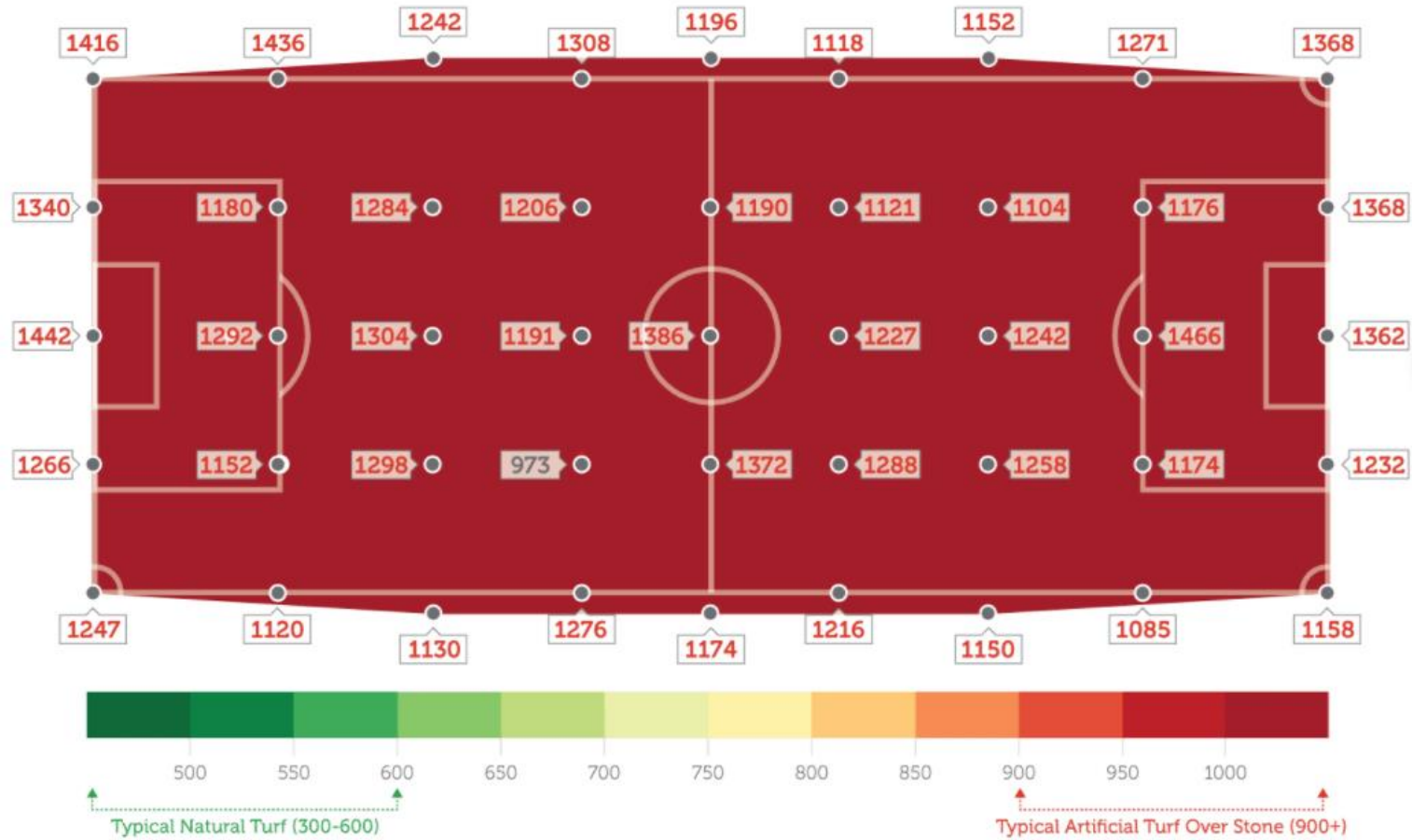
2" Turf; Sand/Wood Infill
 HIC Results 1.3 m Drop - April, 2020; 17mm EPP Shock Pad
 HS Multi-Use Field (MD) - Built 2020 (<1 Year Old)



1.5" Turf; Sand/Rubber Infill
HIC Results 1.3 m Drop - September, 2020; 25mm EPP Shock Pad
 Soccer Field (VA) - Built 2012 (8 Years Old)



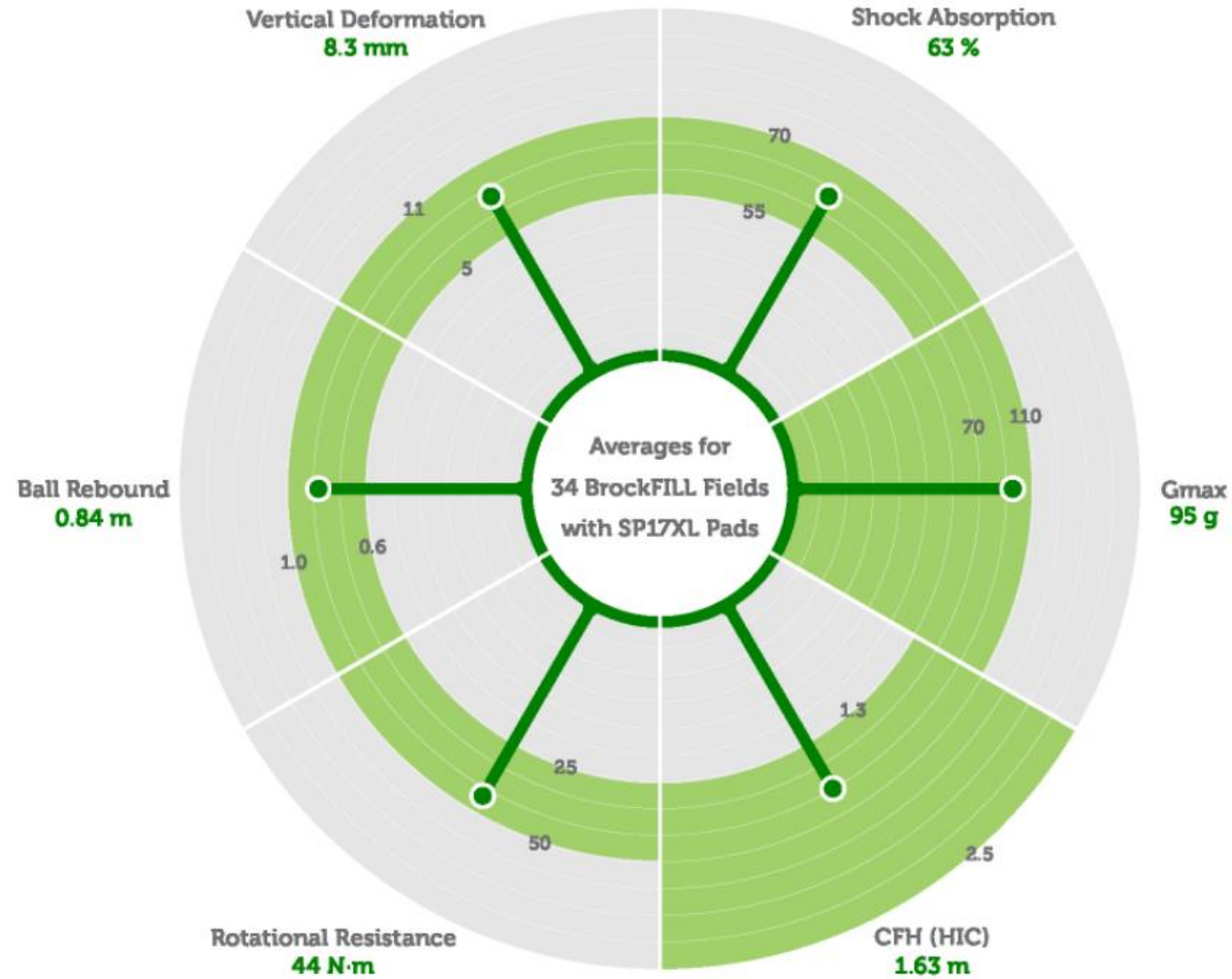
2" Turf; Sand/Rubber Infill
 HIC Results 1.3 m Drop - September, 2020; No Pad
 Soccer Field (VA) - Built 2012 (8 Years Old)



SPOKE KEY

<p>SHOCK ABSORPTION TOO HIGH</p> <p>Field may be too soft underfoot. Increased fatigue.</p>	<p>SHOCK ABSORPTION TOO LOW</p> <p>Field is too hard underfoot. Increased injury risk, increased impacts to joints.</p>
<p>GMAX TOO HIGH</p> <p>Field is too hard. Increased impact injury risk at high values.</p>	<p>GMAX TOO LOW</p> <p>Field may be too soft. No risk if other results are in optimal ranges.</p>
<p>CFH (HIC) TOO HIGH</p> <p>No risk. The higher, the safer.</p>	<p>CFH (HIC) TOO LOW</p> <p>Increased risk of serious head injuries.</p>
<p>ROTATIONAL RESISTANCE TOO HIGH</p> <p>Excessive cleat grab, increased risk of lower extremity injuries.</p>	<p>ROTATIONAL RESISTANCE TOO LOW</p> <p>Slipping, lack of stable footing during cuts.</p>
<p>BALL REBOUND TOO HIGH</p> <p>Ball bounce is unnaturally high. Hard to control ball.</p>	<p>BALL REBOUND TOO LOW</p> <p>"Dead" ball bounce. Slow game.</p>
<p>VERTICAL DEFORMATION TOO HIGH</p> <p>Field is too soft underfoot. Increased fatigue, less stable footing.</p>	<p>VERTICAL DEFORMATION TOO LOW</p> <p>Field is too hard underfoot. Increased muscle & joint soreness.</p>

AVERAGE FOR 34 BROCKFILL FIELDS WITH SP17XL PADS



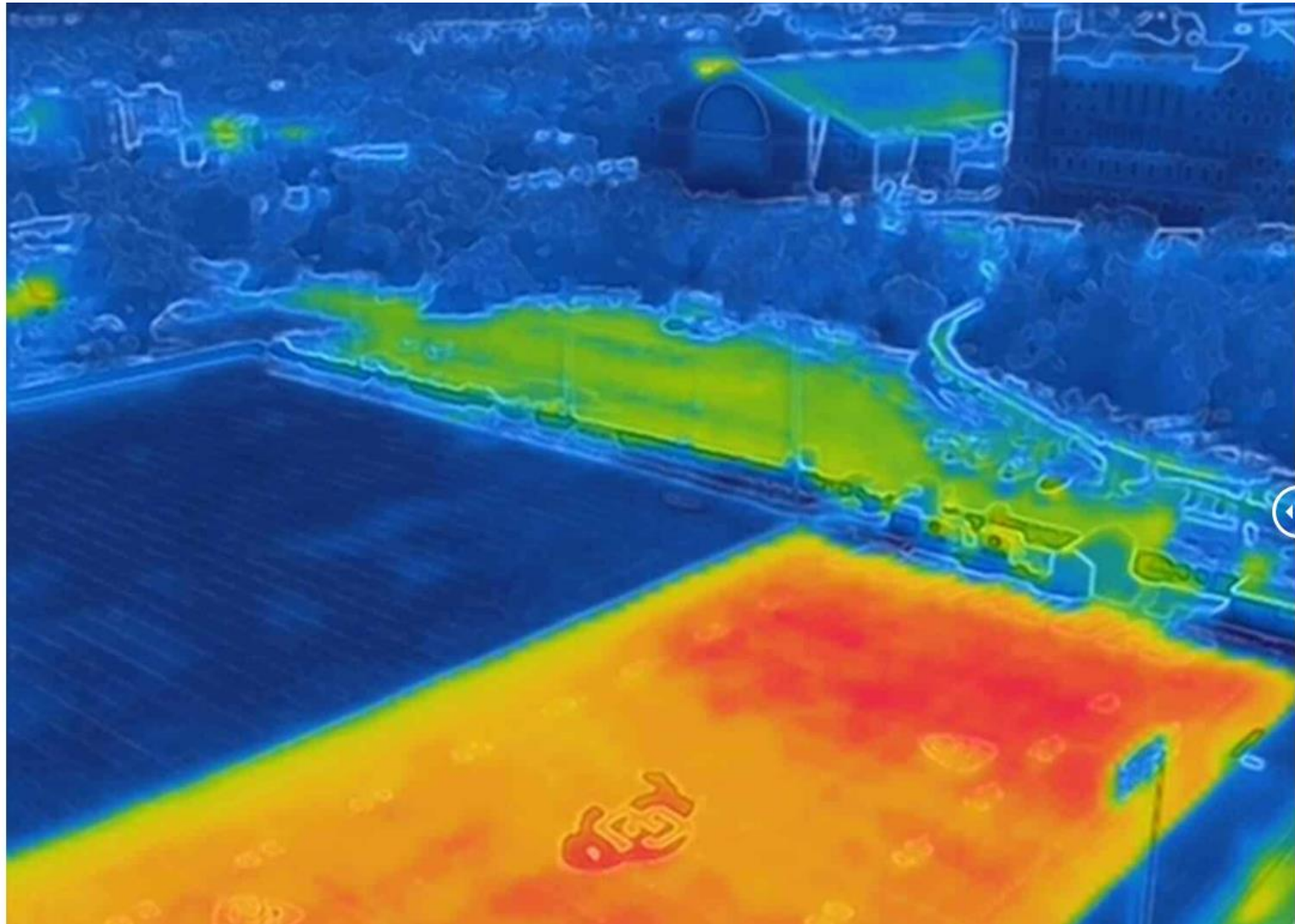


2. HEAT



- HEAT STRESS IS A MAJOR SAFETY ISSUE WITH ARTIFICIAL TURF
- IN MANY AREAS IN THE U.S., TEMPERATURES OF AN ARTIFICIAL TURF FIELD WITH CRUMB RUBBER CAN EXCEED 180 DEGREES F

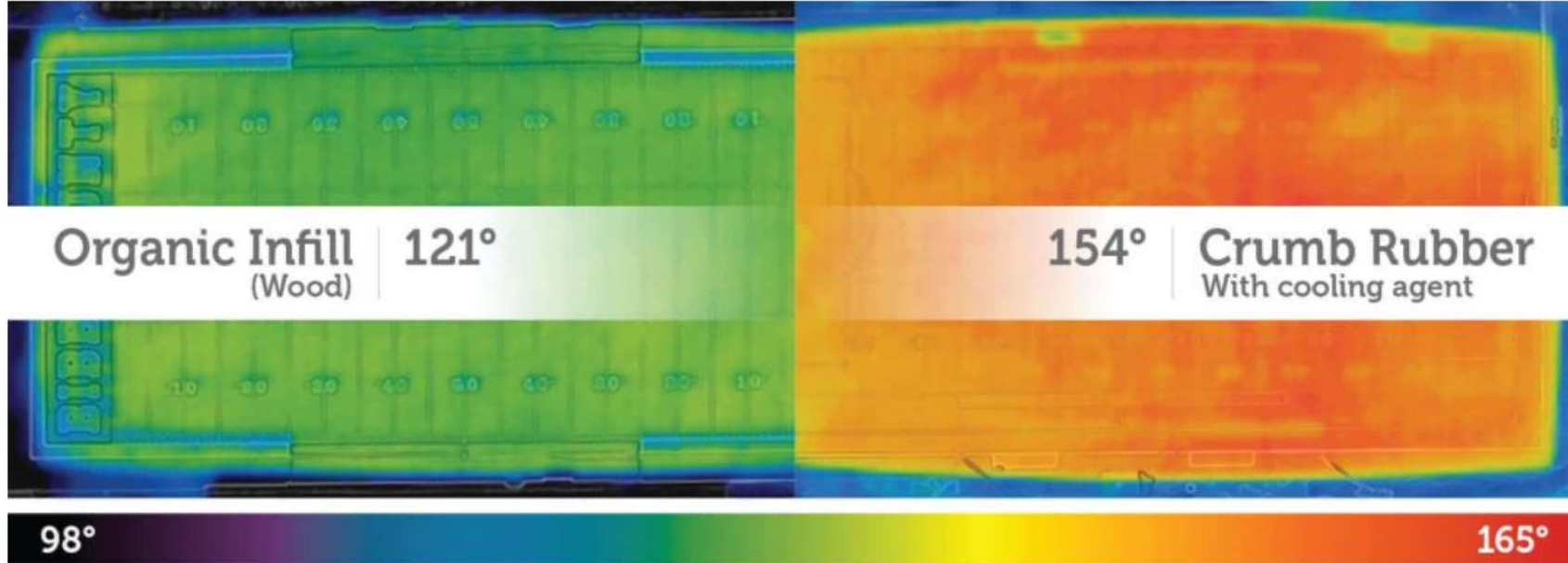




ORGANIC INFILLS COOL THE FIELD

Two adjacent fields; same location; same turf product; same 95 Degree day; same time of day; both were dry. The organic infill (wood) field measured 33 degrees cooler than the crumb rubber field with a cooling agent added.

Note: lower thermal conductivity of organic infill (wood) reduced heat transmission through shoes and skin.



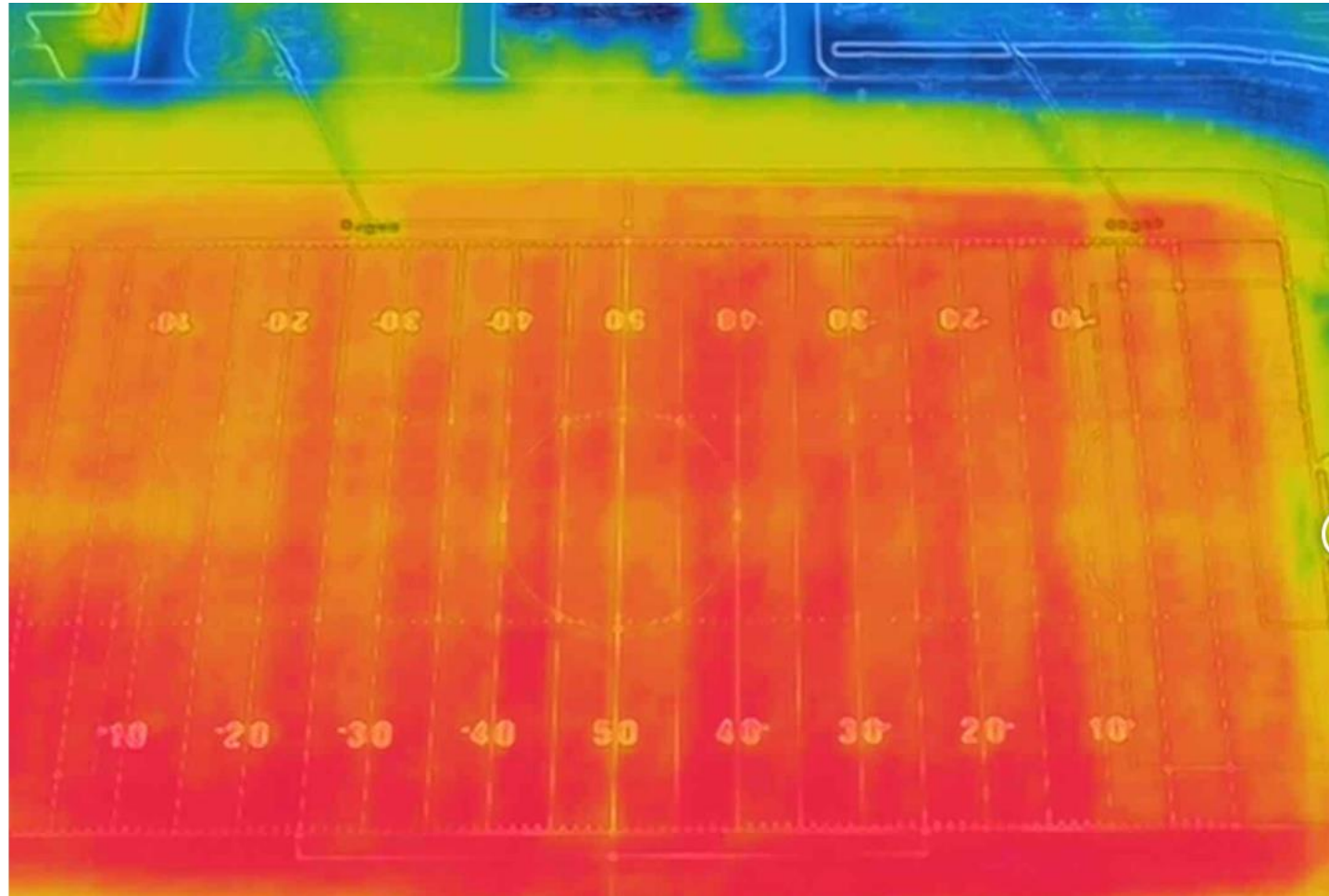
CRUMB RUBBER

Outside Temp: 97F
Crumb Rubber Field: 163F



CRUMB RUBBER

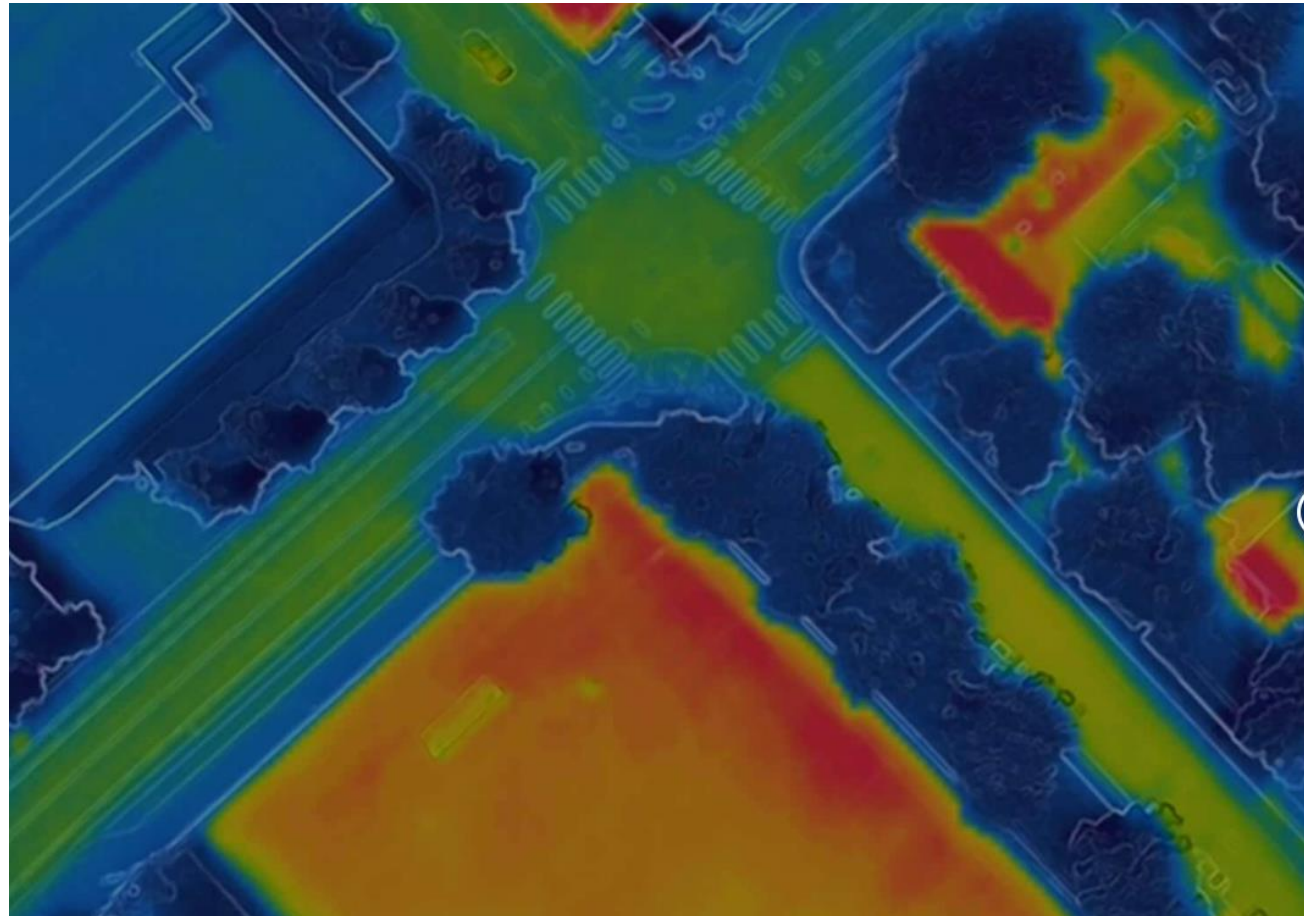
Outside Temp: 97F
Crumb Rubber Field: 163F



Outdoor temperature: **85F**
Temp gun near center of field: **170F**
Drone settings: **75-175F**
Grass next to field: **89F**
Intersection next to field: **120F**
Parking lot in shopping center near field: **125F**



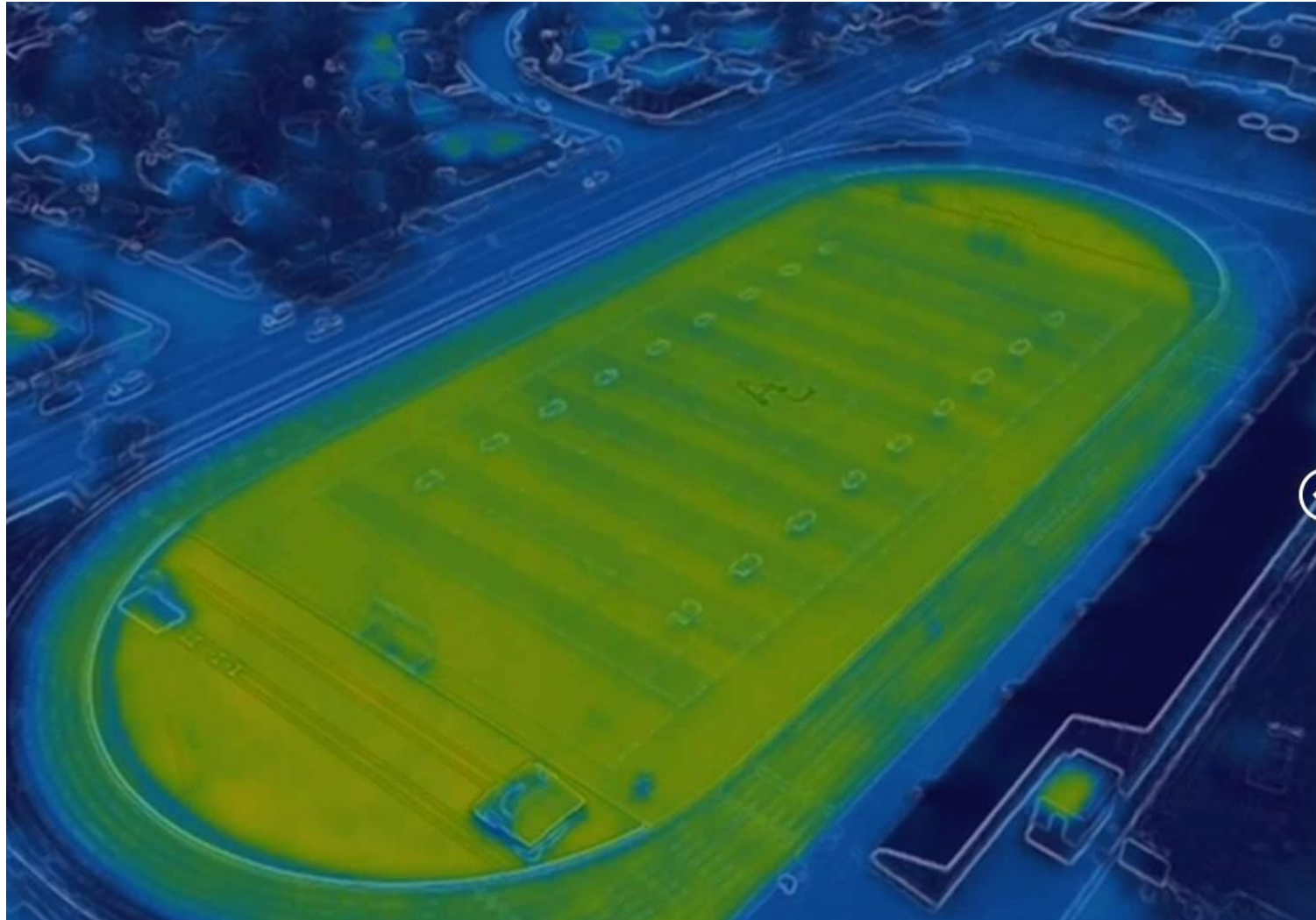
Outdoor temperature: **85F**
Temp gun near center of field: **170F**
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Grass next to field: **89F**
Intersection next to field: **120F**
Parking lot in shopping center near field: **125F**



Outside Temp: 90F
Organic Infill (Wood) Field Temp: 135F



Outside Temp: 90F
Organic Infill (Wood) Field Temp: 135F





3. TRACTION



- CONSISTENCY AND STABILITY IS WHAT EVERY ATHLETE NEEDS TO HAVE A FUN AND SUCCESSFUL GAME OR CAREER



TWO RECENT STUDIES: 2019 NCAA

AJSM: Incidence of Knee Injuries on Artificial Turf Versus Natural Grass in National Collegiate Athletic Association American Football: 2004-2005 Through 2013-2014 Seasons.

NFL

AJSM: Higher Rates of Lower Extremity Injury on Synthetic Turf Compared With Natural Turf Among National Football League Athletes, 2012-2016.

NCAA STUDY FINDINGS



Athletes in Division I competitions experienced **199% higher** PCL injury rates on artificial turf than on natural grass.



Athletes in Division II and III competitions experienced **213% higher** PCL injury rates on artificial turf than on natural grass.



Athletes in Division II and III competitions experienced **63% higher** ACL injury rates on artificial turf than on natural grass.

27% ↑

NFL STUDY*

showed 27% increase in surface-caused lower extremity injuries on artificial turf vs natural turf.

TRACTION: RUBBER VS. WOOD INFILL



PLANETARY SAFETY



REDUCE

- Lower your carbon footprint - sequestration
- Discontinue use of non-recyclable materials
- Reduce area heat



REUSE

- Reuse shock pads for multi-field lifecycles -without losing quality
- Use organic infills -from the planet back onto the planet



RECYCLE

- Using organic infill prevents probability of polluting waterways
- Using category 5 PP (polypropylene) brings the end of live value for upcycling and feedstock to secondary application

MICROPLASTICS



- Microplastics (NOAA): Small plastic pieces less than five millimeters long which can be harmful to our ocean and aquatic life
- ECHA: The infill material used in (artificial turf) – small pieces of end-of-life tires – falls under the definition of “intentionally added microplastics”
- ECHA: Proposing Ban on intentional addition of microplastics to the environment – grace period: TBD (6 years?) and/or containment on sites

GOOD NEWS! THE SOLUTIONS ARE HERE NOW!

MODERN ARTIFICIAL TURF SYSTEMS CAN:

- Mimic pristine natural grass
- Improve safety and reduce injuries
- Lower temperatures
- Reduce the environmental impact



QUESTIONS?

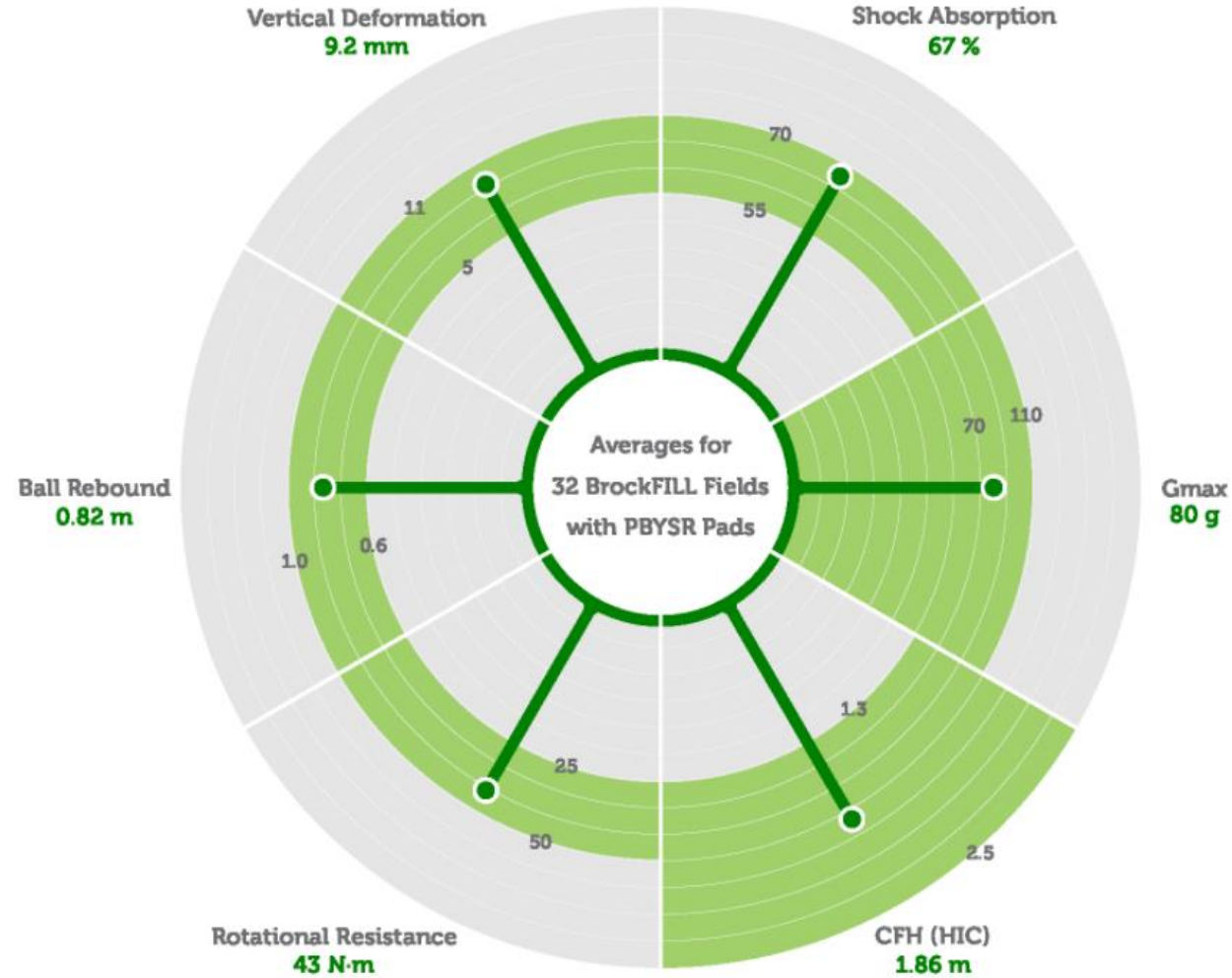
THE END



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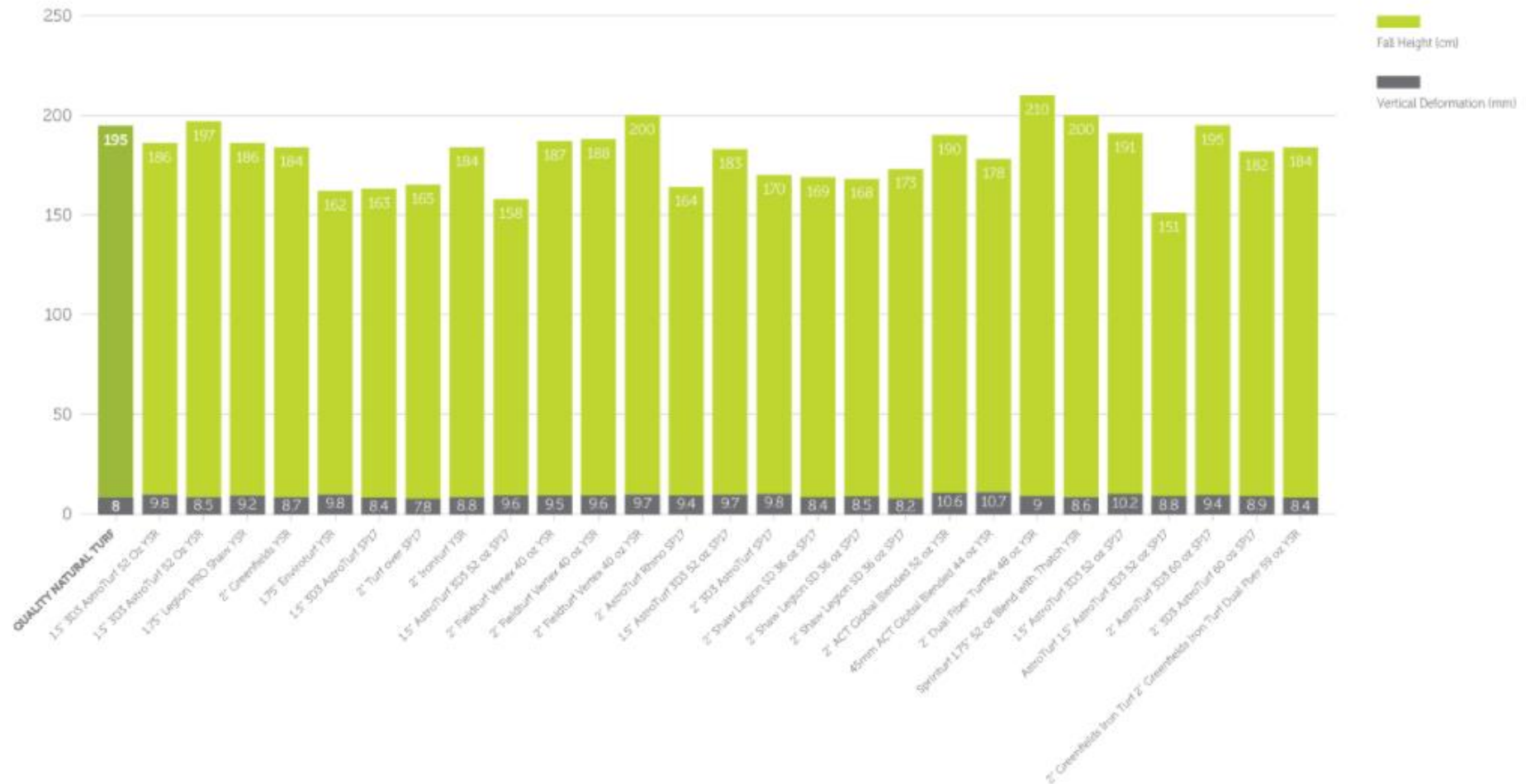
AVERAGE FOR 32 BROCKFILL FIELDS WITH PBYSR PADS



Organic Infill (Wood)

Average Critical Fall Height and Vertical Deformation

One Turf Concept Test Method - Independent Testing Conducted by Sports Labs



Organic Infill (Wood)

Average GMax and Vertical Deformation

One Turf Concept Test Method - Independent Testing Conducted by Sports Labs

