

**Playing Field Turfgrass Assessment and Recommendations**

***Toronto District School Board  
Church Street Junior Public School***

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## **Executive Summary:**

The playground area at Church Street junior Public School was assessed for the purpose of evaluating the feasibility of maintaining a functional natural turf playing field on the site. The current playing field is mostly devoid of vegetation and unsuitable for student active play. Based on our assessment, it would be very challenging to maintain a functional natural turfgrass playing field on the site. Surrounding high-rise development shades the site and the level of shading will increase as proposed new buildings are developed.

The site has the ability to support a natural turf field but to prevent the current cycle of regrassing followed by field failure, significant changes would have to be made with regards to field construction, maintenance and most critically, field access and use. The existing soil would require significant modification and the installation of subsurface drainage and an updated irrigation system. A significantly higher level of maintenance would be required including regular monitoring by a professional turfgrass manager. Field access would need to be limited to only school use requiring additional site security and monitoring. School use of the field would be further limited during periods when the field is vulnerable to damage when environmental conditions are unfavourable, the soil is saturated or frozen and the turfgrass plants are in a dormant state.

The significant restrictions required to maintain a safe and functional natural turfgrass surface on the site would severely restrict active student use of the field. A permeable, properly constructed and maintained synthetic playing surface would provide greater active use by students during the school year and allow appropriate natural living plant components such as trees, shrubs and ground covers to be incorporated into other areas of the playground landscape.

## **I. Playing Field Assessment**

### **Playground Size:**

Asphalt Play Area: 1,950 m<sup>2</sup>

Sports Field: 2,000 m<sup>2</sup>

Play Equipment Area: 560 m<sup>2</sup>

Total Playground Area: 4,510 m<sup>2</sup>

**Vegetative Cover:** Topsoil portion of playground estimated to have vegetation cover of less than 30%. Kentucky bluegrass predominant turfgrass species - plantain predominant weed.

**Soil Physical and Nutritional Status:** Fairly uniform loam soil profile with visual evidence of organic matter at surface, possibly from previous installations of sod. Laboratory results are provided in Table 1.

Table 1. Soil Physical Analysis

Soil Component	Percentage
Clay	20.5
Silt	30.7
Total Silt + Clay	51.2
Sand	44.3
Organic Matter	3.97
Fine Gravel - 2 mm	4.5
Very Coarse Sand - 1 mm	3.4
Coarse Sand - 0.5 mm	3.0
Medium Sand - 0.25 mm	7.7
Fine Sand - 0.15 mm	8.8
Very Fine Sand - 0.106 mm	8.9
Very Fine Sand - 0.053 mm	12.5
Total Fine Sand	30.2
Saturated Hydraulic Conductivity (estimated) 25.9 mm/hour (1.0 inch/hour)	

**Light Conditions:** Playing field is surrounded by high-rise development on east, south and west sides with an additional thirty-seven storey condominium tower planned to the south. Shade analysis reveals field shading at all times of year with available sunlight decreasing significantly in the September to November period. Sunlight at this time of year is critical for turfgrass winter survival.

**Surface Topography and Drainage:** Moderate slope from school building to Wood Street. Some surface depression and water collecting at trees along fence on south side of property. No evidence of installed drainage system.

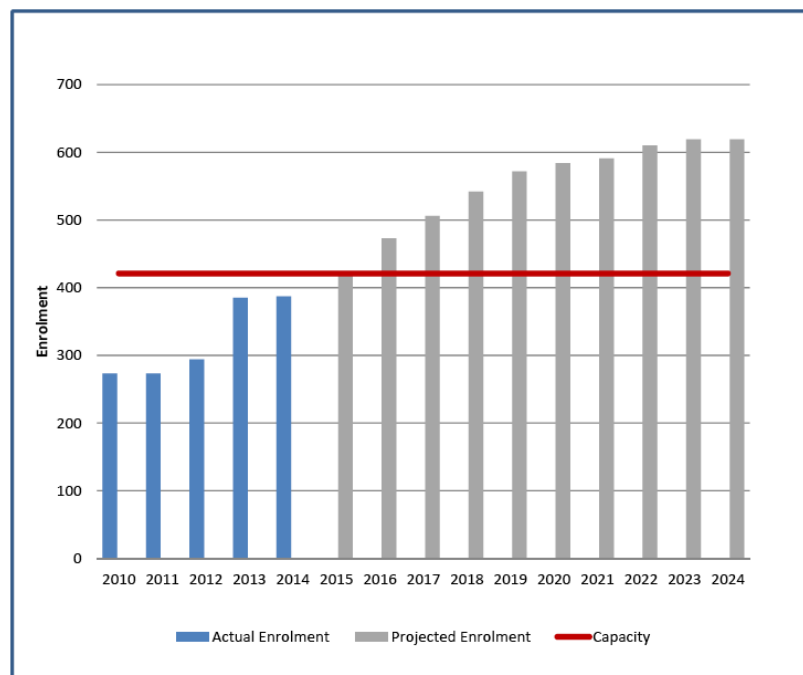
**Wear Patterns:** Field shows severe wear as indicated by the limited vegetative cover.

**Current Hazards:** Lack of vegetative cover and compaction decreases shock absorption. Field drains to the south with water pooling along tree planter located on south side of playground. Under wet or frozen conditions, bare soil areas will create potential slipping hazard.

**Turf Maintenance Practices:** The playing field receives standard TDSB turfgrass maintenance that includes regular mowing and periodic resodding. The field currently has an irrigation system.

**Current and Future Student Population:**

Figure 1: Church Street JPS actual and projected enrolment to 2024 (Source: TDSB staff)



The number of students in the active field use age group (6-11) at the school is currently approximately 370 students. This number is projected to increase to 530 by 2024.

**Non-Permitted Use of Playing Field:** Given the urban location and current and projected residential development within the catchment area of the school, it is assumed that there is significant field use by the community outside of normal school use which will intensify as new residential units are occupied in the neighbourhood. While the area is fenced, staff indicated the gates are not locked.

## **II. Requirements to Support Sustainable Natural Turfgrass Surface**

The following recommendations have been developed to provide insight into what would be required to develop and maintain a strong, healthy and sustainable natural turf surface on the playing field at Church Street Junior Public School.

Sports Turf Canada has developed designated athletic field categories, construction specifications and suggested guidelines for permitted use of each category of athletic field. Tables 2 and 3 summarize the field classification system and guidelines for hours of field use.

Table 2. Sports Turf Canada Field Classification System

<b>Design Requirement</b>	<b>Category 1</b>	<b>Category 2</b>	<b>Category 3</b>	<b>Category 4</b>	<b>Category 5</b>
<b>Soil (% silt + clay)</b>	< 8.0	<25	25-35	> 35	All Soils
<b>Sub-surface Drainage</b>	Yes	Yes	Yes	Yes	No
<b>Irrigation</b>	Yes	Yes	Optional	Optional	No
<b>Night Lighting</b>	Yes	Yes	Optional	Optional	No

Table 3. Sports Turf Canada Field Use Guidelines

<b>Category</b>	<b>Days of Use Per Year</b>	<b>Hours of Use Per Day</b>	<b>Consecutive Days of Use</b>	<b>Hours of Use Per Year</b>
<b>1*</b>	90	5	2	450
<b>2</b>	110	5	3	550
<b>3</b>	140	5	4	700
<b>4</b>	180	2.5	4	450
<b>5</b>	180	2.5	5	450

*\*Category 1 fields:*

- *May have significant down time for restoration during the playing season.*
- *Require a high level of on-site supervision and technical knowledge.*
- *Shall have controlled access.*

Factors such as maintenance practices, precipitation, drought, hours of use, time of year, sport and the ages of field users may have a significant impact on field resilience to wear and damage.

Fields can be severely damaged if play is allowed when the soil is saturated or when the field is frozen.

The success of any athletic field relies as much on after care (maintenance program) as on the method of construction. The recommendations for field management outlined in this report have been developed to optimize field conditions.

As outlined in Tables 2 and 3, a Category 3 field best meets the requirements of a field that will receive a significant amount of use. The existing topsoil material at Church Street Junior PS does not meet the requirements for construction of a Category 3 athletic field if used alone. The topsoil will require the addition of sand to meet the soil textural requirements of a Category 3 athletic field.

Given the high values for silt plus clay in the existing topsoil, blending sand with the topsoil will be difficult and require specialized blending equipment.

The following general recommendations are for the renovation and management of the existing field to provide an athletic field that will provide the best possible playing conditions with minimal agronomic inputs. Detailed specifications would be required prior to beginning construction. The cost of converting the field to a Category 3 field will vary depending on contractor, material, transportation costs and field design.

#### A. Recommendations for Construction

1. Rootzone Material: Blend the on-site topsoil with approved coarse sand at a ratio of 60% on-site topsoil and 40% approved coarse sand. The final product shall have a combined value for silt plus clay near 35% and a value for fine plus very fine sand less than 25%. Install the growing medium to a consistent depth of 300 mm.
2. Drainage: Install a sub-surface drainage system of corrugated drain tile covered with coarse construction sand.
3. Irrigation: Install an automated sub-surface irrigation system with pop-up sprinklers appropriate for use on athletic fields.
4. Natural Turf Playing Surface: Sod with a NSGA Number One Grade Kentucky bluegrass sod. The sod should be harvested with an intact growing medium with values for silt plus clay and fine sand the same as, or less than, values reported for the developed rootzone material. Roll and water the sod within one hour of

installation and water regularly to maintain a moist rootzone until the sod is firmly established. Mow with lightweight equipment at a 5.0-7.5 cm mowing height removing no more than 1/3 of the turf height at each mowing. If growing conditions are optimal, restrict traffic for a minimum of 6-8 weeks to allow the sod to establish. If growing conditions are less than optimal or intensive field use is anticipated to commence upon field opening, the current TDSB twelve-week use restriction after sodding should be maintained.

## B. Recommendations for On-Going Field Management and Maintenance

1. Controlled Field Use:
  - a. Install fencing and locked gates so that the field does not receive greater than 5 hours of play per day for a maximum of 4 consecutive days per week. The recommended annual total for hours of field use should not exceed 700 hours per year. Hours of use consist of all usage including normal school usage as well as evening or weekend usage by TDSB authorized groups.
  - b. Restrict field access under saturated soil conditions to prevent excessive compaction and wear damage.
  - c. Restrict field use in winter months when soil is not frozen and during freeze/thaw periods in winter to prevent soil compaction and ice formation on the field.
2. Aeration: Commencing one year after field renovation.
  - a. Deep tine aeration in May and October.
  - b. Core Aeration in June and September.
  - c. Shatter tine aeration in July and August.
3. Overseeding: Following core aeration in June and September, overseed with perennial ryegrass at a rate of 500-600 kg/ha.
4. Fertility: Apply 40 kg of nitrogen (N) per hectare (0.4 kg N/100 m<sup>2</sup>) applied in June, July, August, September and late October/early November for a total annual application rate of 200 kg N/ha per season (2 kg N/100 m<sup>2</sup>). Additional nutrient requirements to be determined by annual soil test and recommendations from a qualified agronomist.
5. Topdressing: Topdressing at the time of core aerating/overseeding as necessary to correct slight depressions, or areas damaged during use. The topdressing material should be subjected to a physical analysis to insure it has similar characteristics to the root zone material.

6. Irrigation: Irrigate based on observed weather conditions to support germination of overseeded perennial ryegrass and maintain turf growth through periods of drought.
7. Mowing: Mow with lightweight equipment at a 5 – 7.5 cm mowing height removing no more than 1/3 of the turf height at each mowing.



**Church Street Junior Public School - Playing Field Evaluation Summary**  
**Current Conditions, Requirements, Remedial Actions and Costs to Develop and Maintain a Natural Turf Playing Field**

Requirement	Current	Required	Remedial Actions and Estimated Cost
<b>1. Field Size</b>	Entire playground area – 4,510 m <sup>2</sup> (~12 m <sup>2</sup> /student – less than board standard of 15-20 m <sup>2</sup> /student) Sports Field area - 2,000 m <sup>2</sup>	Field size is appropriate for field user age group but amount of available total field space is insufficient for current and future school population. Insufficient space exists on site for construction of additional fields.	Not applicable.
<b>2. Scheduling/Access</b>	Estimated 2-3 hours of scheduled school use per day from September to June.  Unscheduled community use unknown.	<ul style="list-style-type: none"> <li>• Maximum 5 hours of play per day for a maximum of 4 consecutive days per week.</li> <li>• Annual total for hours of field use should not exceed 700 hours per year.</li> <li>• Limited use of field during periods turf is dormant (late fall to early spring). Field could be used with some limitations during winter months after soil is frozen.</li> <li>• Restrict field usage during periods when soil is saturated to prevent excessive compaction and wear damage.</li> <li>• No use of field outside of normal scheduled school use (subject to the restrictions listed above).</li> </ul>	<ul style="list-style-type: none"> <li>• Establish field condition monitoring program and restrict student access as indicated when field conditions are not suitable for use.</li> <li>• Upgrade perimeter security and monitoring to prevent unauthorized field use (estimated cost \$50,000-\$60,000).</li> </ul>

Requirement	Current	Required	Remedial Actions and Estimated Cost
<b>3. Light Conditions</b>	Shade from adjacent buildings reduces sun exposure throughout the year with significant reduction in the critical spring and fall periods.	Typical grasses used on sports fields (Kentucky bluegrass and perennial ryegrass) are not shade tolerant and require full sun exposure for optimum performance.	While supplementary light systems not be practical for use in a school environment due to high installation and operating costs.  Field conditions should be monitored and depending on turf vigour and environmental conditions field use to be reduced or suspended.
<b>4. Soil Conditions</b>	Loam soil (20.5% clay, 30.7% silt, 44.3% sand, 4.5% gravel) Estimated saturated hydraulic conductivity 25.9 mm/hour	Combined silt + clay fraction 35% or less.	Removal of existing soil some of which may be blended with coarse sand to achieve the required silt:clay fraction. Soil would be reinstalled to a consistent depth. <b>Estimated Field Construction Cost - \$120,000-\$160,000 including drainage and irrigation</b>
<b>5. Drainage</b>	No installed drainage.	As part of field renovation, install engineered subsurface drainage system.	Installation of properly designed subsurface drainage system consisting of corrugated drainage pipe covered with coarse construction sand.
<b>6. Irrigation</b>	In ground irrigation system installed.	As part of field renovations, install updated irrigation system.	Estimates Annual Operating Cost - \$2,000.
<b>7. Maintenance</b>	Basic school grounds maintenance. Field resodded approximately once every five years.	Enhanced maintenance program with regular oversight and site inspection by trained professional turfgrass manager.	Annual aeration (6X), overseeding(2X) , resodding wear areas, fertilizing (5X), topdressing (2X), irrigation and mowing. Annual soil test by accredited agronomist (Estimated \$10,000/year).