



Athletic Campus Renovations Hull High School

School Board Meeting

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Project Engineer
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Overview of Project Scope & Bid Results



Common Synthetic Turf Health Concerns



Alternative Infill



Natural Grass Fields

Project Scope

Proposed Athletic Field

- Synthetic turf baseball/softball and multipurpose field
 - 2.25" pile height, crumb rubber, shockpad
 - Five sports lines inlaid
- MUSCO Athletic Lighting with LED fixtures
- Three lane walking track with rubberized surface
- Scoreboard with LED digits and ad panels



Bid Results

Contractor (Address, Phone number, email)	Acknowledge Addendum No. 1 , 2	Base Bid Amount	Alternate No.1	Alternate No.2	Alternate No.3
WES CONSTRUCTION CORP.	✓	\$2,592,000.00	\$50,000	\$25,000	\$90,000
HEIMLICH LANDSCAPING & CONSTRUCTION CORP.	✓	\$1,819,000.00	\$34,000	\$63,000	\$61,000
GREEN ACRES LANDSCAPING & CONSTRUCTION CO. INC.	✓	\$1,814,680.00	\$28,378	\$58,320	\$59,593
RAD SPORTS, INC.	✓	\$1,869,000.00	\$12,000	\$64,000	\$64,000
ARGUS CONSTRUCTION	✓	\$1,990,000.00	\$32,000	\$65,000	\$60,000
FIELD TURF	✓	\$2,265,526.00	\$31,755	\$63,969	\$63,641

Gale Associates, Inc. Projects With Green Acres



The Wheeler School, Seekonk, Massachusetts

- Hopkinton High School, Hopkinton, MA
- Norwell Little League Fields, Norwell, MA
- Portsmouth High School, Portsmouth, RI
- Attleboro High School, Attleboro, MA



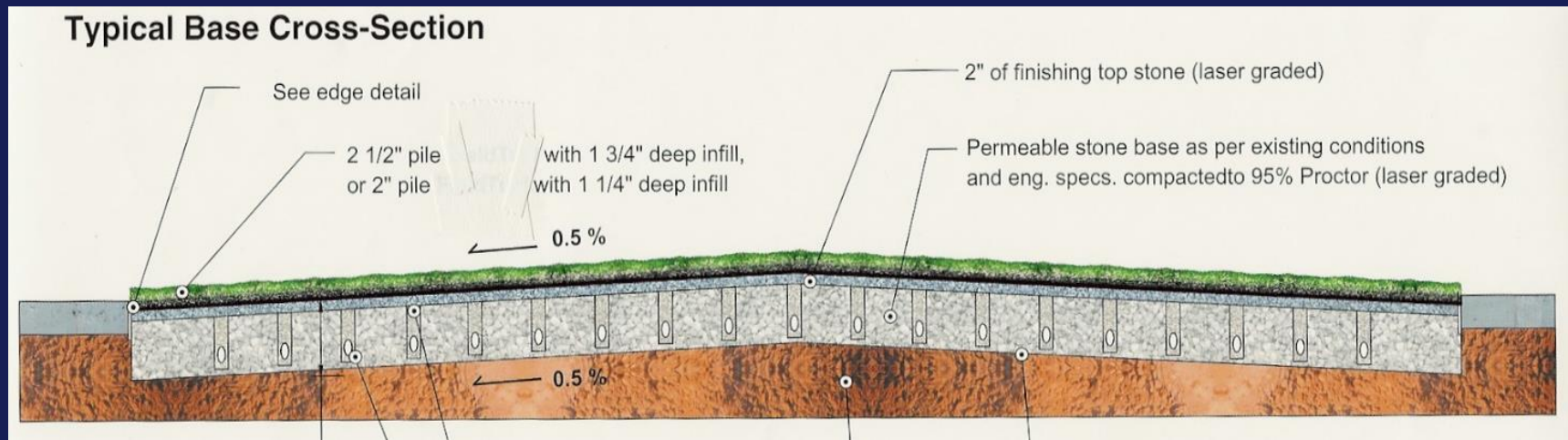
Littleton High School, Littleton, Massachusetts

- Brewster Academy, Wolfeboro, NH
- Bishop Feehan High School, Attleboro, MA
- Stellos Stadium, Nashua, NH
- East Longmeadow High School, East Longmeadow, MA
- Shepherd Hill Regional High School, Dudley, MA

How will the field be constructed?

- Top soil is removed to a depth of about 12 inches
- A concrete anchor curb is constructed around the field perimeter – in this case, existing to be modified.
- Filter fabric installed on sub grade.
- Drainage pipe is installed every 20-30 feet
- A free-draining stone base is installed and laser graded
- A slope of 0.5% is maintained and crowned from center
- Shock pad is installed
- The carpet is installed on top of the stone
- The carpet is “infilled” with sand & crumb rubber

The Hull High School field is designed to infiltrate the 100 Year storm event. = No runoff.



Synthetic Turf Evolving Technology



Turf on base stone

Turf on shock pad



EPDM



Envirofill



Safe Shell



Cork / Coconut



BROCKFILL
THE ENGINEERED INFILL FOR ATHLETES



TPE

Alternative Infill Costs



Type of Alternative Infill	Approximate Cost
Crumb Rubber	\$0 (baseline)
Silica Sand	+\$0 net for additional sand
Organic	+\$130,000
Coated Crumb Rubber	+\$125,000
EPDM Rubber	+ \$250,000
TPE	+250,000
Envirofill	+250,000
Nike Grind	+\$130,000
Brock Fill	+\$27,000
Safeshell	+\$150,000



Are there health or environmental risks with crumb rubber infilled turf?

California Office of Environmental Health Hazard Assessment 2010: Conducted a study on VOCs and metals in the air above crumb rubber turf fields. Results suggested that **adverse health effects were unlikely to occur from the inhalation of VOCs or metals in particulates above the fields.**

Connecticut Department of Public Health, 2011: Conducted air sampling at four outdoor artificial turf fields with crumb rubber infills under summer conditions. They concluded that **exposure opportunities to turf contaminants were not associated with elevated health risks.**

Rutgers Robert Wood Johnson Medical School, New Jersey, 2014: Conducted and evaluated exposure opportunities through simulated body fluids that represented different routes of exposure. This study aimed to provide a better measure of the actual amount of these contaminants that might be absorbed into the body after exposure. Researchers found that **PAHs were routinely below the limit of detection and SVOCs were at levels too low to quantify, thus not posing a health risk.**

Are there health or environmental risks with crumb rubber infilled turf?

MA Department of Public Health, Needham, 2011 & 2013: The town of Needham contracted with an environmental testing firm to conduct tests including air measurements of VOC's and heavy metals. Their review and conclusions for the testing **did not indicate exposures of health concern.**

Teter Engineering, 2015: Two crumb rubber infill samples were analyzed for total metals, total SVOC's/PAH's, leachable metals and leachable SVOCs, PAHs. The concentrations of metals detected in the samples fall below the California soil screening levels (CHHSLs) for unrestricted land use, which are highly conservative for a recreational use scenario. **The cancer risk from exposure during a recreational use scenario falls below the EPA risk level.** The concentrations of dissolved zinc and phenol were below levels required to affect the taste of drinking water.

Haley & Aldrich, 2015: Four years quarterly monitoring at the Fenn School confirms that **there is no credible evidence to suggest that either new or weathering synthetic turf results in metals and organic compounds in the groundwater at concentrations above the safe drinking water standard.**

Turf Safety – Gale Specifications

The Synthetic Turf Supplier/Installer must provide a written statement that their product is lead free prior to installation. (The Federal requirement for lead in paint and similar surface coatings of a not to exceed limit 90 ppm, to be classified as “lead free”).

Are there environmental advantages with infilled turf versus natural grass?

- Provide water savings of 160,000 gallons per year
- No application of pesticides
- No application of fertilizer
(reduced nitrogen & phosphorous)
- No pH adjustment
- Improved groundwater recharge
- No mowing, striping, aeration machines, etc.



Other Natural Turf Considerations

- Typically overused and overscheduled.
- A typical natural turf field, with athletic lighting can only be used approximately 250 times per year without severe degradation
- Maintenance costs \$35-40,000 per year
- A natural turf field requires 'turf establishment' which is 1-2 years after completion
- Application of pesticides and fertilizers in order to maintain a sufficient stand of turf.



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)
- 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 Criterion

- The Head Injury Criterion (HIC) is a measure of the likelihood of head injury arising from an impact. Head Impact (Concussions)
- ASTM F1292
- ASTM Max allowed = 1000 at 1.3 meters (Pending)
- World Rugby and FIFA 1000 at 1.3 meter
- Old World Rugby and FIFA 1000 at 1.0 meters

Gale Recommendation:

- 1000 at 1.3 initial and life



Turf System, 2.25" pile height over Brock SP14

SHOCKPAD SERIES BY BROCK	ASTM F355-A Gmax	Deltec Vertical Def. (mm)	EN14808 Force Reduction %	Deltec Field Tester - Energy Restitution %	Critical Fall Height Average Drop 2&3(m)
SP14 (Pad Only)	145	5.0	55%	32%	0.5
SP17 (Pad Only)	112	5.5	63%	30%	0.6
SP20 (Pad Only)	101	5.6	64%	31%	0.9
1.25" Turf with 1.5lbs Zeofill per sq inch.- SP14	117	7.3	61%	31%	1.3
2" Turf with 65% Sand 35% Rubber- SP14	97	7.9	67%	23%	1.4
2" Turf with 73% Sand 27% Organic infill- SP14	103	6.4	60%	21%	1.4
1.25" Turf with 1.5lbs Zeofill per sq inch.- SP17	98	7.2	64%	31%	1.3
2" Turf with 65% Sand 35% Rubber- SP17	89	8.8	64%	37%	1.5
2" Turf with 73% Sand 27% Organic infill- SP17	96	8.6	64%	28%	1.5
1.25" Turf with 1.5lbs Zeofill per sq inch.- SP20	92	7.5	65%	32%	1.4
2" Turf with 65% Sand 35% Rubber- SP20	87	8.8	62%	35%	1.6
2" Turf with 73% Sand 27% Organic infill- SP20	91	7.9	62%	28%	1.6

Injury rates of play on synthetic turf vs. natural grass

(Compares synthetic turf to ideal natural grass field)

2010 long term study by researchers in Norway and Sweden compared knee injury, ankle sprains, muscle strains, concussions, MCL tears and fractures.

Result: Injury risk of playing on artificial turf is no greater than playing on natural grass.

NCAA study: Injury rate on natural turf = 4.4%
Injury rate on synthetic turf = 3.5%

Foot and Ankle Service, Hospital for Special Surgery, New York, NY, USA – Taylor et. al.

- Shoe-surface interface plays a significant roll in injury results.
- NFL players may sustain a higher injury rate on synthetic turf
- Lower-level athletes may sustain a lower injury rate on synthetic turf.

Additional Information from Penn State

<http://plantscience.psu.edu/research/centers/ssrc/research/synthetic-turf-injuries>



GMAX Testing, ASTM 355-95

Staph Infection Risk In Synthetic Turf

Penn State Conclusions

Staph survives on both natural grass and synthetic turf indoors
multiple days

Commercially available anti microbial treatments significantly
decrease survival rate

Outdoor survival rate much lower (temp/UV)

Survival rate on natural grass comparable to synthetic turf outdoors

*Survival of Staphylococcus on Synthetic Turf,
Andrew S. McNitt, The Pennsylvania State University,
Diane Petrunak, The Pennsylvania State University*



How Long Will the Carpet Last? How Durable Is the Turf?

Today's infilled carpets expected to last 12-14 years

UMASS Lowell (the oldest infilled field in New England) used a less durable technology carpet and still lasted 11 years of constant use

UMASS Lowell Users:

- Football (2 Seasons)
- Field Hockey – Varsity & JV
- Soccer – Men & Women
- Lacrosse – Men & Women
- Intramurals
- Club Sports
- Community/Youth Sports
- Summer Camps/Clinics
- Baseball
- Softball

Actual Use Statistics:

- 7 Hours/Day (Mon.-Fri.)
- 12 Hours/Day (Sat.-Sun.)
- 30 weeks per year (May-Nov.)
- 1800 direct use hours per year
- **720 events/year @ 2.5 Hours/Event**
- 18,000 hours over the 10-year life
- **A well cared for Natural Grass field cannot maintain more than 250 +/- uses.**



UMASS Lowell - 1999



Questions?

CELEBRATING 50 YEARS
GALE

www.galeassociates.org