TORONTO DISTRICT SCHOOL BOARD

TERMS OF REFERENCE GOVERNING FUTURE INSTALLATIONS OF ARTIFICIAL TURF ON ELEMENTARY PLAYING FIELDS

TO	Operations and Facilities Management Committee	23 October 2013

RECOMMENDATION **IT IS RECOMMENDED that the report be received.**

STRATEGIC DIRECTION Make every school an effective school.

CONTEXT This report is the outcome of an extensive review of the installation of artificial turf at schools.

The main conclusion, as outlined in detail below, is that a small number of elementary school playing fields are continually in very poor condition in spite of significant investments in maintenance over the years.

These schools have both large student enrollments and small school grounds. Taken together, large numbers of students on very small grounds means that natural turf can neither be established nor well-maintained.

Staff believes that in these cases installing artificial turf is the best option for providing students with a safe, practical, soft surface to play on.

From a financial point of view, even though the upfront capital cost of artificial turf is high, the current practice of re-sodding, aerating, over-seeding and top-dressing every few years is not a wise investment of limited resources because these measures provide only short-term benefits.

Repeatedly taking playing fields out of service for maintenance also puts an unreasonable strain on the students and staff in these schools that are already under pressure because of the large numbers of students on very small sites.

Regularly investing limited resources into these schools can also mean that the playing fields at other schools do not receive the attention they deserve.

Benefits and Drawbacks

Since 2003, artificial turf has been installed at 15 elementary schools and 3 secondary schools, ranging in size from 5,000 to 83,800 square feet.

Table 1: Schools with Artificial Turf

School	Installation date	Size (sq. ft.)
Orde Street Jr. PS	2003	6,900
Brown Jr. PS	2005	8,800
Deer Park Jr. and Sr. PS	2005	29,600
Hillcrest CS	2006	5,000
Grenoble PS	2006	21,000
Northlea EMS	2006	37,700
Rose Ave. Jr. PS	2006	19,400
Claude Watson School for the Arts	2006	18,850
Niagara St. Jr. PS	2008	6,200
Thorncliffe Park PS	2008	17,300
Bessborough Drive Elementary and Middle School	2008	23,500
Jesse Ketchum Jr. and Sr. PS	2010	34,700
North Toronto CI	2011	74,300
Northern SS	2011	76,900
Lambton Kingsway JMS	2011	7,900
Lakeshore CI	2011	66,000
Monarch Park CI	2012	83,800
Nelson Mandela Park PS	2012	29,200

Since the first installation at Orde Street Jr. PS ten years ago, the Board has learned a lot about artificial turf.

As discussed in detail in *Appendix A: Artificial Turf Lessons Learned*, there are both benefits and drawbacks to artificial turf fields.

The main benefit of artificial turf is that it provides a practical, safe, soft play surface for elementary playing fields that have both a large student enrollment and an undersized playground. It is not possible to establish or maintain natural turf at such schools be-

cause of the *extreme* intensity of use.

Artificial turf fields can also be used for longer periods of time during the year, from early spring until very late in the fall, and frequently during the winter when the conditions are right.

Artificial turf playing fields also do not have to be taken out of service for long periods of time for maintenance.

Drawbacks to artificial turf fields include the upfront capital costs and replacement costs, problems associated with an increase in non-permitted activity, and the environmental impact. Some parents are also uneasy about questions related to potential health risks associated with their children playing on artificial turf.

The following terms of reference attempt to take all of these factors into consideration and are intended to be used to help guide the approval and implementation of future projects.

SUMMARY **Terms of Reference Governing Future Installations of Artificial Turf on Elementary Playing Fields**

1. Which schools should receive artificial turf fields?

For elementary schools, the Board should only invest its limited capital resources in artificial turf where natural turf cannot be established or maintained due to extreme intensity of use resulting from a high student enrollment combined with an undersized area of useable outdoor space.

Before proceeding, potential projects need to be reviewed and approved by the Central Accommodation Team (CAT) and have the support of the local school community as determined by the Superintendent of Education in consultation with the school principal and local trustee.

Schools may consider organizing a community meeting to seek input before making a decision about whether or not to proceed with installing artificial turf on their playing field.

Note: some schools that cannot sustain large areas of natural turf have asked if other alternatives can be considered other

than artificial turf. Under these circumstances, staff will work with local school communities to explore the feasibility of alternative solutions.

Appendix B: Elementary Playing Fields with Extreme Intensity of Use lists the schools that have playing fields under intense pressure and that would benefit most from the installation of artificial turf.

Exceptions may be made where local school communities raise sufficient funds to pay for the full cost (materials, labour, design, regulatory fees and taxes), and as outlined in more detail below, the field will be permitted to generate sufficient revenue to help pay the replacement cost of the field when required.

For secondary schools, artificial turf projects should be supported at schools where, as part of the TDSB's Championship Fields Partnership Program, the Board and a private sports field developer enter into a license agreement whereby the developer pays the full installation, maintenance, and replacement cost of an artificial field in return for exclusive access to the facility after school hours, on weekends, and during holidays.

2. Paying for artificial turf fields at elementary schools

For projects that have the support of the local school community and have been approved by CAT, the upfront capital costs should be paid by the Board, not through local fundraising efforts.

If parents at these schools want to fundraise, they can do so for features that complement the basic artificial turf field installed by the Board. The Board will not pay for any ancillary features beyond what is needed to install a basic field.

Local athletic associations, and the City of Toronto, will be allowed to secure pre-determined, albeit limited, access to the field during times that would normally be made available to the public for permitting by contributing to the upfront capital costs of artificial turf. Detailed arrangements will be negotiated

case-by-case.

3. Permitting artificial turf fields

Artificial turf has a life of 12 to 14 years; when required, replacement will have a high cost. The Board's existing artificial turf fields, along with others that will be installed in the future, will only be financially sustainable if a secure source of funding is created for turf replacement. The only feasible way for the Board to afford the long-term costs of artificial turf is to direct permit revenue from artificial turf fields into a reserve. Staff recommends that the Board create a reserve fund and direct all permit revenue from artificial turf fields into this reserve to be drawn upon when needed.

To achieve a secure funding source, it is imperative that the Board make all artificial turf fields, including those already in existence, available for permitting to groups, including adults. Even though schools should not have the option of completely opting out of permitting their artificial turf field, staff will consult with local school communities to find a compromise between meeting local needs and generating income through permits.

For a comparison of the approximate life-cycle maintenance costs of an artificial field with a natural turf field, please see Appendix C.

For information on the installation and estimated replacement costs of existing artificial turf fields, please see Appendix D.

4. Addressing concerns about the potential impact of artificial turf on children's health

The potential impact of artificial turf on children's health is controversial, particularly in some communities.

Public health agencies across North America have assessed the potential health hazards associated with students playing on artificial turf. Issues related to toxic exposures, heat and bacterial infections have been raised as potential issues of concern. Toronto Public Health has reviewed the available studies and

notes that to date no unacceptable health risks have been identified for children playing on artificial turf (some of the initial concern was related to first generation artificial turf, which is not in use by the TDSB or the City's department of Parks Forestry and Recreation).

Some jurisdictions have provided signage at their fields to inform players of actions they can take to minimize potential health risks from heat and bacterial infections. Staff will continue to work closely with Toronto Public Health to address concerns about potential risks associated with artificial turf and to explore potential risk mitigation strategies.

In an effort to purchase the best artificial turf products on the market, from a health and environmental point of view, the Board will develop a "health and environmental impact scorecard" that will be used to compare bids in all future projects. The results of the scorecard, along with overall cost, will be used to evaluate bids in accordance with the Board's procurement policy.

5. Keeping rainwater on site and protecting existing trees

Artificial turf fields are designed to efficiently remove storm water from the playing surface. However, directing rain water into sewers is contrary to the City's Wet Weather Flow Management Guidelines. Artificial turf fields will be designed to detain and infiltrate water underground to reduce the impact of the field on the City's infrastructure. Existing large trees and their root systems will be protected and not injured by the installation of artificial turf.

6. What about playing fields at schools that do not qualify for artificial turf?

Staff will work toward improving the quality of all school playing fields, the vast majority of which will not qualify for funding for artificial turf, by developing a new playing field management plan. The plan will include a re-examination of the Board's field maintenance practices and opportunities to upgrade field irrigation.

Resources, Implementation and Review

The installation of artificial turf at the nine schools listed in Appendix B will take place over a five year period starting in the 2013/14 school year.

The cost for the nine new projects in total is estimated to be $4,356,000 over the five year installation period (or $871,200 per year). Funding for the program will be divided between the Renewal budget and the Central Accommodation Team budget.

The projects will be installed according to the following schedule: 2013/14: Runnymede and John Wanless; 2014/15: Oakridge/Samuel Hearne; 2015/16: Allenby and Diefenbaker; 2016/17: John Fisher and McKee; and 2017/18: Humbercrest and Earl Beatty.

Revenue from permitting of all of the Board's artificial turf fields will be directed into a reserve fund to help pay for future replacement costs starting in September 2013.

The program will be reviewed over the next five years to determine if a small number of additional elementary playing fields could also benefit from the installation of artificial turf.

APPENDICES

Appendix A:	Artificial Turf Lessons Learned
Appendix B:	Elementary Playing Fields with Extreme Intensity of Use
Appendix C:	Life-cycle Maintenance Costs
Appendix D:	Installation and Estimated Replacement Costs
Appendix E:	Typical Cross Section for an Artificial Turf System Using Granulated Rubber Infill

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Artificial Turf Lessons Learned

What factors have led to the choice of artificial turf fields?

At least five different scenarios influence the decision to install artificial turf:

- As a technical solution to very small school grounds with large student populations. These projects are often initiated by staff at schools undergoing a major capital project.
- Where local athletic clubs, seeking after-school-hours access to high quality fields, have galvanized local support by offering capital funding to help pay for installation in return for a guaranteed permit schedule.
- Where parents have organized significant fundraising efforts to help pay for the turf installation.
- Where partial funding from the City of Toronto has been obtained, often under Section 37, to make the installation possible.
- Where, as part of the TDSB's Championship Fields Partnership Program, the Board and local businesses have begun to enter into agreements whereby the business pays the full installation, maintenance, and replacement cost of an artificial field and seasonal dome in return for exclusive access to the facility after school hours, on weekends, and during holidays. The school receives the benefit of year round climate controlled access to the field at no cost.

Benefits

There are at least three benefits to artificial turf fields.

1. **Increases amount of durable, softer surface play areas of very small school grounds**
   Artificial turf is well suited to areas of playgrounds that experience an extreme intensity of use where natural turf cannot be established and where asphalt or limestone screening would traditionally be used as an alternative surfacing material. Extreme use occurs at schools with large student enrollment combined with a small school ground.

2. **Extends ice-free active play time**
   By absorbing more heat from the sun, artificial turf fields tend to be more ice-free during winter months thereby extending the amount of time they can be used for active play. Artificial turf also extends the playing season in the shoulder seasons (spring and fall) when natural turf fields would be muddy and wet and activities on the field would be restricted or forbidden.

3. **Eliminates de-commissioning time needed for annual care**
   Artificial turf also eliminates the need to take the fields out of commission annually for aerating, over-seeding, and topdressing, and for re-sodding every five years.

Drawbacks

There are at least three drawbacks related to both the cost and the social and environmental impacts of artificial turf.

1. **The cost of installing and maintaining artificial turf**

   Artificial turf costs $18/square foot depending on the site conditions and the type of system. A new 23,500 square foot field at an elementary school would cost about $575,000.

   In terms of maintenance costs, when the TDSB first began supporting local school efforts to fundraise for artificial turf, the expectation was that the maintenance costs for artificial turf would be significantly less compared to natural turf. After all, the grass would not have to be cut, aerated, over-seeded or top-dressed, let alone re-sodded every five years.

   Since then, the Board has learned that artificial turf requires extensive maintenance: regular brushing, raking in areas that have become compacted, the periodic replacement of infill in located areas, and the application of infill across the entire surface every few years.

   In addition to the need for on-going maintenance, the cost of replacing artificial fields is often overlooked. Artificial turf is typically under warranty for 8 years. Most fields are expected to fail after 12 to 14 years, assuming that they have been well-maintained. Replacement costs can be high. The same 23,500 square foot artificial field described above will cost about $107,000 to replace.

   Contrary to its initial expectation, the Board has now learned that the full-life cycle costs of purchasing and maintaining artificial turf are significant.

2. **Social impact of increased non-permitted activity**

   Ten years of experience has also taught the Board that artificial turf fields on school grounds can attract a significant increase in non-permitted activity. Troubles can be particularly acute at school sites near transit stations and where residential properties are located in close proximity to the artificial turf field.

   Increases in non-permitted activity have led to increased and ongoing complaints from neighbours about noise.

   In many cases, the increase in activity comes from adults in loosely affiliated groups who use social media to organize large ad-hoc games on their fields. Often games take place in twilight hours when fields are not permitted. This activity has prompted increased complaints from neighbours and from organized groups that permit the sites.

   Increased use of school fields can also put a strain on a school's caretaking staff to clean up increased litter.

3. **Environmental impacts**

   There are at least two environmental problems with artificial fields.

First, artificial turf on school grounds generates much higher surface temperatures than natural turf. On a typical hot summer day at the Board, artificial turf reaches temperatures between 62º C and 67º C compared to 32º C to 35º C for natural turf.

Table 2: Playground Surface Temperatures

School	Surface	Temperature (Celsius)		Ambient Air Temperature (Celsius)
		Sun	Shade	
Bessborough	Natural Turf	34	22	30
	Asphalt	56	29	
	Artificial Turf	67	30	
Northlea	Natural Turf	34	23	
	Asphalt	56	26	
	Artificial Turf	64	Not Known	
	Concrete	47	Not Known	
Thorncliffe Park	Natural Turf	35	21	
	Older Asphalt	53	25	
	Newer Asphalt	57	25	
	Artificial Turf	62	Not Known	
	Concrete	45	22	
Grenoble	Natural Turf	32	22	
	Asphalt	51	25	
	Artificial Turf	63	Not Known	
	Thick Patches of Clover	27	Not Known	

Like rooftops and asphalt parking lots, artificial turf fields also contribute to the urban heat island effect which makes cities like Toronto more susceptible to extreme heat events. Extreme heat in urban environments increases smog production which has an impact on human health, particularly that of children.

Second, when it rains on an artificial field, unless designed with a storm water detention system, all of the water will be directed into catch basins which then flow directly into streams and other waterways. Heavy rainfall flowing into sewers has recently caused extensive flooding. In some parts of the city with combined storm and sanitary sewers, heavy rainfall means that excess raw sewage by-passes overwhelmed treatment plants and flows untreated into Lake Ontario.

Thus, the design of artificial fields must include a facility to detain water on site to work with the City of Toronto's efforts to mitigate the need to upgrade and expand the City's sewer infrastructure. (In 2011, water rates increased by 10.8%. This year, City Council approved a 9% increase.)

If water goes directly into catch basins, artificial fields can also deprive nearby trees of the water they need to survive over the long term.

APPENDIX B

Elementary Playing Fields with Extreme Intensity of Use

The following is a list of elementary schools with playing fields that are under intense pressure and that would benefit most from the installation of artificial turf.

School Name	Approximate Size of Proposed Artificial Turf Playing Field (Sq. Ft.)
Runnymede Jr. and Sr. PS	29,438
John Wanless Jr. PS	27,518
Oakridge Jr. PS/Samuel Hearne MS	51,980
Allenby Jr. PS	25,941
Diefenbaker ES	29,264
John Fischer Jr. PS	27,331
McKee PS	24,150
Humbercrest PS	11,880
Earl Beatty Jr. & Sr. PS	14,517

The selection of the schools was based on two main factors:

1. Useable play space per pupil – Staff reviewed each site to determine the area of *usable* hard and soft surface play space. This area was then divided by the student enrollment (not including kindergarten students) to determine the usable play space per student.

2. Experience of grounds staff – Grounds staff responsible for the maintenance of playing fields were also consulted so that their first-hand experience was taken into consideration.

Life-cycle Maintenance Costs

The following table compares the approximate life-cycle maintenance costs of artificial and natural turf of two similar fields – Northern Secondary School and Danforth Technical School.

Type	Maintenance Requirements	Approximate Full Life-Cycle Maintenance Costs (13 years)
Standard Turf Sports Field (e.g., Danforth Technical School)	• Aerate, over-seed, top-dress twice yearly • Fertilize twice yearly • Irrigate • Line the fields • Sod every five years • Grass cutting • Total cost approximately $19,000 per year	$247,000
Artificial Sports Field (e.g., Northern)	• Artificial turf will need to be replaced at an approximate cost of $385,000. • Sweeping and grooming – approximately $2000 per year	$437,000

The upfront capital cost of the artificial field at Northern cost $1.285 million.

APPENDIX D

Installation and Estimated Replacement Costs

School	Installation Date	Total Current Cost	Estimated Replacement Year	Estimated Replacement Cost in Future Dollars*
Orde Street Jr. PS	2003	$ 19,353	2016	$ 27,865
Brown Jr. PS	2005	$ 146,947	2018	$ 37,336
Deer Park Jr. and Sr. PS	2005	$ 180,852	2018	$ 125,586
Hillcrest Community School	2006	$ 79,794	2019	$ 21,744
Grenoble PS	2006	$ 179,047	2019	$ 91,761
Northlea EMS	2006	$ 445,000	2019	$ 163,952
Rose Ave. Jr. PS	2006	$ 602,451	2019	$ 84,368
Claude Watson School for the Arts	2006	$ 265,660	2019	$ 81,976
Niagara St. Jr. PS	2008	$ 104,437	2021	$ 28,328
Thorncliffe Park PS	2008	$ 250,000	2021	$ 79,044
Bessborough	2008	$ 575,000	2021	$ 107,372
Jesse Ketchum Jr. and Sr. PS	2010	$ 450,000	2023	$ 166,571
North Toronto CI	2011	$ 1,700,000	2024	$ 365,580
Northern CI	2011	$ 1,285,805	2025	$ 385,311
Lambton Kingsway	2011	$ 396,360	2024	$ 38,871
Lakeshore CI**	2011	NA	2024	NA
Monarch Park CI**	2012	NA	2025	NA
Nelson Mandela	2012	$ 190,130	2025	$ 147,265
Maurice Cody	2013	$ 376,470	2025	$ 107,423

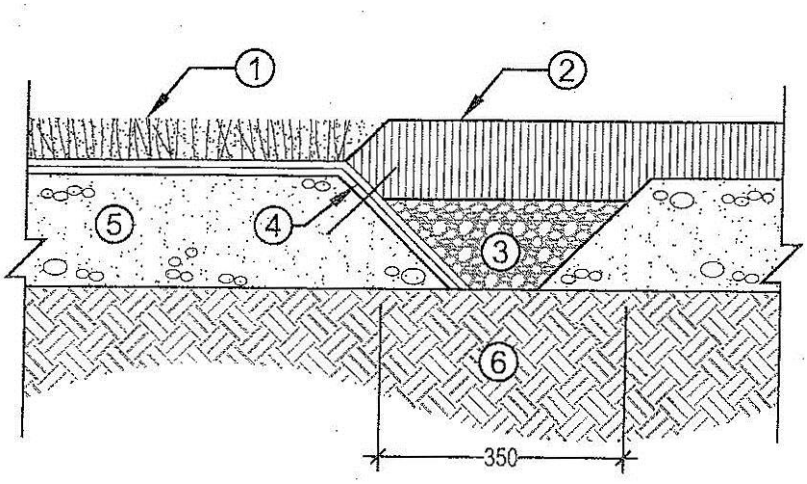
*The replacement cost is based on $3.75 per sq. ft. and an inflation rate of 2.5% per annum. The calculation is: Area * 3.75 * $(1.025^{\text{(Difference: Year 2013 – Replacement Year)}})$
Estimated costs are future cost.

**The artificial turf fields at both Lakeshore and Monarch Park were installed as part of the Championship Fields Partnership Program. As such, the initial installations costs and the future replacement costs are the responsibility of the developers.

APPENDIX E

Typical Cross Section for an Artificial Turf System Using Granulated Rubber Infill

Note: the illustration shows the artificial turf field as it meets the asphalt edge surrounding the field.



1 – Grass fiber and granulated rubber infill
2 – Asphalt pavement
3 – Clear Stone
4 – Backing system
5 – Gravel (for drainage)
6 – Existing sub-grade soil

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