

Shrewsbury High School Athletic Campus Improvement Plans:

Part II

Kathy Hervol, Gale Associates
Peter Spanos, Gale Associates

Patrick Collins, Assistant Superintendent for Finance and Operations

Jason Costa, Athletic Director

Angela Snell, Director of Parks, Recreation, and Cemetery

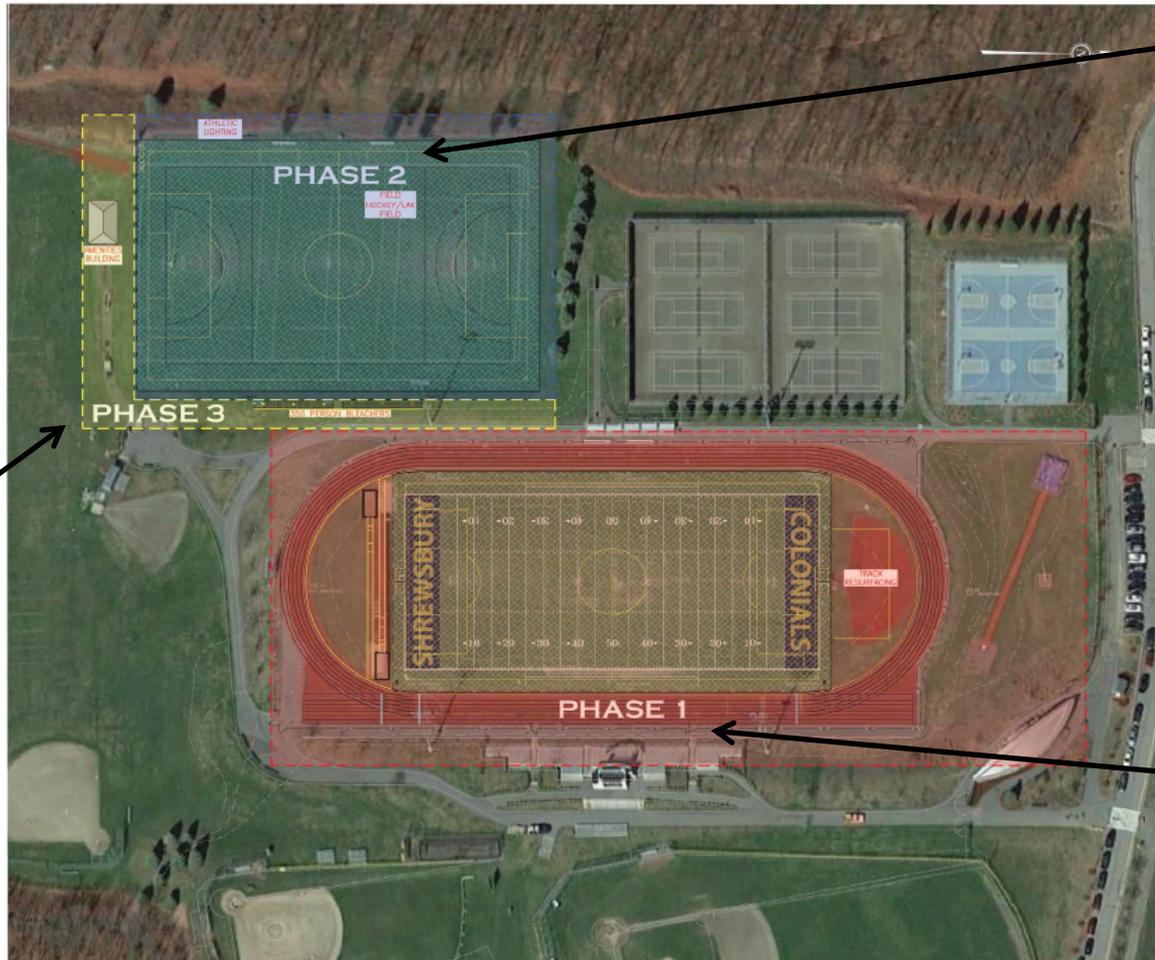
Michelle Biscotti and Kathleen Keohane, Coordinators of Development & Volunteer Activities



Topics

- Project Origins and Status Update
- Rationale for Improvements
- Benefits of Having a Turf Field
- Construction Process Overview
- Maintenance & Total Cost of Ownership Comparisons
- Player Safety/Injury Rates
- Health & Environmental Considerations
- Scope of Work Project Budget
- Funding Plan
- Project Timeline
- Procurement Process
- Action Required to Begin Process

Vision for the Future



Second, multi-sport turf field with lights.

Multi-sport stadium turf and re-surface track with new D areas

New seating and amenities/storage building

Project Origins and Status Update

- Need for athletic field improvements was identified several years ago and part of District Goals
- SHS Boosters Club funded an athletic campus master plan study [completed June 2015]
- School committee authorized use of up to \$65,000 from the Facility Rental Fund to procure a design and project management company for synthetic turf on stadium field. [June 2016]
- Gale Associates was hired due to their extensive experience in developing athletic field complexes all along the East Coast [June 2016]



Rationale for Improvements

- Current condition of grass fields
 - Rutted, uneven, bare spots, hard-pack, poor/blocked drainage
- Inability to play at home in bad weather
 - Both during and after rain/snow
 - Bus costs incurred to play on turf elsewhere
- Cannot properly maintain grass given athletic schedules and demand for field use
- Teams need more field play time

Current SHS Field Conditions



*Worn areas of lacrosse field.
Mid season-October 2016.*

Current SHS Field Conditions



View of stadium significantly worn and rutted mid-field. -Oct. 2016

Current SHS Field Conditions



*Large, long bare spot on stadium field sideline.
Part of soccer field of play- Oct. 2016*

Benefits of Having A Turf Field

- Better playing conditions for multiple high school sports teams
 - A turf stadium field would be used by soccer, lacrosse, football, field hockey, track, cross country
- All students benefit via use during Physical Education class
- Extended use of fields due to “all weather” playability of turf fields
 - Allows for earlier start to practice seasons
 - Eliminates moving/re-scheduling of games due to rain
 - Allows SHS to host playoff games

Benefits of Having A Turf Field

- Turf allows for community use of fields
 - Not allowed today because of need to preserve grass fields for SHS teams
 - Youth sport programs for soccer, lacrosse & football could host games and jamborees
- Reduced maintenance: labor, water, fertilizer/seed, field paint
- Potential revenue generator
 - Other districts report revenue from turf field rentals to club teams, other districts, etc.

Potential Community Use Rentals

Day of Week	Fall	Winter	Spring	Summer
Mon-Fri*	NA	NA	6-9pm	3-9pm
Saturday*	2-9pm	NA	3-9pm	3-9pm
Sunday*	8am-9pm	NA	8am-9pm	3-9pm

**Shrewsbury High School programs and athletics will have first priority.*

This is an initial, pro-forma availability schedule which is subject to change.

Use fees are TBD and will include all direct and indirect costs.

Turf In Other Districts

- Mid-Wachusett League turf stadiums
 - Wachusett Regional
 - Leominster
 - Shepherd Hill
 - Nashoba Regional
 - Westborough
 - Lunenburg
 - Oakmont
 - Tyngsborough
 - Marlborough (fall 2016)
 - Groton Dunstable (2017)

Turf In Other Districts



(Clockwise, L to R) Leominster, Wachusett, Nashoba



SYNTHETIC TURF FIELD CONSTRUCTION

- Top soil is removed to a depth of about 12 inches
- A concrete anchor curb is constructed around the field perimeter
- 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 across the field
- The carpet is installed on top of the stone
- Field lines and markings are permanently installed
- The carpet is “infilled” with a ballast product



Why Install Synthetic Turf Multi-Purpose Game Field?

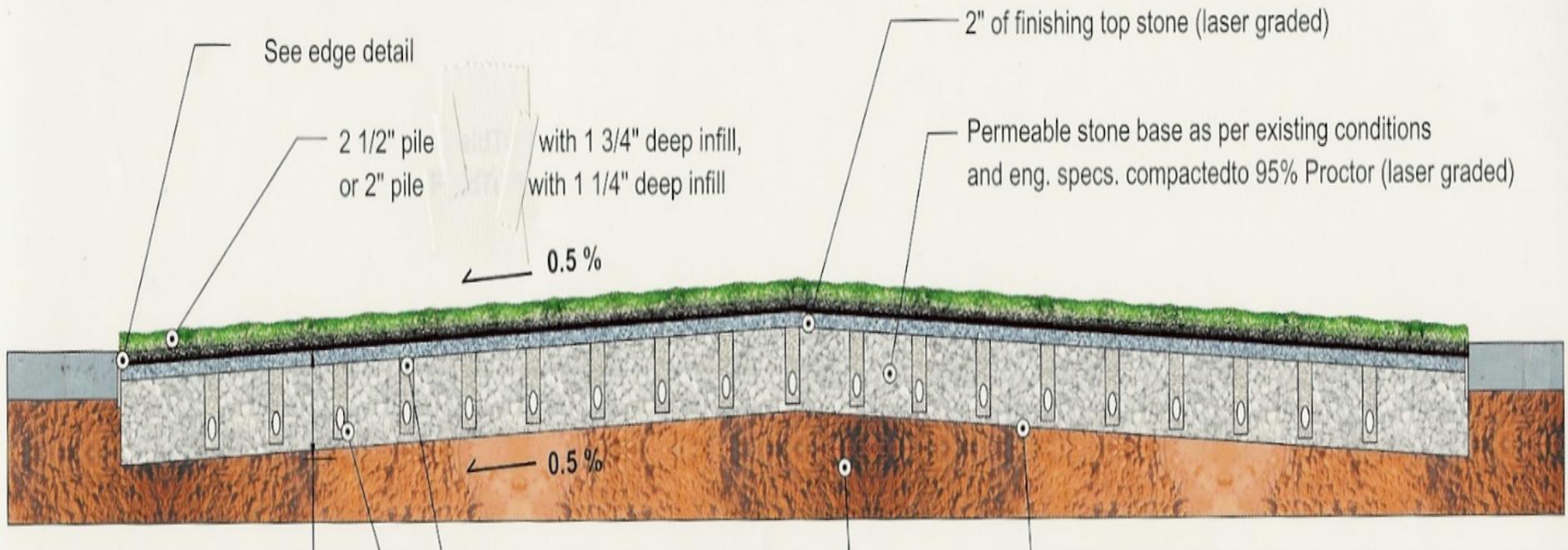
“Filled” Synthetic Turf Advantages:

- Dramatically increased use (2-3 X)
- Very low maintenance
- Grass-like look and performance
- All-weather availability
- Environmentally sensitive
- Permanent lines and markings
- Enhanced player safety
- Image/Branding
- Immediate availability after construction



The Layers: A Cross Section

Typical Base Cross-Section



Turf Attachment

Typical Edging Detail - Standard Curb

surface (3M" pile exposed above infill)

Concrete curb (supplied by others)

nailed to 2"x4" treated lumber or
recycled plastic nailer board

2' of finishing top stone (laser graded)

Steel rebar

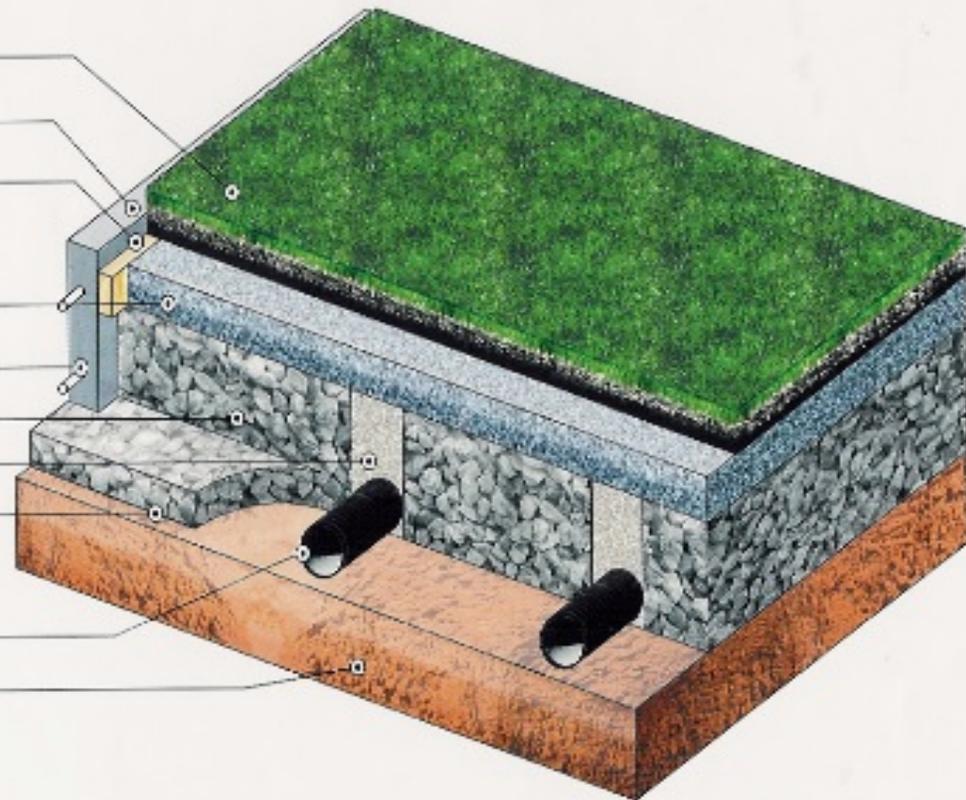
Permeable crushed stone

3' trench filled with pea gravel

Geotextile if required

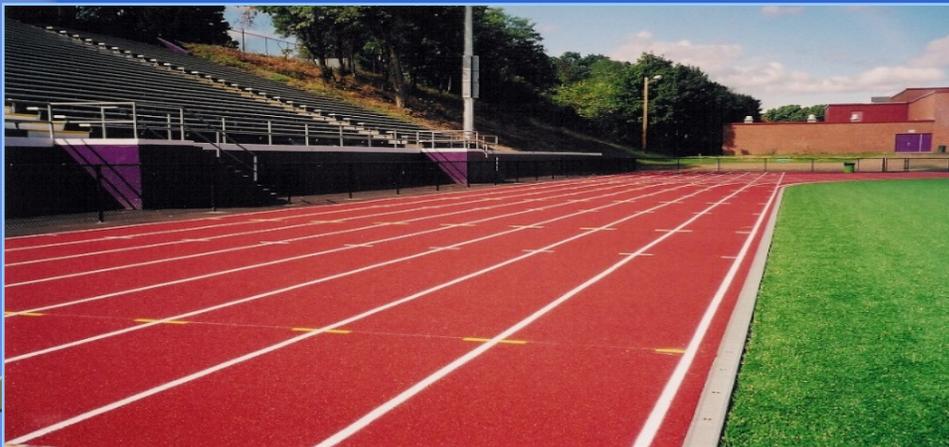
2" NMP drain at 5ft to 10ft o/c

Natural soil bed



Drainage Construction

- Rated at 16 inches/hour min.
- Where does it go?



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

- Today's infilled carpets expected to last 10-14 years
- UMASS Lowell (the oldest infilled field in New England) used a less durable technology carpet and still lasted 11 seasons 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 300 uses.***



UMASS Lowell - 1999

Does an infilled turf field extend the playing season? Is it truly an all-weather surface?

Dartmouth College – Lacrosse Field:

- Designed to drain over 16 in./hr
- The field may be plowed



Snow Removal Operations



Early March



Same field, next day

Are there maintenance savings associated with the new field?

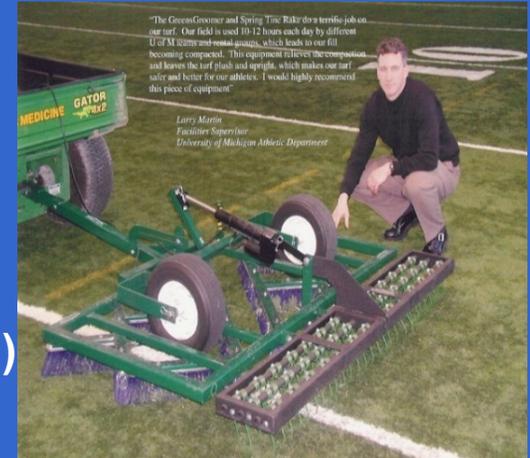
YES: Maintenance costs decrease by an estimated \$30,000/year and the number of uses increases by 300% on a national level for highly-maintained natural grass fields

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

▪ Mowing, 30 cuttings	\$5,500
▪ Watering – ½-1 in./week @ 20 weeks	\$5,000
▪ Irrigation Winterize/De-winterize	\$4,000
▪ Fertilizer x 3, lime, pesticides	\$6,000
▪ Aeration, topdressing, overseeding	\$6,000
▪ Line markings (weekly @ 24 weeks)	\$4,500
	\$31,000/year

-The infilled synthetic turf field is groomed with a towed groomer provided with the field, approximately 4-5 Times/Year: **\$1,000 / Year**

-Additional costs would include temporary line painting for lacrosse and field hockey.



Maintenance Cost Comparison

Annual Maintenance Costs

Natural Grass FIELDTurf

Mowing Equipment	\$7,068.00	-
Labor Cost (\$20/Hour)	\$6,000.00	\$1,000.00
Clipping Removal	\$2,861.00	-
Fertilization	\$4,856.00	-
Overseeding	\$466.00	-
Coring	\$2,848.00	-
Topdressing	\$9,565.00	-
Thatch Removal	\$185.00	-
Monitor Irrigation	\$846.00	-
Equipment Depreciation and Fuel	\$3,500.00	\$1,500.00
<u>Water Cost</u>	\$5,400.00	-
Sub Total	43,595.00	2,500.00
<i>Re-Striping Field Lines:</i>	\$5,800.00	\$1,000.00
Labor	<u>\$3,105.00</u>	<u>\$1,500.00</u>
Material		
Total	\$52,500.00	\$5,000.00

Maintenance of FieldTurf

The cost of maintaining FieldTurf is minimal. The primary maintenance item is removing leaves and other debris which may stray onto the field. Removal is accomplished by a tractor-pulled vacuum system. These tractors do not remove the fill material. FieldTurf also recommends brushing the field (every 4-6 weeks depending on use) to redistribute infill material that may have migrated.



Source: FieldTurf Report to Wellesley Public Schools

Maintenance Cost Budget- Shrewsbury

- We do not expect the Parks and Recreation budget to be decreased with installation of a turf field
- Rather, existing staff and supply budgets will be re-deployed from S.H.S. field maintenance tasks to better maintain remaining fields more in line with industry maintenance standards
- Installing a turf field at S.H.S. will enhance the condition of all fields over time

Long-term Cost Comparison

EXHIBIT 1

NATURAL GRASS/ SYNTHETIC TURF INFILL COST SUMMARY

YR	SUMMARY OF TURF SYSTEM COST AND TIMING OVER 24 YEARS	Greenplay		FieldTurf	US Greentech	Sprinturf	FieldTurf	Natural Turf Grass
		Crumb Rubber Infill	Organic Infill	PureFill (Cork)	Envirofill (acrylic coated sand)	TPE/ EPDM	EcoGreen (TPE)	
1	Initial Construction	\$ 1,100,000	\$ 1,136,384	\$ 1,276,384	\$ 1,223,584	\$ 1,427,024	\$ 1,298,784	\$ 90,000
6	Infill Replacement	\$ -	\$ 144,200	\$ 144,200	\$ -	\$ -	\$ -	\$ -
8	Maintenance YR 1-8	\$ -	\$ 112,522	\$ 33,600	\$ -	\$ -	\$ -	\$ 530,240
12	Maintenance YR 9-12	\$ -	\$ 46,340	\$ 16,800	\$ -	\$ -	\$ -	\$ 198,840
12	Carpet Replacement	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ -
12	Infill Replacement	\$ 121,691	\$ 144,200	\$ 144,200	\$ 168,400	\$ 448,616	\$ 243,600	\$ -
13	Grass Resod YR 4,7,10,13	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 360,000
18	Maintenance 12-20	\$ -	\$ 112,522	\$ 33,600	\$ -	\$ -	\$ -	\$ 530,240
18	Infill Replacement	\$ -	\$ 144,200	\$ 144,200	\$ -	\$ -	\$ -	\$ -
24	Maintenance 20-24	\$ -	\$ 46,340	\$ 16,800	\$ -	\$ -	\$ -	\$ 198,840
24	Carpet Replacement	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ -
13	Grass Resod YR 16,19,22,25	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 360,000
24	Infill Replacement	\$ 121,691	\$ 144,200	\$ 144,200	\$ 168,400	\$ 448,616	\$ 243,600	\$ -
	Total 24 YR Budget	\$ 2,343,382	\$ 3,030,908	\$ 2,953,984	\$ 2,560,384	\$ 3,324,256	\$ 2,785,984	\$ 2,268,160
	SUMMARY							
	Initial Construction	\$ 1,100,000	\$ 1,136,384	\$ 1,276,384	\$ 1,223,584	\$ 1,427,024	\$ 1,298,784	\$ 90,000
	Additional Maintenance	\$ -	\$ 317,724	\$ 100,800	\$ -	\$ -	\$ -	\$ 1,458,160
	Infill & Carpet Replacement	\$ 1,243,382	\$ 1,576,800	\$ 1,576,800	\$ 1,336,800	\$ 1,897,232	\$ 1,487,200	\$ -
	Grass Resod	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 720,000
	Total 24 YR Budget	\$ 2,343,382	\$ 3,030,908	\$ 2,953,984	\$ 2,560,384	\$ 3,324,256	\$ 2,785,984	\$ 2,268,160

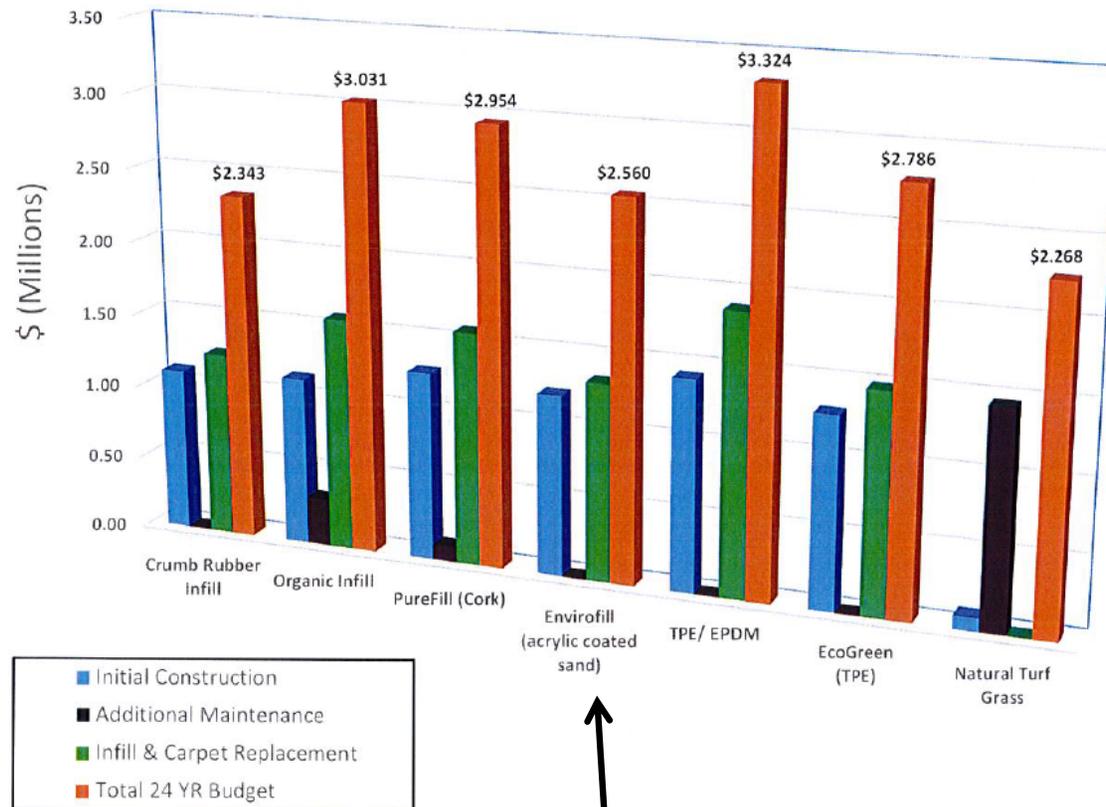
20160309 Turf Analysis.xlsx

3/9/2016

Source: Loudon County Public Schools, Division of Construction Services

24 Year Cost Comparison

EXHIBIT 4
Synthetic Turf Infill Alternatives
Total Budget Through 24 Years (No Escalation)



Injury rates of play on synthetic turf vs. natural grass

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.

2004 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

Environmental Impact

- for the greenest artificial turf

- Recycling turf:
 - Pelletizing and re-using the turf & backing
 - Complete removal of the infill for re-use on future installations



Grinding



Field Removal



Pelletizing

GALE



Environmental Advantages with Infilled Turf vs. Natural Grass

- Provide water savings of approximately 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.



Alternative Infill



envirofill
HIGH PERFORMANCE INFILL
Microban



GALE

Alternative Infill Comparison

Prepared by: Gale Associates Inc.
10/6/2016



Alternative Infills for Synthetic Turf - Properties as Infill

Type of Alternative Infill	Material ^a	Color	Shape	Abrasiveness	UV Stability	Typical Turf Pile Height	Availability ^b	Resilient Shock Pad Recommended	Irrigation Recommended	Expected Life Span	Typical Mixture (By weight)	Approximate Cost ^c	Comments ^{d,2}
Crumb Rubber	Styrene butadiene Rubber (SBR) Recycled tire rubber shredded	Black	Angular shaped granules	Low	Stable	2.25" - 2.50"	Readily Available	No	No	Life of Carpet	50% Sand 50% Rubber	\$50,000 per field	1. SBR rubber and sand is the typical infill system used in the majority of synthetic turf fields installed since 1997's. 2. SBR rubber maintains its resiliency over a wide range of temperature and environmental conditions.
Silica Sand	Rounded Silica Sand	Tan/Brown	Rounded Particles	High	Stable	1.50" - 2.0"	Readily Available	Required (See Comments)	No	Life of Carpet	100% Silica Sand	+\$50 net for additional sand +\$130,000 for resilient pad	1. Shock pad is required to provide shock attenuation (in-mat). 2. Sand stays hard under cold/frozen conditions (regardless of shock pad). 3. Use turf stitch gage of 5/16" or less. 4. Consider turf stitch layer for fly-up prevention.
Organic	Cork or Coconut Husk or rice hulls	Natural appearance (tan/brown)	Angular shaped granules	Low	Low Stability	1.50" - 2.50"	Limited Availability	Yes (See Comments)	Yes ^a	Unknown ^a ability to decompose	10%-15% Organic 90% to 85% Sand	+\$200,000	1. Reports of early degradation and floating of particles. 2. Organics can stay hard under frozen conditions (regardless of shock pad). 3. Shock pad recommended to provide shock attenuation over warranty period. 4. Consider increased maintenance.
Coated Crumb Rubber	SBR (Styrene butadiene Rubber) Recycled tires shredded and coated with acrylic or EPDM	Custom colors available	Angular shaped granules	Low	Medium stability	2.25" - 2.50"	Readily Available	No	No	Life of Carpet	50% Sand 50% Coated Rubber	+\$125,000	1. SBR contains SBR rubber. 2. Manufacturers claim coating encapsulates (prevents) migration of SBR rubber. 3. Shock pad is not required, consider a combination of shock pad and other infill material to reduce quantity of needed material.
EPDM (Ethylene Propylene Diene Monomer) Rubber	Virgin rubber produced for infill of athletic fields only	Custom colors available	Angular shaped Granules	Low	Medium stability	2.25"-2.50"	Limited Availability	(See Comments)	No	Not proven long term	50% Sand 50% EPDM	+\$150,000	1. Similar material to SBR rubber. 2. Shock pad is not required, consider a combination of shock pad and other infill material to reduce quantity of EPDM needed. 3. EPDM is a generic term and quality can vary greatly. Proven source and proprietary formulations are recommended.
TPE (Thermoplastic Elastomer)	Extruded plastic pellets	Custom colors available	Typically Uniform pellets Shape depends on manufacturer	Low to Medium	Stable	1.5" - 2.50"	Limited Availability	Required	No	Not proven long term	50% TPE 50% Sand	+\$150,000	1. Turf stitch layer is suggested to help reduce fly up/displacement of material. 2. Shock pad is not required, some owners have used combination of shock pad and TPE to reduce quantity of infill needed. 3. TPE is generic term - Quality can vary greatly. Proven source and proprietary formulations are recommended.
Coated Sand	Polymer Coated Silica Sand	Green	Fairly Round Particles	Med	Stable	1.50" - 1.75"	Readily Available	Required	No	16 Year Warranty (See Comment)	100% Coated Silica Sand Particles	+\$275,000	1. Coating has been reported to last shorter than warranty period (16years). 2. Shock pad is required. Some manufacturers suggest a mix with TPE to obtain required resiliency (5mm). 3. Turf stitch gage of 5/16" or less is recommended to prevent displacement. 4. Turf Thatch layers should be considered to reduce fly-up and displacement.
Nike Grind	Nike's Environmentally Preferred Rubber (Meets or exceeds restricted substance standards set for wearable consumer goods)	Multiple Colors	Angular shaped granules	Low	Stable	2.25" - 2.50"	Limited Availability	No	No	Per Nike, Expected life 10 years of play at 40 hours per week	50% Sand 50% Nike grind	+\$150,000	1. Proprietary. 2. Reports that infill is not aesthetically pleasing. 3. Has occasionally been used as a supplement to SBR rubber or in lieu of SBR to provide "wearable" label since 1997's.

NOTES:
 1. Information provided was compiled by available online data, manufacturers literature and conversations with turf and infill distributors. Gale has not conducted any independent testing of infill materials and does not guarantee the accuracy of information provided here in.
 2. Installations of fields with alternative infill material (other than SBR Rubber and Sand) are somewhat limited and many have not been proven long term. Gale does not guarantee performance of any turf system.
 3. Few older installations in U.S. More common in Europe. Only one supplier warranties for life of turf (gesturf) in U.S.
 4. May become more or less available as demand and popularity fluctuates. Cost fluctuates with availability.
 5. Costs are generalized approximations. Costs are NET addition to cost of a typical sand/SBR turf infill system. Actual costs will vary based on depth of infill/turf depth, type of resilient pad used. Market costs can vary greatly due to materials demand and availability.
 6. Organic Infill suppliers recommend keeping infill moist to aid with resiliency, improve longevity, prevent compaction and material displacement.

Alternative Infill Costs

Initial cost increase from traditional sand and crumb rubber field.

- TPE + \$350k-\$400k
- Envirofill + \$200k - \$250k
- Organic + \$150k - \$200k

Project Status Update

- Test pits were dug to ascertain soil types and depths
- Several meetings with the project team were held to further plan the design and specific features of “Phase 1”
- Schematic design and updated budget completed
- Turf and infill products reviewed

SHS Stadium Track & Field Rendering



New paved "D" areas for track and field events.

Recommended Scope of Work: Phase #1

PHASE 1	Budget	Notes
General Conditions	\$ 310,086	Bonds, insurance, overhead, profit
Erosion Control, Site Preparation, and Demolition	\$ 93,483	Site and silt fencing, topsoil removal
Synthetic Turf	\$ 798,823	Sub-base, shock pad, carpet, infill, lettering
Track and D-Area	\$ 392,892	Re-surface track and new surface "D" areas
Utilities/Lighting	\$ 40,000	Re-route irrigation, lighting contingency
Equipment	\$ 89,000	Football and soccer goals, scoreboard, safety net
Repairs	\$ 65,722	Stadium seating and asphalt repairs
Project Contingency [15%]	\$ 268,501	Unforeseen conditions or change orders
Total Project Cost	\$ 2,058,508	
<i>Less appropriated/approved funds for track repair</i>	\$ (285,000)	Town meeting approved and SHS Bldg fund
Net Cost to Fundraise	\$ 1,773,508	Private donors, naming rights, grants

Health & Environmental Considerations

[from June 15, 2016 presentation]

- Media reports have raised concerns about the possible association between playing on artificial turf and the development of cancers
 - Studies to date do not show elevated cancer risk
 - Government study launched in February but results aren't expected for 2 years
- We'll continue to evaluate new products as they are developed to help minimize public concern & the possibility of risk to our athletes
- Our athletes are already playing on turf, both at the high school level and younger



Health & Environmental Considerations

- Although no study has determined a causal link between crumb rubber and negative health effects, we are recommending a so-called “alternative” or next-generation infill product.
- This strategy avoids lingering health or environmental concerns either perceived or determined to be real in the future
- We believe the increased cost will provide both short and long term benefit



Envirofill Recommended

- An acrylic, anti-microbial, coated sand
- Requires a “shock pad” under the turf and costs more up front
- Has twice the lifespan of crumb rubber
- Has 75% less “fly-out” than crumb rubber
- Reduced heat retention
- Installed on approximately 125 fields across the U.S. including in MA: Holyoke, Ipswich, Medfield, Newburyport, and UMass-Dartmouth

Funding Plan

- Given competing demands for public financial resources, this project is being funded through “private” funding.
- Funding sources continue to be evaluated and may include:
 - Grants
 - Corporate sponsorship via naming rights
 - Youth group donations
 - Private, individual donations received via a Capital Campaign to begin upon School Committee approval

Funding Plan

- A fundraising committee has been established to begin planning a Capital Campaign. Committee includes:
 - Development professionals from the community
 - Past & present SHS administrators
 - Representatives from youth sports leagues
 - SHS alumni
 - Local business people
 - Current school/sports parents
- The quiet phase of this campaign will begin upon School Committee approval of Phase 1 of this project

Project Timeline: Phase 1

Revised Timeline	
2016	
June	Gain School Committee approval to hire project consultant
June	Form a committee and start meeting to develop fundraising process plan
July	Secure a design firm and begin detailed property and soil survey
August-September	Conduct detailed project planning with consultant
October 19th	Bring final project recommendations to School Committee
Oct. 19-Nov. 8th	School Committee receive public comments/input
November 9th	School Committee vote
November-December	Begin fundraising
December	Complete design and bid package
2017	
January-December	Continue fundraising effort
December	Update design and bid package
2018	
March	Bid award- CONTINGENT UPON SECURING ALL NECESSARY FUNDS
June-September	Construction
October	Begin use of field

***This schedule would be advanced for completion in Summer 2017 if sufficient funds were raised by February-March 2017.*



Procurement Process

- Because donated funds become the property of the Town of Shrewsbury/School Department, all goods and services related to this project are subject to Massachusetts General Laws pertaining to procurement
- The Prevailing Wage Law will also apply given that it is a public works project

Recommended Action Required to Continue Process

- Consider all of the information you have received on this topic
- Receive public comment or feedback
- Vote on November 9th .
- If approved:
 - Fundraising will begin
 - A bid package will be prepared but not let out until sufficient funds are raised

Questions...

