

Synthetic Field Turf

Are the benefits worth the environmental and health risks?



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A special thanks to:

- Meghan Bullock
- Maida Galvez, MD, MPH
- Perry Sheffield, MD, MPH

For all their help with data and pictures

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In The News

CITYWIDE
The New York Times
 Monday, August 13, 2007

On Playing Fields, Grass Is an Endangered Species



The Record Critics worry about artificial turf's impact on ecosystem

Friday, November 23, 2007

By COLLEEN DISKIN
 STAFF WRITER

All those artificial fields being put down in North Jersey may be harmful to the environment and the athletes who use them, researchers say.

Researchers, environmentalists and grass seed and sod companies are concerned that athletes are exposed to chemicals while playing on the turf. They worry about the impact these fields have on the surrounding ecosystem. Some even believe the fields contribute to global warming.

"In the past five years more and more of these turf fields have been proposed, and more and more concerns have been raised," said Eileen Murphy, director of the division of science, research and technology for the Department of Environmental Protection.



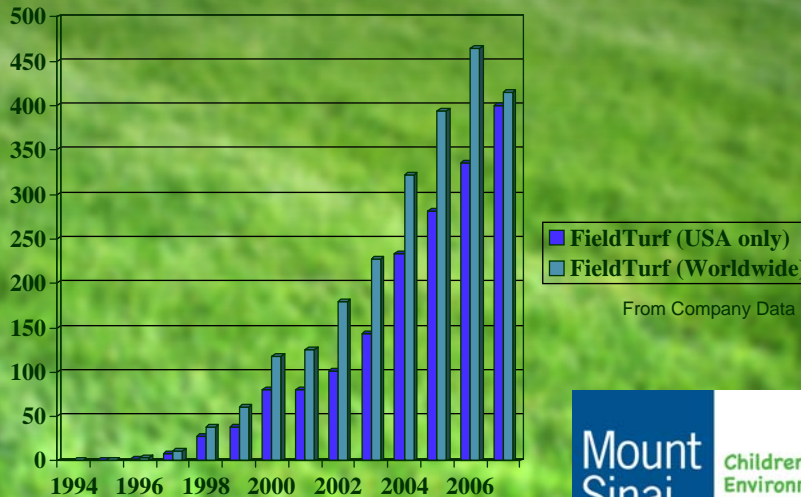
THOMAS E. FRANKLIN / THE RECORD

St. Joseph in Montvale is one of 27 North Jersey high schools with artificial turf. The fields use rubber granules from recycled tires.

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Growth of FieldTurf Installations



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Why the move to Synthetic Turf

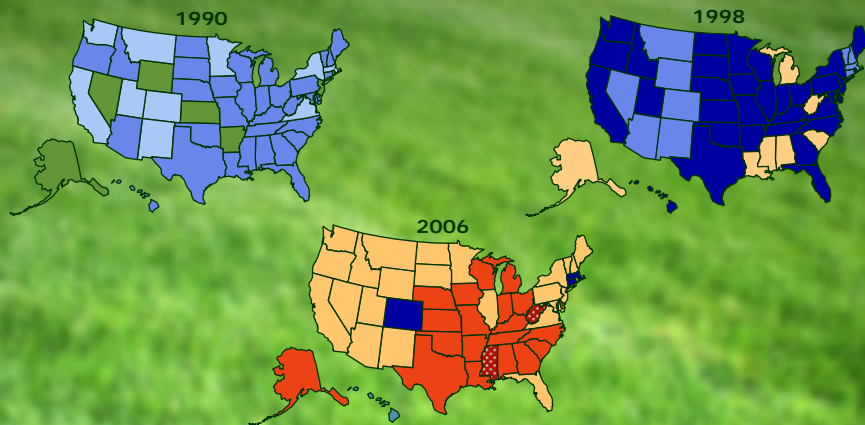
- Initial interest by Ford Foundation in 1950s as a means to improve access to playing fields and thus improve fitness
- 1st Generation AstroTurf (carpet like) - 1960s
 - Moses Brown - Prov, RI
 - Houston Astrodome
- 2nd Generation Turf (fibers and 'infill' rubber) - 1990s



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Obesity Trends* Among U.S. Adults

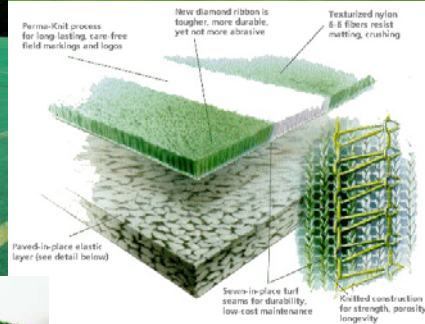
(*BMI ≥ 30 , or about 30 lbs. overweight for 5'4" person)



No Data <10% 10%–14% 15%–19% 20%–24% 25%–29% $\geq 30\%$

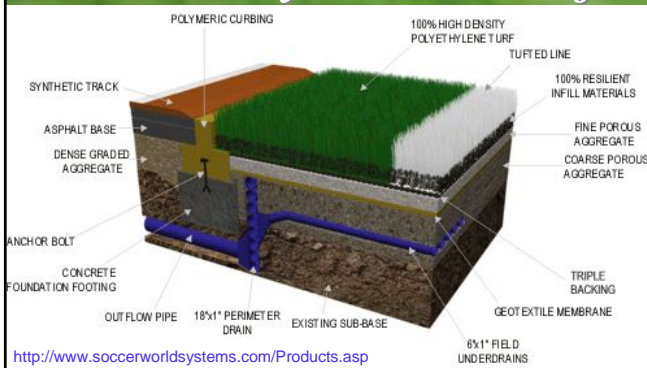
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AstroTurf - The Original



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Modern Synthetic Turf Design



<http://www.soccerworldsystems.com/Products.asp>



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Infill Rubber

- Rubber pellets
 - Ethylene Propylene Diene Monomer rubber (EPDM)
 - Block copolymers
 - Styrene and Butadiene (TPE-S)
 - Styrene Butadiene rubber (SBR)
 - 1mm diameter
- Sand mix sometimes
- New or from recycled tires
- Variable with different products



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Balancing Act

- | | |
|--|--|
| <ul style="list-style-type: none">▪  Field Use▪  Phys. Activity▪  Obesity▪ Water Conservation▪ Carbon Footprint▪ Use for Recycled Tires▪ Cost Savings | <ul style="list-style-type: none">▪ Local Heat Effects▪ Toxic Exposures on Fields▪ Toxin Exposures disbursed from Field▪ Environmental Heat effects▪ Environmental Toxin Contamination▪ Habitat Effects |
|--|--|

Benefits

Harms



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Potential Benefits of Synthetic Turf

- Decreased maintenance requirement
- All weather play → **Combat Obesity**
- Greater availability →
- No need for pesticides and fertilizers
- Resource conservation (fossil fuel and water)
- Lower long term costs
- Aesthetics
- Use for recycled tires

Potential Adverse Health Effects

- Toxic exposures from crumb rubber pellets:
 - zinc, lead, copper, chromium, cadmium, PAHs, phthalates, phenols
 - Routes of exposure and concern:
 - Volatilization - potential respiratory or MM irritation
 - Contact – Dermal absorption and irritation
 - Hand to Mouth - Ingestion
- Excessive Heat
 - Burns
 - Dehydration
- Injuries
- Increased 'turf burns'
 - Infection Risk

Evidence of Toxin Release

- Rutgers - 2006
 - NYC samples
 - PAHs leached from synthetic turf rubber pellets at levels 3x what is allowed in contaminated soil
 - Used solvents and nitric acid
- EHHI (CT - 8/07)
 - Demonstrated volatilization of phenols and PAHs at 60 degrees celcius
 - Zinc, Selenium, Lead, Cadmium were found in distilled water leachate after 7 weeks
 - Higher amounts when acidified water used

The lab conditions used may not accurately reflect real world conditions

Health Concerns

- Exposure to Toxins
 - Acute: Respiratory and Mucous Membrane Irritation
 - Chronic: Cancer and Neurotoxicity
- Excessive Heat
 - Dehydration
 - Heat Exhaustion
 - Burns
- 'Turf Burns' and MRSA Risk
 - CDC reported turf burns as a risk factor for MRSA infection in football players (MMWR August 22, 2003 / 52(33);793-795)
 - CDC reports cluster of MRSA infections in LA Rams Pro football players all associated with 'turf burns. (NEJM 2005 Kazakova et al.)

Injuries

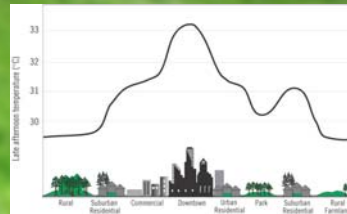
- 5-year Prospective comparison of injuries on natural grass and FieldTurf. (Meyers et al. 2004; 32; 1626*Am. J. Sports Med.*)
- Injury patterns differed:
 - Higher incidences of 0-day time loss injuries, non-contact injuries, surface/epidermal injuries, muscle-related trauma, and injuries during higher temperatures were reported on FieldTurf.
 - Higher incidences of 1- to 2-day time loss injuries, 22+ days time loss injuries, head and neural trauma, and ligament injuries were reported on natural grass.

On Field Temperatures

- University of Missouri Research - Brad Fresenburg.
University of Missouri
 - Ambient temp - 98 degrees
 - Synthetic Turf Surface Temperature - 173
 - Natural Grass Temperature - 105
 - Head Level Air Temperature - 138
- BYU Field study 2002 - Source: Williams and Pulley, Brigham Young University
 - One of the trainers received blisters through his training shoes
 - Artificial Turf Avg. 117, high of 157
 - Natural Grass Avg. 78, high of 88.5

Potential Environmental Effects

- Contribution to 'urban heat island'
- Leaching of chemicals and metals into water runoff - storm drains vs sewers
- Dispersal of 'infill' rubber to distant sites
- Lost habitat for insects and birds



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Cost Comparison - NYC

Figure 2 - Cost Comparison, Multi-use/Soccer Field³⁰

		Synthetic Turf	Natural Grass
Installation Costs (capital)	Per Field	\$1,365,000	\$690,000
	Expected Life Span (yrs)	10	5
	Installation Costs per Year (distributed over the projected lifetime of the field)	\$136,500	\$138,000
Annual Maintenance	Materials ³¹	\$0	\$750
	Lawn Mowing (equipment)	\$0	\$107
	Field Maintenance (equipment)	\$31	\$59
	Lawn Mowing (staff)	\$0	\$826
	Field Maintenance (staff)	\$1,239	\$10,864
	Staff Supervision	\$255	\$2,133
	Total Maintenance Cost	\$1,525	\$14,739
Total Cost per Field per Year		\$138,025	\$152,739

Estimates vary widely by source!

- Difference = \$14,714 per soccer field per year

Department of Parks & Recreation, Operations, 15 Dec. 2005. Costs were figured in 2004 and vary depending on site. Reproduced from NY4Ps a New Turf War

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Costs Not Considered

- Increased vacuuming or raking for heavily used fields
- Repairing loose seams or burns
- Disposal costs
- Potential environmental cleanup costs
- Cost variance by type of field (Soccer vs Baseball)

Alternative Natural Grass Systems

- Natural Grass Systems have evolved
- Key Features:
 - Selecting the right grass (prevailing weather)
 - Drainage System
 - Perforated pipe system
 - Pea Gravel or Sand
 - Root Zone Mix
 - Grass Seed or Sod

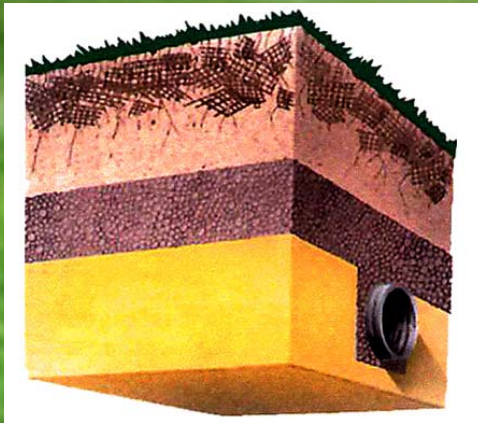
Improved Grass Varieties

- Dramatic rise in research on varieties for fields in the 1990s
- Improved Wear Tolerance
 - Increased shoot density
 - Increased strength of recovery
- Improved Shade and Heat Tolerance

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Great Lawn Renovation



www.strathayr.com.au/html/turf/stadia.htm
http://www.centralpark.com/pages/attractions/great_lawn.jpg

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Choices and Balance

- Compelling need for increased sports field access (Obesity, etc.)
- Advantages, disadvantages, and health risks of Synthetic Turf are still being evaluated
- Newer Natural Turf systems may not have been adequately considered in terms of costs and benefits.
- Decisions should carefully consider the use of fields to be replaced

Tips for safer use of turf fields:

- Do not use the turf fields on extremely hot days.
- Be sure to clean and monitor any "turf burns" obtained while playing.
- Attempt to remove all pellets from shoes and clothes prior to leaving the fields.
- At home, shake out your children's equipment and clothes in the garage or over the garbage.
- Have your child shower and wash thoroughly after playing on the field.

Thank You

Questions?

