APPENDIX A
REN 155 2022

Toronto Catholic District School Board

Sport Field Study

Interim Final Report

April 2023

RK & Associates Inc.

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1.0 EXECUTIVE SUMMARY

The Toronto Catholic District School Board (TCDSB) has over 200 properties throughout the City of Toronto, many of which include recreational natural turf or artificial turf sport fields. The TCDSB requires the development of a comprehensive field inventory, design, use and maintenance strategy to provide students, staff and the community the best possible facility while capitalizing on the staff resources and funds available for capital development and maintenance.

The objective of the Outdoor Sport Field Strategy is to develop a long-term implementation and maintenance strategy for the 200+ properties owned and operated by the Board. This document will assist in determining the strategic direction for the development and renovation of existing infrastructure that will address the standards and industry trends for the provision of appropriate sport field facilities reflective of the performance and safety requirements of various levels of fields.

The Outdoor Sport Field Strategy has been developed to provide the Board with a defensible strategy and decision-making framework for staff to determine the best solution on a site-by-site basis. The strategy provides the Board with standard specifications and drawings for various facilities that reflect the level of play intended for the site. These standards and specifications include recommendations for artificial turf fields as well as natural turf fields. They are accompanied by high level cost estimates for implementation of facilities, as well as best management practices and maintenance costs for internal staff maintenance and third-party maintenance.

During the development of the Field Strategy, RK and Associates Consulting Inc. (RK) conducted field investigations at each field to determine the condition of the field, size of the field, and to determine any site concerns such as drainage issues and poor turf grass coverage. A desktop exercise was conducted to review the student population size and the square meters of field per student. This information was analyzed in conjunction with the information from the site review.

There are many fields within the TCDSB inventory in fair to poor condition due to various factors. These factors include maintenance practices, overdue renewal, and the inability of a field to support the level of use regardless of maintenance practices. Weather also plays a significant role in the success of a field. Most fields are heavily used during the Fall and Spring months in frozen and wet conditions, which are not conducive to the establishment and success of natural turf.

One compounding factor in the success of the fields is the Toronto Green Standards, especially on smaller properties. With large student populations and small green spaces composed primarily of natural turf and mulch, facilities are intensively used, leading to sparse turf coverage and muddy conditions.

The data gathered strongly suggests that the condition of a field has a direct correlation with the square meters available per student. This report identifies the facilities that are in poor condition that should be prioritized for renewal. It is recommended that the TCDSB review and prioritize this list of schools and determine the implementation strategy for each site, with artificial turf being the most effective means of ensuring long-term playability on existing fields with less than 10 square meters of area per student.

2.0 OBSERVATIONS AND ANALYSIS

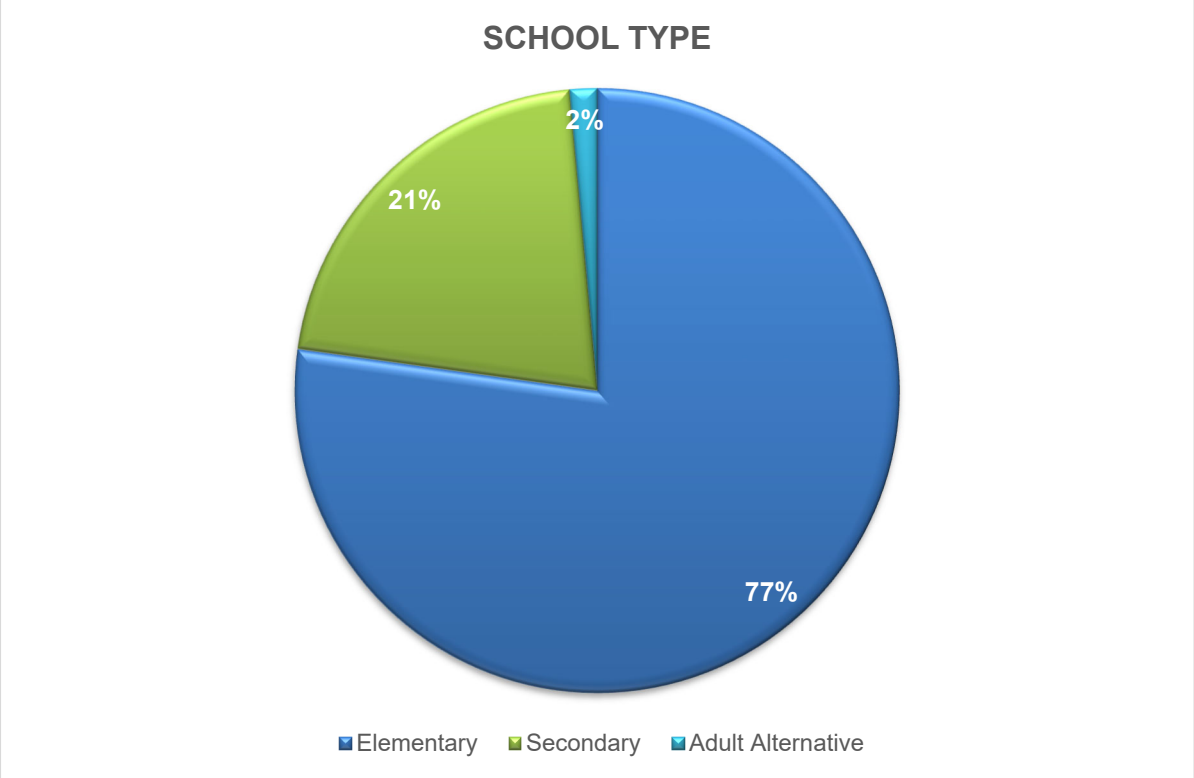
2.1 Methodology

RK and Associates completed detailed field inventories of 130 facilities during the Fall of 2021. This inventory gathered various data including:

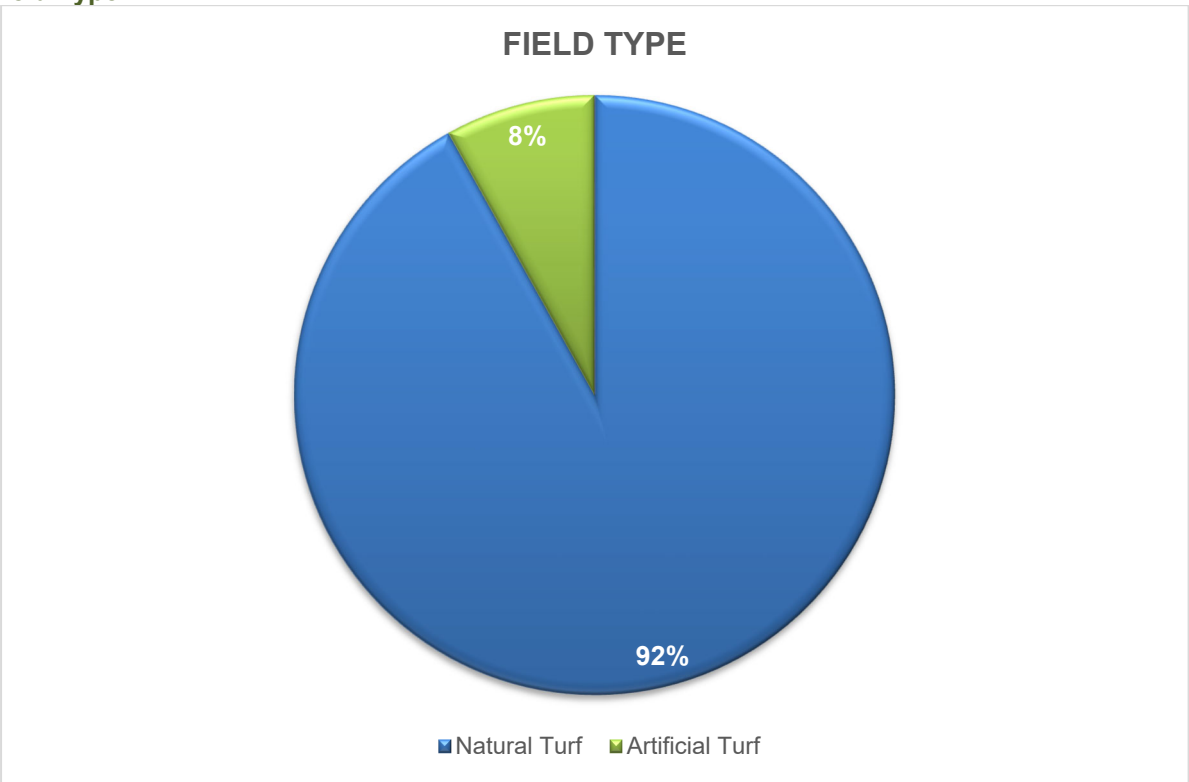
1. School type ie: Primary or Secondary
2. Field type ie: Artificial or Natural
3. Turf grass coverage, observed as a percentage of turf cover versus weed growth in 1m x 1m sample plots
4. Condition from poor to excellent based upon turf coverage, planarity and exposed soil area
5. Square meters of turf per student based upon measured field size and student population

2.2 Field Data Collection Charts

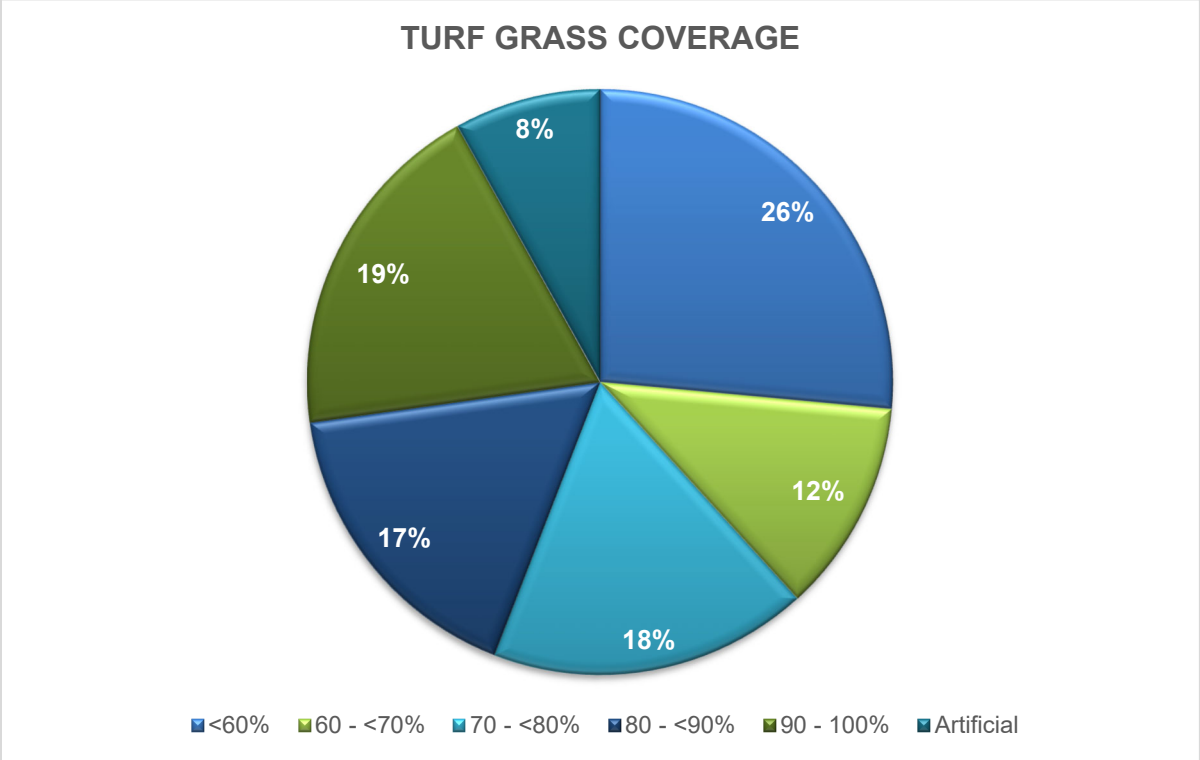
2.2.1 School Type



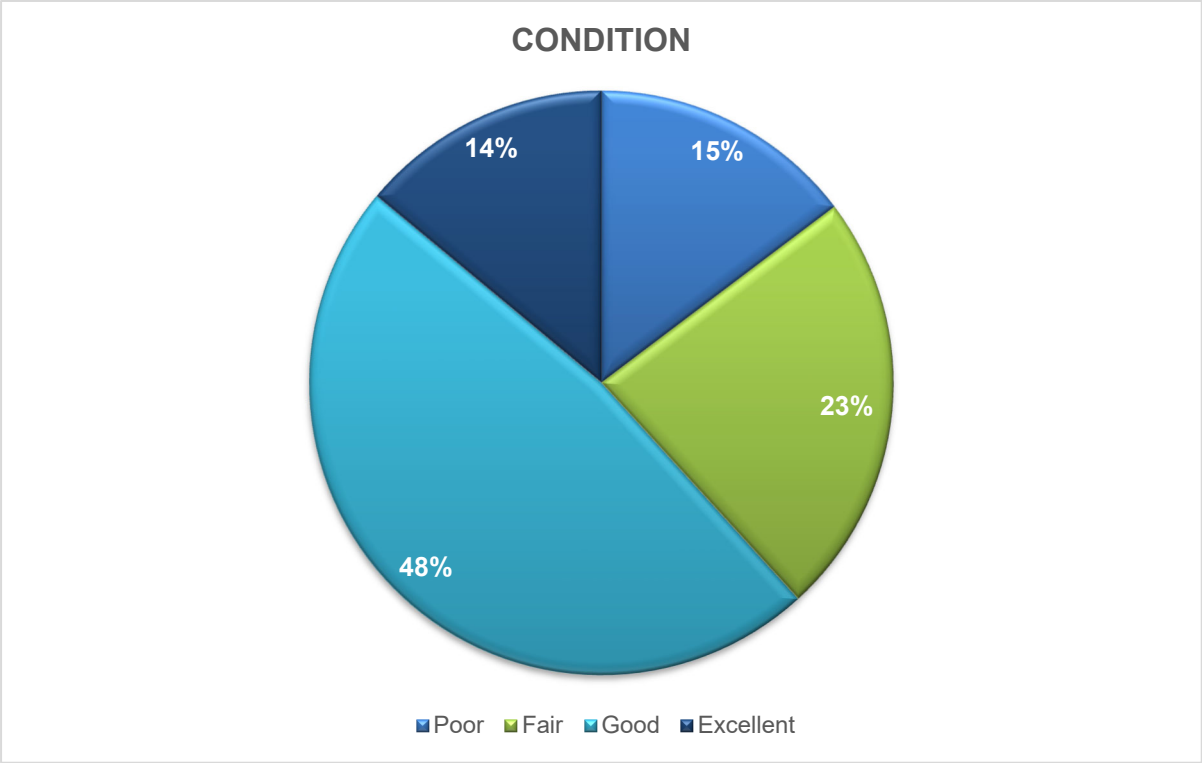
2.2.2 Field Type



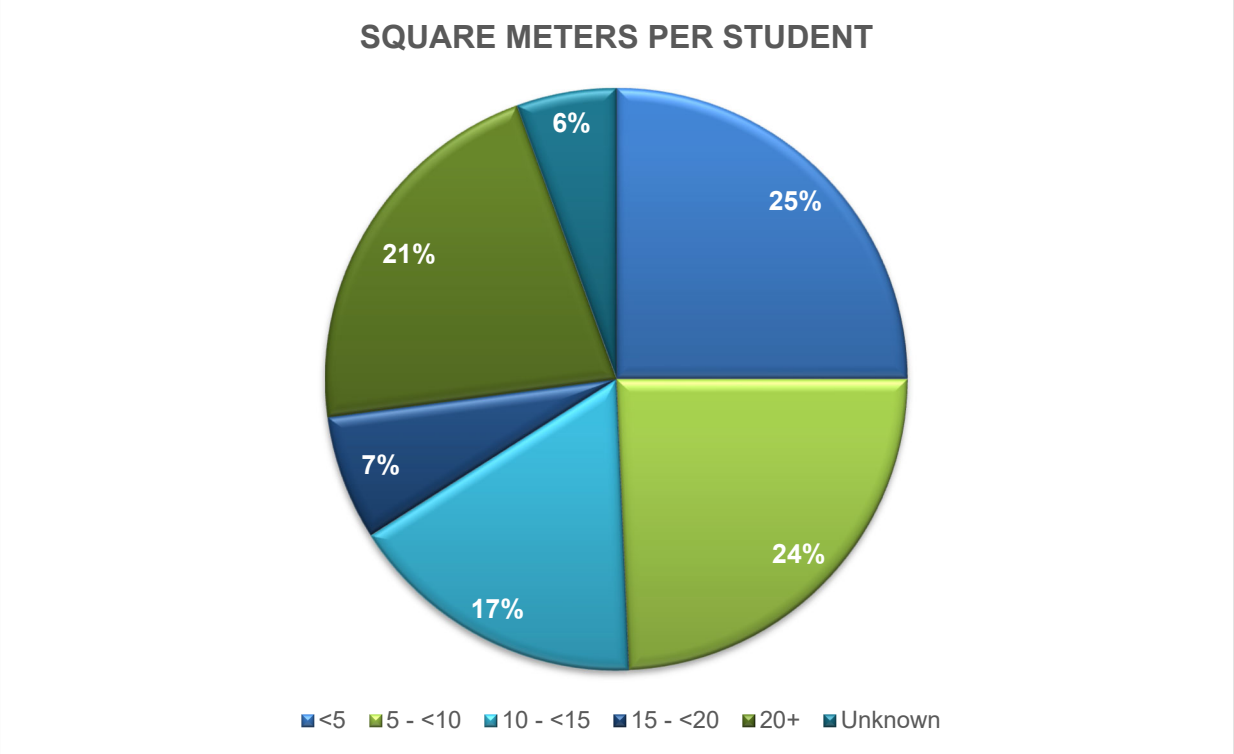
2.2.3 Turf Grass Coverage



2.2.4 Condition

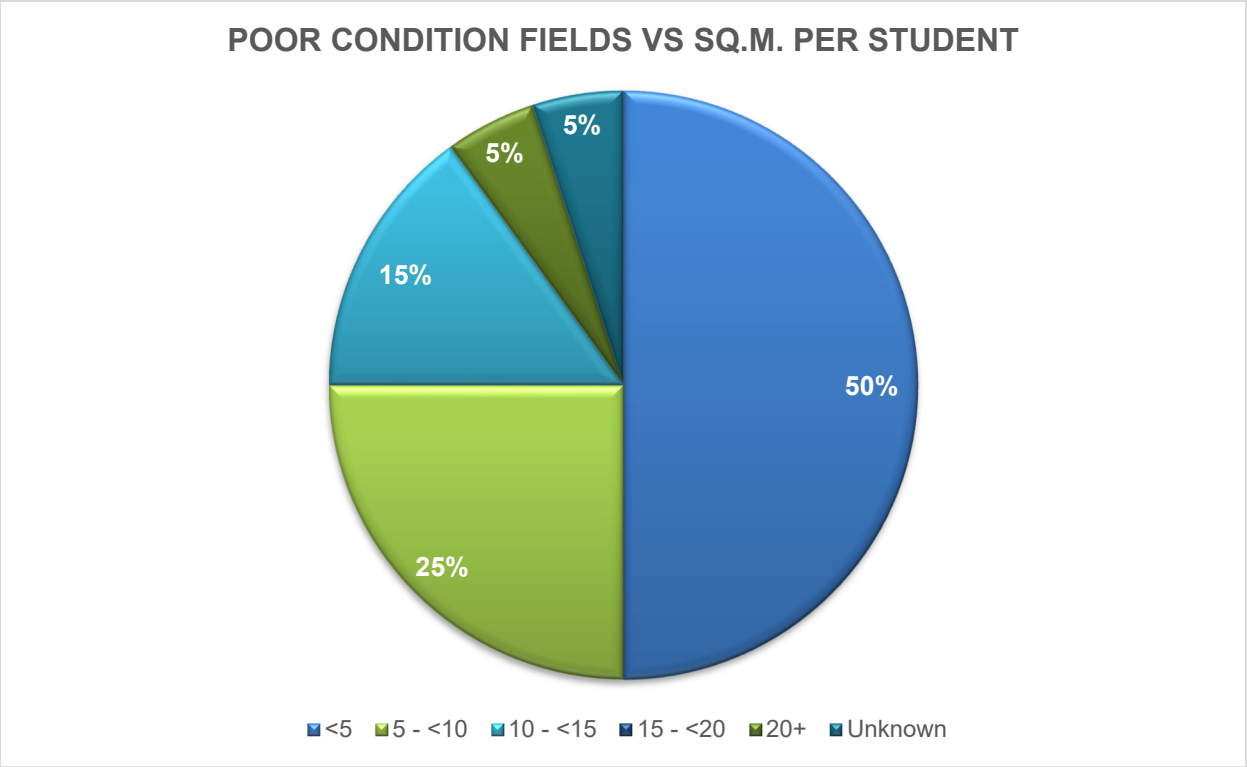


2.2.5 Square Meters Per Student

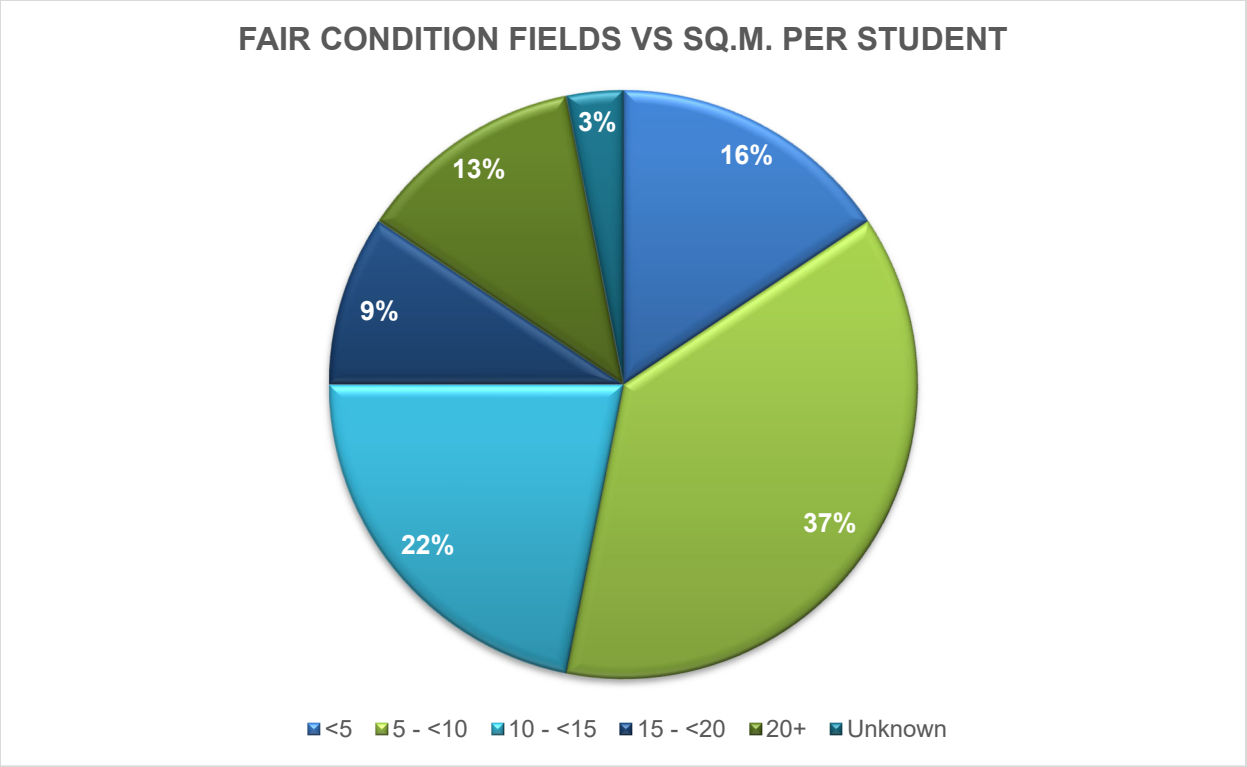


2.3 Condition Analysis Versus Square Meters/Student

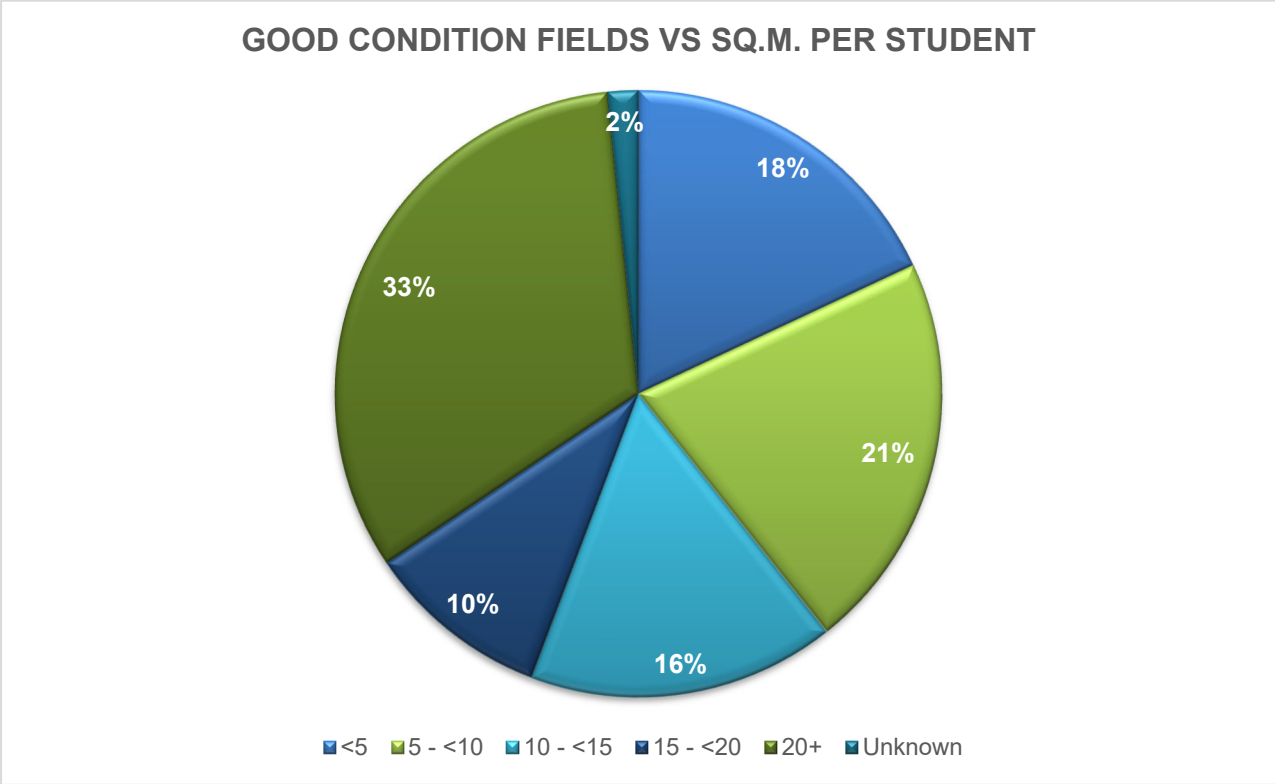
2.3.1 Poor Condition Fields Versus Sq.m. Per Student



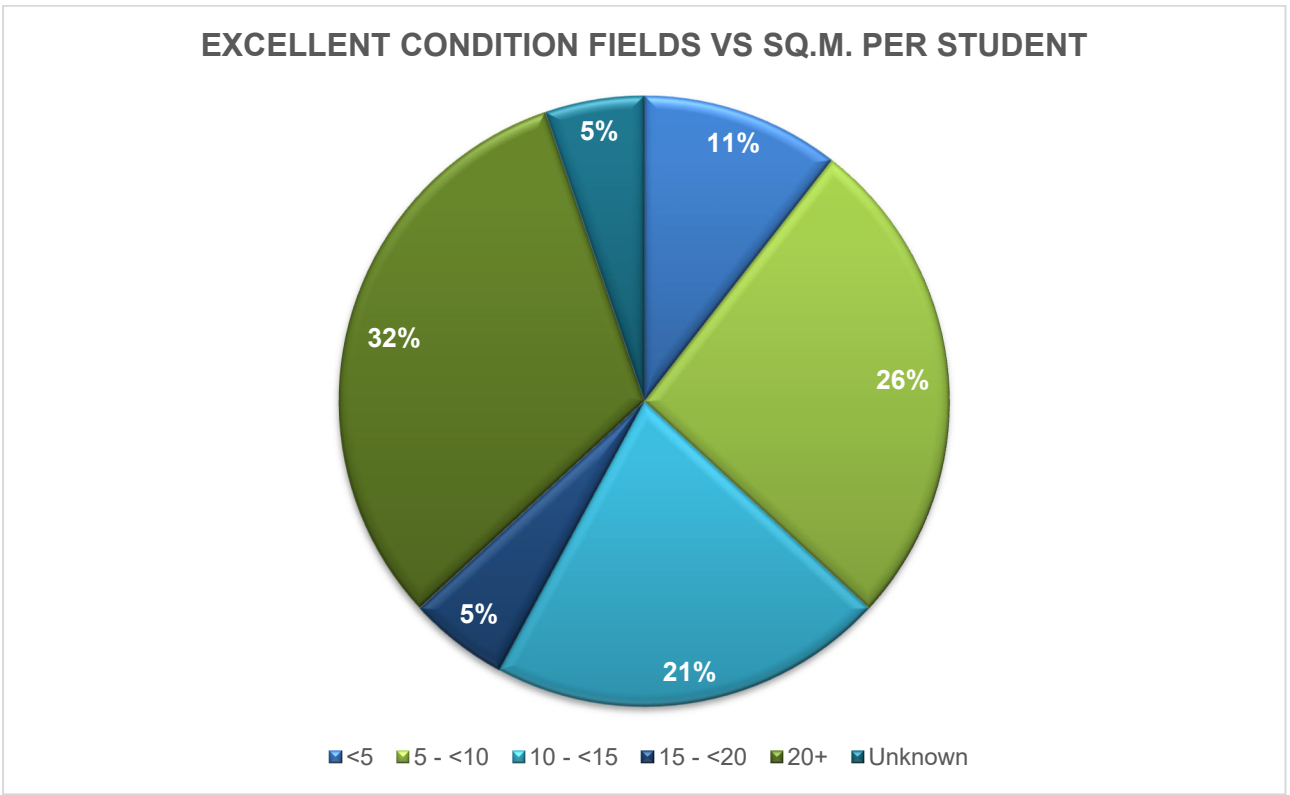
2.3.2 Fair Condition Fields Versus Sq.m. Per Student



2.3.3 Good Condition Fields Versus Sq.m. Per Student



2.3.4 Excellent Condition Fields Versus Sq.m. Per Student



2.3.5 Condition Versus Student/sq.m. Analysis Summary

Upon review of the data provided through the on-site analysis of 130 fields it can be determined that the condition of the natural turf fields have a direct correlation with the square meters of recreational space provided per student.

Below are key summaries of the data:

1. 48% of the 130 schools have been identified in poor condition. Schools with fields that have less than 5sq.m./student represent 50% of the fields in poor condition (+/-31 fields).

2. 23% of the 130 fields have been identified in fair condition. Schools with fields that have between 5-10sq.m./student represent 37% of the fields in fair condition (+/-11 fields).

3. It is demonstrated that the greater the amount of sq.m./student provided the field is generally in better condition.

The data suggests that the TCDSB should consider implementing artificial turf fields for the fields (+/-31 fields) that have less than 5sq.m./student in poor condition, and this should be reviewed on a school-by-school basis based upon the condition rating provided in Appendix 'A'.

The date also suggests that the TCDSB should consider implementing artificial turf fields for the (+/-11 fields) that have between 5-10sq.m./student in fair condition, and this should be reviewed on a school-by school basis based upon the condition rating provided in Appendix 'A'-

All other field redevelopment considerations should be reviewed by the Board on a school-by-school basis. These sites should be reviewed to determine the use of the field, ie: Secondary versus Primary, permitted versus non-permitted, to determine the appropriate approach to site redevelopment as well as revenue generating opportunities.

Artificial turf fields have been recommended for the sites noted above as natural turf cannot withstand the intensive use and is not a viable option. Management of natural turf would require extensive down time with no use. This approach would not be feasible as the school yard is required to be open 5 days per week for student use. The only approach for these sites is to provide an artificial turf surface that can withstand the anticipated hours of programming and use that extends late into the Fall and Spring seasons when natural turf is vulnerable to significant damage.

3.0 FIELD CHARACTERISTICS

3.1 Natural Turf Fields

The following sections reference the field category classifications set forth by the Sport Turf Association Athletic Field Construction Manual (2008). The field types range from Category 1, a professional sand-based field, to Category 5, a basic field composed of native topsoil.

3.1.1 Category 1 Characteristics

Category 1 fields are composed of a 100% sand-based root zone system based upon the United States Golf Association greens construction methods. These fields require a granular drainage base of 300mm depth, and a drain tile system spaced at 5.0m O.C. and is accompanied by an irrigation system.

Site amenities typically include lighting, changeroom and washroom facilities, and spectator stadium seating. This type of field is reserved for professional play, or high-level collegiate play. Maintenance requirements are intensive and require a full time turfgrass specialist

3.1.2 Category 2 Characteristics

Category 2 field are generally constructed from imported soils that contain less than 25% silt/clay content. They require a drain tile system spaced at 3.0m O.C., however they do not include a 300mm depth granular drainage layer. Irrigation is a requirement for these fields.

Site amenities typically include lighting, change rooms and washrooms, as well as spectator bleachers. This type of field is typical of a high level collegiate or academy field and requires specialized knowledge for maintenance.

3.1.3 Category 3 Characteristics

Category 3 field are constructed from imported soils or amended in situ soils and contain less than 40% silt/clay content. The field can be designed with or without irrigation, however an irrigation system is recommended to facilitate maintenance (overseeding and sod establishment and maintenance) and to maintain a suitable playing surface during the summer season.

Site amenities may include lighting, changeroom and washrooms, and basic spectator seating. This type of field requires a basic knowledge of turfgrass maintenance to maintain. This category is typically used for municipal and institutional natural turf fields that cater to high school level athletics and league play.

3.1.4 Category 4 Characteristics

Category 4 fields are constructed from in situ soils that have greater than 40% silt/clay content. These fields may include an irrigation system, and it shall be determined on a case-by-case basis dependent upon existing soil types and budget. A slit drainage system composed of 100mm side sand trenches with a 50mm drain tile at 3.0m O.C. is recommended.

This type of field generally does not include lighting or amenity buildings and may contain basic spectator seating. This category is typically used for community recreational use. These fields tend to be difficult to maintain due to general overuse and are not recommended for a facility that will see continual use.

3.1.5 Category 5 Characteristics

Category 5 fields are constructed from in situ soils. These fields do not contain irrigation, drainage, lighting, or other amenities. They are basic fields constructed when limited funds are available, or the requirements of the field are for casual use. Maintenance can be performed with limited turf grass knowledge. These fields are intended for light use and require a fair amount of ongoing maintenance, including overseeding to maintain a safe and playable surface.

3.2 Natural Turf Field Construction Costs

Preliminary capital costs are based upon market pricing at the time of preparation of this strategy. These are high level estimates that will require seasonal revision based upon current market trends. These costs can be variable year to year based upon inflation, material costs, labour costs, construction timing and contractor availability.

In addition to construction costs the Board shall consider the following costs on a site-by-site basis:

1. Design consulting fees
2. Topographic and legal survey
3. Geotechnical investigation
4. Soil analysis including testing as per Section 32 18 2303 Natural Turf Athletic Fields and chemical analysis as per the current O. Reg 406/19 On-Site and Excess Soil Management
5. Permit fees ie: Forestry, Site Plan Approval, Site Alteration Permit, Building Permit etc. and;
6. Additional study fees ie: Archaeological, Heritage etc.

Category 3 (Full Size Field – 10,500sq.m.)	
Item	**Cost**
Mobilization/Demobilization	$50,000
Bonding and Insurance	$20,000
Site Preparation	$15,000
Civil Servicing	$10,000
Electrical Servicing	$45,000
Water Servicing	$10,000
Rough Grading	$75,000
Imported Category 3 Soil	$190,000
Tile Drainage System at 3.0m O.C.	$75,000
Sodding	$85,000
Irrigation System	$80,000
Lighting	$450,000
Bleachers (200 person capacity)	$35,000
General Site Work ie: Walkways, Concrete, Planting etc.	$200,000
Total	**$1,290,000**

*Assumes existing storm service is available
*Assumes new primary electrical service is required
*Assumes new water service is required

Category 5 (Soccer Field Sized – 6,000sq.m.)	
Item	**Cost**
Mobilization/Demobilization	$10,000
Bonding and Insurance	$7,500
Site Preparation	$10,000
Rough Grading	$25,000
Sodding	$48,000
General Site Work ie: Walkways, Concrete, Planting etc.	$50,000
Total	**$150,500**

*Assumes all soils are to remain on site and be used for new field construction

3.3 Natural Turf Field Recommendations

3.3.1 Secondary School Natural Turf Recommendations

This recommendation should be considered in conjunction with the recommendation for artificial turf field implementation. For full size secondary school fields that are note being considered for artificial turf it is recommended that the Board consider implementing a Category 3 field. This type of field allows the maximum number of programmable hours per year. However, the field requires maintenance by an experienced staff and will be offline during heavy rain events, and will could require as much as 48hrs of downtime after a rain event to become dry enough to play on without causing significant damage to the facility. The permitted hours per day and recommended rest periods should be strictly adhered to maintain the playability, safety, and lifespan of the facility.

3.3.2 Primary School Natural Turf Recommendations

This recommendation should be considered in conjunction with the recommendation for artificial turf field implementation. For primary school fields that are note being considered for artificial turf it is recommended that the Board consider implementing a Category 5 field. This type of field represents the lowest capital investment and has the lowest maintenance costs. This category of field does not require specialized maintenance.

3.4 Natural Turf Specifications and Drawings

Specifications for the development of natural turf fields are included in Appendix ‘B’. The specifications pertain to the construction of Category 3 and Category 4/5 natural turf fields. The list of specifications include:

- Section 32 18 23.03 Natural Turf Athletic Fields

Drawings for the development of natural turf fields are included in Appendix ‘C’. The drawings pertain to the construction of Category 3 natural turf fields. The list of drawings include:

1. FD-1 Natural Turf Field Profile
2. FD-2 Natural Turf Field Tile Drain

3.5 Artificial Turf Fields

3.5.1 Turf Types

There are several synthetic turf products that can be used for outdoor sports fields. The design criteria and specification should be determined by the proposed program usage, the availability for maintenance, and by the long-term plan for durability verses performance. The detailed specifications of the turf systems will also dictate the performance, durability, and maintenance requirements.

3.5.1.1 Monofilament

Monofilament synthetic turf systems have evolved over the past 10 years with more attention on durability and performance. While monofilament systems will now perform better for durability, these synthetic turf systems are more susceptible to “lay-down” and will require maintenance on a more regular basis. Monofilament is better for a soccer centric programmed usage as they tend to provide the highest level of performance for soccer activities. There are low pile height, dense monofilament systems that will work for multi-use, high traffic installations but they tend to cost prohibitive and not very natural looking. Pile height, density and infill will be dependent on whether there is a shock pad included with the system. The following fiber characteristics are provided by the Synthetic Turf Council.

3.5.1.2 Slit Film

Slit filament synthetic turf systems (or “fibrillated) are considered the most durable of all synthetic turf. The fibrers are wider and will fibrillate in a honeycomb pattern throughout the lifecycle of the synthetic turf with usage and maintenance. For high traffic and multi-use facilities slit filament systems will be durable, lower maintenance, and will perform well for various sports and programming. Pile height, density, and infill will be dependent on whether there is a shock pad included with the system.

3.5.1.3 Dual Fibre

Hybrid synthetic turf systems represent a large portion of the installations in today’s market. Hybrid systems are durable, perform well for sports and other programmed uses and require the same amount of maintenance as the slit filament systems. From a multi-use standpoint, hybrid synthetic turf systems will create the best combination of performance and durability. It is essential that the monofilament fibre in the hybrid system is of high quality and meets a specification for durability. Pile height, density, and infill will be dependent on whether there is a shock pad included with the system.

3.5.2 Infill Options

As with synthetic turf, there are a number of options available for the infilling of the systems being installed. Infill is used for both performance of the systems and for the “standing up” of fibers in the system. While there are non-infilled systems in the marketplace, these tend to be used indoors or for residential landscape projects that do not include programming of sports. Non-infilled systems for sports usage are cost prohibitive and exhibit a shorter lifecycle. The following infill characteristics are provided by the Synthetic Turf Council.

3.5.2.1 Natural

There are several organic infills available in the North American market, all utilizing different organic components, such as natural cork and/or ground fibers from the outside shell of the coconut. These products can be utilized in professional sports applications as well as for landscaping. At the end of its life cycle, it can be recycled directly into the environment. The issue in the Ontario or Canadian market is the cost for these infills is prohibitive and the climate will create a scenario that causes regular replacement of infill due to snow and rain causing the infill to migrate from the playing surface through wind action and rain. The ongoing cost to keep a field infilled can be extraordinary depending on the size of the field and the number of fields involved.

3.5.2.2 SBR/CRI

SBR/CRI (Styrene Butadiene Rubber/Crumb Rubber) is derived from scrap car and truck tires that are ground up and recycled. Two types of crumb rubber infill exist, ambient and cryogenic. Together these make up the most widely used infill in the synthetic sports field market. Crumb rubber infill is substantially metal free, and according to the STC Guidelines for Crumb Rubber Infill should not contain liberated fiber in an amount that exceeds .01% of the total weight of crumb rubber, or .6 lbs. per ton. There are well over 100 studies worldwide that state the use of SBR for synthetic turf is a safe and viable solution. It is important to be aware of the source of the SBR and to include testing protocols in the installation process. Infill levels and mixtures will be determined based on the synthetic turf system being specified including pile height, pile density and the use/nonuse of a shock pad.

3.5.2.3 EPEM Rubber

Ethylene Propylene Diene Monomer (EPDM) is a polymer elastomer with high resistance to abrasion and wear and will not change its solid form under high temperatures. Typical EPDM colors are green and tan. EPDM has proven its durability as an infill product in all types of climates. Its excellent elasticity properties and resistance to atmospheric and chemical agents provide a stable, high performance infill product. EPDM Is a higher cost infill system to crumb rubber. Infill levels and mixtures will be determined based on the synthetic turf system being specified including pile height, pile density and the use/nonuse of a shock pad.

3.5.2.4 TPE

Thermo-Plastic Elastomer (TPE) infill is non-toxic, heavy metal free, available in a variety of colors that resist fading, very long lasting, and 100% recyclable and reusable as infill when the field is replaced. TPE infill, when utilizing virgin-based resins, will offer consistent performance and excellent g-max over a wide temperature range. Infill levels and mixtures will be determined based on the synthetic turf system being specified including pile height, pile density and the use/nonuse of a shock pad.

3.5.2.5 Sand

Pure silica sand is one of the original infilling materials utilized in synthetic turf. This product is a natural infill that is non-toxic, chemically stable and fracture resistant. Silica sand infills are typically tan, off-tan or white in color and - depending upon plant location – may be round or sub-round in particle shape. As a natural product there is no possibility of heavy metals, and the dust/turbidity rating is less than 100. It can be used in conjunction with many other infills on the market to provide a safe and more realistic playing surface. The round shape plays an integral part in the synthetic turf system. It is important that silica sand have a high purity (greater than 90%) to resist crushing and absorption of bacteria and other field contaminants. Silica sand can either be coated with different materials as a standalone product or can be used to firm up in combination with traditional crumb rubber infill systems. Infill levels and mixtures will be determined based on the synthetic turf system being specified including pile height, pile density and the use/nonuse of a shock pad.

3.5.2.6 Coated Sand

This class of infill consists of coated, high-purity silica sand with either a soft or rigid coating specifically engineered for synthetic turf. These coatings are either elastomeric or acrylic in nature (non-toxic) and form a bond with the sand grain sealing it from bacteria to provide superior performance and durability over the life of a field. Coated sand is available in various sizes to meet the application's needs.

Depending on the amount and type of infill, coated sands can either be used with or without a pad and are available in various colors. All of the coatings are non-toxic and are bonded to the quartz grain for superior performance and durability over the life of your field. These materials are typically used as a homogenous infill which provides both ballast and shock absorbing qualities to a synthetic turf application.

Coated sand products are cost prohibitive based on manufacturing process and on shipping cost. Infill levels and mixtures will be determined based on the synthetic turf system being specified including pile height, pile density and the use/nonuse of a shock pad.

3.5.3 Shockpads

Shock pad systems are one of the fastest growing trends in the synthetic turf sports field industry. Shock attenuation pads offer an added level of protection and consistent playability to the playing surface and are designed to contribute to a safe *g*-max level throughout a synthetic turf field's life. Roll out or panel systems are relatively economical and offer ease of installation. Pads can be permeable or impermeable. Some can replace all or portions of the stone base and provide both shock attenuation and drainage, while others are used in combination with a traditional stone and drainage base.

Shock pads provide additional safety, added durability and will perform well for athletes with the correct synthetic turf and infill systems. Shock pads while costly, will last a minimum of two lifecycles of artificial turf and create a

level of safety for all users. There are a number of different shock pad manufacturers in the market place and a number of different sizes of shock pads that can be used in a sports environment.

3.6 Key Turf Characteristics

When specifying the performance characteristics it is important to consider budget, performance, and durability of the turf system. The following key characteristics should considered during the development of the specification and product selection. The following characteristics are provided by the Synthetic Turf Council.

3.6.1 Tuft Bind

The force, measured in pounds or newtons, required to pull a tuft from the turf backing. The greater the tuft bind the more difficult it will be to remove the fiber from the backing.

3.6.2 Fiber Thickness

Typically, the fiber used in synthetic turf is textured and/or non-textured polypropylene, polyethylene, nylon, or other suitable performing hybrid or copolymer in tape form or monofilament. Minimum fiber sizes are 50 microns for polypropylene or polyester, 100 microns for tape form (slit film) polyethylene, 140-300 form mono-filament polyethylene (shape dependent), and 500 denier for nylon. Generally, the thicker the fiber, the more durable it will be.

3.6.3 Face Weight

The total weight of the yarn/fiber tufted into the backing measured in oz/sq.ft, or grams/sq.m.. Generally, the greater the face weight the more durable the turf will be.

3.6.4 GMax

A field's level of shock absorbency is tested by using a unit of measurement called the *g*-max, where one "g" represents a single unit of gravity. The peak acceleration reached upon impact of two objects, such a football player and the synthetic turf surface, is the maximum number of g's a field is able to absorb. A field with a higher *g*-max level loses its ability to absorb the force and places more impact on the athlete during a collision, while a surface with a lower *g*-max absorbs more force, lessening the impact to the athlete. Using ASTM F1936 test method, *g*-max readings shall not exceed 200 at each test point. With proper maintenance, a synthetic turf field should have a *g*-max of well below 200. The *g*-max guideline in the STC's *Guidelines for Synthetic Turf Performance* is "below 165" for the life of the synthetic turf field

3.7 Recommendations

The synthetic turf system including infill and shock pad should be specified based on the proposed usage, the available maintenance, the level of performance of the field required (or not required) and the expected lifecycle. While many systems will work for many aspects, having the correct system will better answer the needs of the stakeholders and user groups.

Synthetic turf and infill need to be tested prior to installation to ensure quality and meet environmental requirements. Developing testing criteria to be followed with specifications and installations should be a priority.

3.8 Specifications and Drawings

Specifications for the development of artificial turf fields are included in Appendix ‘B’. The list of specifications include:

1. Section 32 18 23.01 Artificial Turf Fields (Senior)
2. Section 32 18 23.02 Artificial Turf Fields (Junior)

Drawings for the development of artificial turf fields are included in Appendix 'C'. The drawings pertain to the construction of both Senior and Junior artificial turf fields. The list of drawings include:

1. FD-3 Artificial Turf Field Standard Field Profile
2. FD-4 Artificial Turf Field Standard Cleanout
3. FD-5 Artificial Turf Field Schematic Rendering
4. FD-6 Artificial Turf Field Composite Layout Plan
5. FD-7 Artificial Turf Field CFL Layout
6. FD-8 Artificial Turf Field Soccer Layout
7. FD-9 Artificial Turf Field Cross Field Soccer
8. FD-10 Artificial Turf Field Field Hockey Layout

3.9 Artificial Turf Field Construction Costs

Preliminary capital costs are based upon market pricing at the time of preparation of this strategy. These are high level estimates that will require seasonal revision based upon current market trends. These costs can be variable year to year based upon inflation, material costs, labour costs, construction timing and contractor availability.

In addition to construction costs the Board shall consider the following costs on a site-by-site basis:

1. Design consulting fees
2. Topographic and legal survey
3. Geotechnical investigation
4. Soil chemical analysis as per the current O. Reg 406/19 On-Site and Excess Soil Management
5. Permit fees ie: Forestry, Site Plan Approval, Site Alteration Permit, Building Permit etc. and;
6. Additional study fees ie: Archaeological, Heritage etc.

Full Size Senior Field – 10,500sq.m.	
Item	**Cost**
Mobilization/Demobilization	$50,000
Bonding and Insurance	$20,000
Site Preparation	$15,000
Civil Servicing	$10,000
Electrical Servicing	$45,000
Rough Grading	$125,000
Concrete Turf Anchor	$40,000
Artificial Turf Drainage System (Granulars, Lateral Tiles, Headers)	$160,000
Artificial Turf System (Shockpad, Dual Fibre, SBR/sand Infill)	$890,000
End Zone Lettering	$15,000
Lighting	$450,000
Bleachers (200 person capacity)	$35,000
General Site Work ie: Walkways, Concrete, Planting, Fencing etc.	$250,000
Total	**$2,105,000**

*Assumes there is capacity in the existing SWM system and there is no requirement for additional storage

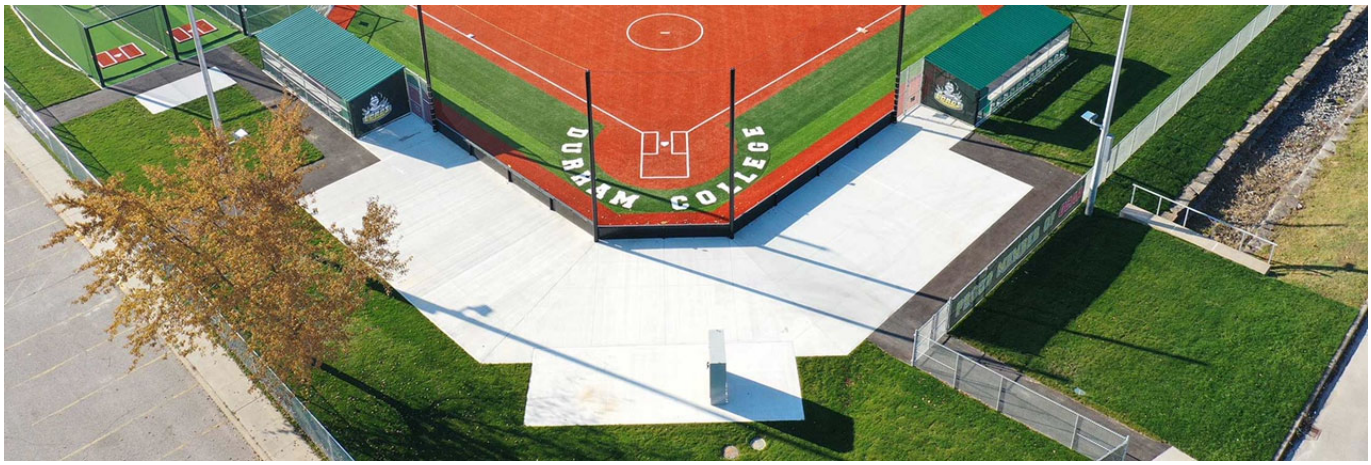
*Assumes there is an existing stormwater management connection on site

*Assumes new primary electrical service is required

Junior Field – 4,000 sq.m.	
Item	**Cost**
Mobilization/Demobilization	$20,000
Bonding and Insurance	$10,000
Site Preparation	$10,000
Civil Servicing	$10,000
Rough Grading	$75,000
Concrete Turf Anchor	$40,000
Artificial Turf Drainage System (Granulars, Lateral Tiles, Headers)	$125,000
Artificial Turf System (Shockpad, Dual Fibre, SBR/sand Infill)	$400,000
Bleachers (100 person capacity)	$20,000
General Site Work ie: Walkways, Concrete, Planting, Fencing etc.	$100,000
Total	**$810,000**

*Assumes there is capacity in the existing SWM system and there is no requirement for additional storage

*Assumes there is an existing stormwater management connection on site



4.0 FIELD MANAGEMENT STRATEGIES

4.1 Natural Turf Best Management Practices

The following tables provided by the Sport Turf Association outline the yearly recommended maintenance requirements, contracted maintenance costs and assumptions adjusted to 2022 costs.

Maintenance Cost Estimate

Category	Mow	Aerify	Fertilize	Overseed	Irrigate	Hydro	Cost/year	Cost/permitted hour
1	$13,500	$0	$4,200	$2,700	$19,550	$1,850	$41,800	$92.89
2	$13,500	$3,220	$4,200	$2,700	$9,900	$2,400	$35,920	$65.30
3	$13,500	$3,220	$2,700	$3,100	$6,800	$3,000	$32,320	$46.17
4	$2,875	$2,875	$2,700	$3,100	$0	$0	$11,550	$25.67
5	$2,875	$2,475	$2,700	$3,100	$0	$0	$11,150	$24.78

Assumptions for Maintenance Costs

Task	Field Category				
	1	2	3	4	5
Mowing Frequency (#/season)	56	56	56	24	24
Vertidrain Frequency (#/season)	0	1	1	1	2
Tyne Aerification (#/season)	0	4	4	2	2
Coring Frequency (#/season)	0	2	2	2	1
Fertilization Frequency (#/season)	6	6	4	4	4
Fertilization Rate (kg/100m^2)	4	4	3	3	3
Overseeding Frequency (#/season)	2	2	2	2	2
Overseeding Rate (kg/100m^2)	2	2	2	2	2
Irrigation Frequency (#/season)	28	13	9	0	0
Irrigation Rate (mm/week)	28	13	9	0	0
Hydro (hours/season)	378	462	588	0	0

4.2 Artificial Turf Best Management Practices

4.2.1 Artificial Turf Maintenance

Proper, regular maintenance of artificial turf sport fields is important for safety, performance and to maximize the lifespan of the turf.

The amount of maintenance required is somewhat dependent on the synthetic turf system being installed and the types of infill in the system. Generally, a field will need to be reviewed for infill displacement and infill levels and groomed every 70-90 hours of programmed usage. The typical field will be programmed for 40 hours a week and would require basic grooming every 2 weeks. Fields maintenance would occur from March 1st through November 30th seasonally.

Basic grooming of the field will take one person an estimated 3-4 hours, including a review of the field, addition of infill to high wear locations, and the grooming of the field with a large brush being towed behind a small vehicle such as a turf tire tractor or Gator.

There are two options for the grooming process:

1. Grooming completed in house by Board Maintenance Staff. Equipment would need to be purchased and stored to be taken to the field to complete the maintenance. There are many Boards that have the regular maintenance done by in-house staff.

2. Grooming completed by a field maintenance company. This tends to be more costly than using Board Staff. Within Ontario there are 3-4 qualified companies that perform this type of service. This work can also be included in any grass cutting contracts that the Board has if the vendor that is engaged has completed proper training for this service.

It should be noted that depending on the system installed, a deep grooming of the field may be required once every 6-18 months. This should be contracted to a professional maintenance company or the original installation contractor.

Included as Appendix 'D' is the Synthetic Turf Council Guidelines for Maintenance. This a "best practices" document. Not all the items noted in this document may be applicable as specifications, systems, weather etc. effect the required level of maintenance.

Occasionally there will be separation of seams or vandalism that occurs on a field. During the basic grooming process the field should be inspected for separation and damage. During the 8 Year warranty period, any repairs due to workmanship or materials shall be completed by the original installer. In the event of vandalism, it is recommended that the original installer be utilized during the 8-year warranty period. Should an alternate service be retained it may void the warranty. Upon expiration of the warranty period the Board should retain the services of a reputable maintenance company or turf installer to complete any necessary repairs.

4.2.2 Artificial Turf Maintenance Costs

Maintenance of artificial turf sport fields can be completed in-house or contracted out. The number of artificial turf fields within the Board's inventory may have an impact on the maintenance scenario the TCDSB prefers to use.

In cases where a school board or municipality have several fields to maintain, in-house maintenance is the most cost effective with grounds staff maintaining the fields. Each field will require basic grooming every 70-90 hours of programmed usage. Basic grooming of a field will be a four-hour task for one person, plus travel time, and will require the Board to own a groomer, a piece of equipment to pull the groomer and the means to transport the equipment to the field to be groomed.

The type of system installed will also have an impact on the cost of maintenance. The budget provided below is for a multi-sport turf system composed of a dual fiber turf and a sand/sbr infill system as per Specification Sections 32 18 23.01 and 32 18 23.02, Artificial Turf Fields (Senior and Junior). This system requires the level of maintenance described above. Other systems could require more maintenance should a different infill system be utilized. For example, a system that includes a high level of sand infill and a lower density of artificial turf may need to be groomed every 50-60 hours of programmed usage. In addition to regular basic grooming a deep Grooming of an artificial turf field should be contracted out to a company that specializes in this work and has the appropriate equipment and knowledge to complete the task.

Maintenance Costs Per Year				
In House Staff				
Basic Grooming	Frequency	Visits	Cost/Visit	Subtotal
	Bi-weekly	18	$360.00	$6,480.00
Deep Grooming (Contracted)	Every 6 Months	2	$3,500.00	$7,000.00
			Total	**$13,480.00**

Maintenance Costs Per Year				
Contracted				
Basic Grooming	Frequency	Visits	Cost/Visit	Subtotal
	Bi-weekly	18	$600.00	$10,800.00
Deep Grooming	Every 6 Months	2	$3,500.00	$7,000.00
			Total	**$17,800.00**

*Cost for In-House staff grooming includes 4 hours of staff time on site, plus 2 hours of travel time at a rate of $60/hr. Cost does not include the cost of the equipment or fuel.

4.2.3 Artificial Turf Maintenance Logs

In order to maintain the warranty for the artificial turf field, suppliers and manufacturers required a comprehensive maintenance record for all of the maintenance performed on the field. A sample maintenance log is available in Appendix 'E'.

4.3 Sport Field Partnership Opportunities

4.3.1 Municipal Partnerships

This concept works well for both parties and the cost splitting allows for budgets to go further, and more facilities being offered to students and local user groups. Generally the Board will utilize the field during non-prime time hours, with the prime time hours in the evening and weekends open for Municipal use. Cost splitting and time splitting of the sport field and amenities works well for both partners. It provides a lower cost facility to the Board and space and a revenue opportunity for the Municipality.

4.3.2 Private/Entrepreneurial Partnerships

In a number of cases, private businesses have funded the installation of an artificial turf field at a school location. This partnership would include a long term (20 year) shared usage agreement. In most cases, the private entrepreneur will fund the field, lights and general amenities and the School Board would fund other amenities such as a synthetic running track. The private business would then maintain and run the field during off school hours and benefit from the revenue stream created from programming and rentals.

4.3.3 Sport Organizations/Clubs/Academies Partnerships

There are numerouis examples where a partnership can be developed with sports clubs and training academies. Quite often this has been local soccer clubs either partially funding the development or providing a long-term usage/rental agreement with the School Board to provide the required funding.

4.3.4 Revenue Opportunities for the Board

Should the Board self-fund the capital costs of a facility there is an opportunity to create revenue during prime-time periods from April through November. There are three distinct usage seasons that would see various hours of usage. Typically Spring and Fall will see less usage with soccer and football respectively renting the facilities. The summer would be a combination of soccer, football, camps, and various other users for training or summer camp use. The seasons can be categorized as follows:

1. Spring – April 1st to May 15th
2. Summer – May 15th to September 15th
3. Fall – September 15th to November 30th

The installation of lighting would facilitate evening rentals and could expand the revenue opportunities for the Board, especially during the Spring, Late Summer, and Fall seasons when sunset occurs earlier.

Rental rates vary by geographic location and by demand. The Board should take in the following considerations when determining the feasibility of rentals.

1. Municipalities and School Boards that have minimal number of available fields and a high number of users will charge more per hour for field usage.

2. Rates vary with the addition of sports field lighting.

3. Sports fields are often split into mini fields to reduce rental costs for junior programming.

4. Rental opportunities include Not for Profit organizations, for profit sports groups, municipal contracting and one-off events such as business group outing/game.

The following are general rental rates for artificial turf fields:

1. Rental prices range from $100.00 to $181.00 per hour for full size fields depending on weekday verses weekend and also on sports field lighting usage.

2. Mini Fields range from $30.00 per hour to $85.00 per hour depending on the geographic locations

3. Shared field/Quarter field/Third field costs are usually $45.00-$65.00 per hour per quarter/third. This would require side field markings on the field. In some cases, netting systems are added to separate the fields during usage.

The following are specific rental rates for full sized field for various Owner's:

1. Toronto District School Board $148 to $181/hr dependent upon lighting
2. City of Oshawa full field $114/hr
3. Halton Catholic School Board full field $85 to $155/hr dependent upon season and lighting
4. City of Waterloo full field $100/hr
5. City of Hamilton full field $135/hr

Artificial Turf Field Possible Utilization			
Spring – April 1st to May 15th			
	Total Hours	Hourly rate	Total
Full field non lit weekday evenings (2hrs/day)	60	$125	$7,500.00
Full field lit weekday evenings (1hrs/day)	30	$155	$4,650.00
Full field non lit weekends (4hrs/day)	48	$125	$6,000.00
Full fields lit weekend (1hr/day)	12	$155	$1,860.00
		Total Spring	**$20,010.00**
Summer – May 15th to September 15th			
Full field non lit weekday evenings (3hrs/day)	240	$145	$34,800.00
Full field lit weekday evenings (1hrs/day)	80	$175	$14,000.00
Full field non lit weekends (5hrs/day)	160	$145	$23,200.00
Full fields lit weekend (1hr/day)	32	$175	$5,600.00
		Total Summer	**$77,600.00**

Fall – September 15th to November 30th			
Full field non lit weekday evenings (1-0hrs/day)*	10	$125	$1,250.00
Full field lit weekday evenings (2-3hrs/day)	80	$155	$12,400.00
Full field non lit weekends (3hrs/day)	72	$125	$9,000.00
Full fields lit weekend (1hr/day)	12	$155	$1,860.00
		Total Fall	**$24,510.00**

Summary	
Total Spring	$20,010.00
Total Summer	$77,600.00
Total Fall	$24,510.00
Yearly Total	**$122,120.00**

*Fall non-lit weekday and weekend evenings for September assumes there is only 1hr non-lit hour available

*Hours assume operation from 6:00pm to 10:00pm and full capacity programming

*Hourly rates shown are proposed. Discounted rates have been shown for Spring and Fall programming. The Board shall determine the appropriate hourly rates through a complete financial analysis. Rates shown are based upon general rates within Toronto, specifically the TDSB facilities.

*This is a representative example of possible programming and revenue. The Board shall explore rental opportunities to determine actual available rentals and usage hours in conjunction with rates.

*These tables should be viewed in conjunction with operating and maintenance costs.

*Lit field usage is based upon 2023 sunset times as provided by Environment Canada:

1. April 7:44 to 8:18pm
2. May 8:19 to 8:51pm
3. June 8:52 to 9:02pm
4. July 9:02 to 8:41pm
5. August 8:40 to 7:51pm
6. September 7:53 to 7:00pm
7. October 6:58 to 6:09pm
8. November 6:08 to 4:42pm

5.0 DESIGN CASE STUDIES

5.1 Design Case Study #1 – St. Ambrose Catholic Elementary School

Case Study #1 – St. Ambrose Catholic School

5.1.1 Site Background

Site Address:	20 Coules Court - Etobicoke		
School Type:	Elementary	**School Population**	459
Ward:	2	**Field Size:**	1,050 sq.m.
Permitted:	No	**Sq.m. Per Student:**	2.29
Irrigated:	No	**Condition:**	Poor
Lighting:	No	**Comments:**	
Subdrainage:	Yes	Little to no grass over entire area	
Sport Furnishings:	Four fixed soccer goals	Heavily compacted	
Primary Use:	Soccer	Has been reconstructed twice in 7 years	
Secondary Use:	Play field		

The site is bound to the north by and west by residential properties, to the east by St. Ambrose Catholic Church, and to the south by Coules Court. The location of the sport field is in the northwest corner of the site. Immediately east and south of the field is an asphalt playground, and the field is surrounded by an asphalt track.

The stormwater management of the site is characterized by the following:

1. The site primarily drains to three existing catch basins located on the west and east side of the grass field, and southeast of the grass field in the asphalt play area. Overland flow arrows are indicated on Existing Conditions drawing EX-1 at the end of this section.

2. The grass field is currently crowned down the centerline and the drainage splits toward the west and east catch basins.

3. There are isolated low areas on the field with potential for ponding during the shoulder seasons and rain events.

The orientation of the main play field is north to south, which exhibits the best orientation for sun angles. There are two cross fields on the site that are oriented east to west.

5.1.2 Design Approach and Rational

The field is in poor condition, which can be contributed to the heavy use of the site and the small amount of square meters per student available (2.29sq.m./student). It is understood that the field has been reconstructed twice within the last seven years. It is anticipated that overseeding of the field has not been successful, and the establishment of new grass is not successful as the field is heavily used during the ideal growing seasons for new seed ie: Fall and Spring.

To provide the students with a safe and useable facility it is recommended that the site be converted to an artificial turf surface with redevelopment of the asphalt walking track. An artificial turf facility will provide the students with a safe and clean facility that will eliminate poor field conditions, especially in the late fall and early spring when there is a higher occurrence of inclement weather. A Conceptual Plan of the renovated facility is available on drawing CP-1 at the end of this section.

The construction of the artificial turf field will require the sub excavation of the existing field to install a granular drainage layer, subsurface drainage pipes, and connection to the existing catch basin located in the southeast.

The existing catch basins to the west and east of the field can be removed. Overland flow across the track and asphalt area will be captured by the field drainage system and conveyed subsurface to the southeast catch basin.

The construction of the field will result in considerable disturbance to the existing walking track. To facilitate the proposed grades, it is recommended that the track be replace with a new granular base and asphalt surface. A Functional Grading Plan is available on drawing C-100 at the end of this section.

5.1.3 Schematic Design Plans

The following schematic drawings have been prepared for the facility and are available at the end of this section.

Drawing CP-1 Concept Plan
Drawing EX-1 Existing Conditions Plan
Drawing C-100 Functional Grading and Servicing Plan

5.1.4 Implementation Costs

It is anticipated that the cost for the redevelopment of the facility to industry standards is $266,035.00. This value include a 10% construction contingency. A detailed breakdown is provided below.

Part 1	Site Preparation				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
1.1	Mobilization/Demobilization	LS	1.0	$7,500.00	$7,500.00
1.2	1800mm height construction fencing	lm	150.0	$15.00	$2,250.00
1.3	Demolition and removals	LS	1.0	$15,000.00	$15,000.00
1.4	Rough grading including cut/fill	LS	1.0	$10,000.00	$10,000.00
				Part 1 Subtotal:	**$34,750.00**

Part 2	Site Improvements				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
2.1	Drainage system including laterals, headers, and filter cloth	LS	1.0	$50,000.00	$50,000.00
2.2	Granular base drainage system	cu.m.	241.0	$70.00	$16,870.00
2.3	Concrete turf anchor	lm	113.0	$100.00	$11,300.00
2.4	Artificial turf including infill and shockpad	sq.m.	964.0	$90.00	$86,760.00
2.5	Portable Jr. soccer nets	ea	4.0	$3,500.00	$14,000.00
2.6	Asphalt running/walking track	sq.m.	394.0	$55.00	$21,670.00
2.7	Running track line painting	LS	1.0	$1,500.00	$1,500.00
				Part 2 Subtotal:	**$202,100.00**

Part 3	Allowances				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
3.1	Geotechnical testing	LS	1.0	$5,000.00	$5,000.00
				Part 3 Subtotal	**$5,000.00**

Budget Summary			
Part 1	Site Preparation	Subtotal:	$34,750.00
Part 2	Site Improvements	Subtotal:	$202,100.00
Part 3	Allowances	Subtotal:	$5,000.00
		Subtotal All Parts:	**$241,850.00**
		Contingency (10%):	**$24,185.00**
		Total:	**$266,035.00**

5.2 Design Case Study #2 – Holy Cross Catholic Elementary School

5.2.1 Site Background

Site Address:	299a Donlands Avenue – East York		
School Type:	Elementary	**School Population**	350
Ward:	11	**Field Size:**	2,705 sq.m.
Permitted:	No	**Sq.m. Per Student:**	7.73 sq.m/student
Irrigated:	Yes	**Condition:**	Poor
Lighting:	No	**Comments:**	
Subdrainage:	Yes	Limited grass – very barren	
Sport Furnishings:	Two Small Soccer Removable Goals	Sheet drain to asphalt	
Primary Use:	Multi-Use		
Secondary Use:	Play Area		

The site is bound to the west by Donlands Avenue and to the east by Lesmount Avenue. To the north is Holy Cross Church and to the south is the Holy Cross Catholic Elementary school. The field is contained by a galvanized 1.8m to 3.6m high galvanized chain link fence on the east, west and north boundaries. Immediately south of the field is a 1.2m high galvanized chain link fence, asphalt play area and the school building.

The stormwater management of the site is characterized by the following:

1. The site primarily drains from the north boundary line to the south edge of the field. From the asphalt it drains north to a shallow swale along the south edge of the field that is intended to outlet to the east. Overland flow arrows are indicated on Existing Conditions drawing EX-1 at the end of this section.

2. The grass field is currently a single slope from the north to south. There is about 0.5m fall across 36m resulting in an average slope or 1.4%.

3. There are isolated low areas in the field along the south side where the field and asphalt area drain to that are limiting positive flow and allowing for ponding during the shoulder seasons and rain events.

The orientation of the play field is east to west, which is a less preferred orientation due to sun angles disrupting play as it rises and sets low in the sky behind the goal areas. As a small field mostly used during school hours this is less impactful on playability than what would be for a larger field permitted in the evenings after school.

5.2.2 Design Approach and Rational

The existing field is in poor condition, which can be contributed to the heavy use of the site and the small amount of square meters per student available (7.75 sq.m./student). It is understood that efforts have been made to revitalize the field including reseeding in 2017, however this did not make significant improvements. This is likely due to the fields heavy use during the idea growing seasons, Fall and Spring.

It is recommended that the existing field be redeveloped with a synthetic turf surface to support the schools field programs. A synthetic turf surface will provide a safe and clean facility for student and community use especially during the shoulder seasons, Spring and Fall, when school is actively using the space.

Additionally, to support the schools active engagement in track events, there is a proposed 150m four lane track around the field. The track includes a 50m straight away and a long jump pit that can use the outside track lane as a run up. The attached concept plan, CP-1, illustrates this revitalized facility at the end of this section.

The construction of the artificial turf field will require the sub excavation of the existing field to install a granular drainage layer, subsurface drainage pipes, and connection to the existing manhole located to the east of the field.

Overland flow across the track and asphalt area will be captured by the field drainage system and conveyed subsurface to the existing manhole. The synthetic turf field will help significantly with drainage as it is more free draining than a natural turf field. Along the south side of the field between the track and existing asphalt play area is a proposed natural turf drainage tile to improve drainage of the natural turf outside of the field area. This subdrain tile will connect with the drainage system under the field to convey stormwater to the sewer system. A Functional Grading Plan is available on drawing C-100 at the end of this section.

5.2.3 Schematic Design Plans

The following schematic drawings have been prepared for the facility and are available at the end of this section.

Drawing CP-1 Concept Plan
Drawing EX-1 Existing Conditions Plan
Drawing C-100 Functional Grading and Servicing Plan

5.2.4 Implementation Costs

It is anticipated that the cost for the redevelopment of the facility to industry standards is $305,519.50. This value include a 10% construction contingency. A detailed breakdown is provided below.

Part 1	**Site Preparation**				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
1.1	Mobilization/Demobilization	LS	1.0	$7,500.00	$7,500.00
1.2	1800mm height construction fencing	lm	60.0	$15.00	$900.00
1.3	Rough grading including cut/fill	LS	1.0	$10,000.00	$10,000.00
				Part 1 Subtotal:	**$18,400.00**

Part 2	**Site Improvements**				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
2.1	Drainage system including laterals, headers, and filter cloth	LS	1.0	$50,000.00	$50,000.00
2.2	Granular base drainage system	cu.m.	335.0	$70.00	$23,450.00
2.3	Concrete turf anchor	lm	150.0	$100.00	$15,000.00
2.4	Artificial turf including infill (no shockpad)	sq.m.	1,340.0	$60.00	$120,600.00
2.5	Portable Jr. soccer nets	ea	2.0	$3,500.00	$7,000.00
2.6	Asphalt running/walking track	sq.m.	669.0	$55.00	$36,795.00
2.7	Running track line painting	LS	1.0	$1,500.00	$1,500.00
				Part 2 Subtotal:	**$254,345.00**

Part 3	**Allowances**				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
3.1	Geotechnical testing	LS	1.0	$5,000.00	$5,000.00
				Part 3 Subtotal	**$5,000.00**

Budget Summary			
Part 1	Site Preparation	Subtotal:	$18,400.00
Part 2	Site Improvements	Subtotal:	$254,345.00
Part 3	Allowances	Subtotal:	$5,000.00
		Subtotal All Parts:	**$277,745.00**
		Contingency (10%):	**$27,745.010**
		Total:	**$305,519.50**

5.3 Design Case Study #3 – Madonna Catholic Elementary School

5.3.1 Site Background

Site Address:	20 Dubray Avenue – North York		
School Type:	Elementary	**School Population**	632
Ward:	4	**Field Size:**	3,745 sq.m.
Permitted:	No	**Sq.m. Per Student:**	5.93 sq.m/student
Irrigated:	No	**Condition:**	Good
Lighting:	No	**Comments:**	
Subdrainage:	No		
Sport Furnishings:	N/A		
Primary Use:	Play Area		
Secondary Use:	Multi-Use		

The site is bound to the west by Dubray Avenue to the west, Wilson Avenue to the south, the school building and parking lot to the north and a neighbouring cemetery to the east. The existing play field is an 'L' shaped space. The field area slopes from west to east and north to south. Mature trees line the south and west property lines. A future multi-use trail corridor is planned to follow the east property line and is assumed to be a corridor 6.0m wide to support a 3.0m wide paved trail that connects Wilson Avenue with the community to the north of the school.

The stormwater management of the site is characterized by the following:

1. The site currently drains from the parking lot and driveway to the field area. From the parking lot there is an existing swale that it enters which directs flow around the top of the existing field area to the east property line. The driveway sheet flows to the field area which drains to the southeast corner of the property.

2. The grass field is currently a single slope from the northwest to southeast. There is about 0.8m fall across 49m resulting in an average slope or 1.6%.

3. The existing swale that directs flow from the parking lot does not have a consistent slope to drain. About halfway there is a low point that ponds water.

The existing field is a larger irregular space and is currently in good condition. There are no obvious wear areas in the existing turf, and this is likely because there are not existing fixed sports goals or equipment. The space is primarily used as an open space for free play.

5.3.2 Design Approach and Rational

The 'L' shaped space of the existing field offers an opportunity to implement a north-south orientated youth soccer field while retaining an unprogrammed free play area to the west. This will provide opportunities for both structured and unstructured play.

While the existing field is in good conditions is recommended that the proposed north-south soccer field be regraded, and tile drains added to support better turf drainage. It is also recommended that the existing north swale directing water from the parking lot is re-graded to support positive drainage at a minimum 2.0% slope and realigned to expand the sport field area.

Portable soccer goals are recommended to be able to move the goals around the field area. This helps to avoid wear areas in the natural turf that typically develop from heavy compaction at the goal areas when fixed goals are installed.

The construction of the natural turf field will require pulverizing the existing turf, installing subsurface drainage tiles, re-grading the field area into a single planed surface, and sodding. Subsurface drain tiles will help maintain the playability of the field and turf growth. A Functional Grading Plan is available on drawing C-100 at the end of this section.

5.3.3 Schematic Design Plans

The following schematic drawings have been prepared for the facility and are available at the end of this section.

Drawing CP-1 Concept Plan
Drawing EX-1 Existing Conditions Plan
Drawing C-100 Functional Grading and Servicing Plan

5.3.4 Implementation Costs

It is anticipated that the cost for the redevelopment of the facility to industry standards is $117,381.00 This value include a 10% construction contingency. A detailed breakdown is provided below.

Part 1	**Site Preparation**				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
1.1	Mobilization/Demobilization	LS	1.0	$7,500.00	$7,500.00
1.2	1800mm height construction fencing	lm	110.0	$15.00	$1,650.00
1.3	Rough grading including cut/fill	LS	1.0	$10,000.00	$10,000.00
			Part 1	**Subtotal:**	**$19,150.00**

Part 2	**Site Improvements**				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
2.1	Drainage system including laterals, headers, and filter cloth	LS	1.0	$50,000.00	$50,000.00
2.2	Fine grading natural turf field	sq.m.	1,512.0	$5.00	$7,560.00
2.3	Sodding natural turf field and swale	sq.m.	1,800.0	$10.00	$18,000.00
2.4	Portable Jr. soccer nets	ea.	2.0	$3,500.00	$7,000.00
			Part 2	**Subtotal:**	**$82,560.00**

Part 3	**Allowances**				
Item	**Description**	**Unit**	**Qty**	**Unit Rate**	**Total**
3.1	Geotechnical testing	LS	1.0	$5,000.00	$5,000.00
				Part 3 Subtotal	**$5,000.00**

Budget Summary			
Part 1	Site Preparation	Subtotal:	$19,150.00
Part 2	Site Improvements	Subtotal:	$82,565.00
Part 3	Allowances	Subtotal:	$5,000.00
		Subtotal All Parts:	**$106,710.00**
		Contingency (10%):	**$10,671.00**
		Total:	**$117,381.00**