



ARTIFICIAL TURF: *A REPORT CARD ON PARKS PROJECT*

An Independent Assessment of New York City's Neighborhood Parks



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New Yorkers for Parks is the independent organization fighting for greener, cleaner and safer parks in all five boroughs. We provide the tools that help communities build better parks for better neighborhoods. Great parks make a great city.

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WHAT IS THE REPORT CARD ON PARKS?

New Yorkers for Parks' *Report Card on Parks* was designed in 2002 as an independent inspection of the maintenance of neighborhood parks (less than 20 acres) in New York City's five boroughs. Unlike the more prestigious parks in the City, neighborhood parks typically depend on fluctuating public funding, which frequently results in insufficient maintenance. The first *Report Card on Parks*, evaluating and grading all the passive and recreational features in 200 neighborhood parks, was published in 2003.

In 2004 and 2005, New Yorkers for Parks (NY4P) published subsequent reports on the same 200 parks to measure and demonstrate the change in conditions. Between 2003 and 2005 the Department of Parks & Recreation (DPR) responded to key findings, including the recurring issue of locked park bathrooms, and subsequently, the average grade for these 200 parks improved slightly over time.

In 2005 *The Report Card on Parks* was honored by the Brookings Institution as an excellent community indicators project.

NY4P built on the success of the initial three reports by expanding *The Report Card on Parks Project*. In 2005 we published *The Mini Report Card on Parks*, which evaluated three poor-performing features – bathrooms, drinking fountains, and athletic fields – in a random selection of neighborhood parks three times over the summer. Similarly, in 2008 the *Spotlight on Recreation: A Report Card on Parks Project* focused on the progression of playground, court and field maintenance over the course of a summer. In 2007 and 2009 *The Report Card on Beaches* measured the conditions of the City's seven public beaches.

As in its inception, the strength of *The Report Card on Parks Project* derives from strong methodology resulting in hard, verifiable data. Policy recommendations to improve conditions are a key component of every report.

This new report, *The Report Card on Artificial Turf*, uses the same survey instrument first developed in 2002 to conduct park inspections for *The Report Card on Parks*. In this report, NY4P examines the conditions of artificial turf fields in parks less than 40 acres in the summers of 2008 and 2009. This structure allows us to measure the performance of these fields over the course of one year.

Since publishing our first annual *Report Card on Parks* in 2003, the survey has proven to be a useful tool for highlighting the conditions of different park features. NY4P hopes that each Report Card survey will inform interested communities as new issues arise. *The Report Card on Artificial Turf* adds to this larger body of research.

Why a Study on Artificial Turf?

Between New York City's continued population growth and public health concerns over the climbing rates of childhood obesity and diabetes, the demand for recreation in New York City parks has never been stronger. In response to the heightened demand for athletic fields and an increasingly tight maintenance budget, the Parks Department has installed 94¹ artificial turf fields and 17 artificial turf play areas across New York City since 1998. In addition to DPR's capital plans, Mayor Bloomberg's PlaNYC 2030 plan calls for replacing 21 asphalt fields with multi-purpose artificial turf by 2013². Proponents of artificial turf point to the following advantages: year-round and all-weather play due



John Mullaly Park, Concourse, Bronx

to drainage capabilities, decreased maintenance costs, versatility of the types of sports it can accommodate, and environmental benefits, since the turf requires no pesticides, herbicides, mowing or watering.

While the Report Card survey evaluates only the maintenance conditions of artificial turf, and not these other issues, the broad interest in more information about the benefits and drawbacks of turf led us to conduct this study. This report provides the only in-depth look at the maintenance of artificial turf in New York City parks.

Budget Concerns

The long-term budgetary benefits of artificial turf have yet to be fully realized. Data provided by DPR to New Yorkers for Parks for our 2006 policy paper “A New TurfWar” did not reveal a substantial financial benefit to using artificial turf. Further, the cost projections at that time did not include the cost of disposing of a turf field at the end of its lifespan³.

Conflicts within Communities

The installation of artificial turf has been debated in communities where some residents prefer natural grass and others support the installation of turf. In other cases, communities have been surprised by the installation of artificial turf fields in their local parks and are concerned that there is not enough public process during park design.

Environmental Concerns

Environmental groups have questioned the impact of artificial turf on stormwater runoff, air temperatures, and ecological habitats. A study conducted by the NY State Department of Environmental Conservation (DEC) found that the crumb rubber infill—made from recycled car and truck tires—used in most NYC parks has no negative impact on air or water pollution⁴. However, wherever the artificial turf has replaced natural grass fields, which cool the air, filter air and water pollutants and provide park-goers with a sense of nature, a variety of environmental services are lost.

Health & Safety Concerns

A number of safety concerns have been raised about artificial turf, including the impacts of inhalation of crumb rubber infill, contact with skin and increased air temperatures above turf fields. Recent studies have shown that crumb rubber fields pose no significant health risk to park users; however, DPR does recognize that air temperatures above the artificial turf fields are significantly hotter than those above natural grass surfaces. Current DPR policy requires heat warnings to be posted in all parks with artificial turf fields.

New York City Council Legislation

In an acknowledgement of persistent environmental and health concerns, the New York City Council passed legislation in May 2010 calling for review of all new surfaces of playing fields and playgrounds prior to their installation⁵.

All of these issues led NY4P to focus our 2008 and 2009 inspections on artificial turf.



Alexander-Hamilton Metz Memorial Field, Prospect Lefferts Gardens, Brooklyn
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High Lead Levels at Manhattan Turf Field

Following a routine inspection, lead was identified on two artificial turf fields in New Jersey in 2008, leading to national attention on this issue. The growing concern as well as pressure from park and public health advocates led the City to conduct tests for lead and other hazardous chemicals on artificial turf surfaces in NYC parks. Elevated lead levels were detected in the crumb-rubber field in Thomas Jefferson Park in December 2008. The Parks Department closed this field immediately. The field in Thomas Jefferson Park was the only artificial turf field exceeding the EPA’s criteria for lead in playground soil, and as a consequence the Parks Department replaced this field in early 2009. Though the park was originally included in this study, the field replacement made it impossible to compare results from our 2008 and 2009 survey periods, and Thomas Jefferson Park was therefore dropped from consideration in this study.

ARTIFICIAL TURF FIELDS: AN OVERVIEW

This report tracks the maintenance conditions of artificial turf fields over two summers in an effort to shed light on performance trends during the high-use season. The inspections evaluate 11 indicators at each field, listed below. For this study, New Yorkers for Parks surveyed all synthetic turf fields within city parks smaller than 40 acres. These criteria resulted in a survey universe of 48 artificial turf fields in 40 parks. Each field was inspected twice, once in the summer of 2008 and once in the summer of 2009. For a list and map of sites surveyed, see pages 12-13. Of the 48 fields surveyed, 19 were previously covered in natural grass, 28 were previously asphalt and one was built as part of a new park.

Indicators Evaluated
Publicly accessibility
Presence of litter
Presence of broken glass
Presence of vandalism, graffiti or arson
Containment of trash in bins
Condition of seating: benches and bleachers
Condition of fencing, backstops and caging
Presence of puddles that may interfere with use
Condition of artificial turf seams
Condition of artificial turf blades
Condition of artificial turf: missing or detached sections

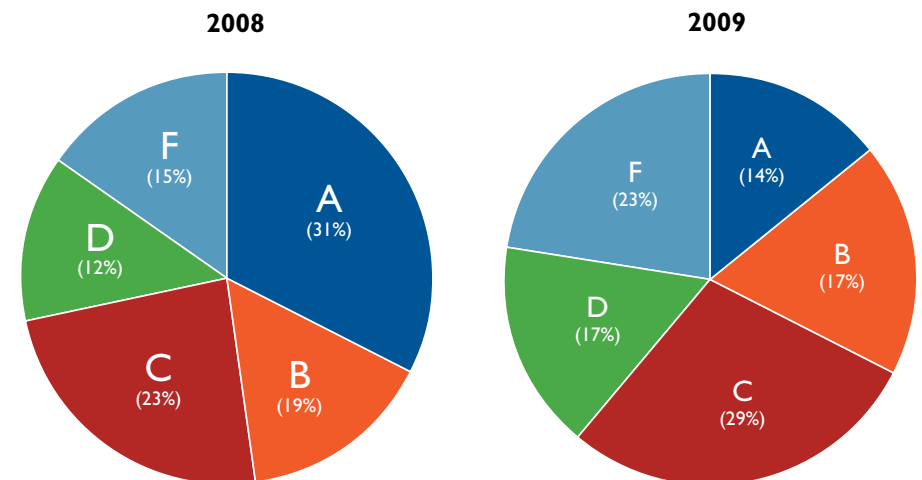
OVERALL RESULTS

The results of the study show that the overall performance of the artificial turf fields fell from 80%(B-) to 72%(C-) between the summers of 2008 and 2009. For the most part, this decline can be attributed to the three indicators evaluating the condition of the artificial turf:

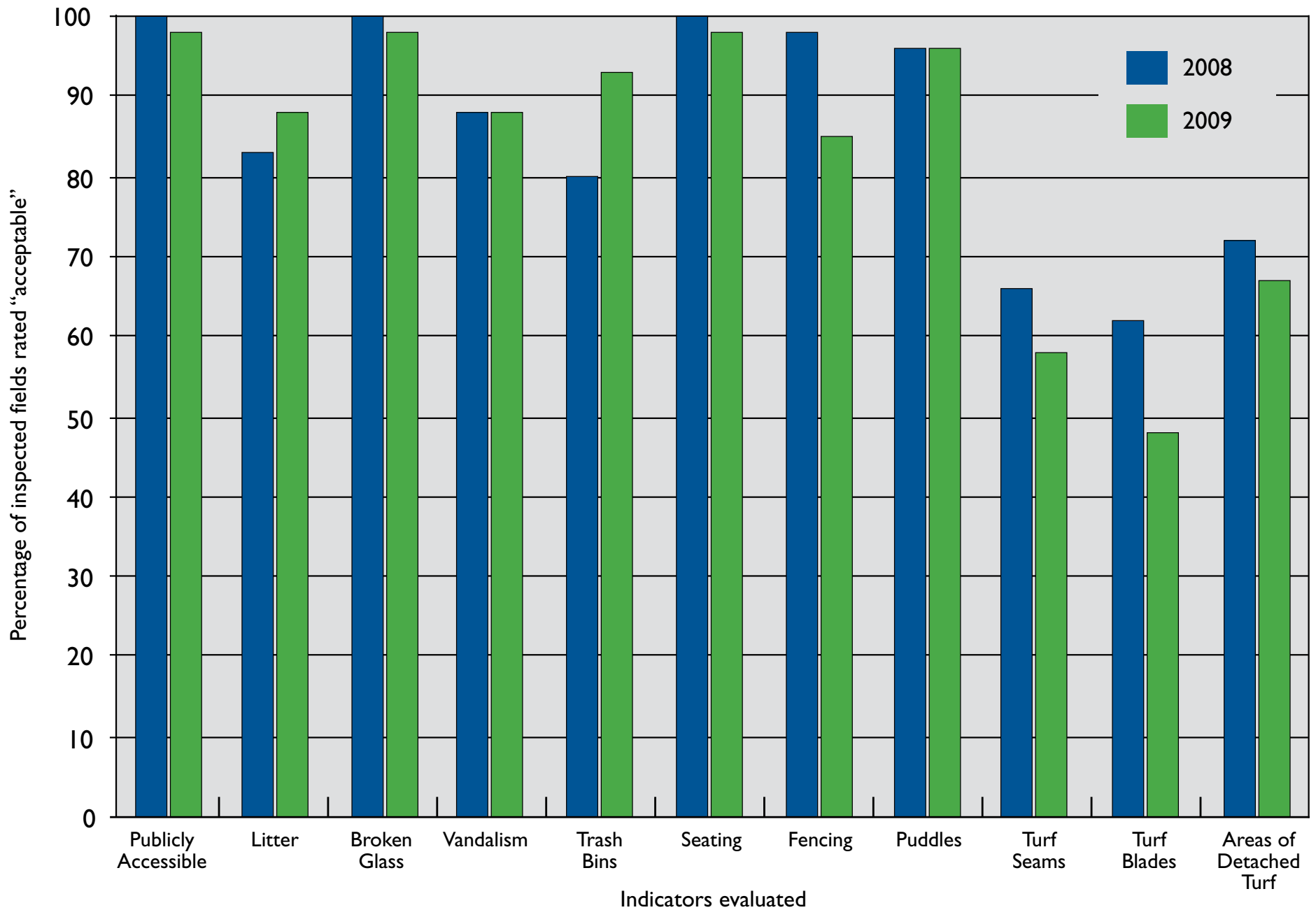
- loose seams where the turf is becoming detached and causing a trip hazard
- worn areas where turf blades are missing
- missing or detached sections of turf

Indicators evaluating general park maintenance performed very well overall. Significantly, litter on the field and trash bin containment both improved substantially between the two summers. The strength of the overall maintenance indicators helped the field scores to remain high both years and show a close attention to park maintenance by the Parks Department.

Breakdown of Grades, Summer 2008 & 2009



Indicator Performance Over Two Summers



SUCCESSSES

Indicators evaluating general park maintenance performed very well overall. Seating was the best performing of the features. Over the course of the two summers, 99% of the benches and bleachers at the fields were free of damage. Additionally, in both summers 88% of fields were found to be free of vandalism such as graffiti and arson, and 96% of fields were found to be free of puddles or standing water that could severely impact play.

Two maintenance indicators improved between 2008 and 2009. On average, 86% of fields were free of excessive litter, improving from 83% in 2008 to 88% in 2009. Over the course of the two summers, trash was contained in trash bins at 87% of fields, rising from 80% in 2008 to 93% in 2009.

These strong performances and improvements indicate a successful focus on maintenance by the Department of Parks and Recreation.



Well-maintained benches in Haffen Park, Baychester, Bronx



Alexander Hamilton-Metz Memorial Field, Prospect Lefferts Gardens, Brooklyn



Multi-use turf field at Linden (Gershwin) Park, East New York, Brooklyn

CHALLENGES

While general park maintenance indicators scored very well, the conditions of the artificial turf surfaces were subpar. DPR is still determining how to best monitor and provide needed care for artificial turf, a relatively new product.

Artificial Turf Blades

The poorest performing indicator in the survey was the condition of turf blades, which declined significantly between the two summers. In 2008, 39% of the fields were impacted by areas of worn blades, and by the summer of 2009 that percentage had risen to 52%. Worn areas have lost most of their turf blades, which increases the temperature above the field, reduces traction and exposes crumb rubber infill or other base material. These conditions increase opportunity for injury and impede play. Over the long term, the deterioration can lead to holes, sometimes exposing the drainage system beneath the turf surface, which can pose danger to park users.



Worn and compacted area, St. Mary's Park, Mott Haven, Bronx

Loose Artificial Turf Seams

Turf fields are installed in sections, and edges where the sections and field lines meet are called turf seams. Evaluation of this indicator focuses on the extent to which these seams have become loosened from each other and detached from the field's foundation.

In 2008, 35% of fields were impacted by loose seams, and by the summer of 2009 that percentage had risen to 42%. Loose seams create trip hazards and contribute to field deterioration.



Loose seams result in near-detachment of turf in Baruch Park, Lower East Side, Manhattan

Missing Sections of Artificial Turf

In the absence of diligent maintenance, worn turf blades and loose seams result in turf becoming completely detached from the field, leaving the field's foundation and drainage system exposed. Often, the foundation is composed of rocks and a plastic or metal drainage structure. Areas where turf is missing create dangerous trip and impalement hazards for park users.

In 2008, 28% of the fields inspected experienced missing or detached sections of artificial turf, and by 2009 that percentage had increased to 33%.



Exposed drainage system in Sternberg Park, Williamsburg, Brooklyn

Playground 96

The batter's box and homeplate on the artificial turf baseball field at Playground 96 in Manhattan showed extensive wear and sections of missing turf in 2008. By the summer of 2009, the cracks around homeplate had worsened, and the area of exposed field foundation in the batter's box had been covered by a rubber mat.



2008



2009

HIGHEST AND LOWEST PERFORMING FIELDS

Haffen Park in the Bronx scored a 100% in both 2008 and 2009. In 2008, nine fields scored 100%, and in 2009, five fields scored 100%.



Haffen Park, Baychester, Bronx

Fields Scoring an A in 2008:

Alexander Hamilton-Metz Memorial Field, Brooklyn
 Annunciation Park, Manhattan
 Chelsea Park, Manhattan
 Haffen Park, Bronx
 Harlem River Park, Manhattan
 John Mullaly Park, Bronx
 Joseph F. Mafera Park, Queens
 Liberty Park (Detective Keith Williams), Queens
 Linden Park, Brooklyn
 Marble Hill Park, Bronx
 Mclaughlin Park, Brooklyn
 MCU Park, Brooklyn
 P.O. Renaldo Salgado Plgd, Brooklyn
 Reiff Park, Queens

Fields Scoring an A in 2009:

Annunciation Park, Manhattan
 Detective Russel Timoshenko Soccer Field, Staten Island
 Haffen Park, Bronx
 Hinton Park, Queens
 Linden Park, Brooklyn
 Queensbridge Park, Queens
 Reiff Park, Queens

In 2008, seven parks scored an F. All seven scored poorly for loose seams; five were found to have significant missing sections of turf; and four out of seven scored poorly for worn areas of turf. Five of these seven fields also failed in 2009. In 2009, eleven fields failed. Eight out of eleven scored poorly for loose seams. Eight out of eleven were found to have significant missing sections of turf, seven out of eleven scored poorly for worn areas of turf.



A loose seam in Fort Hamilton Park, Bay Ridge, Brooklyn

Fields Scoring an F in 2008:

Columbus Park, Manhattan
 Ft. Hamilton Park, Brooklyn
 Jacob Schiff Playground, Manhattan
 Leon S. Kaiser Park, Brooklyn
 Playground 96, Manhattan
 Sara D. Roosevelt Park, Manhattan
 Wagner Playground, Manhattan

Fields Scoring a F in 2009:

Baruch Park, Manhattan
 Bushwick Playground, Brooklyn
 Frederick Douglass Playground, Manhattan
 Jacob Schiff Playground, Manhattan
 Leon S. Kaiser Park, Brooklyn
 Linden Park, Queens
 Marble Hill Playground, Bronx
 Parade Grounds, Manhattan
 Playground 96, Manhattan
 Sara D Roosevelt, Manhattan
 Wagner Playground, Manhattan

CONCLUSION & RECOMMENDATIONS

The City of New York is a leading purchaser of artificial turf, and its fields arguably experience more use than any other city's nationwide. Therefore, the Parks Department is uniquely positioned to encourage innovative and sustainable materials, installation, maintenance, and removal practices used by the artificial turf industry.

Strong overall scores in the areas of litter, trash bin containment, vandalism, seating, and broken glass showed a concentration on park maintenance by the Parks Department. In addition, very few artificial turf fields exhibited egregious or dangerous conditions; instead, most suffered from needs relating to turf surfacing deterioration. The 2010 Report Card on Artificial Turf identifies several needs that, if met, will help the City to make well-informed choices regarding artificial turf use and ensure that the fields are maintained at an acceptable level.

One notable aspect of DPR's budget estimates for turf fields is the relatively low costs listed for ongoing turf maintenance. However, this survey illustrates a need for increased, targeted turf maintenance. Of the fields surveyed in 2008 and 2009, the conditions of the turf surfaces, specifically excessive wear to blades, loose seams and detached sections of turf, consistently scored the lowest. An effort to track the usership of individual fields in concert with turf deterioration could help to determine a maintenance schedule based on usage and more accurately estimate a replacement schedule.

New Yorkers for Parks offers the following recommendations:

1. Ensure sufficient funding for park maintenance staff. Increase maintenance resources for artificial turf fields, including staff training, to combat turf deterioration.
2. Develop and implement a maintenance strategy for quick replacement of torn, missing and worn areas of artificial turf.
3. Explore with artificial turf manufacturers improvements to technology, such as more resilient blades that can withstand the unusually high level of use that NYC fields experience. This could decrease maintenance needs and extend the lifespan of the field.

FIND YOUR PARK:

ARTIFICIAL TURF FIELDS SURVEYED IN 2008 & 2009



FIND YOUR PARK: ARTIFICIAL TURF FIELDS SURVEYED

When a park contains more than one field, the scores for each field are listed below.

Map ID	Park Name		2008 score (%)	2009 score (%)	Neighborhood	CB	CD
1	Alexander Hamilton-Metz Memorial Field	Brooklyn	100	67	Prospect Lefferts Gardens	9	40
2	Annunciation Park	Manhattan	100	90	Manhattanville	9	7
3	Baruch Park	Manhattan	81	56	Lower East Side	3	2
4	Booker T. Washington Park	Manhattan	77	67	Manhattan Valley	7	8
5	Bushwick Playground	Brooklyn	77	56	Bushwick	4	37
6	Cadman Plaza	Brooklyn	87	77	Brooklyn Heights	2	33
7	Chelsea Park	Manhattan	91	79	Chelsea	4	3
8	Columbus Park	Manhattan	56	79	Chinatown	3	1
9	Detective Russel Timoshenko Soccer Field	Staten Island	88	100	Midland Beach	2	50
10	Eugene McCabe Park	Manhattan	67	81	Harlem	11	9
11	Frederick Douglass Playground	Manhattan	65	56	Manhattan Valley	7	8
12	Ft. Hamilton Park	Brooklyn	58	65	Bay Ridge	10	43
13	Haffen Park	Bronx	100	100	Baychester	12	12
14	Harlem River Park	Manhattan	100	70	East Harlem	11	8, 9
15	Hinton Park	Queens	67	88	East Elmhurst	3	21
15	Hinton Park	Queens	79	100	East Elmhurst	3	21
16	Jacob Schiff Playground	Manhattan	51	47	Manhattanville	9	7
17	James J. Walker Park	Manhattan	79	70	West Village	2	3
18	John Mullaly Park	Bronx	100	77	Concourse	4	16
18	John Mullaly Park	Bronx	100	82	Concourse	4	16
19	Joseph F. Mafera Park	Queens	100	79	Glendale	5	30
20	Leon S. Kaiser Park	Brooklyn	47	0	Sea Gate	13	47
21	Liberty Park (Detective Keith Williams)	Queens	93	81	Jamaica	12	27
22	Linden (Gershwin) Park	Brooklyn	91	100	New Lots - East New York	5	42

CB = Community Board
CD = City Council District

FIND YOUR PARK: ARTIFICIAL TURF FIELDS SURVEYED

Map ID	Park Name		2008 score (%)	2009 score (%)	Neighborhood	CB	CD
23	Linden Park	Queens	77	0	Corona	4	21
24	Marble Hill Playground	Bronx	93	51	Marble Hill	8	10, 11
25	McCarren Park	Brooklyn	62	74	Williamsburg	1	33
26	Mclaughlin Park	Brooklyn	100	88	Downtown Brooklyn	2	35
27	MCU Park in Steeplechase Park	Brooklyn	91	88	Coney Island	13	47
28	P.O. Renaldo Salgado Playground	Brooklyn	100	79	Bedford Stuyvesant	3	41
29	Parade Grounds	Brooklyn	70	74	Prospect Park South	14	40
29	Parade Grounds	Brooklyn	70	51	Prospect Park South	14	40
29	Parade Grounds	Brooklyn	70	67	Prospect Park South	14	40
29	Parade Grounds	Brooklyn	83	79	Prospect Park South	14	40
30	Playground 96	Manhattan	49	56	Upper East Side	11	8
31	Queensbridge Park	Queens	86	100	Long Island City	1, 2	26
32	Raymond O'Connor Park	Queens	60	71	Bayside	11	19
33	Reiff Park	Queens	100	93	Maspeth	5	30
34	Sara D Roosevelt Park	Manhattan	77	67	Lower East Side	3	1
34	Sara D Roosevelt Park	Manhattan	89	58	Lower East Side	3	1
34	Sara D Roosevelt Park	Manhattan	51	67	Lower East Side	3	1
35	South Oxford Park	Brooklyn	77	77	Fort Greene	2	35
36	Southern Fields	Queens	81	88	South Ozone Park	10	28, 32
37	St. Mary's Park	Bronx	89	60	Mott Haven-Port Morris	1	17
38	Sternberg Park	Brooklyn	67	67	Williamsburg	1	34
38	Sternberg Park	Brooklyn	88	88	Williamsburg	1	34
39	Van Voorhees Lower Park	Brooklyn	79	79	Cobble Hill	6	33
40	Wagner Playground	Manhattan	56	40	East Harlem	11	8

METHODOLOGY

The Report Card on Artificial Turf used the same survey instrument first developed in 2002 to conduct park inspections for *The Report Card on Parks*. *The Report Card on Artificial Turf* measured the conditions of artificial turf fields in all city parks less than 40 acres in the summer of 2008 and 2009. This structure allowed us to measure the performance of these fields over the course of one year. Each site was visited in July of 2008 and June of 2009.

Using handheld computers and digital cameras, NY4P staff inspected targeted features using the same extensive questionnaire designed by a focus group of independent park experts and community leaders for *The Report Cards on Parks*. Results were uploaded into a database and analyzed to arrive at the findings cited in this report.

In designing the survey for *The Report Card on Artificial Turf*, NY4P began with the population of 94⁶ artificial turf fields operated by DPR. Due to resource constraints, the population was reduced to the fields located in parks between one and forty acres. This resulted in a collection of 49 artificial turf fields in 41 parks. Field replacement in 2009 at Thomas Jefferson Park made it impossible to compare results from our 2008 and 2009 survey periods, and was therefore dropped from consideration in this study. The final survey universe was 48 fields in 40 parks.

Park properties surveyed can be found on pages 12-13 of this report.

Survey Instrument

In preparing the methodology for the 2003, 2004, 2005 and 2007 *Report Card on Parks*, NY4P staff developed question forms with which to evaluate athletic fields. Individual questions were designed to measure the performance of the fields in the following categories:

- *Maintenance*
- *Cleanliness*
- *Safety*
- *Structural integrity*

Whenever possible, the form questions were adapted from the New York City

Department of Parks and Recreation's own internal evaluation mechanism, the Parks Inspection Program (PIP). The Parks Department's Parks Inspection Program rates artificial turf athletic fields for structural deterioration and potential hazards, including the presence of divots, holes, uplifts and missing sections.⁷

All form questions were sorted into one of two distinct groups: priority and routine. Priority ratings refer to those conditions of a park feature necessary for its safe use. To further refine the routine group, NY4P convened a focus group of park experts to weight each question on a scale from one to five, one being the least important to a user's park experience, and five being the most important.

Fieldwork

Survey work for *The Report Card on Artificial Turf* took place in July 2008 and June 2009 between the hours of 10am and 5pm, Tuesday through Thursday. In each year, NY4P trained and deployed multiple staff members to conduct all survey work. All surveyors were trained in the following techniques: use of the handheld computers and digital cameras, delineation of park features, use of survey forms and standards manual, and procedures for documenting features.

In the field, surveyors traveled to each park selected for inclusion in the survey. At the site, surveyors inspected and completed a survey form for each turf field in the selected parks. For each question in the form, surveyors answered *yes*, *no*, or *not applicable*. Each park selected for inclusion in the study was visited once in 2008 and once in 2009.

In addition to the completion of the required survey forms, surveyors took extensive digital photographs to support and complement survey results. Survey results and photo documentation were stored in a central database. When photo documentation did not correlate with results or did not adequately illustrate park conditions, the park was re-visited and re-evaluated by surveyors.

Rating the Parks

Artificial turf athletic field scores for the 2008 and 2009 rating periods are based entirely upon surveyors' responses to field feature form questions. Artificial turf athletic field scores range from 0 to 100, based upon the proportion of field features rated as in-service and acceptable, with responses weighted in accordance with the relative priorities assigned by the focus group. Scores from the 2008 and 2009 rating periods are converted to letter grades to provide a simple yardstick for interpreting data (Table I).

The survey is designed to fairly rate all features that are or should be available to users of an artificial turf field. For example, if a park has an artificial turf field, then it should be available to users. Should that field be locked or closed without explanation, it would fail a priority question and hence receive a rating of zero in this survey.

**Table I:
Conversion of Raw Scores to Letter Grades**

97-100	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
60-69	D
59 and below	F

ENDNOTES

- ¹ Department of Parks and Recreation. http://www.nycgovparks.org/sub_things_to_do/facilities/synthetic_turf_test_results.html.
- ² PlaNYC Progress Report 2009. Mayor's Office of Long-Term Planning & Sustainability, 2009, p. 11.
- ³ Data courtesy of the Department of Parks & Recreation, Operations, 15 Dec. 2005. Costs were figured in 2004 and vary depending on site. Printed in "A New Turf War: Synthetic Turf in New York City Parks." New Yorkers for Parks. 2006.

Cost Comparison, Multi-use/Soccer Field

		Synthetic Turf	Natural Grass
Installation Costs (capital)	Per Field	\$1,365,000	\$690,000
	Expected Life Span (yrs)	10	5
	Installation Cost per year (distributed over the projected lifetime of the field)	\$136,500	\$138,000
Annual Maintenance Costs	Materials	\$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

- ⁴ A Study to Assess Potential Environmental Impacts from the Use of Crumb Rubber as Infill Material in Synthetic Turf Fields. Bureau of Solid Waste, Reduction & Recycling Division of Solid & Hazardous Materials. New York State Department of Environmental Conservation. June 17, 2008.
- ⁵ Int. No. 123-A. The New York City Council. 5/4/10.
- ⁶ Department of Parks and Recreation. http://www.nycgovparks.org/sub_things_to_do/facilities/synthetic_turf_test_results.htm
- ⁷ Parks Inspection Program Standards. City of New York Parks & Recreation, 2007, p. 59.



Detective Russel Timoshenko Soccer Field, Midland Beach, Staten Island