Assessment of Environmental, Health and Human Safety Concerns Related to the Synthetic Turf Surface at Maple Park in Ridgewood, NJ

January - October 2009

INTRODUCTION

The Ridgewood Environmental Advisory Committee (REAC) is an independent volunteer committee, appointed by the Village Council, with experience and/or interest in environmental issues. REAC advises the Village Council on environmental, health and human safety issues in Ridgewood. It also seeks to assist the residents of Ridgewood in addressing environmental concerns by advocating "best practices", which protect the environment, respect the ecosystem and promote sustainability.

In November 2006, Ridgewood replaced a grass field at Maple Park with a synthetic field manufactured by FieldTurf. Media reports of concerns over synthetic turf fields in NJ received national attention in 2008, prompting REAC to form a sub-committee to conduct a 10-month assessment of whether these concerns affect the residents of Ridgewood. REAC focused on identifying the most current and objective information on synthetic turf, in order to provide an unbiased reference resource for the residents of the Village of Ridgewood.

Some publicized concerns were based on obsolete information and field designs, which are not relevant at Maple Park. Climates that differ significantly from Ridgewood's and dense urban environments may pose concerns that do not exist in Ridgewood. Therefore, **REAC's assessment focused only on concerns, which may be applicable in Ridgewood and are specific to the synthetic "infill" turf field design at Maple Park.** When direct test results were not possible, the most current and relevant data from authoritative and credible sources was considered. Where conflicting data exists, REAC adhered to a priority protocol to draw conclusions, as follows; **1)** Actual test results or experiences in Ridgewood, **2)** Outside testing with methodology that closely replicates "real life" conditions in Ridgewood, **3)** Data provided by governing or regulatory agencies (Department of Environmental Protection, etc.) **4)** Other relevant testing and "expert" commentary, believed to be credible.

The scope of REAC's assessment was limited to environmental, health and human safety issues. Financial justifications were not considered. Natural grass and current generation synthetic fields both offer environmental benefits and drawbacks, which may or may not be evident locally. This assessment does not endorse one surface over another. The objective was to present an understanding of the facts regarding specific environmental and safety issues, in a clear and concise format for reference by Village residents. REAC's conclusions are summarized on the following pages, with references and links to more detailed supporting data, upon which the conclusions are based. REAC recognizes that technology and future research may offer new information. As new information becomes available, REAC intends to update this assessment.

REAC identified a number of commonly raised concerns (listed on page 4) and gathered information from the following sources:

American Journal of Sports Medicine
British Journal of Sports Medicine
California Environmental Protection Agency
Clean Washington Center (CWC)
Direct testing
Extensive review of publicly available information and independent testing
FieldTurf [1]
NBC News
NJ Dept. of Environmental Protection
NYS Dept. of Environmental Conservation
NYS Dept. of Health
Penn State University Center for Sports Surface Research
RHS Athletic Dept.
RHS Director of Health & Wellness
Ridgewood Dept. of Parks & Recreation
Ridgewood Parks & Recreation Master Plan - Comprehensive Draft dated June 23, 2008
SportTurf Managers Association
U.S. Environmental Protection Agency
The Weather Channel

1) FieldTurf provided information about their product design, manufacture, applications and specific installations. It also provided information regarding independent testing, which was not funded by FieldTurf.

CONCERNS

1) **Does the field surface at Maple Park pose a dangerous risk of exposure to lead or other harmful materials for residents or the environment?** ***(pg. 5)***

2) **Does surface heat at Maple Park pose a health or environmental concern?** ***(pg. 7)***

3) **Does the surface at Maple Park offer environmental benefits?** ***(pg. 10)***

4) **Does drainage on the field surface at Maple Park result in leaching of carcinogenic PAHs, lead or zinc into water table over time?** ***(pg. 12)***

5) **Can MRSA infections be caused by the surface at Maple Park?** ***(pg. 14)***

6) **"Field Surface Related Injuries"…RHS Experience on Maple Park vs. Grass** ***(pg. 15)***

7) **Maple Park's "Lifespan Expectations & Recyclability"** ***(pg. 17)***

8) **Does the surface at Maple Park harm the environment by eliminating the normal CO^2 absorption of natural grass?** ***(pg. 19)***

9) **Is the field design at Maple Park suitable in the flood plain?** ***(pg. 21)***

1) Does the field surface at Maple Park pose a dangerous risk of exposure to lead or other harmful materials for residents or the environment?

No. Lead chromate was previously encapsulated in the polyethylene fibers to provide UV resistance, primarily with yellow and red surface colors. The field at Maple Park was designed to use non-toxic, water-soluble paint, not permanent colored lines. The exception is the maroon "R" at center field. Because the lead chromate is encapsulated in the fibers, it is presumed not to be bioavailable (is not released through contact) and cannot be absorbed by humans or other living systems. Research shows that contact with, or incidental ingestion of, the fibers or rubber infill poses no health risk.

If a child eats a loose fiber, it will typically pass through the digestive system without risk. Some critics have raised concern if the fiber remained in the child's stomach for an extended period and digestive acids were able to break down the fiber and release the lead chromate. It is physically impossible for a child to risk exceeding the safe U.S. federal lead levels through ingestion of the fibers at Maple Park. To put this in perspective, if the fibers were bioavailable, a 50 pound child would have to ingest over 23 pounds of loose fiber, or almost 50% the child's total body weight, in a single 24-hour period to reach a level that might exceed federal safety levels. The average adult stomach can hold approximately 0.5 pounds. So, the unsafe amount of fiber is 46 times greater than can be physically contained in an average adult stomach. In addition, large amounts of fibers are not easily removed from the field surface. According to experts in New York City on May 5,2008, "it is absurdly unrealistic" to believe a child could ingest a dangerous amount of loose turf fiber.

On June 14, 2008, independent lead testing was conducted at Maple Park. Test samples were evaluated by a NJ DEP certified laboratory, EMSL Analytical in Westmont, NJ, using digestion method 3050B and analytical method 6010B (inductively coupled plasma). The turf sample test resulted in a lead content of <1.0 mg/kg, 400 times below the NJ DEP Soil Clean-Up Criteria of 400 mg/kg. And the wipe test resulted in a lead content of 1.1 µg/wipe, almost 40 times below the HUD standard for indoor floors and carpets of 40 µg/wipe. The test report described the lead concentration in the fiber as "undetectable" and said the result from the wipe test was attributed to "normal dust in the air". Similar results would also be expected on grass surfaces. There is no reason to expect lead levels to increase at Maple Park. However, REAC believes it would be prudent for Ridgewood to conduct similar tests every 3-5 years at Maple Park and at random grass playing fields in town, as a comparative benchmark.

The cryogenically ground crumb rubber infill used at Maple Park also does not appear to pose any risk to residents or the environment. Shredded tire infill (known as “ambient” rubber) may contain higher levels of fiber and metals than what is produced during the cryogenic grinding process. For a discussion of the difference between “cryogenic” rubber and “ambient” rubber, see the links to the *Clean Washington Best Practice* and *FieldTurf Q6 Quality Control* below. None of the rubber infill at Maple Park came from landfills or “tire piles”. To date, there has never been a documented report of injury or sickness anywhere in the world as a result of inhalation, ingestion or exposure to cryogenic rubber infill at a FieldTurf installation. A study from the spring to fall of 2008 by the NY State Department of Environmental Conservation found that “analysis of crumb rubber samples digested in acid revealed that the lead concentration in crumb rubber samples was well below the federal hazard standard for lead in soil and indicated that the crumb rubber from which the samples were obtained would not be a significant source of lead exposure if used as an infill material in synthetic turf fields.”

A review of available information by the California Office of Environmental Health Hazard Assessment (OEHHA) evaluated the risk of cancer from breathing the air above a synthetic “infill” field over 70 years. The lifetime cancer risk was determined to be 1 in one million. The review stated that “lifetime cancer risks of one cancer in a population of one million are considered a negligible risk level. Many common human activities result in cancer risks that are higher than one in one million.” OEHHA states on their website that the cancer risk of breathing California air (in 2000) due to diesel particles was 540 in one million (540 times greater than the risk of breathing air over a synthetic field for 70 years).

NYC Scientific Panel Discussing "Absurdly Unrealistic" Risk of Lead Exposure - May 5, 2008
Brian Williams on NBC: Turf is Safe According to CPSC - July 30, 2008
"The Record" Reverses and Reports Turf Not Dangerous - Franklin Lakes, NJ - July 30, 2008
NY Department of Environmental Conservation Crumb Rubber Infilled Field Report - May 2009
Clean Washington Center (CWC) Best Practice - Ambient vs. Cryogenic Grinding
FieldTurf Q6 Quality Control
CA Office of Environmental Health Hazard Assessment (CA EPA) - July 2009

2) Does Surface Heat at Maple Park Pose a Health or Environmental Concern? [1]

A. Does the synthetic turf surface at Maple Park reach temperatures, which might pose an unusual health risk for athletes and spectators, particularly youth athletes? If so, should special precautions be undertaken at Maple Park?

B. Do elevated ambient air temperatures from the surface at Maple Park pose an environmental concern, when compared to the natural grass at the RHS Stadium Field?

Objective analysis of synthetic fields notes elevated surface temperatures compared to natural grass. The industry recognizes the potential for elevated surface temperature. In some climates, measures may be required to cool the surface or the design's merits may need to be weighed against this issue. As detailed in the Appendix *(page 26),* the surface temperatures at Maple Park were lower than other recreational surfaces and had little or no impact on the ambient air temperature differential with natural grass. In Ridgewood's climate, surface temperatures at Maple Park do not seem to pose an environmental issue.

During REAC's testing, Maple Park's surface was an average of 30ºF hotter than the natural grass surface at the RHS Stadium Field. However, the ambient air above both surfaces differed by only 3ºF at 12" above the surface and approximately 2ºF at 39" (the approximate chest height of a typical youth athlete). The differences in the ambient air were undetectable without a thermometer. In both cases, the ambient air temperature above the surfaces was slightly higher than the general air temperature.

The surface temperatures at the RHS Tennis Courts and the RHS Track were significantly higher than that of the surface at Maple Park. The ambient air temperature above both surfaces was also generally higher. Neither of these surfaces has been identified as a potential risk to human health or the environment. REAC also took measurements above the asphalt parking lot at Graydon/Maple Park, to approximate conditions for joggers on roadways in Ridgewood. The average surface measurements in the parking lot were lower than those at the RHS Tennis Courts or the Ridgewood Track and were comparable to Maple Park.

1) A detailed discussion of REAC's temperature measurements and findings with links to videos, documenting the measurements, can be found in the Appendix on page 26.

The facilities tested are intended to be used while wearing athletic shoes. No difference in surface temperature was detected while standing on the surface with shoes. On July 12, 2009, when the hottest surface measurements were recorded at Maple Park, there were eight children playing wiffle ball, all with bare feet. When asked about the surface heat, the children indicated no discomfort.

According to the Weather Channel, the temperature in Ridgewood has only exceeded 100ºF once in the last 100 years (1962). Wind, clouds and precipitation all have a significant impact on any surface's temperature. The hottest months of the year in Ridgewood are June through September. The average high temperature in that period is 80ºF and average record high is 99ºF. It is unrealistic to expect surface temperatures to approach those reported in hotter climates. Surface temperatures at Maple Park were well within the historically acceptable and safe levels observed at other recreational surfaces in Ridgewood and did not reach levels that appear to be abnormal or unsafe. REAC's documented temperature measurements contrast with conclusions from a study of surface and soil temperatures at Brigham Young University in 2002 and, speculation about surface heat from synthetic turf posed by Stuart Gaffin, Associate Research Scientist at Columbia University, after he noticed that two of six (high surface temperature) thermal satellite images in New York city appeared to be synthetic fields.

The measurements observed in Ridgewood suggest that the concern over surface temperature is unwarranted at Maple Park. The ambient air above the surfaces, resulting from the combination of air temperature and radiated heat (from the sun and the surface) is the primary determinant of athletes' or spectators' perception of heat. The ambient temperatures above the all surfaces were between 90ºF and 99ºF. The evaluation appears to show that differences in surface temperature, alone, have little impact on the ambient temperature. The average ambient temperatures observed at 12" and 39" above the natural grass at the RHS Stadium Field and the surface at Maple Park were similar. The average difference was 3ºF or less. The average temperature above the surface at Maple Park dropped 20.9% at a height of 12" and dropped 21.4% at a height of 39". The average temperature above the surface at the RHS Stadium Field increased 3.6% at a height of 12" and increased 5.2% at a height of 39".

REAC's observed measurements indicated no basis for health, safety or environmental heat concern between the grass and Maple Park's synthetic surface. The same precautions required to minimize heat exposure on grass fields during elevated temperatures would also apply at Maple Park. REAC recommends that athletes and spectators use common sense and adhere to the same precautions against heat exposure whether playing on grass or artificial surfaces.

Craig Mahler, RHS Girls Soccer coach, said he changed the times of his pre-season practices (in August) to 8 am and 4 pm, but he would have done that whether it was grass or turf, just to avoid the hottest parts of the day. He said, "kids know they have to drink more water when it's hot."

REAC's observations and conclusions were corroborated by a similar independent year-long study conducted in CT, by Milone & MacBroom, a nationally known environmental consulting firm.

NOTE: Please see the detailed findings of REAC's study in the Appendix (starting on page 26).

Milone & MacBroom Comprehensive Turf Study 2009

3) Does the surface at Maple Park offer environmental benefits?

In Ridgewood's case, the Village was able to eliminate thousands of pounds of fertilizer, over a million gallons of water and 54 hours of mowing. Storm water runoff at Maple Park was improved significantly. There were also a number of environmental benefits, which were not recognized locally.

According to data provided by the Department of Parks and Recreation, prior to the installation of the synthetic surface at Maple Park, the Village used over 4,000 pounds of fertilizer at Maple Park ($1,500) every year in the months from March through November. Without specific test data at the time, it cannot be known if chemicals leached into the water table (primarily in the form of Nitrogen) and eventually ended up in the Ho-Ho-Kus Brook. This is a large sources of pollution in the United Sates. The use of fertilizer and pesticides has long been a concern with the EPA in NJ, where grass has been used to control erosion on storm water detention basins. The EPA says, "methods used to maintain turf grass…applying fertilizers and pesticides and mowing frequently (as much as 10 times during the growing season)…can negate any benefits gained in water quality and cost effectiveness. Excess soluble pesticides and fertilizers can mix with storm water runoff and be carried into receiving waters. Excess chemicals can leach into underground aquifers."

The data also shows that 200 pounds of grass seed ($1,000) and over 1,060,000 gallons of water ($3,500) were also used at Maple Park annually. The concern over Ridgewood's water resources announced in October, 2009 makes this a particularly important benefit. In addition, emissions from tractors during 54 hours of mowing the grass at Maple Park (1.5 hours a week for 36 weeks) was eliminated. These benefits are a positive step for the environment in Ridgewood. Quantifying the environmental benefit is difficult. Other materials and labor costs at Maple did not necessarily have an environmental impact.

U.S. EPA Website - Sources of Nonpoint Pollution

Perhaps the most important environmental benefit at Maple Park is the improvement of the storm water runoff management in the flood plain *(this will be discussed in more detail on page 21).* According to the Department of Parks and Recreation's records, the peak storm water runoff into the Ho-Ho-Kus Brook was reduced over 95% for a "2-year storm" event and over 94% for a "10-year storm" event. In fact, today the peak runoff in a "10-year storm" event is 72% lower than it was for a "2-year storm" event with the previous non-engineered natural grass surface and water capture/drainage system.

REAC learned that there are also important environmental benefits to the field design at Maple Park that are are not felt locally. Maple Park permanently prevented approximately 40,000 tires from going to landfills and, in the future, will be recycled in other commercial applications. The manufacturer of the turf at Maple Park is recognized as a member of the U.S. Green Building Council and the Environmental Protection Agency's "Greenscapes" program for their leadership in recycling, water conservation and environmental focus. A FieldTurf installation can earn as many as ten LEED® (Leadership in Energy & Environmental Design) credits.

In several respects, the synthetic surface at Maple Park represents an environmental improvement over the previous natural grass field. An added benefit noted by youth sports groups and RHS coaches is that flocks of Canadian Geese no longer leave droppings on the field, posing a health risk to athletes and fowling the Ho-Ho-Kus Brook along the park. Because the geese can't eat the synthetic fibers, they no longer are attracted to the site and avoid it.

Potential LEED Credits for FieldTurf Installations
"LEED-ing the Way" - Athletic Facility Design (FieldTurf case study reprint)

4) Does drainage on the field surface at Maple Park result in leaching of carcinogenic PAHs, lead or zinc into water table over time?

Several recent studies explored this concern in great depth and found no basis for health or environmental concern due to leaching of hazardous materials from synthetic turf installations, similar to the one at Maple Park. The materials used at Maple Park are regulated by national building codes (similar to the carpet industry) and the installation of such fields in NJ is closely controlled through the NJ DEP permitting process. This concern arises from the idea that the crumb rubber or polyethylene fibers breakdown over time and release toxins into the water table. New FieldTurf surfaces are lead-free and virtually all heavy metals are removed from the crumb rubber during cryogenic grinding processing.

The question is, if traces of these metals remain, can they be released in levels that pose a danger? Some groups, such as Environment and Human Health, Inc. (EHHI), claim that this is the case. However, their conclusions appear to be based on extreme laboratory testing methodology that "do not replicate natural field conditions", according to D. Michael Johns, Ph.D. and Tom Goodlin, who conducted an evaluation for King County Water and Land Resource Division in Seattle. King County looked at the long term affects on water quality of synthetic turf runoff and found that the runoff had no effect on the test organisms and met all state and federal water quality standards. In the EHHI funded tests, crumb rubber was submerged in water, methanol or acid for extended periods. In some tests, the samples in the solutions were heated to as much as 300ºC (575ºF) and held at that temperature in an apparent effort to produce a desired result. EHHI rejects the findings of independent and government testing that contradicts their results, calling for more testing. In REAC's opinion, their testing methodology, calls into question the objectivity of their testing and assertions.

Johns and Goodlin noted that, "Overall, studies that measured chemical concentrations in installed fields under normal operating and environmental conditions reported significantly lower concentrations than did laboratory studies using simulated precipitation events." Tests conducted under normal environmental conditions revealed that "organic compounds generally do not seem to be released in detectable concentrations."

Studies conducted by the NY State Departments of Environmental Conservation in 2008 to assess the safety of crumb rubber in synthetic turf fields concluded that “crumb rubber may be used as an infill without significant impact on groundwater quality.” In recent independent testing, minor evidence of metals was detected. However, the levels were consistent with levels that would be found in rain water or the native soil.

In January 2009, Milone & MacBroom, a CT based firm specializing in environmental science completed their own year-long study on water quality, air quality and temperature of three synthetic fields in CT, built in 2007. Their findings were conclusive that leaching of organic compounds and heavy metals should “be of no concern with regard to the safety of synthetic fields.” The study concluded that eight water samples from three different fields “indicate that the actual storm water drainage from the fields allows for complete survival of the test species called Daphnia pulex. An analysis of the concentration of metals in the actual drainage water indicates that metals do not leach in amounts that would be considered a risk to aquatic life as compared to existing water quality standards.” Further, analysis following EPA methods “indicates that metals will leach from crumb rubber but in concentrations that are within ranges that could be expected to leach from native soil.”

REAC believes that there is sufficient evidence to support the conclusion that the field design at Maple Park poses no risk to the local environment in Ridgewood.

NY Department of Health Fact Sheet On Rubber In Filled fields
NY Department of Environmental Conservation Crumb Rubber Infilled Field Report - May 2009
Milone & MacBroom Comprehensive Turf Study 2009
King County (Seattle) Water & Land Resource Division Evaluation of Environmental Risks
Clean Washington Center (CWC) Best Practice - Ambient vs. Cryogenic Grinding
FieldTurf Q6 Quality Control

5) Can MRSA Infections Be Caused By the Surface at Maple Park?

No. MRSA infection has never been reported in connection with the synthetic surface at Maple Park or similar field designs. Several studies have proven that there is no connection between current generation synthetic surfaces and MRSA infections. The most notable among these was a study by Penn State's College of Agricultural Sciences, conducted by Andy McNitt, Associate Professor of Soil Science the University's Center for Turfgrass Science. The study tested 20 "infill" design synthetic fields at various locations in PA and found no trace of staphylococcus aureus bacterium in any of the fields. McNitt concluded that "the infill systems are not a hospitable environment for microbial activity…they tend to be dry and exposed to outdoor temperatures, which fluctuate rapidly." He went on to say that "the microbe population of natural turf grass far exceeds anything we've found in the infill systems." Personal hygiene is the most important factor in preventing the spread of MRSA, regardless of the source.

Both the Center for Disease Control and the NCAA concur that MRSA has yet to be found in synthetic turf and that McNitt's study is conclusive in its findings. This was recently supported by a review of available information conducted by the California Office of Environmental Health Hazard Assessment (OEHHA).

Penn State MRSA Study
CA Office of Environmental Health Hazard Assessment (CA EPA) - July 2009

6) "Field Surface Related Injuries"…RHS Experience on Maple Park vs. Grass

Based on discussion with the RHS coaches, RHS Director of Wellness and RHS Athletic Trainer, injuries at Maple Park are, if anything, lower than on Ridgewood's grass fields due to the poor condition of our grass fields. The critical issue, according to RHS staff, is the consistency of the playing surface. The volume of activity in Ridgewood and typical weather conditions in Ridgewood make it very difficult to maintain natural grass fields. The surface at Maple Park has allowed practices and games to occur without damaging our grass fields during inclement weather. This has helped to minimize subsequent field damage, which can contribute to field related injuries. Colder weather can make grass fields a harder surface. The surface at Maple Park does not freeze as easily and thaws quickly.

According to Mike Pounds, RHS Boys Lacrosse coach, "since the team has been playing at Maple Park (since 2007), injuries have definitely gone down, especially ankles and knees."

Craig Mahler, RHS Girls Soccer coach, said he would "rather play on grass, but that it's safer to play on a well-maintained turf field than on a poorly maintained grass field, and what we have in Ridgewood are poorly maintained grass fields." He added that a lot of information out there about turf is based on old reports dating back to the Astroturf days. The old Astroturf was "really bad…lots of twisted knees, burns, abrasions." His team often plays on Somerville's grass field, where areas have "been repeatedly re-sodded, resulting in a hump in front of the goal that led to several ACL and MCL injuries." He noted that sprinkler head areas also cause a lot of problems because the areas around the sprinkler heads are not maintained. Craig also coaches softball and said he "would prefer having dirt around the bases or even having a full dirt infield with turf elsewhere." Again the problem is maintenance, he said. "If you don't water and groom the clay, it becomes so hard that players get more injuries sliding on the dirt than sliding on artificial turf."

Although synthetic turf may be easier to maintain than natural grass, it must be maintained. During a flood in 2008, a portable soccer goal was left on Maple Park and "floated" across the field. As the goal slid along the field surface, it caused a temporary ripple in the field. The ripple was not on the playing surface and did not cause an injury. It was eventually eliminated with proper grooming. However, it emphasizes the point that synthetic fields are not indestructible and reasonable maintenance and grooming is required.

Garland Allen, RHS Director of Wellness, said “there appear to be fewer injuries (with RHS athletic teams), not so much because the artificial surface is better, but because we’ve reduced the number of practices and games on the poorly maintained grass fields in Ridgewood.”

RHS Athletic Trainer, Nick Nicolaides, said that “out of the 30 ACL tears experienced by RHS athletes in the past five years, only one occurred at Maple Field.” It should be noted that Maple Park has only had the new surface for three years.

The NYS Dept. of Health identified five studies that compared injury rates among athletes when playing on infilled synthetic turf and natural grass fields. Although the ability of the studies to detect differences in the injury rates was limited by the small number of injuries reported, the studies concluded that there were no major differences in overall injury rates between natural and infilled synthetic turf, like that at Maple Park.

An NBC News report from Dublin, OH discussed a comprehensive 5-year study done in Texas regarding the comparative safety between natural grass and turf. The study, which was published in the *American Journal of Sports Medicine* in 2004, concluded that natural grass results in a greater number of “serious” injuries, particularly concussions and knees, than the newest generation of synthetic turf. Dublin High School’s experience over a two year period supported the results in Texas. A 2-year study published in the *British Journal of Sports Medicine* in 2007 found no significant difference in the frequency or severity of injuries in men’s and women’s NCAA soccer between natural grass and the latest generation turf fields.

NBC News Report (Dublin, OH) on AJSM Article Concluding That Natural Grass Causes More Serious Injuries Than Turf
5-Year Meyers & Barnhill Texas HS Football Study 2004 - American Journal of Sports Medicine, Vol. 32, No. 7
2-Year NCAA Soccer Study 2007 - British Journal of Sports Medicine
FieldTurf Maximum Safety & Performance (MSP) Standard Video

7) Maple Park's "Lifespan Expectations & Recyclability"

The surface at Maple Park is warranted by FieldTurf for 8 years. However, the usable lifespan of the surface is expected to be 12-15 years. REAC contacted FieldTurf's corporate headquarters to understand what happens then. Darren Gill, Director of Marketing, began by explaining that "of the 3,000 fields installed by FieldTurf since 1994, only 10 have been replaced." In fact, the first installation from 1994 is still in use. The drainage system beneath the field surface is permanent. However, once the field reaches the end of its usable life, the fiber "carpet" and sand/rubber infill will be replaced.

In 1999 FieldTurf installed 60 fields. Since those fields will be approaching the end of their useful life in the next 2-5 years, FieldTurf has focused its attention on the issue of recyclability. According to Gill, "finding ways to recycle the field materials is the the #1 research and development effort at the company today." Gill emphasized that, "as part of any new contract, FieldTurf will guarantee that the field materials will be recycled when the field is replaced." He assured REAC that this applies to the field at Maple Park, as well, even though it was installed before this new policy was established.

There are four materials used in the field, which collectively have an unlimited number of recycling applications. According to Gill, the key is to identify those applications that are most economically viable and focus on those areas. In some cases, the company is able to reuse the materials in their own processes. In other cases, the polyethylene (fibers) and polypropylene (fiber backing) materials can be re-pelletized and uses in new product applications. FieldTurf says they have made a significant investment in their business to facilitate the recycling of their products and they have established cooperative partnerships with leading "pelletizers" to accelerate the process over the next several years. FieldTurf has several patents pending from their recycling R&D efforts.

Page 18 details how the ten FieldTurf fields that have been replaced have been recycled and offers examples of future applications under development by the company. The surface materials at Maple Park will not go to a landfill, when the field reaches the end of its useful life.

Given the small number of fields that have been replaced, the recycling of “old fields” is in its infancy. However, over the next decade, as the supply of recyclable materials from synthetic fields becomes greater, the opportunities will expand.

Synthetic Grass Fibers (polyethylene)

The fibers can be ground up and sold to “re-pelletizers”, who produce raw material “pellets”. Polyethylene is the most common plastic in the world and is used to make many of the products we use every day. FieldTurf is developing applications for the fibers to be made into garbage cans and park benches (similar to those at Maple Park).

Fiber Backing (polypropylene)

The fiber backing can also be ground up and sold to “re-pelletizers”, who produce raw material “pellets”. There are thousands of household and automotive applications for these pellets, including T-shirts and bags. FieldTurf re-manufactures the backing into its FieldTurf Armor, which is a hard plastic cover used to protect the field surface in some multi-use field installations. FieldTurf has formed strategic partnerships to drive recycling demand for the backing. This material can also be used as road base fill.

Sand

The sand from field is currently being used as top fill on grass fields, road base fill and ballast in highway crash barriers. After being sanitized with UV light, it is also re-used on new FieldTurf fields. There is no practical limit to the number of times the sand can be recycled in a new field.

Cryogenic SBR (rubber)

The cryogenic rubber from field is currently being used as road base fill, ballast in highway crash barriers and, after being sanitized with UV light, it is repackaged and re-used on new FieldTurf fields. The rubber will maintain its beneficial characteristics for approximately 25 years in a field. Therefore, FieldTurf expects to be able to re-use the the same cleaned rubber on 2-3 different fields before recycling it as road base fill or in similar applications.

FieldTurf's Statement on 100% Recyclability

8) Does the surface at Maple Park harm the environment by eliminating the normal CO^2 absorption of natural grass?

It is well known that grass, plants and trees absorb CO^2 from the atmosphere and sequester carbon in their roots, stalks and trunks. Larger and faster growing organic systems, such as pine trees, are particularly effective in this regard. So, it is logical to assume that the synthetic surface at Maple Park would reduce the healthy absorption of CO^2 in the area.

The absorption of CO^2 is only half of the carbon cycle with plants and grasses. Gardeners and turf managers know that, when these systems decay, they release nutrients into the soil, and heat and sequestered carbon, in the form of CO^2, back into the atmosphere. This is the principle behind "grass cycling" or allowing grass clippings, which decay rapidly, to remain in the grass as a natural fertilizer. Furthermore, with grass in Ridgewood, the carbon sequestration process primarily occurs during the growing seasons (not year-round). The final issue is the health of the grass. Lush thick grasses will absorb more CO^2 (and give more back when mowed). However, fields with large dirt areas and thinned, over-stressed grass absorb and give off a comparatively small amount of CO^2.

A 2008 article in the Boston Globe discusses the organic decay process when describing Boston's plans to harness the biogases released in this process to generate "environmentally friendly" electricity. Jerry Hannan, PhD, a retired researcher from the Naval Research Laboratories in Washington, D.C., who now works with the Environmental Protection Agency, cautions people to keep the issue of carbon sequestration in perspective. He states that "grass absorbs CO^2 but only on a short term basis. Grass clippings decompose or are eaten, but in a relatively short time much of the carbon is released back into the atmosphere as CO^2."

As a result, natural grass fields that are mowed regularly (Maple Park was mowed once per week for 36 weeks out of the year) offer no meaningful "net" CO^2 absorption. According to the Cornell University Turfgrass Times *(2008 Issue 2, Volume 19, Number 2),* a newsletter published by the New York Greengrass Association, "managed turf (such as a golf course) is a carbon sink. Trees are an even greater carbon sink. Native vegetation and grassland is neutral."

Large trees and bodies of water, such as oceans, are the primary storehouses of CO^2. Lawns and grass athletic fields are approximately carbon neutral. As is also evident in the video, which documents the construction at Maple Park, the former field had large areas of bare dirt and was not a lush grass field during the spring and fall growing seasons. This would have further diminished the effectiveness of CO^2 absorption at Maple Park. While the new surface at Maple Park is synthetic, the previous grass field would have had a low CO^2 absorption rate and, like all athletic fields, would have been approximately carbon neutral due to the normal carbon cycle. REAC believes that the new surface at Maple has resulted in a negligible net decline in CO^2 absorption.

It was also pointed out that five rotting trees (net producers of CO^2) were removed at the site along with scrub brush (which died every fall) along the east side of the park. These were replaced with thick grasses and thriving new gardens, including 15 fast growing Norwegian Spruce trees. The new trees are 15'-18' tall and will grow to about 50'. These landscaping changes are not part of the turf design. But, they provide a "net gain" in CO^2 absorption at the park, as a result of the project. According to the Department of Parks and Recreation, the new landscaping was a critical component in the plan to revitalize and beautify Maple Park. "The new field surface and landscaping were complementary and were part of the plan from day one", said Tim Cronin. The whole park is now more attractive, more functional and more environmentally friendly. As a result, a grant was received to extend the landscaping between Maple Park and Graydon Pool. That project was completed in the fall of 2009.

If Ridgewood considers additional synthetic fields in the future, REAC strongly recommends that beneficial landscaping be required as part of the project(s). REAC believes that it is possible to complement Ridgewood's natural grass fields with synthetic fields in an environmentally sensitive way that also can improve the aesthetics of the surrounding area, as was done at Maple Park.

Boston: Urban Decay Redefined 2008
Cornell University Turfgrass Times (CUTT)
J. Hannan 1997 - Your Role in the "Greenhouse Effect" (in response to public ignorance on scientifc matters)
"Photosynthesis" - David Oakly Hall & K.K. Rao, Institute of Biology
Maple Park Construction Video

9) Is the field design at Maple Park suitable in the flood plain?

To understand why one would consider locating a synthetic field in a flood plain, REAC summarized the fundamental need for athletic fields in Ridgewood. Most of Ridgewood's largest and most heavily used athletic fields (Maple Park, Veterans Field, Stevens Field, RHS Stadium Field and Brookside Field) lay in a flood plain. In the early 1900s the current site of Veterans Field, Stevens Field and RHS Stadium Field were the site of the Ridgewood Golf Club and the area between Stevens Field and RHS Stadium Field was a swamp that was converted to a large pond. Due to rapid residential development around this area in the following years, available land for athletic field use was limited. This condition still exists 100 years later.

However, the demand upon the fields has expanded exponentially in the last 20 years and continues to grow. According to page 20 in Schoor DePalma's report to Ridgewood in the latest draft of the Comprehensive Parks, Fields, Facilities and Recreation Master Plan (June 23, 2008), "the combined acreage (for park and active recreation space) of the Village park system properties, Board of Education properties, and County facilities/parks…cannot adequately support the existing or future population." The conclusion was based on the National Recreation and Park Association Core System calculation, which showed that Ridgewood had only 80% of the necessary acreage. According to Schoor DePalma, this condition is compounded by the fact that Ridgewood's school age population is 25%, as compared to the national average of 18%, and Ridgewood has one of the largest combined youth sports programs in NJ. With no new acreage available, the response has been to consider ways to use existing fields more efficiently. This was the motivation to convert Maple Park to a synthetic surface, before the Schoor DePalma recommendations were made.

Latest Version of Ridgewood Master Plan - June 23, 2008 (takes several minutes to download)

REAC took a step back to understand what issues a flood plain presents for an athletic field. Because of the flood plain location, these fields are not usable much of the time. The average monthly precipitation when the fields are in use is 4.51" and, according to the sports organizations in town, it is not uncommon for the fields to be closed for 30% or more of their scheduled time on the various fields in a season.

Maple Park's old drainage system consisted of a French Drain perimeter drain system with a single collection point that drained into the Ho-Ho-Kus Brook. There was no "crown" on the field to allow water to flow toward the perimeter. Because of the flood plain, the water table at Maple Park is shallow (36"-50" below the surface) and the field was quickly saturated, causing inefficient drainage. Ridgewood was required to conduct an engineering study at Maple Park prior to NJDEP approval of the project. According to the engineering study performed by Neglia Engineering Associates in July 2005, the soil samples exhibited slow surface runoff. Like all the fields in the flood plain, this left Maple Park vulnerable to damage from over-usage, caused by the shortage of fields and demand from Ridgewood's above average school age population. In their presentation, titled, "Natural Grass Athletic Fields for High Schools", The Sports Turf Managers Association (STMA), an industry group that advocates the use of natural grass fields, notes that standing water and overusage are problems with grass athletic fields in parks, schools and colleges that can "lead to compaction and bare areas, which can cause a surface to be unsafe and unplayable." The Maple Park Construction video shows this is precisely the condition that existed with the old grass field. According to, Dr. A.J. Powell, a natural grass advocate and turfgrass agronomist with the University of Kentucky, "the fact is, we have never been able to manage grass that would take the kind of wear we now want to give it."

Flood conditions are not required for our flood plain fields to become "unplayable". However, in flood conditions, which occur every 1-2 years in Ridgewood, fields in the flood plain may be unplayable for several days, while the surface at Maple Park has been playable within hours after flooding. During normal heavy rains that routinely close our grass fields there has been no disruption of use at Maple Park.

Sports Turf Managers Association
Maple Park Construction Video

REAC wanted to know what makes this possible and reviewed the design of the field at Maple Park.

The new field at Maple Park is surrounded by a 12” high concrete curb. The natural soil inside the curb was compacted to 95% Proctor and graded. The surface of the natural soil is about 1” above the bottom edge of the curve. A couple of feet inside the curb, a 2’-3’ perimeter drainage trench was dug (total of 1,650’ of trench included a section under the baseball field). A non-woven geotextile lining that filters soil particles and allows water to flow through is laid on top of the natural soil and the perimeter drainage trench surface. In effect, this created a large “tub” to hold water and drain into the water table at a controlled rate.

A 6” foundation of large stone fill was then compacted in the trench and an 8” perforated drainage pipe was laid into the trench with 42 connection points. Sleeves extend at an angle from the connection points to the height of the natural soil beneath the field surface. The remainder of the drainage trench was filled with large stone fill and compacted, leaving the sleeve ends exposed.

Then 4,140’ of flat drain channel membrane (1” X 12”) was laid across the surface in a herringbone pattern and connected to the perimeter drain sleeves. Once the drainage connections were complete, the entire tub inside the curb was filled with approximately 6” of compacted and graded large stone fill. Above that is a 2” layer of fine top stone, which was compacted and graded to the design specifications with a laser guided grader. This is the permanent portion of the drainage system.

The synthetic fibers (2.5”) and backing are laid on the top stone, stretched and secured to the curb. Then several layers of sand are tufted into the fibers (approx 0.25”). Then an equal mix of similarly sized cryogenic rubber and sand are tufted into the fibers (approx. 1”) with alternating layers. Finally, a top layer of slightly larger sized cryogenic rubber is tufted into the fibers (approx. 0.5”). The infill process required approximately 20 layers of sand and rubber infill. The completed field and drainage system at Maple Park is essentially a 95,000 square foot water detention basin with a total volume of approximately 105,000 cubic feet below the infill layers.

Neglia Engineering Associates’ study calculated peak storm water runoff rates of 0.65cfs for a 2-year storm event and 3.08cfs for a 10-year storm event. The new storm water design resulted in peak storm water runoff rates of 0.03cfs for a 2-year storm event and 0.18cfs for a 10-year storm event.

There are several keys to Maple Park's ability to handle large volumes of water in a short period of time, while dramatically reducing the storm water runoff rates. First, according to FieldTurf, the system drains much more effectively than the previous natural soil because of the 8" stone base below the sand and rubber infill. Secondly, the drain channels below the stone base can rapidly move the water to the perimeter drain trenches. Thirdly, as the water flows into the perimeter drain trenches, it is stored there and drains slowly into the water table until approximately 8" of water (approximately 20,000-25,000 gallons) has collected in the trench. Only then does the water begin to flow into the drainage pipes and into the Ho-Ho-Kus Brook. Finally, the stone base under the field has the ability to hold hundreds of thousands of gallons of water. This means that a significant amount of water will be contained in the stone base beneath the field before the drainage trenches approach a level, at which they will begin to drain. The result is that during most rain events in Ridgewood, Maple Park does not drain any water at all into the Ho-Ho-Kus Brook. It should be noted that a natural grass field could employ a similar drainage design to achieve similar drainage results, particularly if the top soil blended with sand and is routinely top dressed with new sand. However, the previously noted environmental benefits of the turf surface would not be realized. None of Ridgewood's grass fields employs the sophisticated drainage system used at Maple Park.

Neglia Engineering Associates' engineering study summarized the storm water design as follows. The design premise will "provide temporary storage and will facilitate infiltration. Rainfall that would otherwise runoff the grassed areas is retained on site for a longer period of time, thus allowing more water to be infiltrated during small storm events. During larger storm events, or 'back to back' small storms, the area will act as a small detention basin and will discharge to the existing storm water collection system upon reaching saturation, in a manner similar to the existing grassed field."

Based on REAC's understanding of the "engineered" storm water management system at Maple Park, REAC believes it is a significant improvement over the previous natural soil and French Drain system. The significant reduction in runoff rates is a clear indication of the site's ability to handle vastly greater quantities of storm water over shorter periods of time. While extreme events can still cause the site to flood, this is due to conditions where the Ho-Ho-Kus Brook breaches its banks, rather than saturation of site itself. This condition is infrequent. Although, as we have witnessed in 2007, when it does occur, the new storm water design will accommodate the flood water in a matter of hours and be available for use with minimal disruption.

Cascia Hall Preparatory School in Tulsa has a multi-decade history of catastrophic flooding with its football field along the Arkansas River. In September 2007 they installed a FieldTurf field. Their experience in “the strictest flood control district in the country” (see link below) supports the belief that the storm water design at Maple Park will continue to be effective in our conditions.

As a final note, REAC was concerned that the rubber infill will wash off the field during storm events. In reality, the cryogenic rubber used at Maple Park does not float, since air pockets are eliminated during the cryogenic process. If a condition of “rushing water” existed, it might be possible for a small amount of rubber to be carried off the surface, similar to sand or dirt. However, overflow from the Ho-Ho-Kus Brook does not create a “rushing water” condition at Maple Park or any of the fields in the flood plain. Therefore, REAC does not believe that this represents a basis for environmental concern in Ridgewood.

One issue that was raised by the sports groups and RHS coaches was that overflow conditions could result in debris being deposited on the field surface. According to FieldTurf, such debris should be removed from the surface as soon as possible, as with grass fields. If dirt is deposited into the infill, it can reduce the drainage capacity advantage of the field over natural grass. If addressed promptly, this condition is easily corrected with the proper maintenance equipment. The Department of Parks and Recreation confirmed that they have the necessary equipment to deal with this issue and are aware of the proper procedure. Simple routine grooming and maintenance once or twice a season is required to keep the field surface in peak condition,depending on usage.

In conclusion, REAC believes that the synthetic turf and drainage system at Maple Park is a viable alternative to natural grass fields in Ridgewood’s flood plain. Furthermore, the Village’s experience at Maple Park demonstrates that there are significant environmental and functional advantages with this system over the previous natural grass field. Based on the experience at Maple Park, there does not appear to be evidence for environmental concern about these fields in Ridgewood’s flood plain.

"Winning Over the Skeptics" - Athletic Facility Design (FieldTurf case study reprint)
Maple Park Construction Video

APPENDIX

Ridgewood Environmental Advisory Committee (REAC)
Evaluation of Temperature Measurements at Recreational Facilities in Ridgewood, NJ

July/August 2009

CONCERNS

Media attention during 2008 in New York, Connecticut and New Jersey regarding the potential dangers of heat exposure from synthetic turf fields has added new fuel to the debate over the popularity of synthetic fields. It has been asserted that synthetic fields in New York City are "heat islands" that can reach 160 ºF, contributing to global warming. Even the world's leading manufacturer of synthetic fields admits that the surface temperatures on their fields can be higher than surface temperatures for natural grass under similar conditions.

Given Ridgewood's proximity to New York City, REAC was alarmed by claims of temperatures in excess of 160º F. REAC measured the temperature at Maple Park in comparison to other recreational surfaces in Ridgewood under "high heat" conditions in July and August, in order to document actual results "from our own experience". The testing methodology is summarized in the background information on page 28. REAC's concerns are detailed simply below:

A. Does the synthetic turf surface at Maple Park in Ridgewood, NJ reach temperatures, which might pose an unusual health risk for athletes and spectators, particularly youth athletes? If so, should special precautions be undertaken at Maple Park?

B. Do elevated ambient air temperatures from the surface at Maple Park pose an environmental concern, when compared to the natural grass at the RHS Stadium Field?

BACKGROUND INFORMATION

Outdoor recreational facilities in Ridgewood, NJ are used from March through November, with highest usage during six school months in the spring (March - June) and fall (September - November).

Ridgewood's record high temperature is 102ºF, recorded in July 1966. [1]

June through September have the highest "record" temperatures in Ridgewood (average "record" in this period is 99ºF). Ridgewood has not seen a new record high during any of these months in over 21 years.[1] The average "mean" temperature during these months is 69ºF. The average "high" temperature during these months is 89ºF.

- **June:** Average Mean = 68ºF / Average High = 79ºF / Record High (1957) = 98ºF
- **July:** Average Mean = 73ºF / Average High = 84ºF / Record High (1966) = 102ºF
- **August:** Average Mean = 71ºF / Average High = 82ºF / Record High (1988) = 98ºF
- **September:** Average Mean = 64ºF / Average High = 75ºF / Record High (1980) = 98ºF

Average monthly rainfall in Ridgewood from March through November is 4.51". Highest average is May (5.14").[1]

No "heat related" injury, resulting from high surface temperature on any surface, was reported to REAC by Ridgewood High School or Ridgewood youth sports groups during this 10-month study. It is REAC's understanding that no such injury has been reported at Maple Park, since the installation of the synthetic surface in 2006.

REAC evaluated five different facilities, representing outdoor recreational surfaces used in Ridgewood:

- Ridgewood High School Tennis Courts (asphalt)
- Ridgewood High School Running Track (rubberized surface)
- Ridgewood High School Stadium Field (natural grass)
- Maple Park Field (synthetic "infill" turf)
- Maple Park/Graydon Parking Lot (black top asphalt similar to roadways used by joggers)

Temperature readings were taken on three days between July 5th and August 15th (2009). Days with near or above average temperatures and bright sun were selected to sample "worst case" scenarios. Three simultaneous measurements were taken; **1)** surface temperature (infrared reading), **2)** 12" height above the surface (thermometer) and **3)** 39" height above the surface (thermometer). The measurements were taken close to highs for the day within 45 minutes of each other and the sequence of the measurements was different on each day. The 39" height was intended to approximate the chest/head height of an elementary school age athlete. The air temperature on the three days ranged from 81ºF to 94ºF. The average was 86.3ºF, which exceeds the average monthly "mean" temperature for June through September in Ridgewood above by 25% and exceeds the Average "high" by 7.87%. [1, 2]

1) Source: *The Weather Channel - Ridgewood, NJ Monthly Averages* , *The Weather Channel - Ridgewood, NJ Monthly Mean Table*

2) The measurements were taken with two Taylor outdoor thermometers and a General Tools digital infrared thermometer heat gun

FINDINGS

(for details, see video links, table and chart on pages 32-34)

- The highest surface temperatures were recorded at the RHS Tennis Courts (148ºF) and RHS Track (137ºF). The average surface temperatures at these locations were up to 14.8% hotter than the average surface temperature at Maple Park (114.4ºF).
- Natural grass at the RHS Stadium Field had the lowest average surface temperature (87.4ºF). The natural grass field was also the only surface, which had average ambient air temperatures above the surface, which were higher than the average surface temperature.
- Shoe soles (particularly rubber-sole sneakers, cleats, etc.) insulate virtually all surface heat and no difference in surface temperature or discomfort was "felt" by the evaluators on any of the surfaces on any day. [1, 2]
- At heights of 12" and 39" above the surface, the average ambient air temperatures measured at all five facilities were between 4 - 12ºF higher than the average general air temperature.
- Despite the wide variance in average surface temperatures, the difference in average ambient air temperatures measured above ALL the surfaces were within 8ºF of each other at 12" above the surface and within 5ºF of each other at 39" above the surface. The average air temperature cooled dramatically within a few inches above the surface. The average air temperature was over 17.5% lower than the surface temperature at 12" above the surface and almost 18% lower at 39" above the surface.
- The average ambient air temperatures measured at the natural grass at the RHS Stadium Field and the surface at Maple Park Field were virtually identical (within 3ºF) at heights of both 12" and 39" above the surface. These differences were undetectable without thermometers.
- Partial clouds, light wind (and rain) can significantly lower the surface temperature on natural grass and synthetic turf. The more exposed a surface is (lack of trees or structures surrounding the surface), the greater the effect tends to be, particularly from wind. Under any combination of these conditions, the ambient air temperatures of natural grass and synthetic turf tended to be more similar in our measurements.

1) The sole of the the shoes insulated the surface temperature from the feet.

2) On July 12th, the highest surface temperatures were measured at Maple Park (127.5ºF). However, a number of children were playing wiffle ball on the synthetic turf surface in bare feet and reported no discomfort when asked if it was too hot (see video).

CONCLUSIONS

- REAC's average measurements indicated that the surface at Maple Park Field was 35% (approx. 30ºF) hotter than the natural grass surface at the RHS Stadium Field, under similar conditions.
- The average measurements indicated that the surfaces at the RHS Tennis Courts and the RHS Track, two frequently used and well accepted recreational facilities (from a safety perspective), were 50% (44ºF) hotter than the natural grass surface at the RHS Stadium. This has never been a health, safety or environmental problem in Ridgewood.
- The ambient air above the surfaces is a result of air temperature and radiated heat (from the sun and the surface). Thus, the ambient air determines an athlete's or spectator's "perception of heat." Our evaluation clearly showed that the surface temperature, by itself, has little impact. Thus, concern over elevated surface temperature appears to be misleading. REAC's average ambient air measurements at each facility were consistently similar, regardless of the surface type or temperature. In particular, the measurements taken at 12" and 39" above the natural grass at the RHS Stadium Field and the surface at Maple Park Field were extremely similar. The average difference was 3ºF or less. A contributing factor may be the high trees, which surround Maple Park providing more wind blockage than at the RHS Stadium Field. The negligible differential in the ambient air measurements do not suggest any basis for health or safety concern between the two surfaces.
- The ambient air temperature above the surface at Maple Park appears normal and does not suggest a basis for environmental concern that would have an adverse impact on the surrounding area.
- Experts agree that synthetic surfaces will be hotter than natural surfaces for several reasons. The specific relative temperatures are a direct function of the local climate conditions. Unlike other parts of the country, Ridgewood's seasonal climate has only resulted in air temperatures in excess of 100ºF once in the last 100 years. It is unrealistic to expect surface temperatures to approach those reported in hotter climates. The surface and ambient air temperatures above the surface at Maple Park are well within the historically acceptable and safe levels experienced at other recreational surfaces in Ridgewood and, thus, do not reach levels that appear to be abnormal or unsafe. REAC's documented measurements of the surface at Maple Park sharply contrast with claims that have been publicized in the local press in recent years about synthetic turf.

CONCLUSIONS

- REAC took measurements during periods of above average daily temperatures in Ridgewood (average temperature was 25% above the mean temperature for June, July, August & September) and found no evidence to suggest that the surface at Maple Park generates a heat condition that poses an unusual health risk to athletes or spectators even under these elevated summer conditions.
- Under historically experienced conditions during the fall and spring months when Maple Park Field is most heavily used, REAC expects the ambient air and the surface temperatures at Maple Park Field to be considerably lower than were measured in this evaluation and, further, to be normal and similar to that of natural grass at other fields in Ridgewood. Therefore, REAC recommends that, during periods of unusually high temperatures, the same precautions to reduce heat exposure and remain hydrated that are followed on any natural grass field also be followed at Maple Park. There is no need to cool the field surface itself.

VIDEO DOCUMENTATION/COMMENTARY OF MEASUREMENTS

Video Links:

July 5, 2009 Temperature Readings

July 12, 2009 Temperature Readings

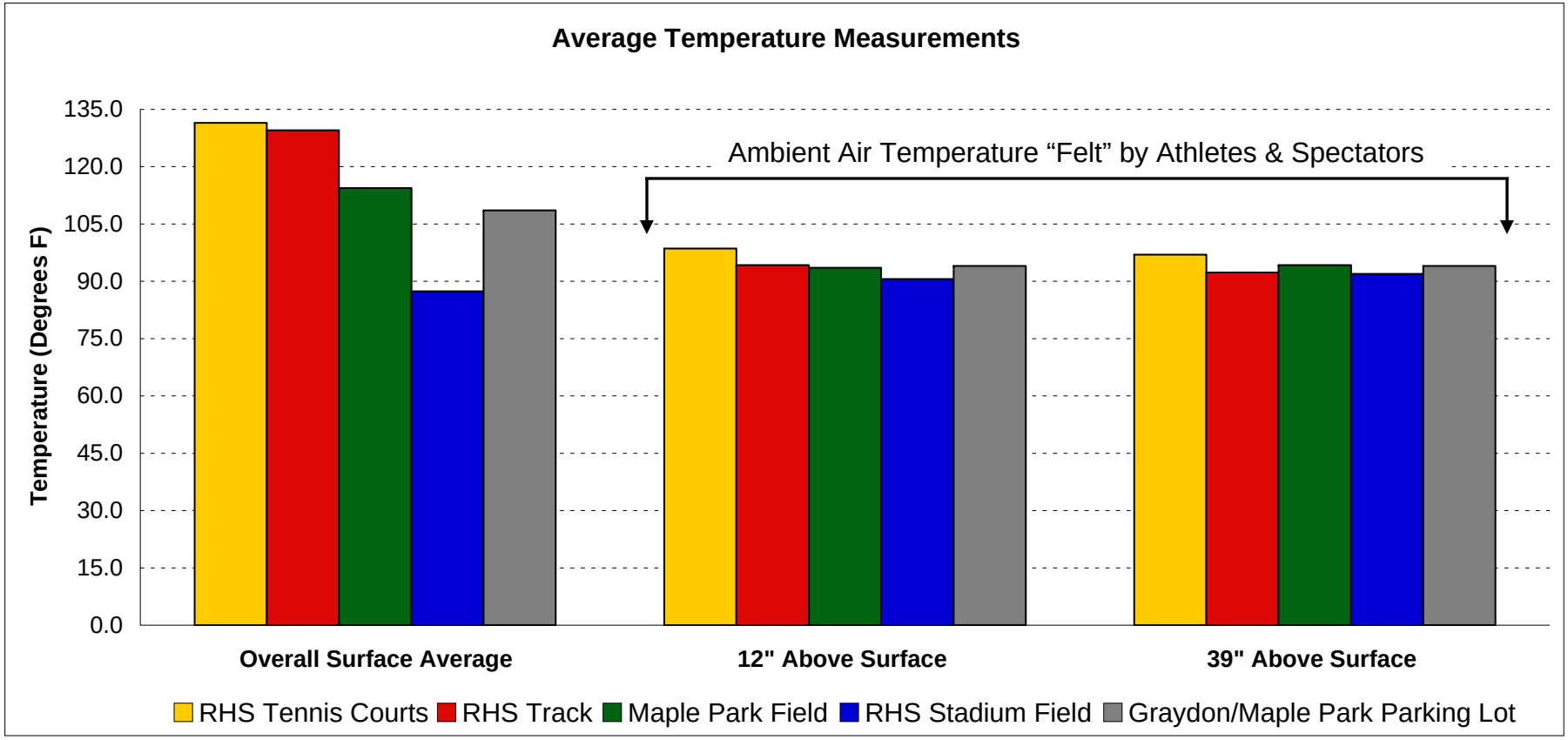
August 15, 2009 Temperature Readings

Additional Links:

Brigham Young Surface Temperature Study 2002

Milone & MacBroom Environmental Study 2009

LOCATION	RHS TENNIS COURTS	RHS TRACK	MAPLE PARK FIELD	RHS STADIUM FIELD	MAPLE/GRAYDON PARKING LOT
JULY 5, 2009					
Surface Type	**Asphalt**	**Rubberized**	**FieldTurf (October 2006)**	**Natural Grass**	**Asphalt (black top)**
Air Temperature	**81° F**	**81° F**	**81° F**	**81° F**	**81° F**
Weather	**Bright Sun/Scattered Clouds**	**Bright Sun/Scattered Clouds**	**Bright Sun/Scattered Clouds**	**Bright Sun/Scattered Clouds**	**Bright Sun/Scattered Clouds**
Wind	**Light**	**Light**	**Light**	**Light**	**Light**
Time	**2:20PM**	**2:35PM**	**2:50PM**	**2:40PM**	**3:05PM**
Surface "RED" (infrared digital meter)	135.5° F	134.5° F	102.5° F	N/A	N/A
Surface "WHITE" (infrared digital meter)	112° F	N/A	101° F	N/A	N/A
Surface "GREEN" (infrared digital meter)	136.5° F	N/A	106° F	77.9° F	N/A
Surface "BLACK TOP" (infrared digital meter)	N/A	N/A	N/A	N/A	114° F
12" Above Surface (outdoor thermometer)	94° F	91.5° F	86.5° F	86° F	94° F
39" Above Surface (outdoor thermometer)	92° F	88° F	86.5° F	86° F	92° F
JULY 12, 2009					
Surface Type	**Asphalt**	**Rubberized**	**FieldTurf (October 2006)**	**Natural Grass**	**Asphalt (black top)**
Air Temperature	**84° F**	**84° F**	**84° F**	**84° F**	**84° F**
Weather	**Bright Sun/No Clouds**	**Bright Sun/No Clouds**	**Bright Sun/No Clouds**	**Bright Sun/No Clouds**	**Bright Sun/No Clouds**
Wind	**Breezy**	**Breezy**	**Breezy**	**Breezy**	**Breezy**
Time	**12:45PM**	**12:40PM**	**12:15PM**	**12:35PM**	**12:25PM**
Surface "RED" (infrared digital meter)	134.5° F	117° F	N/A	N/A	N/A
Surface "WHITE" (infrared digital meter)	114° F	N/A	N/A	N/A	N/A
Surface "GREEN" (infrared digital meter)	132.5° F	N/A	127.5° F	88.5° F	N/A
Surface "BLACK TOP" (infrared digital meter)	N/A	N/A	N/A	N/A	88.5° F
12" Above Surface (outdoor thermometer)	93° F	88° F	90.5° F	88° F	88° F
39" Above Surface (outdoor thermometer)	89° F	86° F	90° F	88° F	88° F
AUGUST 15, 2009					
Surface Type	**Asphalt**	**Rubberized**	**FieldTurf (October 2006)**	**Natural Grass**	**Asphalt (black top)**
Air Temperature	**94° F**	**94° F**	**94° F**	**94° F**	**94° F**
Weather	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**
Wind	**Light**	**Light**	**Light**	**Light**	**Light**
Time	**3:02PM**	**2:50PM**	**3:14PM**	**2:56PM**	**3:10PM**
Surface "RED" (infrared digital meter)	146° F	137° F	118.5° F	N/A	N/A
Surface "WHITE" (infrared digital meter)	126.5° F	N/A	N/A	N/A	N/A
Surface "GREEN" (infrared digital meter)	145.5° F	N/A	121.5° F	95.7° F	N/A
Surface "BLACK TOP" (infrared digital meter)	N/A	N/A	N/A	N/A	123.5° F
12" Above Surface (outdoor thermometer)	109° F	103° F	104° F	98° F	100° F
39" Above Surface (outdoor thermometer)	110° F	103° F	106° F	102° F	102° F
3 DAY AVERAGE					
Surface Type	**Asphalt**	**Rubberized**	**FieldTurf (October 2006)**	**Natural Grass**	**Asphalt (black top)**
Air Temperature	**86.3° F**	**86.3° F**	**86.3° F**	**86.3° F**	**86.3° F**
Weather	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**	**Bright Sun/Partly Cloudy**
Wind	**Light**	**Light**	**Light**	**Light**	**Light**
Time	**2:02PM**	**2:01PM**	**2:06PM**	**2:03PM**	**2:13PM**
Surface "RED"	138.6° F	129.5° F	110.5° F	N/A	N/A
Surface "WHITE"	117.5° F	N/A	N/A	N/A	N/A
Surface "GREEN"	138.2° F	N/A	118.3° F	87.4° F	N/A
Surface "BLACK TOP"	N/A	N/A	N/A	N/A	108.6° F
OVERALL SURFACE AVERAGE	**131.4° F**	**129.5° F**	**114.4° F**	**87.4° F**	**108.6° F**
12" Above Surface	**98.6° F**	**94.2° F**	**93.6° F**	**90.6° F**	**94° F**
39" Above Surface	**97° F**	**92.3° F**	**94.2° F**	**92° F**	**94° F**


Average Temperature Measurements
Temperature (Degrees F)
135.0
120.0
105.0
90.0
75.0
60.0
45.0
30.0
15.0
0.0
Ambient Air Temperature "Felt" by Athletes & Spectators
Overall Surface Average
12" Above Surface
39" Above Surface
RHS Tennis Courts
RHS Track
Maple Park Field
RHS Stadium Field
Graydon/Maple Park Parking Lot

Full List & Additional Informational Links of Interest

Penn State Center for Sports Surface Research
FieldTurf Product Overview
Maple Park Construction Video
Sports Turf Managers Association
Latest Version of Ridgewood Master Plan - June 23, 2008 (takes several minutes to download)
Boston: Urban Decay Redefined 2008
Cornell University Turfgrass Times (CUTT)
J. Hannan 1997 - Your Role in the "Greenhouse Effect" (in response to public ignorance on scientifc matters)
"Photosynthesis" - David Oakly Hall & K.K. Rao, Institute of Biology
NYC Scientific Panel Discussing "Absurdly Unrealistic" Risk of Lead Exposure - May 5, 2008
Brian Williams on NBC: Turf is Safe According to CPSC - July 30, 2008
"The Record" Reverses and Reports Turf Not Dangerous - Franklin Lakes, NJ - July 30, 2008
NY Department of Environmental Conservation Crumb Rubber Infilled Field Report - May 2009
Clean Washington Center (CWC) Best Practice - Ambient vs. Cryogenic Grinding
FieldTurf Q6 Quality Control
CA Office of Environmental Health Hazard Assessment (CA EPA) - July 2009
U.S. EPA Website - Sources of Nonpoint Pollution
Potential LEED Credits for FieldTurf Installations
"Winning Over the Skeptics" - Athletic Facility Design (FieldTurf case study reprint)
"LEED-ing the Way" - Athletic Facility Design (FieldTurf case study reprint)
NY Department of Health Fact Sheet On Rubber In Filled fields
Milone & MacBroom Comprehensive Turf Study 2009
King County (Seattle) Water & Land Resource Division Evaluation of Environmental Risks
Penn State MRSA Study
NBC News Report (Dublin, OH) on AJSM Article Concluding That Natural Grass Causes More Serious Injuries Than Turf
5-Year Meyers & Barnhill Texas HS Football Study 2004 - American Journal of Sports Medicine, Vol. 32, No. 7
2-Year NCAA Soccer Study 2007 - British Journal of Sports Medicine
FieldTurf Maximum Safety & Performance (MSP) Standard Video
FieldTurf's Statement on 100% Recyclability
The Weather Channel - Ridgewood, NJ Monthly Averages
The Weather Channel - Ridgewood, NJ Monthly Mean Table
July 5, 2009 Temperature Readings
July 12, 2009 Temperature Readings
August 15, 2009 Temperature Readings
Brigham Young Surface Temperature Study 2002

REAC Synthetic Turf Assessment Sub-Committee (alphabetical)

Bayard DeMallie	- Vice President, Morgan Stanley - Worked extensively with Maple Park renovation effort
Robin Gardner, CEC	- President, Phoenix Life Coaching - Member of Ridgewood Chamber of Commerce - Developed REAC Consumer Guide for Selecting Landscaping Contractors
John Halenar	- Environmental writer and consultant (clients include Amtrak, the Gaia Institute, Scenic Hudson, and the New York State Recycling Association - Former Manager of Environmental Issues, Verizon Information Services
Michele Lenhard	- Ridgewood Board of Education Representative to REAC
George Wolfson	- Retired from Waste Management - Over 30 years experience in business development and general management in the recycling and maritime transportation industries