



Alternative Infills for Synthetic Turf Fields

SRAPPA 2020

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Overview

**Natural Grass
Overview**

Alternative Infills

**History of Synthetic
Turf**

Typical Costs

**Synthetic Turf Field
Construction**



Why Not Just Use Natural Grass?

Benefits of Natural Grass

- A pristine natural field is an ideal surface for playability and impact reduction
- Can reduce surface runoff through infiltration and evapotranspiration
- Surface temperatures of natural grass are cooler than synthetic turf

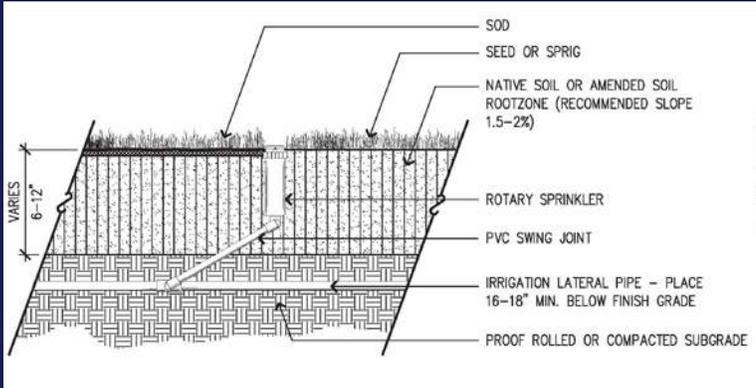


Limitations of Natural Grass

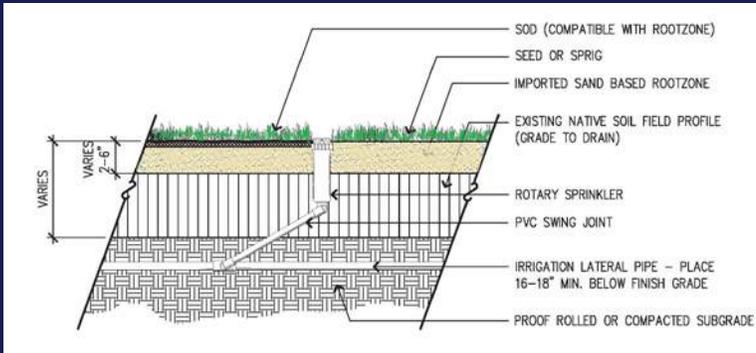
- Overuse can lead to compaction and bare spots
- Precipitation can lead to overly saturated soils or standing water; the fields could become permanently damaged if played on when saturated
- Irrigation is essential
- Rigorous maintenance program is required to promote player safety and protect the turf & root systems
- Maintenance is labor and equipment intensive and expensive



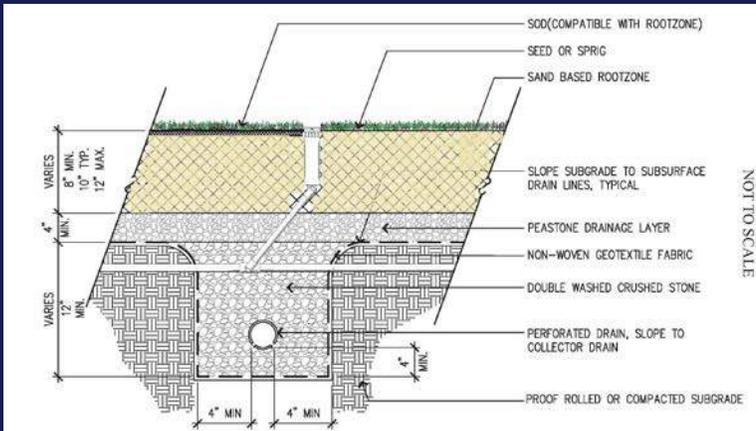
Natural Grass Systems



Natural with Native or Amended Soils



Sand Cap over Native Soil



Sand-based Rootzone

Grass Species are selected based on hardiness zones





Is Synthetic Turf Right for Your Field?

Benefits of Synthetic Turf

- Immediate availability
- Requires lower maintenance than natural turf
- No mowing, aeration, pesticides, fertilizer, herbicides required
- Can be plowed in snowy conditions
- Have near all-weather availability for play
- Field lines and markings can be permanently inlaid
- With athletic lighting, can sustain continual use

Limitations of Synthetic Turf

- Higher initial installation costs
- Higher surface temperature
- Can be more abrasive depending on infill selection





History of Synthetic Turf

First Generation

- Was first introduced in 1960s
- The first installation to become known nationally was at the Astro Dome in Houston



First Generation

- Very short pile knitted nylon or polypropylene fibers
- Installed over a hard surface
- Very firm and abrasive



Second Generation

- Longer pile height extruded monofilament or slit film polypropylene fibers
- Infilled with sand to more closely mimic natural grass.
- Tended to harden over time



Third Generation

- Developed in early 1990s
- Longer pile height extruded monofilament or slit film polypropylene fibers
- Infilled with a variety of infills to include crumb rubber & sand (and other alternatives)
- Can be underlaid with a shock absorbing pad for improved safety and enhanced playability



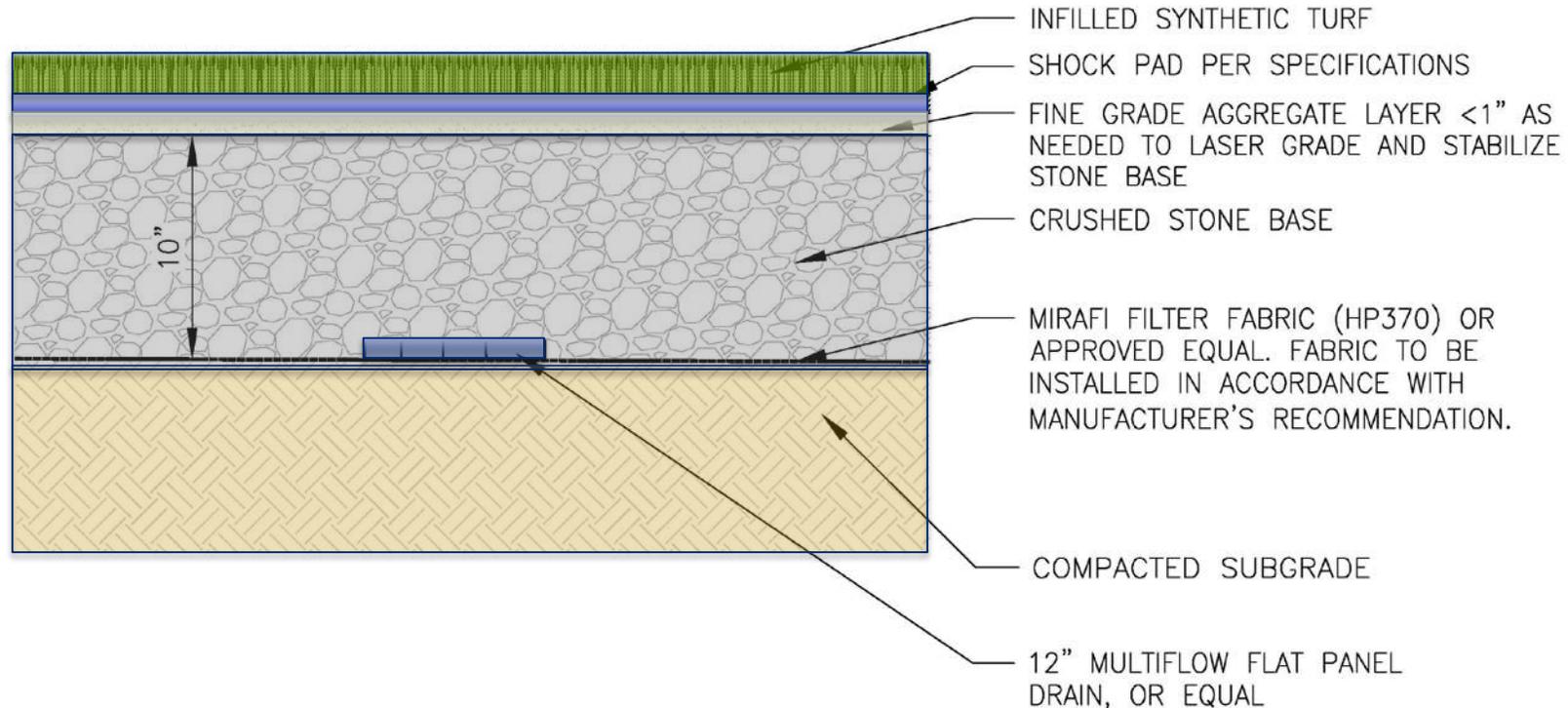


Synthetic Turf Field Construction / Renovation

No Cookie Cutter Designs



New Construction: Typical Field Cross-Section



SYNTHETIC TURF SECTION & FIELD UNDER DRAIN DETAIL

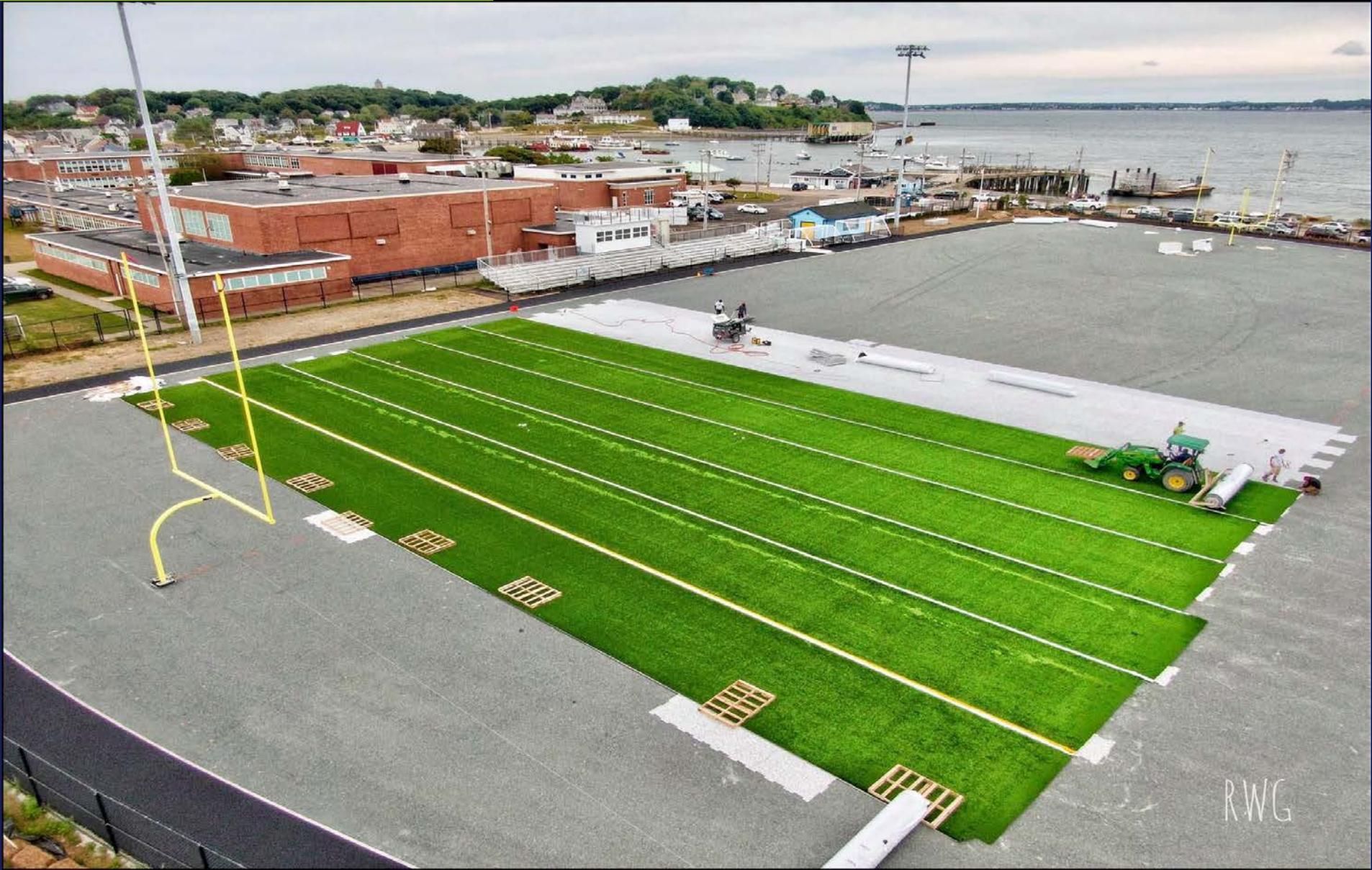
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N.T.S.

New Construction: Typical Field Plan View



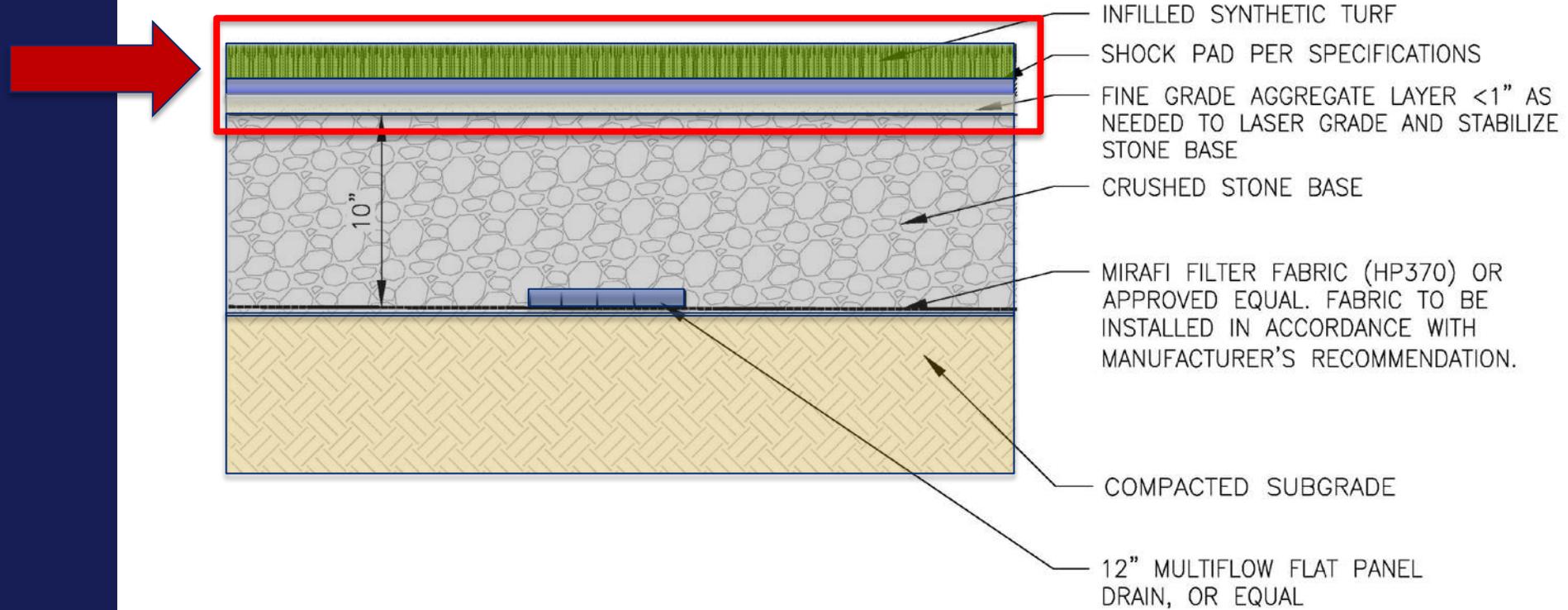
New Construction: Installation Process



New Construction: Completed Field



Renovation: Typical Area of Renovation



SYNTHETIC TURF SECTION & FIELD UNDER DRAIN DETAIL

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N.T.S.

Renovation: Turf Removal



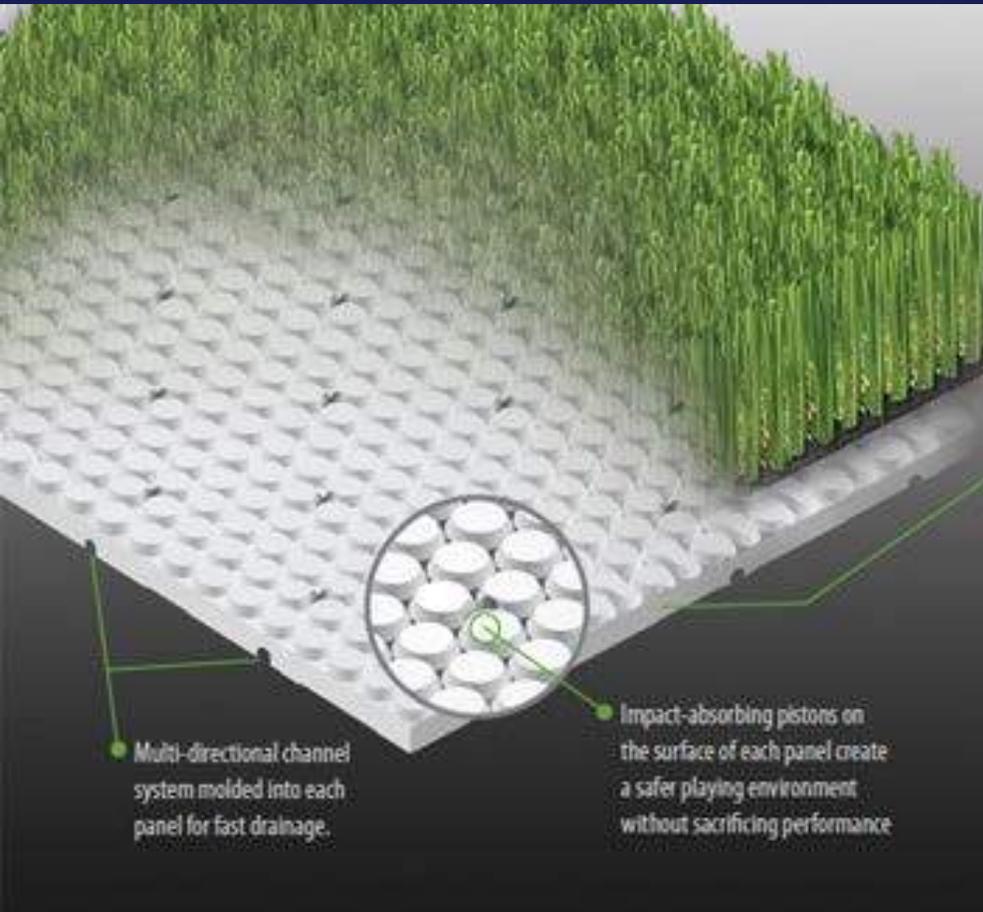
Drainage Testing: Dual Ring Infiltrometer



Renovation: Surface stone preparation



Shock Pad: Reduces concussions; firmer feel with softer results



Shock Pad: Installation Process



Shock Pad: Installation Process



Gmax

- The ratio of the maximum acceleration /deceleration experienced during an impact, to the normal rate of acceleration due to gravity
- Blunt impact (body impact – lower extremities)
- ASTM F355 / F1936
- ASTM Max allowed = 200
STC Max Recommendation = 165

Gale Spec:

- Initial reading 85 to 130
- Never above 160 for life of system



HIC – Head Injury (Concussion) Criterion

- HIC is a measure of the likelihood of head injury arising from an impact
- EN 1177 is basis for HIC procedure
- ASTM max allowed = 1000 at 1.3 meters (pending)
- World Rugby and FIFA have adopted the “One Turf Concept” methods which stipulate 1000 at 1.3 meters

Gale Recommendation:

- 1000 at 1.3 (minimum) initial and life





Why Consider Alternate Infills?

- **Heat impact**
- **Due to potential for opposition, or other perceived health/safety concerns, some owners may not want to use standard crumb rubber and sand infill**
- **Market competition and consumer choices**



- Infill Flyout





Alternative Infills

Organic/Natural

**Thermo Plastic
Elastomer (TPE)**

Virgin EPDM Rubber

Coated Sand

Organic/Natural Infill



Cork



Corkonut (cork and coconut husk)

Organic/Natural Infill



Walnut shells



Engineered Wood

Pros: Organic/Natural Infill

- Manufactured from naturally occurring materials
- Organic colors and texture closely imitate a natural grass field
- Can be used for soil amendments at end of life
- Cooler than SBR infilled fields

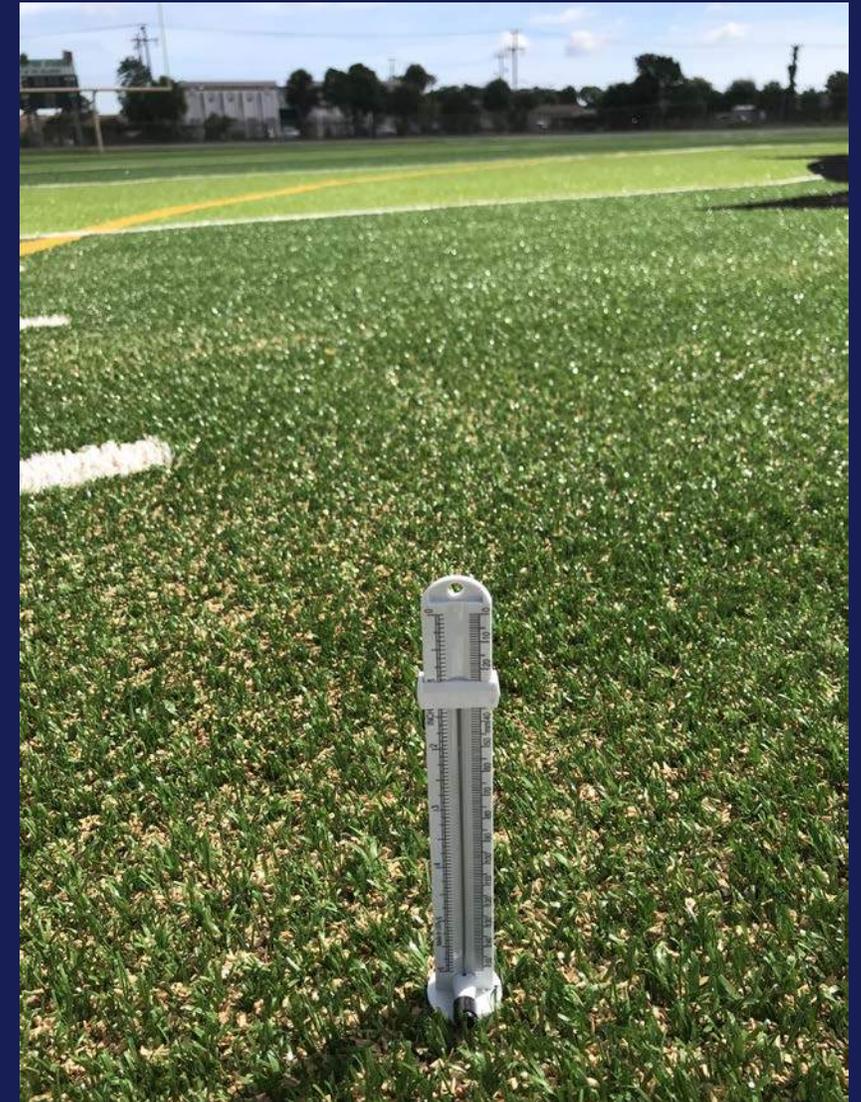


Cons: Organic/ Natural Infill

- May require replenishing and watering
- Possibility of freezing because of material's ability to hold moisture (corkonut)
- Can add approximately \$150,000



Installation Process: Organic/Natural Infill





Recent Projects



Tantasqua Regional High School, Fiskdale, MA

Converted the existing natural turf stadium and soccer fields to synthetic turf (corkonut)



2019 ASBA Distinguished Single-Field Facility Award

The Wheeler School, Seekonk, MA

Converted the existing natural grass soccer field into a synthetic turf field with athletic lighting and a new scoreboard. This field is the first in New England and second in the United States to install the “Safeshell” infill system, which consists of sand and crushed walnut shells.



Melbourne High School, Melbourne, FL

Designed a new synthetic turf field with wood infill; held up against Hurricane Dorian with no issues.

Virgin EPDM Rubber Infill



Pros: Virgin EPDM Rubber Infill

- Its properties, traction and resilience qualities, maintenance, and manufacturing process is the same or similar to SBR
- Available in various colors, which can reduce the heat effect of synthetic fields



Cons: Virgin EPDM Rubber Infill

- Can add approximately \$150,000 to initial costs
- Availability of EPDM materials can be limited in some locations in the United States





Recent Projects



Alumni and Jet Fields, Littleton, MA

Designed the complete renovation of Alumni Field and Jet Field utilizing a dual surface approach by implementing synthetic turf (with Virgin EPDM Rubber infill) on the multipurpose field and irrigated natural grass on the softball field

Thermo Plastic Elastomer (TPE) Infill



Pros: Thermo Plastic Elastomer Infill

- Harder than rubber but its rounded shape gives it resilient properties and softer feel
- Commonly used in various industries, frequently used in medical devices, children's toys, and household items
- Can be reused for multiple turf replacements.
- Used TPE can be melted down and recycled into new products



Cons: Thermo Plastic Elastomer Infill

- Poor quality TPE can be at risk of clumping or melting together over time
- Can add approximately \$100,000 - \$200,000 to initial costs





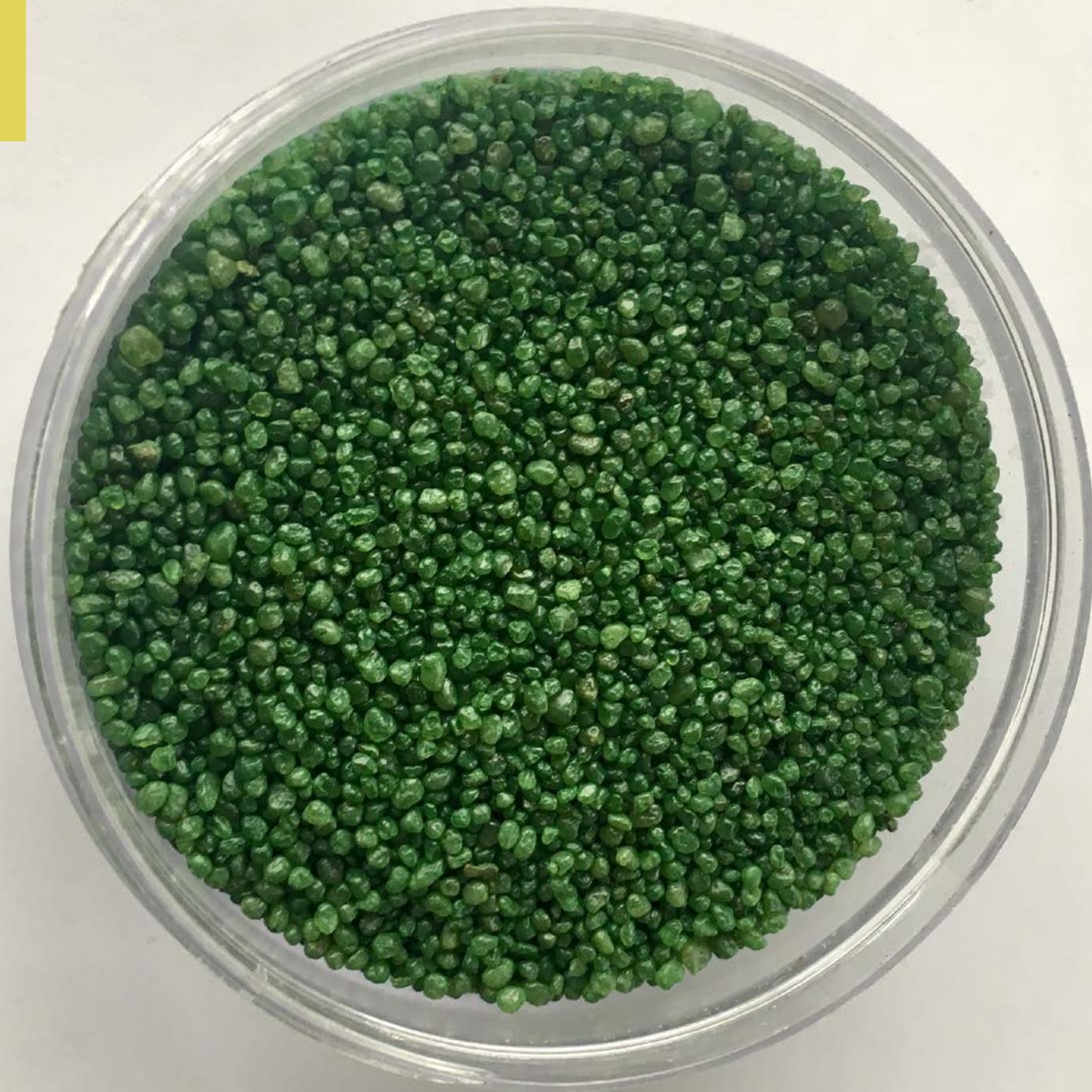
Recent Projects



Wellesley High School, Wellesley, MA

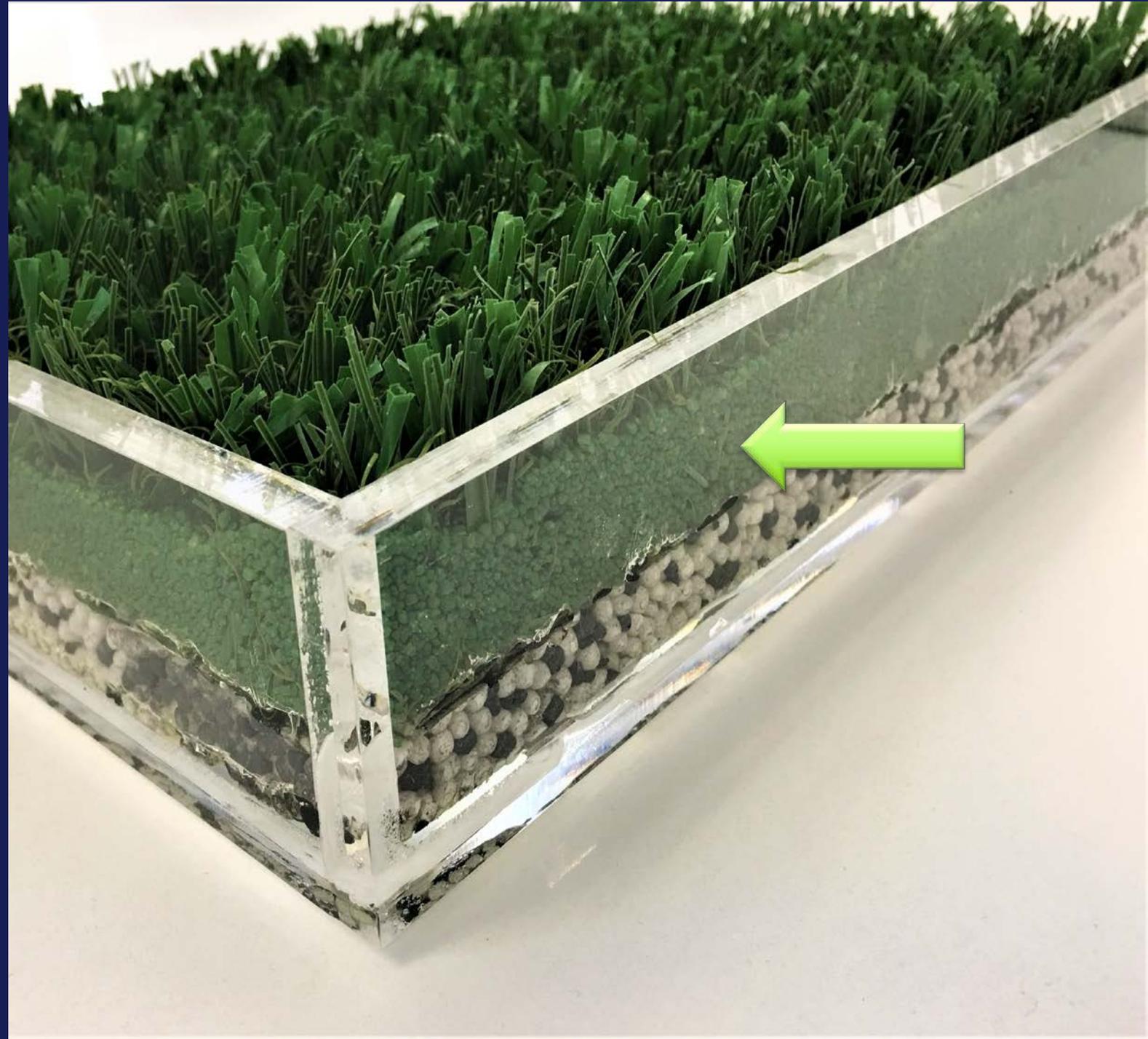
Designed a new multi-purpose Thermo Plastic Elastomer Infilled synthetic turf, as well as a Brock shock pad to enhance player safety and shock attenuation, a waterborne structural spray on the track, permeable surfaces, and sustainable plantings.

Coated Sand



Pros: Coated Sand

- Durable
- Reduced fly-out and migration of infill
- Firm surface, preferred for soccer, lacrosse, field hockey



Cons: Coated Sand

- Poor-quality coatings can degrade overtime
- Considered one of the most abrasive of infill options
- Can add approximately \$150,000 - 200,000 to initial costs



Installation Process: Coated Sand



Installation Process: Coated Sand





Recent Projects



Indian Creek School, Crownsville, MD

Installation of two new synthetic turf fields, with Envirofill (coated sand) infill, to replace the existing natural grass fields



2019 ASBA Distinguished Multi-Field Facility Award

Hopkinton High School/Middle School, Hopkinton, MA

Converted an existing natural grass field to a synthetic turf multipurpose playing field with Envirofill (coated sand) infill.



Maintenance and Costs

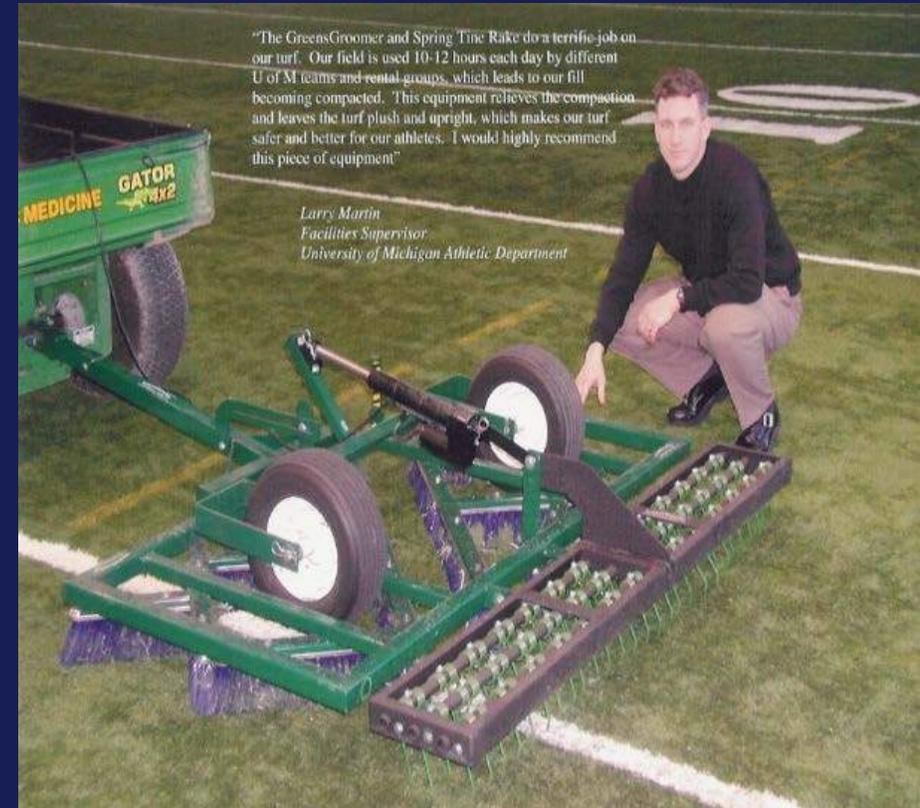
Are there maintenance savings associated with synthetic turf?

YES: Maintenance costs decrease by \$23,500/year and the number of uses increases by 300%

Natural Turf Field Maintenance Cost (labor, material, depreciation):

| | |
|--------------------------------------|----------------|
| ■ Mowing, 30 cuttings | \$4,500 |
| ■ Watering – ½-1 in./week @ 20 weeks | \$4,000 |
| ■ Irrigation Winterize/De-winterize | \$3,000 |
| ■ Fertilizer x 3, lime, pesticides | \$5,000 |
| ■ Aeration, topdressing, overseeding | \$5,000 |
| ■ Line markings (weekly @ 24 weeks) | <u>\$3,500</u> |
| | \$25,000/year |

The infilled synthetic turf field is groomed with a towed groomer provided with the field, approximately 6 times/year: \$1,500 / year



Approximate Costs: Construct a Synthetic Turf Field

Assume: Standard Installation by Industry Leader
Formal Under-drainage
Standard curb

Cost: \$850,000

Alternative Infill: \$300,000

No loss of use

Yearly Maintenance: \$1,500

Renovation: Assume replace carpet at year 13

Thank you!

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