REPORT OF FINDINGS

Investigation of Artificial Turf

versus

Natural Grass Turf Playing Field

To: Belmont Middle and High School Building Committee

Prepared by: Robert E. McLaughlin, Sr., Committee Member

August 14, 2019

BACKGROUND

At the request of the Chairman, this Committee Member undertook an investigation of the advantages and disadvantages of artificial turf compared to natural grass turf and to report to the full Committee the findings to assist the Committee in determining what is the best turf coverage for the 69,300 square foot playing field designed on the north side of the new Middle and High School building (the so-called "Rugby Field"). Attached hereto in the Appendix as Exhibit 1 is the summary of the efforts in conducting the investigation.

There seems to be a general consensus that the major advantages of natural grass fields include: (i) they last about twenty (20) years with regular maintenance; (ii) function as carbon sinks; (iii) they filter storm water; (iv) installation costs are lower; (v) they absorb heat on hot days; and (vi) if properly maintained, they are less injury prone.

Similarly, there seems to be a general consensus that some of the disadvantages of a natural grass field include: (i) they have a limited playing season; (ii) playing on saturated, soggy fields damages the field surface; (iii) less safe when played on in the rain, they become muddy and uneven; (iv) in dry weather, they become impacted and rutted and risk sports injuries; and (v) they require regular, intensive maintenance, mowing, irrigation, weed management, reseeding worn spots, aeration of compacted soils and they require rest between play.

Our Committee in the feasibility study and schematic design phase of the new school was motivated to plan for synthetic artificial turf field on the north side of the new school primarily for two reasons. First, as discussed in more detail below, with the shortage of playing fields in Belmont, the advantage that the usage of artificial turf exceeds the usage of a natural grass field by at least 300% and second, the proposed field is located in part in the shadow of the new building and in an area where growing and maintaining natural grass is difficult.

Artificial turf generally has several components, including a base layer made from gravel or stone, an artificial grass carpet, including a backing material and artificial grass fibers, and one or more infill materials, used to hold the grass fibers upright and provide cushioning, among

other functions. Infill is the portion of the artificial turf that mimics the role of soil in a natural grass system. Many artificial turf fields, including our planned field, include a shock pad below the carpet for additional cushioning.

The great majority of the artificial turf fields throughout the country, and indeed the world, employ so-called crumb rubber as the infill material. Crumb rubber is derived from recycled motor vehicle tires and ground down to fine particles about the size of grains of sand. Belmont's Harris Field uses crumb rubber as an infill product.

For several years, questions have been raised concerning any adverse health effects that may be caused to athletes playing on artificial turf fields using crumb rubber as the infill material. In addition to the health issue discussed below, there are other concerns relating to the issue of artificial turf being more injury-prone and artificial turf with black infill crumb rubber on sunny days, rising to temperatures that could be detrimental to athletes playing on such an elevated heated surface.

DISCUSSION

A. USAGE.

Belmont does not have sufficient playing fields to meet the demands of the school athletic program and the recreational program. Attached in the Appendix as Exhibit 2A is an email from Jon Marshall, Assistant Town Manager and Director of Recreation Department, along with two spreadsheets that show for both the spring and fall schedules the total hours available during daylight for all of the Town fields controlled by Belmont Recreation Department. It does not include the playing fields under the control of the School Department. The take-away from the materials provided by Jon Marshall are: First, we have an extremely robust youth sports program. Second, as the spreadsheets indicate, each field is used 482 hours in the spring and 290 hours in the fall. Usage beyond 250 hours in any season is when the field suffers stress and deteriorates.

Attached in the Appendix as Exhibit 2B is an email from Jim Davis, Belmont High School Athletic Director, in which Jim makes a compelling case for the advantages of artificial turf over natural grass turf, pointing out the artificial turf flexibility, much greater usage, less maintenance and consistency.

Many of the studies read by the undersigned suggest that artificial turf fields can be used at least three times as much as natural grass turf.

This Committee Member remembers that prior to the rebuilding of Harris Field with artificial turf, the old natural grass field was used only for home varsity football games, thus between either four to five times a year. Today, we all enjoy watching Harris Field used full-time in all weather conditions for not only football, but lacrosse, field hockey, soccer, etc.

Finding: On the assumption of cooperation between the School Department and the Recreational Department, an artificial turf field will significantly relieve the pressure for the use of playing fields in Belmont. The flexibility and increased usage available with artificial turf is vital to maintaining an acceptable athletic program for the now-expanded grades 7-12 enrollment on our limited school campus.

B. HEALTH CONCERNS.

There are between 12,000 and 13,000 synthetic athletic fields in the United States and we are adding between 1,200 and 1,500 each year. Although there have been health concerns related to synthetic turf for years, in 2009, the issue came under more public scrutiny when the women's athletic coach at the University of Washington became concerned about the amount of cancer among her soccer players, especially the number of goalkeepers, and questioned whether exposure to crumb rubber infill in artificial turf might be causing it. The Washington State Department of Health conducted a study and concluded that their investigation ". . . did not find increased cancer among the soccer players on the coach's list compared to what would be expected among the rates of cancer of Washington residents of the same age."

Some questioned the sufficiency of the Washington State Department of Health study and over the years there has been a plethora of studies relating to recycled tire crumb as infill material for artificial turf fields. In the Appendix marked as Exhibit 3, there is a list of Research and Reports by Jurisdictions; Reports, Studies and Published Papers; News Reports & Videos and Synthetic Turf Suppliers; Material Information.[1]

Clearly, this Committee Member has not read all of the literature on the subject; however, approximately fifteen (15) reports have been read or reviewed. The reports generally fall into two (2) categories. First, there are the reports that determine there is no or negligible health concerns with the use of crumb rubber as the infill material. Second, there are the reports that note crumb rubber contains known carcinogens and advocate caution and the need for more study. This report will quote some of the findings and conclusions.

From the first group:

1. Elsevier, Environmental Research Journal – *Comprehensive multi-pathway risk assessment of chemicals associated with recycled ("crumb") rubber in synthetic turf fields*. This report is authored in part by Julie C. Lemay, Chair of the Belmont Board of Health and Senior Scientist with Gradient.

   "This comprehensive, multi-pathway risk assessment demonstrates that the use of synthetic turf fields containing recycled rubber infill would not result in unacceptable risks or hazards to adults or children under US EPA's risk assessment guidelines. This result is informative for the communities that have installed these types of surfaces and the millions of children and adults that use synthetic turf fields yearly. Our results are consistent with those of more limited investigations performed by a variety of regulatory agencies in the US, as well as receive studies of synthetic turf fields performed in the Netherlands and by ECHA. While additional analytical data and comparison to

[1] This list was compiled as part of the City of Portland, Oregon's Parks and Recreation Department's study July 2016.

background chemical concentrations could be used to further refine the results of our evaluation, our findings provide useful information for stakeholders seeking to evaluate possible health risks posed by the use of recycled rubber infill in synthetic turf fields."

2. Elsevier, Cancer Epidemiology – *Incidence of malignant lymphoma in adolescents and young adults in the 58 counties of California with varying synthetic turf field density*

"Annual lymphoma incident trends were not associated with the county-level synthetic turf field."

"Avoidance of synthetic turf fields for fear of increased cancer risks is not warranted."

"These overall epidemiologic findings are consistent with studies . . . that indicate negligible cancer risk . . . including an Italy study and a Netherlands study."

"Because regular physical activity during adolescence and early adulthood helps prevent cancer later in life, restricting use or availability of all-weather year-round synthetic fields and thereby potentially reducing exercise could, in the long run, actually increase cancer incidence, as well as cardiovascular disease and other chronic illnesses. Therefore, it is important to consider the results of our and ongoing studies before the use and development of synthetic turf fields and playgrounds, which provide physical activity, are blocked, prevented or precluded because of cancer concerns.

Further studies assessing individual-level exposures among soccer players are needed, most desirably a case-control analysis. Until then, however, physical activity should be encouraged and promoted by year-round, weather-resistant fields. As concluded and recommended by the State of Washington, "no specific field or geographic residence is problematic in terms of soccer players getting cancer" and "persons who enjoy soccer should continue to play irrespective of the type of field surface."

3. European Chemicals Agency – February 28, 2017.

"ECHA has found no reason to advise people against playing sports on synthetic turf containing recycled rubber granulates as infill materials. This advice is based upon the ECHA's evaluation that there is a very low level of concern from exposure to substances found in the granulates."

4. French Agency for Food Environment and Occupational Health and Safety – November 2018.

"Risk assessments performed by national or international institutes related to the exposure of athletes or children to synthetic grounds containing tyre granules all conclude to a negligible risk to human health. Some uncertainties and methodological limitations remain . . ."

5. Connecticut Department of Public Health – July 28, 2010.

"Overall, these health risks are low, especially given the conservative screening level nature of the assessment and well within the level of risk from air pollution commonly experienced by the general public."

6. Dutch National Institute for Public Health and Environment – 2017.

"The health risk of playing sports on synthetic turf pitches with an infill of rubber granulate is virtually negligible."

7. Portland Parks and Recreation Dept. – July 2016.

"Current research around post-consumer tire crumb rubber does not confirm a concerning level of exposure to chemicals . . ."

From the second group:

1. Mount Sinai Children's Environmental Health Center – May 2017.

   "Based upon the presence of known toxic substances in tire rubber and the lack of comprehensive safety studies, the CEHC of the Icahn School of Medicine at Mount Sinai urges a moratorium on the use artificial turf generated from recycled rubber tires."

   "Recommendation: We recognize the need for further scientific study."

2. Toxics Use Reduction Institute – December 2018 (updated April 2019) (UMass Lowell).

   "Artificial turf poses a number of health and environmental concerns. Those communities that have decided to install artificial turf are encouraged to make careful choices among the materials available to them. This is likely to include requiring some additional testing to get information on organic compounds as well as metals. Communities should bear in mind that existing tests apply only to the sample on which they are conducted, and materials used in artificial turf may vary widely in composition. From an environmental and health standpoint, organically managed natural grass is a safer choice for sports fields. When the full product life cycle is considered, organically managed natural grass also offers lower costs over time."

One-half of long-awaited federal study:

In February of 2016, the federal government acknowledged that parents, athletes, schools and communities had raised concerns about the use of recycled tire crumb rubber on synthetic turf fields. They acknowledged that studies to date had not shown an elevated health risk from playing on fields with tire crumb rubber, but existing studies had been limited. To help address these concerns, the Agency for Toxic Substances and Disease Registry (ATSDR) within the Centers for Disease Control (CDC), the US Environmental Protection Agency (EPA), and the Consumer Product Safety Commission (CPSC) launched a multi-agency research effort. This

effort became known as the Federal Research Action Plan on Recycled Tire Crumb Used in Playing Fields and Playgrounds and is referred to as the FRAP.

On July 25, 2019, the EPA announced that it was issuing a final report on Part 1 of the FRAP which summarizes the results of a range of chemicals, including metals and organic chemicals that were found in tire crumb rubber. Part 2 of the FRAP will document the results from the exposure characterization research and will be released along with a planned biomonitoring study to be conducted by the CDC/ATSDR. Part 2 will also include a discussion of potential follow-up activities that could provide additional insights into potential exposures to recycled tire crumb rubber used on synthetic turf fields.

EPA's announcement of the final report stated in part, "In general, the findings from the report support the premise that while chemicals are present, as expected, in the tire crumb rubber, human exposure appears to be limited on what is released into the air or simulated biological fluids (gastric fluid, saliva and sweat)."

The EPA report containing Volume 1 of Part 1 is 334 pages and Volume 2 of Part 1 is 456 pages (Volume 2 is the appendices), for a total of 790 pages, and represents the largest tire crumb study conducted in the United States. This Committee Member has read the Executive Summary and the key findings and conclusions. On August 6, 2019, this Committee Member also participated in a one-hour EPA-sponsored webinar concerning the report.

EPA's Executive Summary states, in part, that "our laboratory experiments suggest that the amount of chemicals available for exposure through release into the air and simulated biological fluids is relatively low." The EPA researchers tested crumb rubber at 77 degrees Fahrenheit and at 140 degrees Fahrenheit to represent moderate and high-end field temperatures, respectively. The report indicated that the most targeted emissions at 77 degrees Fahrenheit were not measurable above the detection limits or above background levels. Also at 140 degrees Fahrenheit, higher emissions were measured for some, but not all, chemicals.

The Executive Summary concluded, in part:

"As expected, a range of chemicals was found in the recycled tire crumb rubber, including metals and organic chemicals. Where comparative data are available concentrations of most metal and organic chemicals found in tire crumb rubber were found to be similar when comparing this study to previous studies. Further, the emissions of many organic chemicals into air were typically found to be below detection limits or test chamber background, and releases of metals into simulated biological fluids were very low (mean bioaccessibility values averaged about 3% in gastric fluid and less than 1% in saliva and sweat plus sebum). Together, these findings support the premise that while many chemicals are present in the recycled tire crumb rubber, exposure may be limited based on what is released into air or biological fluids."

This Committee Member's take-away from the FRAP study is that the study thoroughly analyzes the characteristics and properties of crumb rubber and determines the pathway by which crumb rubber may interact with the human body. Given the findings of crumb rubber properties and characteristics, it is this Committee Member's layman's assumption that Part 2 of the FRAP study will not lead to any support for a finding of a causal connection between the use of crumb rubber in artificial turf playing fields and health concerns.

Finding*: *There are abundant credible and peer-reviewed scientific studies concluding that there is no health concern with the use of crumb rubber as infill material for artificial turf playing fields. This Committee Member is unaware of any credible scientifically peer-reviewed study that determines that there is a causation connection between crumb rubber and a health concern.

C. OTHER ISSUES RELATING TO ARTIFICIAL TURF.

1. Heat.

In sunny, warm weather, artificial turf can become much hotter than natural grass raising concerns related to heat stress in athletes playing on the fields. Several reports have indicated that surface temperature on artificial turf fields can range between 35° Fahrenheit to as much as

60° Fahrenheit greater than the observed temperature on natural grass. Studies have indicated that some infill materials may reach higher temperatures than others. A study by Penn State's Center for Sports found that frequent, heavy irrigation reduces temperatures on artificial turf, but temperatures rebound quickly under sunny conditions.

We are fortunate in assessing this issue because the Harris Field has tire crumb as the infill material and, therefore, this Committee Member reached out to Jim Davis, Belmont High School Athletic Director, to see if heat on the Harris Field has been a problem. Jim stated that we have had no issues at this time with heat on the field. Jim did state that the only heat-related issue was last September where all outside activities were limited for a period of a few days due to high temperature and "real field" at over 100°.

Jim pointed out that the High School limits outdoor activity during the football Fall preseason between 1:00 p.m. and 3:00 p.m. to stay out of the high temperature points during the day. He also points out that once school begins, all practices and games are typically in the afternoon or evenings when temperatures are cooler. Except for the early season football practice, the High School athletic fields receive very little use during the Summer recess.

Remember, the rugby field is being built on the north side of the new school and will experience less direct sunlight.

Finding: The evidence does not support a finding that the heat concern should be a deterrent to Belmont deciding upon artificial turf on the Rugby Field.

2. Injuries.

There appears to be a consensus that the safest athletic field is a professionally maintained natural grass field. In the real world, with school athletics and municipal playgrounds, the natural grass fields are not professionally maintained. It appears, therefore, that there is not a clear apples-to-apples comparison in determining if artificial turf is more accident prone. It is clear that an artificial turf field with a shock pad below the carpet provides an additional cushion that reduces the incidents of impact injuries. In our specifications, we have

provided for a shock pad. Clearly, natural grass with ruts after use on a muddy day or hard-packed, dried-out with dirt bare spots is dangerous, but that is often what poorly maintained natural grass fields become.

Once again, this Committee Member reached out to Jim Davis, Belmont High School Athletic Director, and asked if he had any issues with injuries on the Harris Field. His response was "none."

It does appear that skin abrasions are more common on artificial turf compared with natural grass. Skin abrasions can be a pathway for bacteria-causing infections. That said, however, natural grass fields are exposed to Canada goose "droppings" whereas the Canada goose is not generally attracted to artificial turf.

In the comparison of alternative infill materials discussed below, it appears that certain infill material has a better impact rating than others which is important when considering injuries such as concussions.

Finding: The evidence does not support a finding that the injury concern should be a deterrent to Belmont deciding upon artificial turf on the Rugby Field.

D. COSTS.

The Perkins & Will estimators are carrying a figure of between $800,000 and $900,000 for the total cost of installing an artificial turf field using crumb rubber as the infill material. The Committee Member is advised by the landscape architect that cost of installing a natural grass field alternative, including sod and irrigation, would be between $350,000 and $400,000. As discussed below and as shown on Exhibit 4, there are several alternatives and the cost varies with the material selected as the infill.

It should be noted that an artificial turf field has a useful life of between 8 and 12 years. The replacement of an artificial turf field in today's dollars should be less because the drainage infrastructure and the shock pads are already in place.

Jay Markoff, Belmont's Director of Public Works, responded to this Committee Member's inquiry concerning maintenance and prepared a schedule which is attached in the Appendix as Exhibit 5. The bottom line shown on the attached schedule indicates the annual cost of maintaining the grass field would be $23,940; whereas, the annual cost of maintaining the artificial field would be $1,350.

Finding: Costs should always be a factor in any decision relating to the new school, but never a factor in any determination in which the health and/or safety of our children is in peril.

E. ENVIRONMENTAL CONCERNS.

Some of the literature reviewed by this Committee Member addresses the environmental concerns of the use of crumb rubber infill. Some expressed a concern that the splash from the infill will find its way into the water table and surrounding environment. Others point out that the use of recycled motor vehicle tires for the crumb rubber infill avoids literally millions of tires ending up in the landfills and the concomitant negative environmental impact.

This Committee Member reached out to Chris Morris, a Member of the Belmont Conservation Commission, for his opinion. Chris has a background in consulting for the installation of athletic playing fields. Chris advises this Committee Member that he believed artificial turf was friendlier to the environment resulting in far less negative impacts than the run-off that would result from the fertilization of a natural grass turf.

Finding: The evidence does not support a finding that the environmental concern should be a deterrent to Belmont deciding upon artificial turf on the Rugby Field.

F. INFILL ALTERNATIVES TO CRUMB RUBBER

In recent years, several different infill materials have come on the market. It is premature and beyond the scope of this report to undertake a detailed analysis comparing the pros and cons of the alternative materials. Indeed, because of the recent arrival of several of the materials, there is a consensus that there has not been enough study to reach any meaningful conclusions on these alternative infill products.

This report will succinctly describe the alternative products to acquaint the Committee Members with a direction that we may proceed to further investigate if it is determined that we should have an artificial turf field but with a material other than crumb rubber.

1. TPE.

Thermoplastic elastomer (TPE) is a general term that can encompass a variety of materials. Based upon on limited information, it appears that TPE used in artificial turf infill contains lower levels of many toxic chemicals than tire crumb. Some studies have expressed concern that use of TPE in indoor facilities posed the concern that it generated airborne dust but other studies have indicated lower generation of dust with a TPE field.

2. Waste shoe material.

This material is often referred to as Nike Grind because it is a byproduct of the manufacturing of Nike sneakers. The Nike material is regulated by the government on a Restricted Substance List which appears to give some comfort to those investigating alternative materials that it is less likely to have any harmful chemicals.

3. Coated crumb rubber.

As the title indicates, this crumb rubber infill has a coating that the manufacturer claims reduces the release of any chemicals.

4. EPDM rubber.

This is a specialty elastomer that is vulcanized (cured). Its properties were studied by the Norwegian Building Institute who concluded that EPDM Rubber contains lower concentrations of hazardous substances than the recycled rubber tires.

5. Acrylic-coated sand.

According to the manufacturer, this product is composed of well-rounded sand, a proprietary acrylic, a Microban antimicrobial and a pigment. It does appear that many of the categories of organic chemicals of concern with other synthetic infills may be lower or absent with acrylic-coated sand, but further study is necessary.

6. Coconut fiber.

There is a concern that those allergic to nuts would be affected with a coconut fiber infill; although others have determined that a coconut is not a biological nut which would cause an allergic reaction.

7. Cork.

Some studies have indicated respiratory disease in cork workers exposed to cork dust.

8. Walnut shells.

Again, the concern of an allergic reaction to nuts has been raised, but according to the manufacturer, the walnut shells are processed to remove all allergens.

9. Brockfill.

This is a new product composed essentially of wood chips reduced in size to approximately the size of a grain of sand. Through our architect's landscape consultant, David Warner, this Committee Member was alerted to contact the City of Somerville, which had just completed a Brockfill artificial turf with another one under construction. This Committee Member visited the newly-constructed Brockfill artificial turf field and reports that it looked beautiful and appeared to have the feel of a well-manicured natural grass field. This Committee Member has also contacted the New England representative for Brockfill. There appears to be

no independent studies of the Brockfill material, but their representative has provided this Committee Member with all manner of certifications and testing results. The advantage the manufacturer claims, in addition to being organic (and made from southern pine, the same material that toothpicks are made of), is it is cooler than crumb rubber.

10. Zeolite. (not shown on Exhibit 4)

Zeolites are a class of minerals which are solids with a relatively open, three-dimensional crystal structure built from the elements aluminum, oxygen and silicon, with alkali or alkaline-earth metals (such as sodium, potassium and magnesium) plus water molecules trapped in the gaps between them. Everyday uses of zeolites include water softeners, water filters, and laundry and dishwater detergents and zeolites are in odor control and pet litter.

Some studies have indicated that zeolites pose a respiratory hazard as some types of zeolites are associated with developing mesothelioma.

Attached in the Appendix as Exhibit 4 is a chart prepared by Warner Larson, our landscape consultants, which compares crumb rubber and all of the alternatives referenced above on the issues of (i) installation costs, (ii) operational costs, (iii) heating exposure, (iv) chemical exposure and (v) injury concerns.

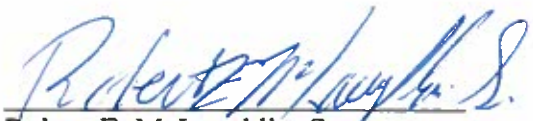
Finding: Some of the alternative infill materials may be superior to crumb rubber. Ironically, all of the peer-reviewed scientific studies of crumb rubber provide overwhelming assurance that there are not health concerns with crumb rubber, but to elect one of the alternative materials, Belmont would be an "early adopter" and it is unknown what future studies may reveal.

G. Next step.

It is the hope of this Committee Member that the foregoing report will inform a reasonable and fact-based dialogue leading to Belmont making the best decision for the turf cover on the so-called Rugby Field. We are fortunate that the field will not be constructed until

2021, before which time Part 2 of the FRAP should be released, which, as referenced above, is expected to conclusively negate the health concerns with crumb rubber infill.

Respectfully submitted,

By: 

Robert E. McLaughlin, Sr.
Belmont Middle and High School
Building Committee Member

EXHIBIT 1

Persons Contacted

Belmont:

- Jon Marshall, Assistant Town Manager and Head of Recreational Department
- Jim Davis, High School Athletic Director
- Jay Marcott, DPW Director
- Frank Sartori, Director of Parks
- Julie Lemay, Chair of the Board of Health
- Catherine (Kate) Bowen, Member School Committee
- Andrea Prestwich, Member School Committee
- Chris Morris, Conservation Commission
- Erin Lubien, Concerned Parent

Our Professionals:

- Brooke Travis, Perkins & Will
- David Warner, Perkins & Will Landscape Architect Consultant
- Max Richter, Co-Director of Material Performance, Perkins & Will
- Stephen Sefton, Sports and Recreation Practice Leader

Others:

- Luisa Oliveira, City of Somerville, Senior Planner Landscape Design, Office of Strategic Planning and Community Development
- Eric Hughes, Regional Manager of Brock USA, manufacturers of wood infill artificial turf

Literature Reviewed

In addition to the studies referred to in the body of the Report, several additional studies, sales' materials from different manufacturers and newspaper articles.

Fields Inspected

This Committee Member inspected the artificial turf with the BrockFill (small wood grind) system located at 150 Glenn Street, Somerville, as well, of course, as Belmont's Harris Field and the Wellington playground.

EXHIBIT 2A

Bob McLaughlin SR.

From: Marshall, Jon <jmarshall@belmont-ma.gov>
Sent: Friday, June 14, 2019 11:59 AM
To: Bob McLaughlin SR.
Subject: Field Usage Information

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Bob-

I know you are looking for field usage data. I requested the information from all field users this spring and have gotten some detailed information back from youth soccer. Still awaiting the other youth users.

Here is some very high level data at this point.

The big youth user groups in town are:
Youth Soccer – average of about 1,450 athletes – spring and fall seasons
Youth Baseball/Softball – Average of 500 athletes – mainly spring, have a summer and fall ball league
Youth Lax – Average of 250 athletes – mainly spring season
High School – Working to collect from Jim Davis

Field usage by hours is approximately the following (we are looking to drill down further):
Spring
Grove Baseball – 611 hrs
Grove Multipurpose – 386 hrs
Town Field Baseball – 100 (multipurpose scheduling)
Town Field Multipurpose – 352 hrs
Chenery Softball Diamonds – 513 hrs
PQ Multipurpose– 398 hrs
Winn Brook Multipurpose – 437 hrs

Fall
Grove Baseball – 84 hrs
Grove Multipurpose – 346 hrs
PQ multipurpose – 342 hrs
Town Field – 312 hrs
Winn Brook Multipurpose – 332 hrs

Based on my experience, conversations with our parks division, discussion with New England Sports Turf Managers Association, and data from the Sports Turf Managers around 25 events/ 250 hours is when fields begin to get stressed. Meaning that compaction and wear are more prominent.
In order to combat the usage it is necessary to rest fields during a growing season (spring or fall) for a minimum of 6 weeks so the grass can begin to recover. Cultural practices are helpful, core aerating, deep tine aerating, verti-cutting, slice seeding, etc...The more compacted turf becomes the higher the disease pressure, creating additional challenges. Ideally we would not have athletics taking place on the fields before mid-April, grass is dormant during this time, a grass more resistant to drought stays dormant even longer. It would also be ideal to stop usage the end of October as grass slows to grow and loses its recuperative potential.

It is my understanding that the Town has not been able to rest the fields in several years due to the increased youth participation number (increased as enrollment has increased). Based on the hours the fields are currently being used, we would not be able to take a field off line without requiring a reduction in the participants our youth program accept. The next several years until the high school fields are back online with increase the number of hours and shift the youth groups access to later in the day.

Happy to chat with you if there is any additional information you are looking for.

Thank you,

Jon Marshall
Assistant Town Administrator
Town of Belmont
455 Concord Avenue
Belmont, MA 02478
Phone: 617-993-2763
jmarshall@belmont-ma.gov

Multi-Purpose Fields (soccer, lax, ultimate, etc..)										
	April			May			June			
	4/15 sunset (7:25)			5/15 sunset (7:58)			6/15 Sunset (8:22)			
	Week	Sat	Sun	Week	Sat	Sun	Week	Sat	Sun	
7:00am										
7:30am										
8:00am		Youth			Youth			Youth		
8:30am		Youth			Youth			Youth		
9:00am		Youth			Youth			Youth		
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12:00pm		Youth	Youth		Youth	Youth		Youth	Youth	
12:30pm		Youth	Youth		Youth	Youth		Youth	Youth	
1:00pm		Youth	Youth		Youth	Youth		Youth	Youth	
1:30pm		Youth	Youth		Youth	Youth		Youth	Youth	
2:00pm		Youth	Youth		Youth	Youth		Youth	Youth	
2:30pm		Youth	Youth		Youth	Youth		Youth	Youth	
3:00pm	BHS	Youth		BHS	Youth		BHS	Youth		
3:30pm	BHS	Youth		BHS	Youth		BHS	Youth		
4:00pm	BHS	Youth		BHS	Youth		BHS	Youth		
4:30pm	BHS	Youth		BHS	Youth		BHS	Youth		
5:00pm	Youth	Youth		Youth	Youth		Youth	Youth		
5:30pm	Youth	Youth		Youth	Youth		Youth	Youth		
6:00pm	Youth	Youth		Youth	Youth		Youth	Youth		
6:30pm	Youth	Youth		Youth	Youth		Youth	Youth		
7:00pm	Youth	Youth		Youth	Youth		Youth	Youth		
7:30pm				Youth	Youth		Youth	Youth		
8:00pm										
8:30pm										
9:00pm										
9:30pm										
10:00pm										Totals
*Hr Avail	250	50	50	260	52	52	270	54	54	1,092
**Hr Permit	90	46	12	100	48	12	100	48	12	468
***Hr Used	90	32	8	100	32	8	100	32	8	410

* Hr Avail are hours field could be used based on day light and field policy

** Hr permit are the hours permitted to groups above, does not include others

*** Hr Used are the average weekly hours used by permitted groups

Dark green denotes times permitted but infrequently used (makeups)

***Usage beyond 250 hours/season is when field stress is an issue

Rest and recovery periods are needed to combat excessive use

Multi-Purpose Fields (soccer, lax, ultimate, etc..)										
	September			October			November			
	9/15 sunset (6:54)			10/15 sunset (6:02)			11/15 Sunset (4:22)			
	Week	Sat	Sun	Week	Sat	Sun	Week	Sat	Sun	
7:00am										
7:30am										
8:00am		Youth			Youth			Youth		
8:30am		Youth			Youth			Youth		
9:00am		Youth			Youth			Youth		
9:30am		Youth			Youth			Youth		
10:00am		Youth			Youth			Youth		
10:30am		Youth			Youth			Youth		
11:00am		Youth			Youth			Youth		
11:30am		Youth			Youth			Youth		
12:00pm		Youth	Youth		Youth	Youth		Youth	Youth	
12:30pm		Youth	Youth		Youth	Youth		Youth	Youth	
1:00pm		Youth	Youth		Youth	Youth		Youth	Youth	
1:30pm		Youth	Youth		Youth	Youth		Youth	Youth	
2:00pm		Youth	Youth		Youth	Youth		Youth	Youth	
2:30pm		Youth	Youth		Youth	Youth		Youth	Youth	
3:00pm	BHS	Youth		BHS	Youth		BHS	Youth		
3:30pm	BHS	Youth		BHS	Youth		BHS	Youth		
4:00pm	BHS	Youth		BHS	Youth		BHS	Youth		
4:30pm	BHS	Youth		BHS	Youth					
5:00pm	Youth	Youth		Youth	Youth					
5:30pm	Youth	Youth		Youth	Youth					
6:00pm	Youth	Youth								
6:30pm	Youth	Youth								
7:00pm										
7:30pm										
8:00pm										
8:30pm										
9:00pm										
9:30pm										
10:00pm										Totals
*Hr Avail	240	48	48	220	44	44	190	38	38	910
**Hr Permit	80	44	12	60	40	12	30	38	12	328
***Hr Used	80	32	8	60	32	8	30	32	8	290

* Hr Avail are hours field could be used based on day light and field policy

** Hr permit are the hours permitted to groups above, does not include others

*** Hr Used are the average weekly hours used by permitted groups

Dark green denotes times permitted but infrequently used (makeups)

***Usage beyond 250 hours/season is when field stress is an issue

Rest and recovery periods are needed to combat excessive use

EXHIBIT 2B

Bob McLaughlin SR.

From: Davis, Jim <jdavis@belmont.k12.ma.us>
Sent: Tuesday, July 9, 2019 8:31 PM
To: Bob McLaughlin SR.; Marshall, Jon
Cc: Phelan, John; Davis, Jim
Subject: RE: Field Permit issued information

Importance: High

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Hi Bob,

Below please find bullet points that speak to the limitations of usage that the natural turf presents verses the artificial turf and what this means to BHS and Youth athletic program.

Artificial turf:
Provides a consistent playing surface for both practices and games. Limits cancellations.

Provides the ability to play contests and conduct practice in wet/snowy conditions. Limited field closures due to wet or unplayable conditions. Which also limits the rescheduling of contests officials, event staff and busing for away teams. Prevent having to play rescheduled games back to back or multiple games in a row during a given week.

Provides the opportunity to play and host consecutive games and or practices which maximize usage of the facility for both High School & Youth programs

Once installed ready to be used immediately.

Provides greater flexibility with practice and game scheduling for all levels (Freshmen, JV & Varsity) of play.

Required density testing to ensure consistent playing surface.

Maintenance is far less in manpower hours, to cost and daily care.

Natural turf
Non consistent playing surface for both practice and games. Games are played on turf fields within the league and are the preferred surface for MIAA State tournament games. Teams want to practice & play on the surface that their games will be played on.

No ability to play contests and conduct practice in wet/snowy conditions. Field closure can be for multiple days while field dries out.

Limited ability to play and host consecutive games and or practices and maximize usage of the facility. Fields would need to be taken offline and shut down .

Limited access for youth sports as field coming off line .

Grow in period which could be one to two years to establish a natural turf field.

Limited flexibility with practice and game schedule for all levels of play.

No required density testing to ensure consistent playing surface.

Maintenance and proper care will require significant man power, cost, irrigation, fertilization, weed prevention, over seeding , annual aeration , procurement of special equipment , maintenance of the equipment, storage of the equipment.

I would also like to note that within the 12 Middlesex League Schools, multiple schools have multiple turf fields that they are able to access and use for both their High School and Youth programs. The Belmont Hill School has multiple turf fields as does Harvard University, Boston College, MIT & Tufts.

Jim Davis, CAA
Director of Athletics
Belmont Public School

EXHIBIT 3

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EXHIBIT 4

	Costs					Potential Health Impacts		
Infill Type	Costs $/SF (infill only)		Total Project Cost Increase over SBR Crumb Rubber	Replacement Interval	Operational Costs	Heat Exposure*	Chemical Exposure	Additional Injury Concerns
	min	max	(approx.)					
Tire Crumb Rubber, Post-Consumer, SBR (w/ angular sand ballast)	$ 0.75	$ 1.00	N/A	8-12 Years	LOW	HIGH	MINIMAL	NO
Plastic Crumb Thermoplastic Elastomer, TPE	$ 4.00	$ 5.00	$ 251,212.50	8-12 Years	MODERATE	MODERATE	NO	NO
Post Industrial Grinds (Nike Grind)	$ 2.10	$ 2.60	$ 102,217.50	8-12 Years	LOW	HIGH	NO	NO
Coated Crumb Rubber (Cushion Fall)	$ 1.50	$ 2.50	$ 77,962.50	8-12 Years	LOW	HIGH	NO	NO
Vulcanized Crumb Rubber, EPDM	$ 4.05	$ 4.55	$ 237,352.50	8-12 Years	LOW	HIGH	NO	NO
Acrylic Polymer Coated Sand (Envirofill)	$ 3.00	$ 4.00	$ 181,912.50	8-12 Years	LOW	MODERATE	NO	NO
Organic Infill: Coconut Fibers	$ 2.85	$ 3.35	$ 154,192.50	8-12 Years	MODERATE	LOW	NO	NO
Organic Infill: Cork	$ 2.10	$ 3.10	$ 119,542.50	8-12 Years	MODERATE	LOW	NO	NO
Organic Infill: Walnut Shells (Safeshell)	$ 2.00	$ 3.00	$ 112,612.50	8-12 Years	MODERATE	LOW	NO	SLIGHTLY ABRASIVE
Organic Infill: Softwood Particles (Brockfill)	$ 1.50	$ 2.00	$ 60,637.50	8-12 Years	MODERATE	LOW	NO	NO
Natural Grass Field	N/A	N/A	N/A	20 Years	HIGH	NONE	NO	NO**

*Dependent on latitude and direct solar exposure

**Natural grass fields when poorly maintained or excessively wet/muddy can result in a higher number of injuries

EXHIBIT 5

appx. 1.5 acres	Input	Description	Cost
Grass	Irrigation	irrigation heads/lines/start up/shut down	$1,500
	well	pump/start up/shut down	$2,600
	or Town Water	pq example 5 year avg. $xx	
	practices	aeration, cross seeding, weeding, fertilizer	$9,340
		deep tine, top dressing	$1,500
	mowing	1 operator 2 hours once/week	$4,000
	painting	Field lines, measure, marking, labor	$4,000
	Electrical	well pumps	$1,000
	Unanticipated		
	non-budgeted	Capital, lifecycle part replacements	
		Ex. 2019 well pump replacment $8,500	
		Ex. 2016 Drought required town water $20k/4 fields	
		Total Annual	**$23,940**
Artificial			
	Grooming	Monthly grooming, 1 individual 2 hours mo	$600
		Impact Testing	$750
	Unanticipated		
		Applying infill 2 years not yet needed	
		$560/2000lb bag	
		non warranty carpet repairs (7yr warranty)	
		Total Annual	**$1,350**